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Ursu, Ana

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MARIN ANCUȚA, *PhD., Research Institute for Agriculture Economy and Rural Development, Bucharest*

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SECTION 1

CONCEPTS, EVALUATIONS AND VISIONS ON THE DYNAMICS OF RURAL SOCIO-ECONOMY

METHOD AND PROGRAM FOR AUTOCORRELATION DISTRIBUTION ON INFLUENCE FACTORS

EMILIAN MERCE[1], MANEA DRĂGHICI[2], MIHAI BERCA[3], CRISTIAN C. MERCE[4], RALUCA-ALEXANDRA NECULA[5]

Summary: *The authors point out that autocorrelation is an accidental statistical phenomenon. The cause of the occurrence of collinearity is the incomplete data base and that ideally, the elimination of the occurrence of autocorrelation is achieved by knowing the effect stage for all possible combinations of the variants of the factors involved. In many cases, the practical realization of such a desideratum is impossible. Such a difficulty is especially specific to statistical processing in the economic, social and psychological field. Neither multi-factorial experiments of agrobiological nature are not avoided by such difficulties. Consequently, to the researcher remain at his disposal methods of distributing collinearity on influence factors using methods based on the calculation of partial correlation coefficients (Merce E., 1986; Moineagu C., 1974). With obvious computing facilities, compared to the evoked methods, the authors suggest using an original method based on the principle of proportional distribution of autocorrelation with the proportion of simple determinations, following the next six steps, the last four are solved instantly after the first two steps have been solved:*

1. The calculation of the multiple correlation coefficient and simple correlation coefficients using the Regression function of the Data Analysis component of Microsoft Excel Program;
2. The recording of the multiple correlation coefficient and of the simple correlation coefficients;
3. The simple determination coefficients and the multiple determination coefficient calculation;
4. The sum of the simple determination coefficients;
5. The calculation of the simple determinations proportions, considering their sum equal to 100;
6. The determination of each factor influence, as a product of multiple determination and the proportion of simple determinations.

Keywords: *autocorrelation, distribution of autocorrelation by factors, method and program*

JEL Classification: *C40*

INTRODUCTION

Collinearity is an objective reality in research of complex causal relationships. It is exteriorized, as illustrated in the literature [5; 6; 7; 10], whenever the causality complex database is incomplete. The presence of collinearity alters the accuracy of numerical determinations between factors, on the one hand, and the effect studied, on the other.

The ideal solution would be to use complete databases. However, this desideratum cannot be always achieved practically because of the complexity of the investigated causal relationships. Here, the research from economics, sociology, psychology, as well as the multi-factorial agrobiological experiments can be nominated. In all these situations, the researcher must assess the collinearity numerically and then proceed to correct the relationship between the factors studied and the effect. In order to achieve this goal, the old working methods [1; 8; 9] based on the calculation of the partial correlation coefficients can be used. The use of these methods is, however, rather cumbersome, requiring separate calculations to be made on a case-by-case basis.

MATERIAL AND METHOD

Whenever the magnitude of the causal complex makes it impossible to organize experiences that include all the possible combinations of the variants of the investigated factors, the

[1] Professor PhD., USAMV Cluj-Napoca, emerce@usamvcluj.ro
[2] Professor PhD., USAMV Bucharest, dmprofesor@hotmail.com
[3] Professor PhD., USAMV Bucharest, prof.mihai.berca@gmail.com
[4] Assistant Professor Ph.D., USAMV Cluj Napoca, merceccristian@hotmail.com
[5] Lecturer Ph.D., USAMV Bucharest; PhD Student at Academy of Economic Studies Bucharest, raluca_nec@yahoo.com

phenomenon of autocorrelation appears. To illustrate the content of the method, we assume an experimental plan with three factors, each factor with 5 variants. That is: N (X_1) [0; 50; 100; 150; 200]; P (X_2) [0; 40; 80; 120; 160] and K (X_3) [0; 30; 60; 90; 120]. In this case, a complete experimental plan would include 125 variants in two or three rehearsals. Such an experimental plan is very difficult or even impossible to organize, to control and to complete. To illustrate the content of the proposed method, it was accepted that the experimental plan was a simplified one and contained only 60 combinations of the 125 possible (conventional data).

Table 1. Correspondence between the level of factors allocated and the average production per hectare

X_1	X_2	X_3	Y	X_1	X_2	X_3	Y	X_1	X_2	X_3	Y
0	0	0	4600	150	120	30	8490	100	40	90	7259
0	40	0	4945	150	160	30	8474	100	80	90	9039
50	40	0	5980	200	120	30	8614	100	120	90	9200
50	80	0	5865	200	160	30	8469	150	80	90	9313
100	40	0	6095	0	0	60	5217	150	120	90	9450
100	80	0	7590	0	40	60	5609	150	160	90	9432
100	120	0	7725	50	40	60	6783	200	120	90	9587
150	80	0	7820	50	80	60	6652	200	160	90	9426
150	120	0	7935	100	40	60	6913	0	0	120	5697
150	160	0	7920	100	80	60	8609	0	40	120	6125
200	120	0	8050	100	120	60	8762	50	40	120	7407
200	160	0	7915	150	80	60	8869	50	80	120	7264
0	0	30	4922	150	120	60	9000	100	40	120	7549
0	40	30	5291	150	160	60	8983	100	80	120	9401
50	40	30	6399	200	120	60	9130	100	120	120	9568
50	80	30	6276	200	160	60	8977	150	80	120	9685
100	40	30	6522	0	0	90	5478	150	120	120	9828
100	80	30	8121	0	40	90	5889	150	160	120	9809
100	120	30	8266	50	40	90	7122	200	120	120	9970
150	80	30	8367	50	80	90	6985	200	160	120	9803

In order to process such an incomplete database, compared to the total number of possible combinations, the literature has validated several methods, which offer the possibility of identifying collinearity and its distribution by factors. Each method is based on a certain hypothesis, the differences in the operability of the calculations may be substantial. The method proposed by the authors has as a working hypothesis the distribution of the total autocorrelation, respectively the sum of the squares of the deviations (SPA), on the factors of production, according to the principle of proportionality with the coefficients of simple correlation, using the distribution coefficient.

The method involves, in the case of three factors, the drawing up of a table (Table 2) comprising:

- Calculation of simple linear equations for each factor (Yx_1; Yx_2; Yx_3) and multiple equation ($Y.x_1x_2x_3$),which was performed with Regression Function, Data => Analysis;
- Passing in the Table the SPA, by regression, for each factor ($SPAX_1$ = 96151981; $SPAX_2$ = 85432839; $SPAX_3$ = 20253550, $SPAX_1X_2X_3$ = 120636154 and SPAtotal = 136126417);
- For the statistical highlighting of autocorrelation, the Dubrin-Watson test for each factor was calculated: DWX_1 = 0.689; DWX_2 = 0.543; DWX_3 = 0.365. DWtheoretical (k = 1; n = 60 is 1.184 and 2.03). It results the autocorrelation results for each factor (0 <DWcal <1.184) [10].
- The distribution of $SPAx_1x_2x_3$ = 120636154 on the three factors using the proportional distribution coefficient, in relation to the SPA sum, of the 3 factors;

Table 2. Linear equations, SPA and the calculation of the pure determination on each factor

	Linear equation	Simple SPA	Distribution coeff. of SPAx1x2x3	Assigned SPA	R2 (determination)	R2(%)	r (correlation coeff.)
X1	Yx1=5743.05+19.17x1	96151981	0.48	57468781	0.4222	42.22	0.650
X2	Yx2=5609.84+24.58x2	85432839	0.42	51062091	0.3751	37.51	0.612

X3	Yx3=6918.98+13.69x3	20253550	0.10	12105282	0.0889	8.89	0.298
Sum SPA (x1+x2+x3)		201838370	1.00				
x1.x2.x3	Yx1x1x3=4693.84+13.33 X1+9.65X2+13.69X3	120636154		120636154	0.8862	88.62	0.941
Rest		15490263		15490263	0.1138	11.38	
Total;		136126417		136126417	1.0000	100.00	1.000

- The calculation of the determinations (R^2) of each factor, according to the SPA, resulted from the distribution of $SPAX_1X_2X_3$, by reference to the total SPA;

- The percentage calculation of the determination for each factor, which is also referred to as pure determination. The correlation factors corresponding to the pure determination were also calculated.

From this calculation, the $YX_1X_2X_3$ multiple regression equation explained 88.62% of factor and production relationship. Factors influenced as follows: X_1 (N) = 42.22%; X_2 (P) = 37.51%; X_3 (K) = 8.89%. Compared to 100% total influence, it remains an unexplained 11.38% rest.

In order to increase the speed of the calculation method of the autocorrelation distribution while preserving the principle of distribution, we suggest a method of calculation starting from the simple correlation coefficients. Practically, it starts from the individualization of the correlation coefficients of each factor, calculated using the features offered by Microsoft Excel as a spreadsheet work program. The calculation method, of course, assures the calculation of the pure determination of each factor by simply deciding the multiplication correlation coefficient and the coefficients of the simple correlation respectively.

RESULTS AND DISCUSSIONS

The distribution of autocorrelation on factors of influence implies the preliminary determination of the multiple correlation coefficient and of the simple correlation coefficients in the hypothesis of a certain theoretical regression model. Given the nature of the database presented in Table 1, a three-factorial linear model, a second-order tri-factorial model and a linear tri-factorial model were used to express the causal relationship between the three factors and the average production, with the combined influence of factors.

All calculations were performed using the Regression and Correlation functions of the Data =>

Analysis component of Microsoft Excel.

Through these calculations, we exemplify by calculating the pure determination for a trifactorial experience that is modeled by a linear equation, a second degree equation and a linear equation with the combined effect of factors.

The following concrete situations resulted:

A. Calculation of the pure determination in the linear tri-factorial model:

- It is calculated with the Regression function of the Data => Analysis component, the multiple equation: $Y_{(X1.X2.X3)} = 4693.8+13.334X_1+9.648X_2+13.694X_3$ and the multiple correlation coefficient ry.x1x2x3=0.94139;

- It is calculated with Correlation Function in Data => Analysis, the simple correlation coefficients: $r_{Y.X_1}$=0.84044; $r_{Y.X_2}$=0.79221 ; $r_{Y.X_3}$=0.38573;

- For the statistical highlighting of autocorrelation, the Dubrin-Watson test for each factor was calculated: DWX_1 = 0.689; DWX_2 = 0.543; DWX_3 = 0.365. DWtheoretical (k = 1; n = 60 is 1.184 and 2.03). It results positive autocorrelation for each factor (0 <DWcal <1.184) [10].

- By registering the coefficient of the multiple correlation and the coefficients of the simple correlation in the centralizing table (Table 3), the calculation steps are taken of the pure determination by factors, which leads to the individualization of the influence of each factor, and which are highlighted in the table as pure determination on factors.

Table 3. The case of a linear multifactorial model

Correlation and determination		Correlation coefficients	Determination coefficients	The simple determination proportion	The pure determination on factors
The sum of simple determination		*	148.27	100.00	*
Simple correlation	X_1	0.84044	70.63	47.64	42.22
	X_2	0.79221	62.76	42.33	37.51
	X_3	0.38573	14.88	10.03	8.89
	X_4	0.0000	0.00	0.00	0.00
	X_5	0.0000	0.00	0.00	0.00
Multiple ($X_1.X_2.X_3$)		0.9414	88.62	*	88.62

From the analysis of the data in Table 3, the linear regression equation Y (X1.X2.X3) shows that the influence explained by the three factors is by 88.62%. This is explained by the influence of factor X_1 (N) by 42.22%, the influence of factor X_2 (P) by 37.51% and factor X_3 (K) by 8.89%. There is an unexplained influence of 11.38%.

B. The pure determination calculation of the second degree tri-factorial model:

- It is calculated with the Regression function of the Data => Analysis component, the multiple equation:

$$Y_{(X1*X1.X1*X2.X2.X2,X3,X3*X3)} = 4001.96+25.18X_1 – 0.0609X_1*X_1+21.001X_2-0.0658X_2*X_2+17.11X_3- - 0.0284 X_3*X_3$$

and the multiple correlation coefficient $r_{y.x_1.x_1*x_1.x_2.x_2*x_2.x_3.x_3*x_3} = 0.94242$;

- It is calculated with the Correlation function in the Data => Analysis component, the simple correlation coefficients (Table 4);

Tabelul 4. The simple correlation coefficients calculation

	Y	*X_1*	*X_1*X_1*	*X_2*	*X_2*X_2*	*X_3*	*X_3*X_3*
Y	1						
X_1	0.840442	1					
X_1*X_1	0.733032	0.954316	1				
X_2	0.792212	0.823662	0.774358	1			
X_2*X_2	0.698539	0.76979	0.765195	0.96272	1		
X_3	0.385726	0	-1.3E-17	0	0	1	
X_3*X_3	0.361809	0	1.36E-17	0	0	0.958927	1

- For the statistical highlighting of autocorrelation, the Dubrin-Watson test for each factor was calculated: DWX_1=0.689; DWX_1*X_1=0.1229; DWX_2=0.543; DWX_2*X_2=0.1253; DWX_3=0.365; DWX_3*X_3=0.1802. DWtheoretical (k = 1; n = 60 is 1.184 and 2.03). It Results positive autocorrelation for each factor (0 <DWcal <1.184) [10].

- By registering the coefficient of multiple correlation, respectively the coefficients of simple correlation in the centralizing table (Table 5), the calculation steps are taken of the pure determination on factors, linear and quadratic, and finally leading to the individualization of the influence of each factor, are passed in the table as pure determination by factors.

Table 5. The case of a second degree multifactorial model

Correlation and determination		Correlation coefficients	Determination coeficients(%)	Proportion of simple determinations	Determination of factors by degree of equation	Pure determination on factors
Simple determination Sum		*	263.89	100.00	*	*
Simple correlation	X_1	0.84044	70.63	26.77	25.23	44.42
	X_1*X_1	0.73303	53.73	20.36	19.19	
	X_2	0.79221	62.76	23.78	22.41	39.84

	X_2*X_2	0.69854	48.80	18.49	17.43	
	X_3	0.38573	14.88	5.64	5.31	9.99
	X_3*X_3	0.36181	13.09	4.96	4.68	
	X_4	0.0000	0.00	0.00	0.00	0.00
	X_4*X_4	0.0000	0.00	0.00	0.00	
Multiple		0.9708	94.24	*	94.24	94.24

From the data analysis in Table 5, it follows that through the quadratic regression equation $Y_{(X1.X1*X1.X2.X2*X2.X3.X3*X3)}$, the influence explained by the three factors is 94.24%. This is explained by the influence of factor X_1 (N) by 44.42%, the influence of factor X_2 (P) by 39.84% and the influence of factor X_3 (K) by 9.99%. There is an unexplained influence of 5.76%.

C. The pure determination calculation in the linear tri-factorial model with the combined influence of the factors:

- It is calculated with the Regression function of the Data => Analysis component, the multiple equation:

$Y_{(X1.X2.X3.X1*X2.X1*X3.X2*X3)}$=4286.84+20.69$X_1$+20.864$X_2$+9.758$X_3$+0.114$X_1*X_2$+0.024$X_1*X_3$+ +0.017$X_2*X_3$ and $r_{Y(X1.X2.X3.X1*X2.X1*X3.X2*X3)}$= 0.9681;

- It is calculated with the Correlation function of Data => Analysis component, the simple correlation coefficients (Table 6);

Table 6. Calculation of simple correlation coefficients

	Y	*X1*	*X2*	*X3*	*x1x2*	*x1x3*	*x2x3*
Y	1						
X_1	0.84044	1					
X_2	0.79221	0.823662	1				
X_3	0.38573	0	0	1			
X_1*X_2	0.75991	0.91565	0.91795	0.00000	1		
X_1*X_3	0.79396	0.60357	0.49714	0.67347	0.553	1	
X_2*X_3	0.75114	0.46824	0.56848	0.71780	0.522	0.907336	1

- For the statistical highlighting of autocorrelation, the Dubrin-Watson test for each factor was calculated: DWX1=0.689; DWX2=0.543; DWX3=0.365; DWX1*X2= ; 0.1169; DWX1*X3=0.1314; DWX2*X3=0.1312. DWtheoretical (k = 1; n = 60 is 1.184 and 2.03). Resulting positive autocorrelation for each factor (0 <DWcal <1.184) [10].

- By registering the coefficient of the multiple correlation and the coefficients of the simple correlation in the centralizing table (Table 7), the calculation steps were taken of pure determination on factors, linear and the combined influence of the factors are completed, which ultimately leads to the individualization of the influence of each factor and influences combined, as well as the calculation of pure determination on factors.

Table 7. The case of a multifactorial linear model with the combined influence of the factors

Correlation and determination		Correlation coefficients	Determination coefficients (procentual)	Simple determination share	Determination of factors after the combination of factors	Pure determination on factors
Determination Sum		*	3.25477	100	*	*
Simple correlation	X_1	0.84044	0.70634	21.7	0.20	44.14
	X_2	0.79221	0.62760	19.3	0.18	39.03
	X_3	0.38573	0.14878	4.6	0.04	10.56
	X_1*X_2	0.75991	0.57746	17.7	0.17	
	X_1*X_3	0.79396	0.63037	19.4	0.18	
	X_2*X_3	0.75114	0.56421	17.3	0.16	
Multiple		0.96812	0.93725	x	0.937	93.73

From the analysis of the data in Table 7, it follows that by the quadratic regression equation $Y_{(X1.X1X1X2.X2X2X3.X3X3)}$, the influence explained by the three factors is 93.73%. This is explained by the influence of each factor (X_1(N)=0.20%; X_2(P)=0.18%; X_3(K)=0.04), and the combined influence of factors X_1 * X_2 (NP) factor X_1 * X_3 (NK) by 0.18% and X_2 * X_3 (PK) = 0.16%. This influence was also allocated to factors by the linear proportional method resulting that the influence of X_1 (N) = 44.14%; X_2 (P) = 39.03% and X_3 (K) = 10.56%. There is an unexpected influence of 6.27%.

CONCLUSIONS AND PROPOSALS

1. The working method aimes to calculate the pure influence of each factor investigated according to the principle of the proportionality of the autocorrelation in relation to the coefficients of the simple determination of the factors;

2. The first step in making the calculations is to calculate the multiple correlation coefficient and the simple correlation coefficients using the Regression and Correlation function of the Microsoft Excel Data Analysis component

3. By registering the multiple correlation coefficient, respectively the coefficients of simple correlation, the program automatically carries out successive steps of repartition of the autocorrelation according to the principle of proportionality;

4. To help the user understand how the calculations work, we show the steps that the program goes through instantly:

• Calculation of the simple determination coefficients and the multiple determination coefficient by reference to 100%;

• Sum of coefficients of simple determination;

• Percentage calculation of simple determinations, considering their sum equal to 100;

• Calculation of the influence of the investigated factors on the effect, by multiplying the simple determination of factors with multiple determinations.

5. We are aware that the extraordinary advances in computer science will allow, in the near future, calculating the pure dermination of factors, by various methods developed by mathematicians, through a single function of a program- product.

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THE ROMANIAN AGRI-FOOD TRADE, IN A PERMANENT DEFICIT? – AN ANALYSIS OF THE LAST TWO DECADES

GAVRILESCU CAMELIA[1]

Abstract: *Over the last three decades, the Romanian agri-food trade has shown a permanent deficit, starting with 1990 (since the resumption of imports) and until now, except for two years only. The paper analyses the evolution of the agri-food trade deficit in the main periods (transition, pre-accession, post-accession), its structure by geographical orientation and product groups, as well as the main influencing factors. The results highlight the product groups that have been the main contributors to the deficit all along these years and have remained over time the main import commodities (sugar, meat, vegetables, fruits), those that have passed from negative to positive balance (poultry meat, eggs), as well as those with permanent positive balance (cereals, oilseeds). The changes in the geographical directions of the trade flows through the penetration of new markets and the massive increase in exports have contributed significantly to the reduction of the deficit, but the unfavorable structure of exports (with an important share of low-processed products) relative to imports largely results in maintaining the agri-food trade deficit.*

Key words: *agri-food trade deficit, Romania, competitiveness, processed products*

JEL classification: *F14, Q17*

INTRODUCTION

Starting with 1990 (since the resumption of imports after the communist period) and until now, except for two years only, the Romanian agri-food trade has shown a permanent deficit.

The radical change of the agricultural land ownership regime and the privatization of the food industry were the main elements that led to the destructuring of the agri-food chains, and the restitution of the agricultural land to the former owners, although it represented a historic repair, had the effect of atomizing the farms with severe consequences on the productivity and efficiency of agricultural production, which was no longer able to cover the domestic demand. Changes in the food consumption model, manifested by the growing demand for various, better-quality agri-food products, which the national food industry could not provide, contributed significantly to the increase of imports. The accession to CEFTA in 1997 and to the EU ten years later contributed as well to the increase of the agri-food deficit by the entrance on the Romanian market of meat and processed food from the partner countries, far more competitive.

The present paper is analyzing the evolution of the Romanian agri-food trade balance, its positive and negative values, the main products contributing to the deficit and the geographical orientation of those flows.

MATERIAL AND METHODS

In the present paper, calculations were made using Eurostat data (HS classification, chapters 01 to 24) with 2 and 4 digits. The analysis concerned the Romanian general agri-food trade in terms of volume (quantities and values), and the flows between Romania and the EU, respectively between Romania and extra-EU countries, for the main product groups.

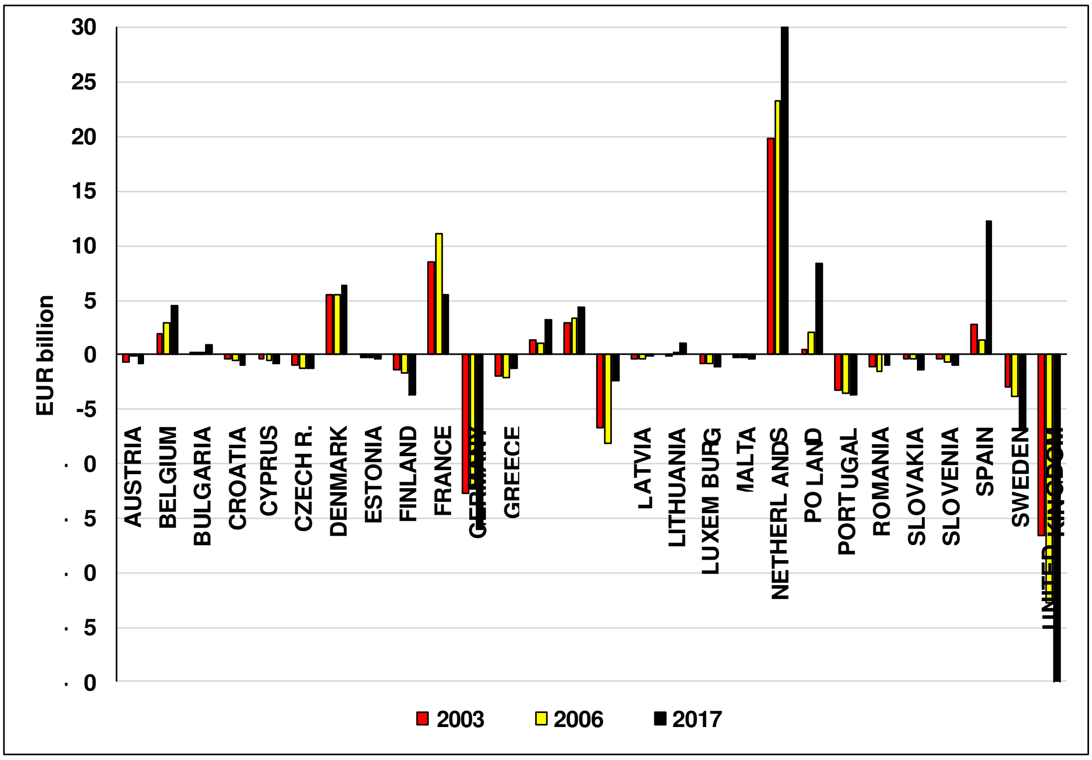
RESULTS AND DISCUSSIONS

In the last three decades, the EU ranked among the top three players on the international agri-food markets, and the last enlargements (2004, 2007, 2013) consolidated that position (EU Commission, 2016). The New Member States contributed in the positive sense by increasing the volume of the traded goods, and in the negative sense by adding their respective negative balances

[1] Dr. Camelia Gavrilescu, senior researcher, Institute of Agricultural Economics, Romanian Academy; email: cami_gavrilescu@yahoo.com

(Bojnec and Fertő, 2012; Gavrilescu and Voicilas, 2014). If one analyses the agri-food trade balance, only 10 countries show a surplus in the last decade: six old Member States (Netherlands, France, Denmark, Belgium, France, Ireland and Spain), and four new Member States (Poland, Hungary, Bulgaria and Lithuania) (figure 1).

Figure 1 – Agri-food trade balance in the 28 EU Member States



Source: calculations using Eurostat data (2018)

In the post-accession period, Romania showed the highest relative increase in the agri-food trade among the new Member States: in the decade since accession, the export value was 7.5 times higher and the import value was 3 times higher (2017/2006). Despite the different increasing pace, the agri-food trade balance remained negative (with a brief exception in 2013-2014).

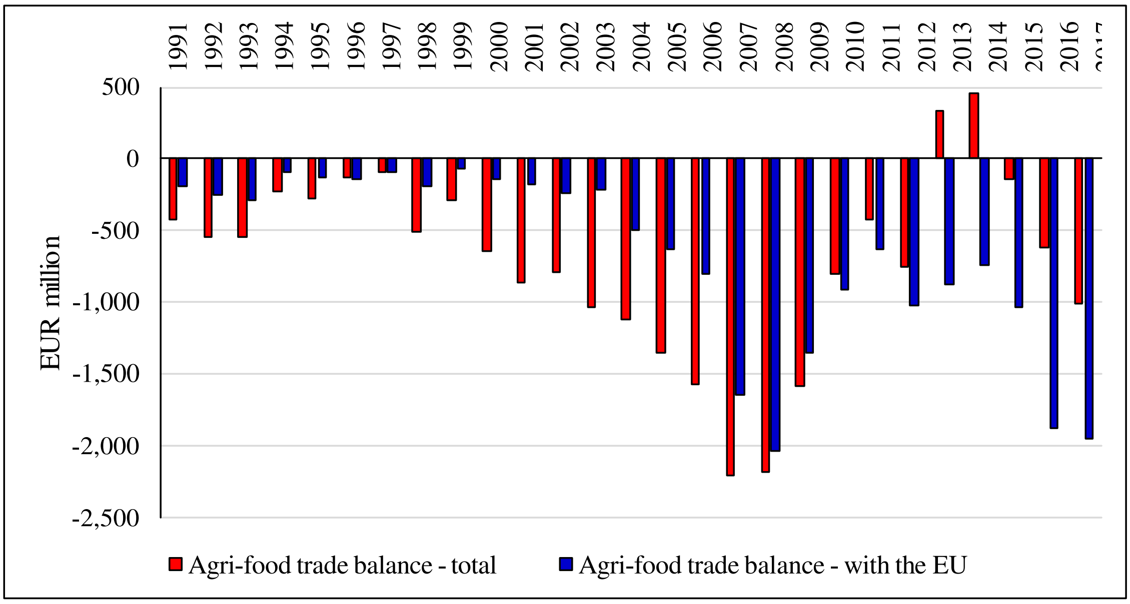
But the story of the negative agri-food trade balance is far older, that is since 1990. During the last part of the communist period, the agri-food trade balance has been positive, due to huge efforts for exporting agricultural and food products and severe restrictions on imports, at the expense of the domestic consumption. The agri-food sector contributed significantly to the reimbursement of the country' external debt.

The new political power liberalized the agri-food trade since early 1990. The massive disruption in the country's economy brought by the transition to the market economic model broke down the agri-food chains and decreased the exports. Imports were liberalized, and the trade balance became negative (figure 2). The dismantling of the COMECON (or CMEA - Council for Mutual Economic Assistance) in 1991 meant that the countries shifted their dealings with one another to a hard currency market basis, while the main partner – Russia continued to pay in its national currency. Consequently, Romania lost some important export markets which could not be replaced by Western markets due to the tough competition and their severe quality requirements.

The exports increased during the first years of transition (2.6 times between 1991 and 1996), but imports were 1.2 – 3.4 times higher than exports, thus the negative trade balance.

The deficit diminished subsequently due to the expansion of exports while imports remained almost the same in 1995-1997 (due to the enforcement of the new WTO regulations which allowed Romania – as a developing country – to raise significantly its import taxes).

Figure 2 – Romanian agri-food trade balance (1991-2017)



Source: calculations using Eurostat data

Joining CEFTA in 1997 meant lowering significantly the trade barriers and opening the Romanian markets to imports originating from Hungary and Poland, far more competitive than the domestic products, mostly in meat production. In 1997, the large industrial state-owned complexes for raising pigs and poultry were dismantled, and since then, the meat trade balance reversed from positive to negative.

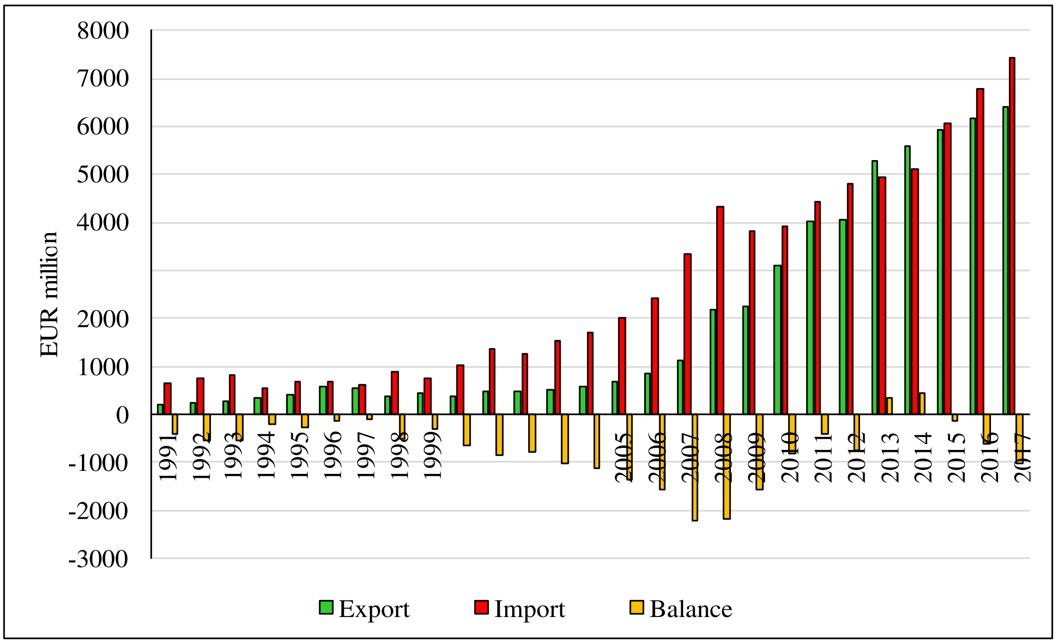
The pre-accession period was a period of economic growth, translated in an increase in domestic demand and changes in the food consumption model, manifested by the growing demand for various, better-quality agri-food products, which the national food industry could not provide, thus contributing significantly to the increase of imports at a very fast pace. Although exports increased as well, the pace was far slower; consequently, the agri-food trade deficit increased 5.4 times from 1999 (last year of economic recession) to 2006 (last year before accession).

Romania's accession to the EU meant free access of the Romanian agri-food products on the Single Market, which boosted exports (due to the removal of all export quotas and custom duties), but also free access of the EU products on the Romanian domestic market, rather unprepared for that kind of competition. As a result, the Romanian international agri-food trade increased significantly in the post-accession period: exports 7.5 times between 2006 and 2017 (to reach EUR 6.4 billion) and imports 3.1 times, to reach EUR 7.4 billion in 2017 (figure 3). The expansion of exports was favored as well by the devaluation of the national currency (by 27% against the EUR in 2007-2009, and by 33% against the US dollar in 2011-2016), as well as by the penetration of Romanian products (cereals, oilseeds and live sheep) on the Mediterranean and Middle East markets (Gavrilescu et al., 2017; Gavrilescu, 2018).

The agri-food trade balance has been permanently negative during both the transition and the pre-accession periods, at increasing values. The deficit deepened rapidly in 2007-2008, reaching the highest value ever (EUR -2.2 billion), a phenomenon familiar to many ex-communist New Member States in the early years of their membership (Fertő, 2008), except for Poland and Lithuania, which shifted from negative to positive agri-food trade balance immediately after accession.

In 2009 and 2010, the economic crisis was felt in Romania as well; imports decreased drastically as a consequence of a contracted demand due to the diminished population's incomes. Yet, the exports kept their upward trend; as a result, the agri-food trade deficit diminished sharply, to turn to surplus first time after 25 years (figure 3).

Figure 3 – Romanian agri-food trade (1991-2017)



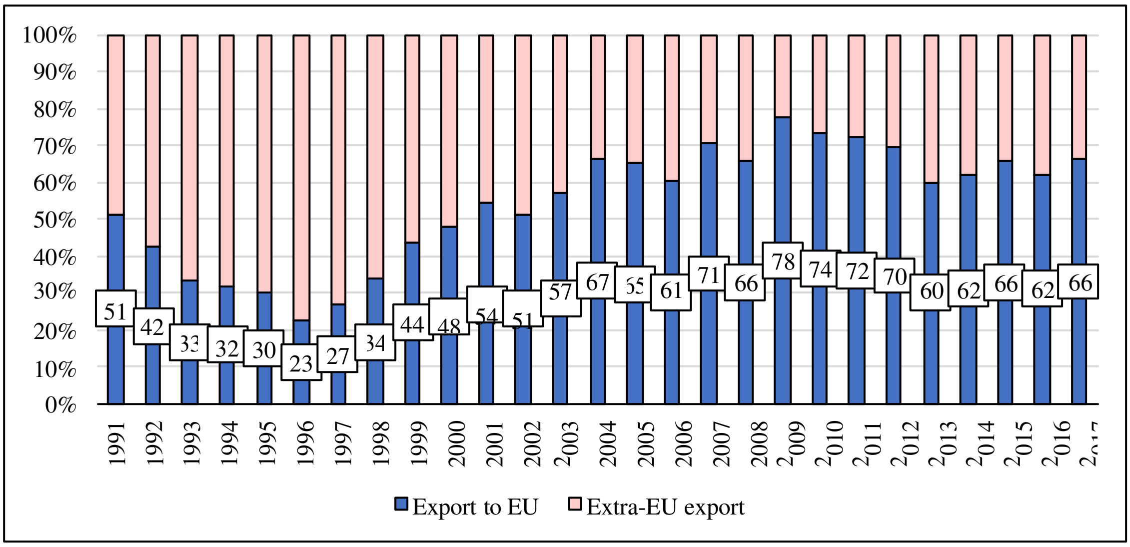
Source: calculations using Eurostat data

Unfortunately, it was able to stay so for only two years (2013-2014), and then the agri-food trade balance turned negative again, increasing sharply from EUR -137 million in 2015, to EUR -620 million in 2016 and up to EUR -1.017 billion in 2017.

The increase in both export and import values was mainly the consequence of a significantly higher volume of marketed products and, to a lesser extent, the consequence of price increase (Gavrilescu, 2018).

In the early transition period, most of the agri-food products were exported to non-EU destinations (as a continuation of the pre-transition period); after 2000, the share of EU increased to more than half, and went over 60% after the 2004 EU enlargement, which included most of the former CEFTA partners. Between 2007-2012, the EU share in exports was at its maximum, but decreased since 2013 when Romania penetrated massively on the Mediterranean and Middle-Eastern markets (figure 4).

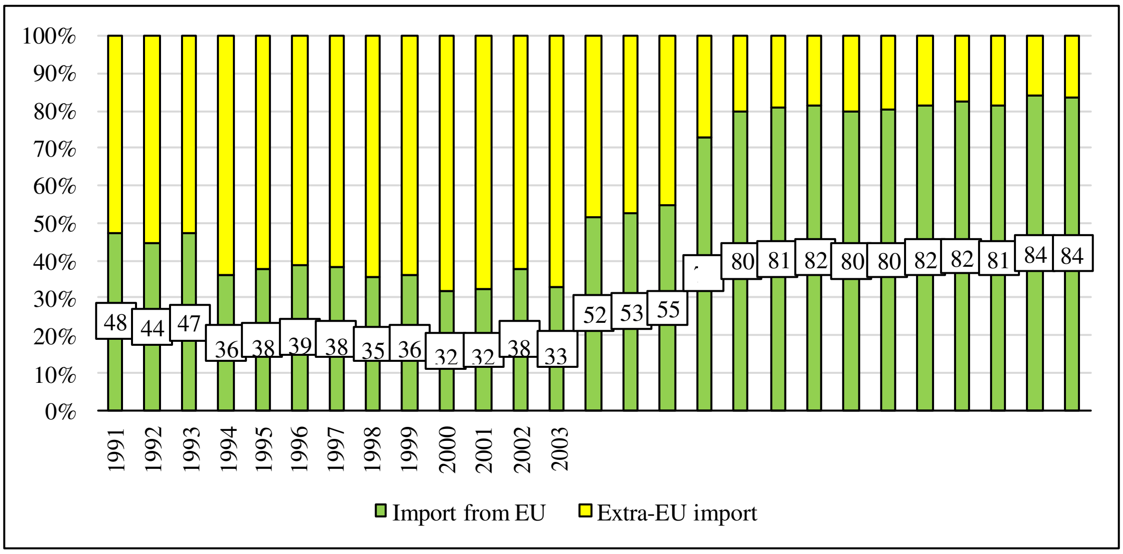
Figure 4 – The EU-orientation of the Romanian agri-food export (1991-2017)



Source: calculations using Eurostat data

After 1993, when several bilateral free trade agreements with non-EU countries (Moldova, Turkey, Israel, etc.) entered into force, the Romanian imports originated mainly from outside the EU; since 2004, the main ex-CEFTA partners joined the EU (Hungary, Poland, Czech Republic), thus the share of EU in the Romanian agri-food imports became more than half. EU accession in 2007 meant the enforcement of the community preference principle, thus boosting the EU share in imports over 80% (figure 5).

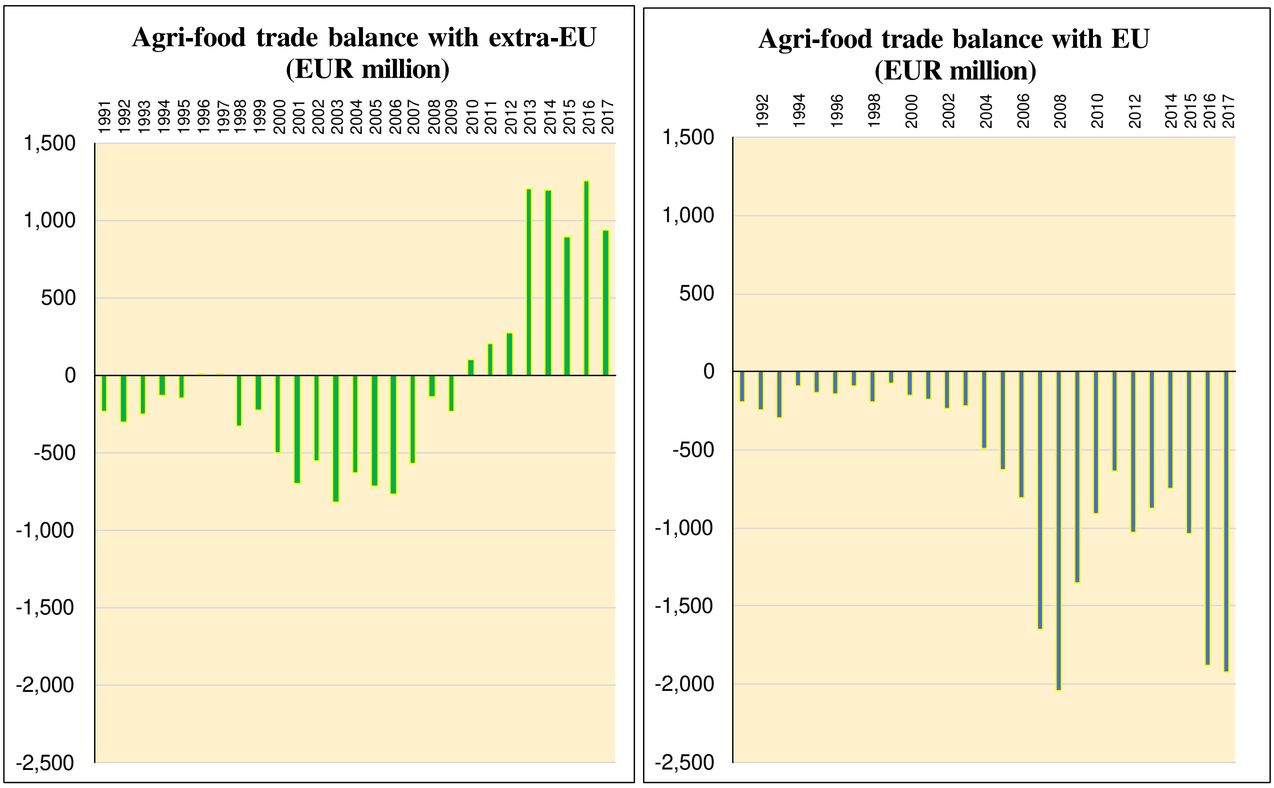
Figure 5 – The EU-orientation of the Romanian agri-food import (1991-2017)



Source: calculations using Eurostat data

The trade balance with the EU was permanently negative, since the EU agri-food products are more competitive, while the balance with extra-EU countries turned positive since 2010 (fig.6).

Figure 6 – Romanian agri-food trade balance by main partner groups (1991-2017)



Source: calculations using Eurostat data

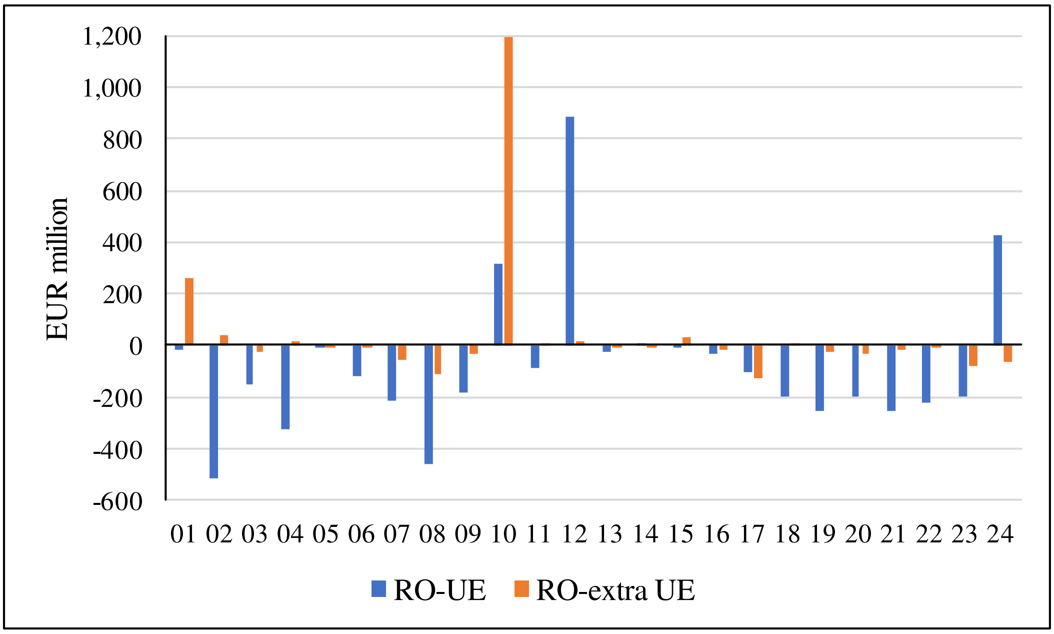
The explanation is that exports to extra-EU countries increased both in absolute and relative terms since 2010 (figure 4), while imports from the same origins diminished after accession in relative terms and remained rather the same in absolute terms (figure 5); as a consequence, the trade balance for the non-EU countries shifted from deficit to surplus since 2010 and remained so to the present day.

After 2012, the Romanian extra-EU exports shifted from Moldova and Turkey to the Middle East (e.g. Egypt, Jordan, Libya), to which massive exports consist of cereals (wheat and maize), oilseeds (sunflower) and live animals (sheep).

From non-EU countries (such as Brazil and Turkey) Romania imports mainly sugar, soybeans, raw tobacco, fruit and vegetables.

If we look at the trade balance by groups of products (HS chapters 01-24), the trade balance is positive with the EU only for cereals (HS-10), oilseeds (HS-12) and tobacco products (HS-24) (figure 7).

Figure 7 – Agri-food trade balance by groups of products (2017)



Notes: chapters HS (Harmonized System) 01-24, which are covering all agri-food products: 01-live animals; 02-meat; 03-fish and seafood; 04-dairy products, eggs and honey; 05-other animal products; 06-live plants; 07-vegetables; 08-fruit; 09-coffee, tea and spices; 10-cereals; 11-products of the milling industry; 12-oilseeds; 13-lacs, gums and resins; 14-other vegetable products; 15-oils and fats; 16-meat and fish preparations; 17-sugar and confectionery; 18-cocoa and cocoa products; 19-cereal baking and pastry products; 20-vegetable and fruit preparations; 21-miscellaneous edible preparations; 22-beverages; 23-animal feed; 24-tobacco and tobacco products.

Source: calculations using Eurostat data

On the other hand, in the relation with extra-EU countries, there are more product groups with a positive trade balance in 2017: live animals (HS-01), meat and offal (HS-02), milk, dairy products, eggs and honey (HS-04), cereals (HS-10), products of the milling industry (HS-11), oilseeds (HS-12), oils and fats (HS-15).

CONCLUSIONS

Since the early transition period, due to the massive changes occurred in all areas of the Romanian economy, the agricultural and food industry sectors mostly lost their ability to produce and export competitively on the international markets. Together with the liberalization of its international trade, Romania became a net agri-food importer since 1990. The trade deficit deepened after joining CEFTA in 1997 and even more after joining the EU in 2007, but started diminishing since 2010, until it shortly turned positive in 2013-2014. Unfortunately, it subsequently turned back to a sharply increasing deficit since 2015.

The trade balance with non-EU countries became positive since 2010 and the surplus increased significantly after 2013, with an important reorientation of the Romanian cereals, oilseeds and live animals towards Mediterranean and Middle-East countries.

At the same time, the trade balance with the EU countries was constantly negative, and increased in 2016-2017, mainly due to the expansion in the domestic demand for meat, milk and dairy products, vegetables and fruits, and mostly for industrially processed food and animal feed.

In the future, in order to diminish the trade deficit, several actions might be envisaged, such as: increasing domestic production (in order to diminish imports) of basic food such as meat, dairy products, vegetables and fruits; increasing and diversifying the production of domestic processed food; gradually replacing the exports of basic agricultural commodities by processed food; increasing exports of high-quality products includes in the EU quality schemes (organic, PDO, PGI and TSG) or not - wines, horticultural products, organic products, traditional processed products.

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THE IMPACT OF NEW TAX POLICIES IN SEMI-SUBSISTENCE AGRICULTURE IN THE PERIOD 2013-2017

TOMA CAMELIA[1], GAVRILESCU CAMELIA[2]

Summary: *The paper aimed to estimate the effects of the 2013 new fiscal policy, by broadening the taxation basis of agricultural incomes on almost all types of crops and animal species as well as on small farmers represented by unauthorized and authorized natural persons. Public statistical data of the Ministry of Finance, NAFA (National Agency for Fiscal Administration) and National Institute for Statistics were used, taking into account the specific taxation methodologies and the current legislation, as well as the results of academic research studies and agrarian economy research. The analysis showed that the agricultural income norms, calculated as regional averages and which are flat baseamounts for tax and health insurance contribution calculation, have a decreasing trend due both to the increasing expenditures for agricultural inputs and the decreasing prices of agricultural products. The collection of taxes and health-related contributions based on agricultural income norms has decreased, but one can notice that tax revenues collected for the State Budget from the taxation of rental income increased almost three times during the analyzed period. The increased appetence for agricultural land lease can be attributed on one hand to a lower tax burden than in case of taxing farm incomes of individual exploitation, but on the another hand to the migration phenomenon of young rural labor to Western Europe, while at home only the aging workforce remained, which is forced by the circumstances to lease the arable land.*

Key words: *income norms, rental incomes, tax, health insurance contribution, state budget*

JEL Classification: *H 20, H 25, H 30, H 31, Q 14*

INTRODUCTION

In our country, the introduction of single-entry accounting system was also experimented for the independent activities from farming, for a more real determination of the taxation basis, supported by a more simplified accountancy system and maybe with the aim to provide an economic-financial and managerial education to small agricultural entrepreneurs.

In the last 20 years, a low taxation level was noticed, rather cumbersome and difficult to control, due to the great number of small entrepreneurs in the rural area, as well as to the low number of taxable activities, only in horticulture, the rest of small individual farmers' activities not being prone to taxation.

In the rural area from Romania, an important part of rural households incomes are obtained from farming. Out of total incomes, 42.2% is represented by the self-consumption of agricultural products and 56.3% cash incomes from social benefits, such as salaries, pensions, social aids, child benefits, etc., and incomes from the sale of obtained agricultural products. Yet all these incomes account for only 24.7% of total cash incomes of rural households (National Institute of Statistics, 2012).

A study by Dachim and Mosora (2012) showed that agricultural incomes are lower in the regions where the semi-subsistence farms prevail.

Furthermore, 65.5% of farm businesses are organized by unauthorized individual farmers without legal status (without a proper accountancy system) and 34.5% as companies (National Institute of Statistics from Romania, 2012).

MATERIAL AND METHOD

Starting with February 1, 2013, the legislation into effect brought important changes with regard to the taxation and accountancy system of tax-payers, as natural persons, physical authorized

[1]PhD., CS III, Institute of Agrarian Economy, Romanian Academy, cameliatoma2004@yahoo.fr
[2]Senior Lecturer PhD., CSII, Institute of Agrarian Economy, Romanian Academy

persons, individual enterprises and family enterprises operating in agriculture (Law 168/2013 and Government's Ordinance 8/2013).

The new tax regulations aimed at broadening the taxation basis in almost all agricultural activities, including those activities that before February 1, 2013 were not subject to taxes, at the simplifying and streamlining the collection of taxes and social contributions, simplifying the financial-fiscal control system of the public finance administration authorities and a better substantiation of the establishment of agricultural income norms at county level.

The taxation basis was generalized by introducing new "agricultural income norms", as flat-rate reference value for almost all categories of farmers without legal status, that is for individual farmers and for authorized farmers who, before February 1, 2013, were taxed in a real system on the basis of single-entry accountancy.

The 16% tax and the 5.5% health insurance contribution are calculated on taxable agricultural income determined on the basis of new agricultural norms, above certain non-taxable physical limits (Law 571/2003 *on the Tax Code* for the years 2007- 2015).

The natural persons, who transfer agricultural goods in use through a lease contract, were obliged to pay, until 2016 inclusively, tax by applying a flat rate of 16% and health insurance contribution of 5.5% on 75% of the rent value and on 60% respectively, starting with the year 2017, by "deduction at source" by the tenant farmer (Law 227/2015 *on the New Tax Code,* with subsequent modifications).

The 25% and 40% difference is considered a lump-sum expense deductible from the gross rent value due by the lessee to the less or, as natural person.

For the fiscal year 2013 (1 February – 31 December) agricultural income norms were established, as national average values, and starting with January 1, 2014, the value of these agricultural income norms were established for each county in part, according to a transparent methodology that takes into consideration the specificity and agricultural and market potential of each county, through yearly negotiations with the representative of small local farmers inclusively.

The upper limits (ceilings) of cultivated areas/ animal heads/bee families owned/operated, up to which no tax on agricultural income is paid, as well as the lower limits of cultivated areas/ animal heads/bee families owned/operated, from which tax on agricultural income norms is paid.

The methodology for establishing the income norms used for the taxation of incomes from agricultural activities[3]proposes to calculate the tax reference income norms at the level of each county, through the difference between the average value of yield per hectare, on three consecutive years, previous to fiscal year and the expenditures made throughout the agricultural year to obtain the production.

In the livestock production sector, the methodology is somehow similar, per head of breeding female (cows, buffalo cows, ewes, goats, bee families, poultry). (Government's Ordinance 330/2014).

The income norm for each type of crop or breeding female represents the calculation basis of the flat rate tax of 16% and of the health insurance contributions of 5.5%.

RESULTS AND DISCUSSIONS

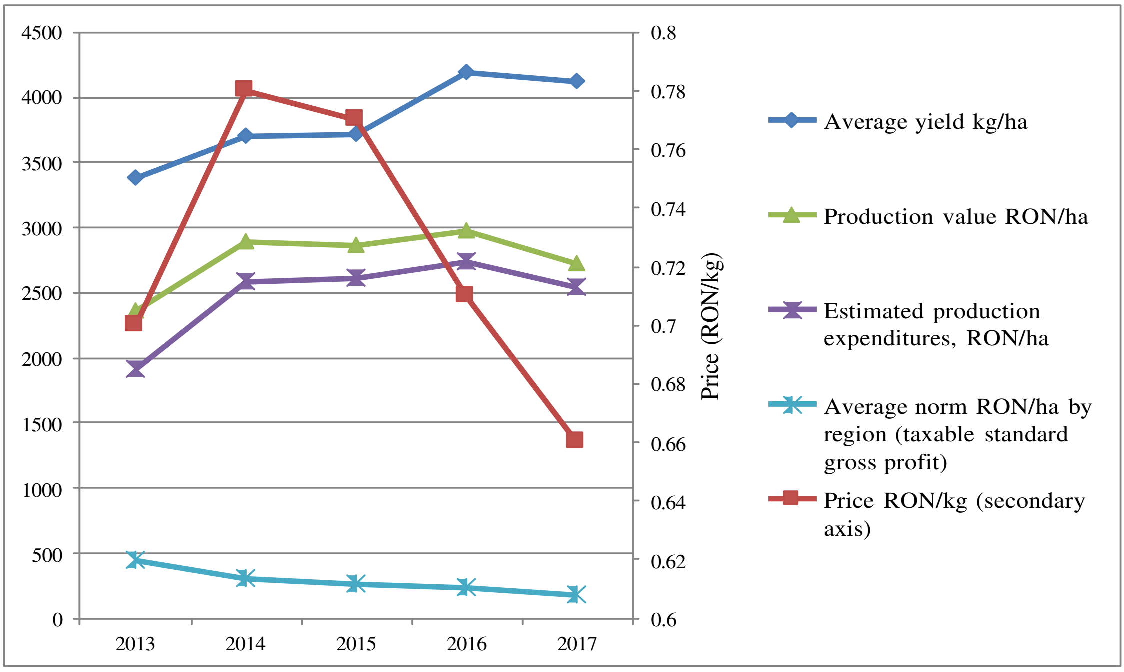
For the period 2013-2017, on the basis of available statistical data, the evolution of the average regional size of income norms and the average regional size of elements (aggregate 3-year averages prior to the fiscal year) were calculated, on the basis of which the income norms were calculated (average yield per hectare, average selling price/kg, value of production per hectare, production costs per hectare) in the field crops. (www.anaf.ro; www.insee.ro)

Out of these, the cereals from Sud region were selected as example.

The processed data reveal a decreasing evolution of the average size of income norms per hectare of cereals in the region Sud, mainly determined by the decreasing evolution of average

[3]Government's Decision 330/2014, published in the Official Gazette no. 320 of 30.04.2014

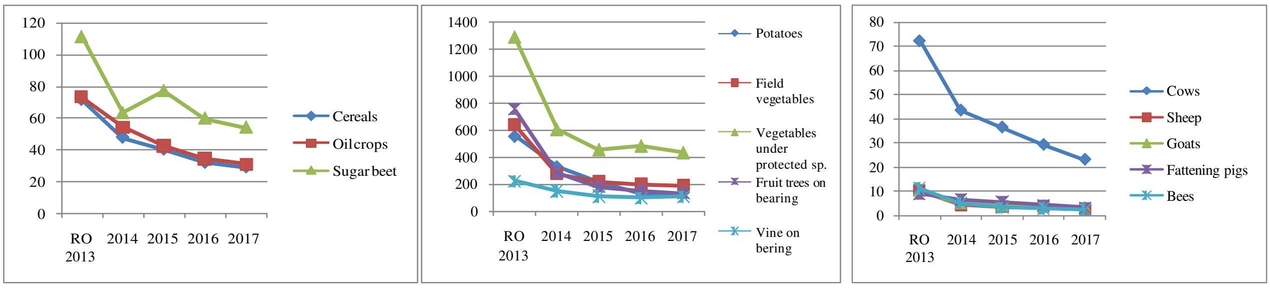
selling prices for cereals and the estimated increasing evolution of production costs per hectare. (Figure 1)



Source: Toma, C.,Izvoranu, A.M**,** 2017

Figure1. Evolution of calculation elements for determining the regional average of county income norms per hectare of cereals, in the region Sud, in the period 2013-2017

As the agricultural income norm per hectare is equivalent to a taxable standard gross profit, its decreasing evolution leads to an increasingly small tax calculated per hectare or per animal head, which is a phenomenon noticed in all regions. (Figures 2 to 9)



Source: anaf.ro, authors' processing

Figure 2. Evolution of the size of calculated income/ha/animal head on Nord-Vest regional average of county agricultural income norms

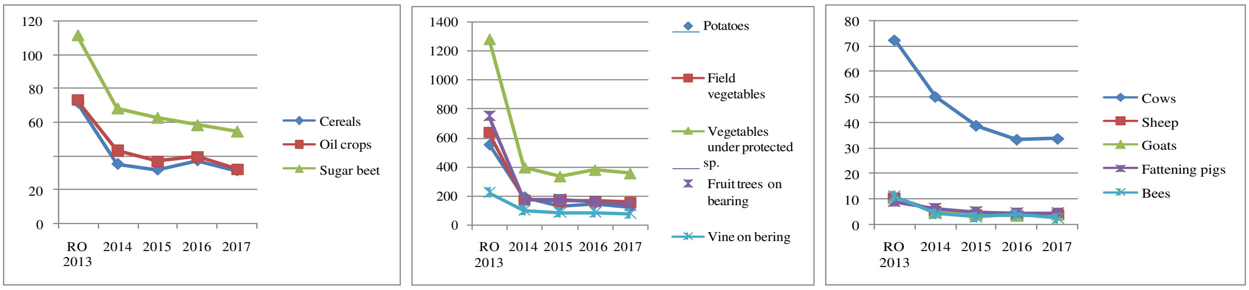


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Figure 3. Evolution of the size of calculated income/ha/animal head on Centru regional average of county agricultural income norms

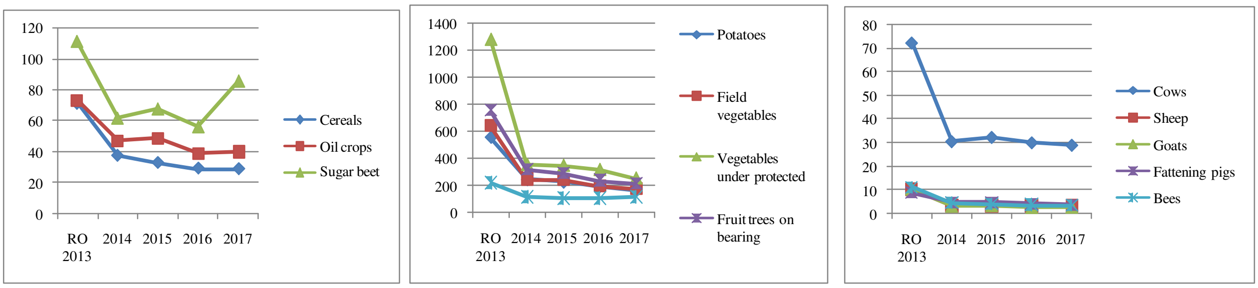

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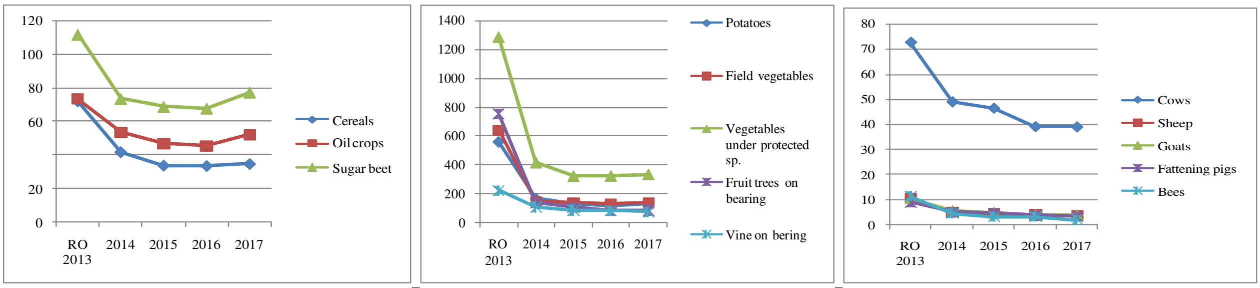
Figure 4. Evolution of the size of calculated income/ha/animal head on Nord-Est regional average of county agricultural income norms



Source: anaf.ro, authors' processing

Figure 5. Evolution of the size of calculated income/ha/animal head on Sud-Est regional average of county agricultural income norms

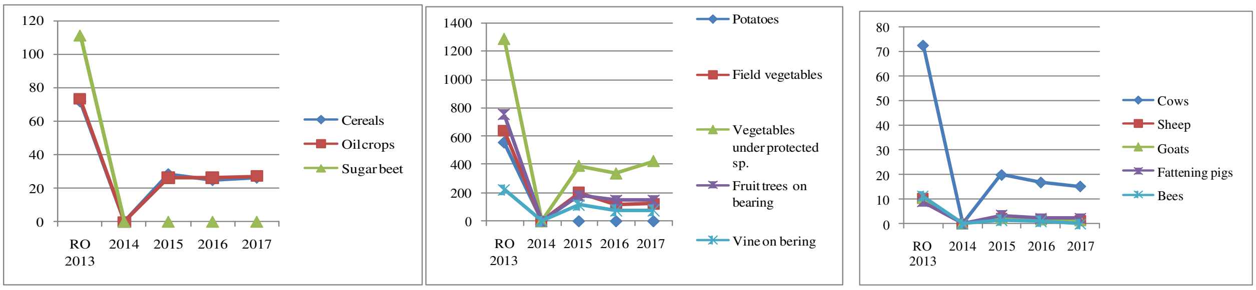


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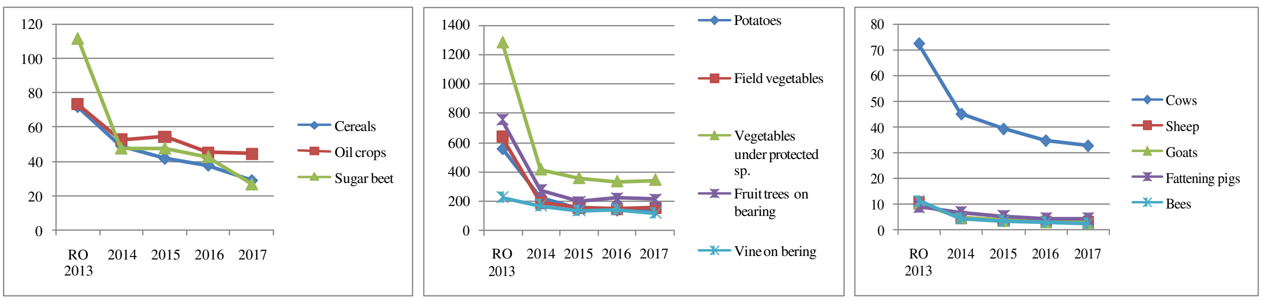
Figure 6. Evolution of the size of calculated income/ha/animal head on Ilfov county agricultural norms



Source: anaf.ro, authors' processing

Figure 7. Evolution of the size of calculated income/ha/animal head on Sud regional average of county agricultural income norms

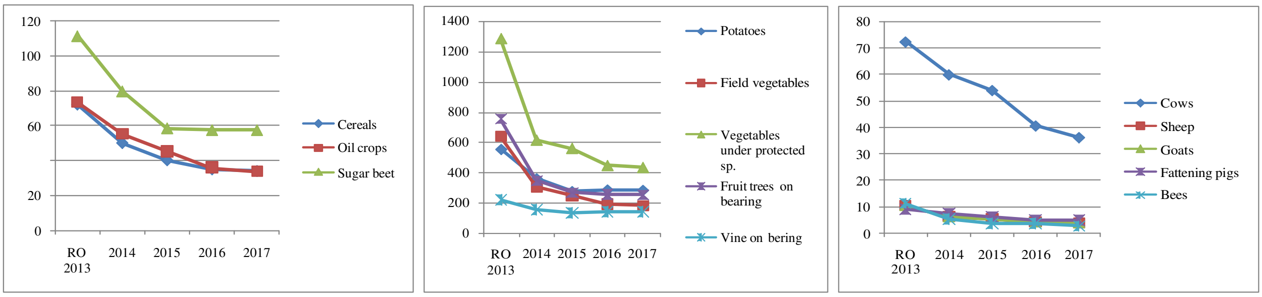


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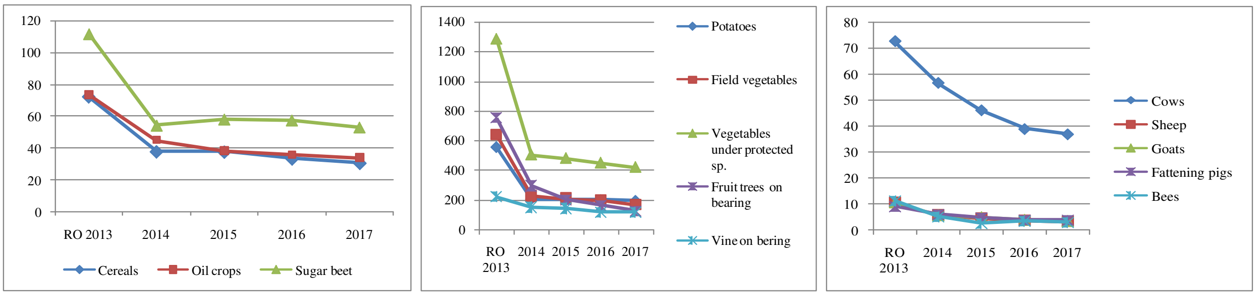
Figure8. Evolution of the size of calculated income/ha/animal head on Sud-Vest regional average of county agricultural income norms



Source: anaf.ro, authors' processing

Figure9. Evolution of the size of calculated income/ha/animal head on Vest regional average of county agricultural income norms

As in the application rules the cultivated agricultural areas smaller than 2 hectares are not taxable, the statistical data prove that the new taxation method, based on norms, of agricultural incomes on individual agricultural holdings (without legal status), ***does not affect more than 70% of producers***, as the taxation rule exclude from tax payment the farms under the minimum threshold for each type of crop. ***These represent about 23% of total agricultural area***. (Table 1)

Table 1
Structure of utilized agricultural areas and of the number of individual holdings, grouped by UAA size classes

UAA size classes	Ha UAA	No. of indivual holdings	% ha from class in total	% no. of holdings from class in total
<2 ha	**1713130**	**2723530**	**23**	**73.7**
2-4.9 ha	2218480	723870	29.8	19.6
5-9.9 ha	1190830	179530	16	4.9
10-19.9 ha	542910	41500	7.3	1.1
20-29.9 ha	211050	8790	2.8	0.2
30-49.9 ha	270910	7080	3.6	0.2
50-99.9 ha	380210	5580	5.1	0.2
>100 ha	922110	4240	12.4	0.1
Total Romania	**7449630**	**3694120**	**100**	**100**

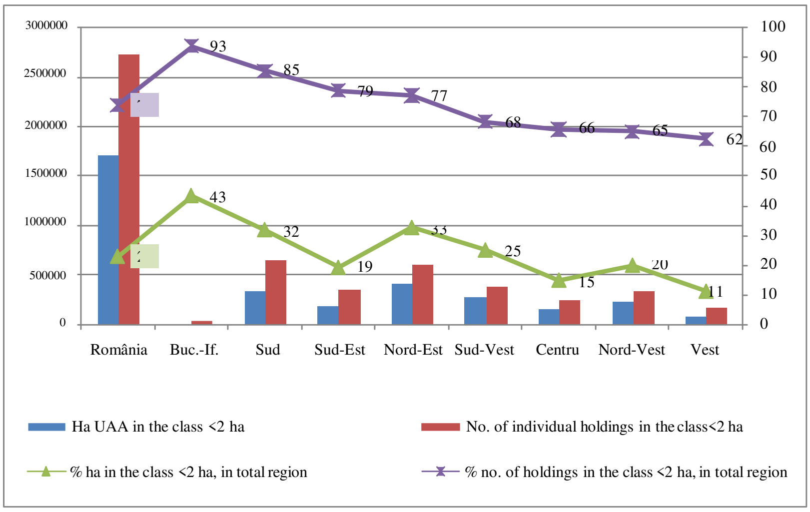
Source: Romania's Statistical Yearbook, 2014, authors' calculations

This exemption from payment of agricultural income taxes is in line with the agricultural policy, in which this type of farms does not receive direct subsidies, as these cultivate crops on parcels smaller than 0.3 ha.

However, although facilities have been created for the diminution of tax burden, the measure does not bring positive incentives for the subsistence farms to increase their area or number of animals, so that they become more market-oriented.

Even the farms with 2-10 ha will diversify their crops so that they will decrease their areas for each crop in part, so as not to exceed the non-taxable areal limit or they will keep animal herds that do not exceed the non-taxable number of animals (2 cows, 50 breeding sheep, 25 breeding goats, 6 pigs, 100 poultry).

The regional distribution of the numberof UAA ha and of the number of individual holdings from the category <2 ha makes the regions Vest, Centru, Sud-Est and Nord-Vest stand out, with shares of areas from the class <2 ha ranging from 10 to 20% of total UAA of regions. (Figure 10)



Source: Eurostat 2013

Figure10. Distribution of utilized agricultural areas and of the number of holdings in the size class “under 2 ha” by development regions

The regions Sud-Muntenia and N-E Moldova stand out as negative examples, where one-third of UAA in each region belong to the farms from the class <2 ha, accounting for more than three quarters of the number of farms.

According to a specialty study (Jitea, I. M. & all. , 2013), the tax income expected from the other categories of farms from taxable size classes is presented in Table 2.

Table 2

Taxes and healthcare contributions expected to be collected in the year 2013, on the basis of agricultural income norms from the potential agricultural holdings, UAA areas and animal herds, taxable and non-taxable

Taxable size class	**Taxes and SSHC expected to be coollected in 2013 from a numberof farms with:**					
	>2 ha	**> 2 cows**	**> 50 sheep**	**> 25 goats**	**> 6 pigs**	**Total -thou.RON**
Number of taxable holdings	970,590	189,170	20.185	12,013	328,906	Xxx
No. of non-taxable holdings*) ”< ”	*2,723,530*	*535,371*	*250.633*	*164,128*	*1,319,652*	*Xxx*
Number of taxable ha/heads	5,736,500	1,107,634	5.405.523	736,883	1,818,590	Xxx
No. of non-taxable ha/heads**)”< ”	*1713,130*	*700,000*	*2.663.261*	*313,855*	*2,000,000*	*Xxx*
Taxes- thou. RON-	273,833.2	53,087.5	33.259,2	2,248.4	145	**362,573**
Social security and healthcare contributions (SSHC)– thou.RON-	94,130.2	18,248.9	11.432,9	772,9	49.9	**124,634**

Source: Jitea, I.M. & all, 2013; authors’ processing and calculations.

*) Number of holdings whose operated areas by types of crops or number of females from different animal species fall within the tax exemption thresholds
**) Total amount of utilized agricultural areas and number of animals belonging to the farms from the size classes that fall within the tax exemption thresholds

In the livestock sector, (Jitea, I. M. &all., 2013) show that about 850 thousand farmers, out of which 535 thousand individual producers with only 2 cows, 250 thousand producers with up to 50 breeding sheep, 164 thousand with up to 25 breeding goats and 1.32 mil. producers with maximum 6 pigs and 100 poultry heads, are not affected by tax regulation.

At the same time, 2.7 million crop farmers with less than 2 hectares, summing up 1.7 million ha UAA, are exempted from the payment of taxes and healthcare contributions.

According to data from the State budgets, the taxes planned to be collected through the State Budget in the year 2013 amounted to 418 million RON, i.e. 363 million RON, plus taxes on rental incomes worth 55 million RON .(Table 3)

Table 3.
Tax incomes from agricultural activities and from rent collected at the State Budgets in the period 2011-2017

Item	2011	2012	2013	2014	2015	2016	2017
Tax incomes –Total -thou.RON-	**67619696**	**75726894**	**83443762**	**85728709**	**89467904**	**88251589**	**87674336**
Tax income natural persons	***18400243***	***19672897***	***22897808***	***23738666***	***25051500***	***25871374***	***29889400***
Tax income from agric. activities	4056	20258	417987	175803	147696	154520	108789
Tax income from rent	0	4800	55425	56811	132669	110005	150627
Agricultural tax from natural persons	**4056**	**25058**	**473412**	**232614**	**280365**	**264525**	**259416**
Share of agric. tax in total tax incomes	**0.01**	**0.03**	**0.57**	**0.27**	**0.31**	**0.30**	**0.30**
Share of agric. tax in tax incomes of natural persons	**0.02**	**0.13**	**2.07**	**0.98**	**1.12**	**1.02**	**0.87**
SSHC cashed with deduction at sourcein total agricultural incomes of natural persons		37014	5964	294	227	56	
SSHC cashed from rental incomes of natural persons		0	0	28877	51544	48440	

Source: State budgets of the Ministry of Finance 2011-2017 and of National Health Insurance House, own calculations

The share of tax contributions of farmers to the State Budget and health insurance budget was relatively constant over the last five years, i.e. about 1% of the tax revenues received from naturalpersons and 0.3% of total tax revenues.

CONCLUSIONS

In the period 2013-2017, from the processed statistical data from all the development regions, we could notice the same decreasing trend of the average agricultural income norms in almost all investigated products.

As the agricultural income norm per ha/head/bee family is equivalent to a reference taxable standard gross profit, its decreasing trend leads to an increasingly small calculated income, which seems to be in favour of tax payers – natural persons.

Yet, if we take into consideration that the agricultural income norms were established not only on the basis of statistical office calculations, but also through annual negotiations with small farmer representatives at the level of each county, we can conclude that the economic-financial results from the farming activities of small farmers were increasingly weaker, mostly due to the increasing agricultural input expenditures and decrease of agricultural products selling prices.

The statistical results and the previous academic research studies show that the new taxation method based on agricultural income norms for individual agricultural holdings ***does not affect more than 70% of farmers,*** who cultivate ***1.7 million hectares UAA in the class under 2 ha, 535 thousand*** individual producers with only 2 cows, ***250 thousand*** producers with up to 50 breeding sheep, ***164 thousand producers*** with up to 25 breeding goats and ***1.32 mil.*** producers with maximum 6 pigs and 100 poultry heads.

The taxes and contributions to the health insurance fund on rental incomes almost tripled in the last five years, and in 2017 contributed by 80% more than taxation based on incomes from the individual farming practice.

A greater appetence for leasing out land can be determined by a lower tax burden on rental incomes than in the case of individual farming and taxation based on income norms and/or by the migration of young rural labour to Western Europe, while only an aged labour force has remained home, forced by circumstances to lease out the arable land.

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THE PARLIAMENTARY INQUIRY INTO THE STATE OF LAND RECLAMATION WORKS IN ROMANIA, 2009

AUREL LUP[1]

Abstract: *Between June 24 and September 13, 2009 the Agriculture Commission of the Romanian Parliament conducted an inquiry into the state of land reclamation works in Romania. The main objectives were: rehabilitation and maintenance works, the exploitation of the works, the way in which the financial resources were used for their maintenance and exploitation, the measures taken to urge irrigations, the losses and costs of watering delays, other problems. From the conclusions of the inquiry we notice: the state of the works is generally unsatisfactory in all aspects. Maintenance works are incomplete either due to the lack of financial resources, or due to a low interest on the part of the user, or pure and simple some irrigation works in some areas have proven to be technically and economically unviable. Among the causes of not realizing the irrigation programs we tackle: the disappearance of large-scale agricultural holdings corresponding to the irrigation systems' constructive schemes, the lack of watering equipment, increasing water fees, the discrepancy between the rehabilitated areas and the establishment of beneficiary irrigation organizations and even the non-observance of the contracts between the water supplier (the state) and the agricultural users. There has been much criticism of the frequent reorganizations and especially of the 138/2004 Law, which separated the administration from the part that had as its object the maintenance and rehabilitation and construction works. In addition, the paper also contains some data on previous analyses and research results of this paper's author.*

Key words*: inquiry, land reclamation, irrigations, laws.*

JEL Classification: *Q 15, Q 25, Q 38*

1. INTRODUCTION

The inquiry that represents the object of this paper is important first and foremost for its pattern of work and duration. The inquiry has covered satisfactorily territorial and thematic issues encompassing all categories of land reclamation works: irrigations, drainage, soil erosion control. This was possible due to the duration of the inquiry (24 June-13 September 2009), but also due to the provision of means of transport which allowed the on-site ascertainment of the state of land reclamation works. The 2009 parliamentary commission's inquiry is also important in aspects such as:

I. The appropriate composition - 15 deputies representing the entire political spectrum of the Romanian Parliament and four experts from outside the organizational system of the Department of land reclamation, including this paper's author.

II. Simultaneously with the field trips, the commission asked the branches of the "*National Administration for Land Reclamation - ANIF*" and its management a series of statistical data on:
   - the area and infrastructure of hydro-amelioration facilities, and the economically viable area at the time of the inquiry;
   - the irrigation infrastructure area handed over to the Users of Water for Irrigations Organizations - AUAI;
   - the area contracted for watering works in 2009;
   - the actual irrigated area over the last three years 2007, 2008 and 2009;
   - the financial situation of ANIF and each of its branches, respectively the cost of irrigations and the degree of coverage from the revenue received from users;
   - the necessary investments for the rehabilitation of land reclamation works: irrigations, drainage, soil erosion control;
   - any other issues related to the land reclamation activity.

III. The Commission also requested:
   - data on electricity, its cost and the possibility of reducing it;

[1] Prof.PhD., The Academy of Romanian Scientists, "Ovidius" University Constanta, e-mail: lupaurel@yahoo.com

- data on production growth possible through irrigations and their efficiency;
- data on the available water sources, the degree of water coverage for irrigations, and the possibility of using groundwater for irrigations.

Simultaneously, at the Commission hearings of stakeholders involved in land reclamation activities at all levels, including ministers and even heads of state in connection with ANIF's collateral activities, took place. Finally, the commission raised the issue of the legislative system on land reclamation by making proposals to improve it.

At the end of this introduction, we mention that its final report contains over 170 pages, and that this paper will only be a partial summary of the conclusions of this report.

2. MATERIAL AND METHODS

Information from various sources was used as a research base, including bibliographic information (especially on the history of reclamation), but the main source was the written information from ANIF's branches, as well as that obtained verbally during the meetings at the agriculture commission headquarters in the Romanian Parliament, as well as those belonging to the representatives of ANIF's branches during field visits.

For the geographical coverage of the country's territory, the commission was divided into four subcommittees composed of 3-5 deputies and 1-2 experts, as follows:

a) Subcommittee no.1, with the ANIF branches: Someş-Criş, Tisa-Someş and Timiş-Mureşul Inferior comprising 9 counties from the center of Transylvania and the north-western part of the country;
b) Subcommittee no.2, with the ANIF branches: Mureş-Olt mijlociu, Mureş-Olt superior and Danube-Olt, comprising 12 counties from Transylvania and the Southern Subcarpathians;
c) Subcommittee no.3 with the ANIF branches: Olt-Argeş, Argeş-Buzău and Argeş-Ialomiţa-Siret, comprising 7 counties from the Wallachian Plain, the Subcarpathians and Bărăgan;
d) Subcommittee no.4, with the ANIF branches: Dobrudja, Moldova-South and Moldova-North, comprising 10 counties from Dobrudja and Moldova.

The 4 subcommittees actually visited the land reclamation works, and outside the statistical statements provided by the branches, they had discussions with the members of the branches. The reports of the subcommittees were typified, each one of these included the area of activity, the history of the works, the source of the works, the set up areas included into the three categories of works, watering in the years 2007-2008-2009, the financial situation, the investments needed for rehabilitation, other aspects. Simultaneously with the field visits, weekly at the Agriculture Commission headquarters hearings were held with stakeholders, institutions or organizations such as:

- ANIF - National Administration for Land Reclamation;
- SNIF - National Society for Land Reclamation;
- ADS - State Property Agency Syndicates;
- LUAI - The Water for Irrigations Users League.

Apart from the reports of the four subcommittees, the report of the Parliamentary Commission contains its own conclusions and proposals.

3. RESULTS AND DISCUSSIONS

3.1. Short history

The need for land reclamation works in Romania has been known since ancient times, we could say. History mentions the need to cultivate land on high terraces, as well as for irrigations in times of distress (2). The chroniclers of the Middle Ages cite grim droughts and catastrophic floods (7). In Banat and Câmpia de Vest (the Western Plain), ever since the eighteenth century, the former

Habsburg Empire began the drainage of over one million hectares in order to make them cultivable and to allow the development of human communities (2).

In Wallachia, ever since the end of the 19th century, some projects have been discussed and have even been carried out concerning large-scale irrigations, such as the paper of eng. Chiru *River Sewerage and Irrigations*. The studies and projects continued throughout the first half of the 20th century, but practically in 1950 only 42 thousands ha were being irrigated, 368.1 thousands ha were drained and soil erosion control work was being carried out on just 2 thousands ha (7).

The pro-communist government installed on March 6, 1945 however, was determined to put an end to this lag, and in 1950, through the *Electrification Plan* (the construction of the hydroelectric power station Bicaz was also considered) it identified a drought-affected area of 2.78 mil. ha out of which 1.2 mil. ha were to be set up in the first stage, out of which the water source for 500000 ha was to be the Danube, the reservoirs for another 500000 ha and for the remaining 200000 ha the internal rivers Jiu, Olt, Argeş, Ialomiţa and Siret (9). However, in 1965 (after 15 years) only 230 thousand ha were being irrigated, 587 thousand hectares drained and 197.5 thousand ha of soil erosion control works, so that the second program *The National program for the extension of land reclamation works during 1966-1970* was launched and followed by a 3rd program. In July 1970, *the National Program on Water Resource Management, the Extension of Irrigation Works, Embankments, Drainage and Soil Erosion Control in RSR in 1971-1975 and General and Prospective Provisions until 1985* was launched.

In 1983 – *The National Program for ensuring safe and stable agricultural productions by increasing the productive potential of the land, better organizing and unitary use of agricultural land, of the entire area of the country, performing irrigations on approx. 55-60% of the arable land, drainage and soil erosion control works* (10).

At the end of 1989, at the fall of the communist-totalitarian regime 3109 thousand ha of irrigations (56.5% of the program), 3085 thousand ha of drainage (55.8% of the program) and 2222 thousand ha (41.9% of the program) of soil erosion control works were set up.

After 1989, the emphasis was not on the extension of the works according to the program, but on the rehabilitation of the areas set up before 1990, taking into account the inadequate quality and the unfinished systems built up to that date. From then until the present, countless analyses have been done, with the emphasis on irrigations. Of these, we will deal mainly with two: the one from the beginning of 1990, conducted by a governmental commission and the one organized by the *Parliamentary commission of inquiry on the state of the irrigation systems, as well as other land reclamation sectors* (18). (The author participated as an expert in both commissions). This latter investigation is the subject of this paper. In particular, the commission set for itself the following objectives:

a) the verification of the way in which the specialized bodies followed the observance of the measures for rehabilitation and maintenance of the irrigation facilities in the affected areas;
b) the analysis of the structures regarding the use of the allocated funds for the irrigation systems;
c) the analysis of the measures put in place to speed up irrigations in 2009;
d) the analysis of the measures (including the legislation) that can be taken urgently;
e) losses and costs of delaying the application of watering;
f) the checking of any incidental issues to this event.

3.2. Informing ANIF about the patrimony

The first document provided to the commission was the report of the National Administration for Land Reclamation - ANIF about the inventory of the facilities it manages, as well as some data on the exploitation of the land reclamation works, including the difficulties encountered in their proper exploitation.

***Irrigationfacilities*.** The area equipped for irrigation works - 2 998 255 ha, out of which: sprinkler watering 2,660,353 ha (88.7%), furrow irrigation 281,982 ha (9.4%) and 55,920 ha watering by flooding (1.9%). The main source of water is the Danube for 2,017,420 ha (67.3%) and the inland rivers 980.835 ha (32.7%).

- transportation, supply and distribution canals of irrigation water 10,975 km, out of which 6,015 km lined;
- buried pipe networks 28,773 km;
- irrigation pumping stations 2.908 units, out of which:
    - fixed and floating base stations 227 pcs;
    - refueling stations 352 pcs;
    - pressure stations 2,329 pcs;
- hydrotechnical constructions 13.923 pcs;
- the installed power of the pumping stations is 4.134 MW;
- Average installed power 1.38 kW / h.

***Drainagefacilities*.** The area equipped - 3.085.295 ha

- Excess water evacuation methods:
    - water evacuation through pumping 1,463,807 ha;
    - water evacuation through gravitation 1,621,488 ha.
- Number of drainage facilities 443.
- Water collection and evacuation canals 56,584 km:
    - main collectors 25,705 km;
    - secondary and tertiary 30,879 km.
- Evacuation pumping stations 740 pieces, out of which
    - electrical stations 698 pcs.
    - thermal stations 42 pcs.
- Hydrotechnical constructions 42,228 units.
- Drainpipes 40,410 km.

Soil erosion control facilities. The area equipped - 2,222,287 ha. in 650 facilities:

- canals and outlets, out of which 13,255 km coastal evacuation canals and 6.681 km outlets.
- anti-erosion roads 28,125 km.
- ravines and torrents 7,926 km.
- hydrotechnical constructions 188,482 pcs.
- collecting and absorbing roads 19,828 km.

Flood protection works:

- flood-protected area 1.378.119 ha, out of which:
    - with defense dams in ANIF's administration 643,870 ha.
    - with defense dams in ANAR's administration 734,249 ha.
- dams in ANIF's administration 2,270.3 km, out of which:
    - at the Danube River 1,181,1 km.
    - at lower rivers 1,089.2 km.
- flood-protected area through dams 189,694 ha.
- dams and accumulations for floods mitigation 114 pcs.

3.3. Exploitation of land reclamation works

Irrigations. According to the data available in ANIF branches's accounts, during 2006-2009, compared to 1989, irrigation was done less and with great variations from one year to the next. A significant reduction in irrigation rules and areas can also be noticed, compared to 1989. Even in particularly dry years -1993, 2003, 2007- there was less irrigation done.

The most important causes that have led to a significant reduction of the irrigated areas are as follows:

- the dissolution of large-scale exploitation structures, starting with the agricultural cooperatives following Law no. 18/1993, the Land Fund and then Law no.1/ 2000;
- the degradation of hydro-amelioration equipment infrastructure by destruction, theft, physical and moral wear, abandonment, disinterest of new landowners and those in repossession of their land. Everything has been assisted by the inability of decision makers and in power players to manage and organize the exploitation of a significant heritage of agriculture and at the same time of the national economy;
- the transition to market economy, whose engine is considered to be the profit obtained exclusively at the level of the economic operator and not of the national economy;
- the progressive increase of irrigation water fees and, in particular, pumping differentiation has also contributed to the reduction of the interest in irrigation;
- the destruction of the power transmission network, accompanied by power supply disconnection and decompletion (extraction of transformers) motivated by its non-use;
- the lack of equipment for water management in plants;
- the lack of correlation between the rehabilitation of the irrigation infrastructure activities and the real water demand at a hydrotechnical level.

Over the 2006-2009 period, the area contracted by the beneficiaries increased in all branches. By contrast, the actual irrigated area was much smaller than the contracted area and variable from one year to another, approximately 15% of the set up surface.

In 2007, an area over two times larger than in 2006 was contracted, and an almost four times larger area was irrigated, which is due to the drought in that year. In 2008, although a larger area was contacted than in 2007, a smaller area was actually irrigated than in the previous year, with rainfall assuring plant water requirements. The actual irrigation situation in 2009 is dated at the beginning of July, so the irrigation season was not complete.

Embankment and drainage. Flood protection is provided by 1,181 km Danube dams and 1,089 km of inland rivers, belonging both to the National Administration for Land Reclamation (ANIF) and to the Romanian National Water Agency (ANAR). The protected area totals 1,378 thousand ha.

According to the situations presented by the branches, the maintenance and reparation works needed to ensure the functioning at the parameters required by the exploitations regulations are totally inadequate. The management of the branches estimates that the drainage systems are only 50% prepared for natural disaster interventions, which is extremely grave.

Not realizing work on the drainage canal network is mainly due to the faulty way of organizing the maintenance and reparation activity required by Law 138/2004 due to the lack of its own working personnel needed to carry out these works and to dealing with the maintenance and reparation works as construction and assembly works in third-party relationships. Also, the chronic lack of funds has led the present canal network to be invaded by vegetation (aquatic, grassy, woody) which in many areas makes it impossible to drain water from agricultural land and not only. Both of the above-mentioned causes have led to the execution of some specific works to the detriment of works that ensure the functioning of the entire system.

Regarding the maintenance of the stations and the reparation of the pumping stations, we notice the following aspects:

- at present, there is no necessary equipment and specialized personnel to perform the reparation works;
- the maintenance and reparation system currently in use is not the proper one, as a pumping unit works until failure, only at the time the reparation is being done;
- it is necessary to apply the maintenance and revisions program according to the technical book prepared by the manufacturer.

Soil erosion control. The application of the land fund laws with the retrocession on the old sites, and hillside downsizing, led to the destruction of soil erosion control works, with an increase in erosion phenomena. This phenomenon was also favored by deforestation and the destruction of protective curtains.

The plotting of the land also resulted in a random placement of the crops, which makes it impossible to exploit economically and anti-erosionally the areas equipped for this purpose.

The shortcomings created by the application of the land fund laws, correlated with the chronic lack of funds for the maintenance and reparation works, led to the degradation of the works and implicitly of the agricultural lands.

A harsh analysis of the works within each hydro-ameliorative system is required and the scrapping of the destroyed works or, where appropriate, their restoration if this is expressly requested by the beneficiaries.

An analysis of the amounts allocated for works and average costs per hectare shows that the budgetary allocations received in 2001-2009 did not ensure the exploitation, maintenance and reparation of the works according to the norms in force, allowing only for interventions in the critical points.

Institutional and legislative evolution in 1990-2009. After 1990, during the transition to the market economy period, a new series of specific reorganizations began, in order to adapt to the new structures.

By *Government Decision* no. 292, in 1991 the Commercial Company for the Exploitation of Land Reclamation Works - S.C.E.L.I.F. S.A., with branches in each county, in which a variable number of hydro-ameliorative systems and Pumping and Automation Stations Maintenance Societies - S.I.S.P.A. functioned. The scope of activity: maintenance, reparation and exploitation of canals, pipelines, hydrotechnical constructions, irrigation installations and equipment, drainage; maintenance and reparation of soil erosion control facilities; agricultural activities; design and technological upgrade of works, installations and land reclamation equipment; import-export trade activities; consulting and public relations, investments.

Law no. 50/1994, on some measures for the organization of the land reclamation activity, which establishes the *Autonomous Land Reclamation Authority* (RAIF) with the same activity objectives.

Law 138/2004 provides for the reorganization of the National Society for Land Reclamation - S.N.I.F. - by the separation from the National Administration for Land Reclamation - A.N.I.F., the former would be privatized according to the provisions of the Government Decision for the approval of the global reorganization plan of S.N.I.F. This law was severely criticized because the ANIF was left without specific services: maintenance, design, construction, etc.

The repeated legislative changes in the land reclamation field have not made progress, but have led to a number of system failures. It is necessary the revision of the legislation aimed at new institutional reorganization measures of the two organizations (ANIF and SNIF).

3.4. The findings and conclusions of Subcommittee no.1 on the management of irrigation facilities and other land reclamation sectors

From the data presented in the table below, it is clear that the predominant activity in the Timiş, Mureş Inferior and Someș Criș branches is drainage, while for the Tisa-Someş branch it is soil erosion control in the counties: Cluj, Sălaj, Maramureş and Bistrița-Năsăud. The irrigation activity in this area is low, the irrigation facilities occupying only an area of 50.122 ha.

Table 1

Capacities of land reclamation under the management
of the ANIF RA branches in the analyzed area

No. char.	Branch	Capacities (ha)				Observations
		Flood protection	Irrigations	Drainage	Soil erosion control	
1.	Someş - Criş	251.410	10.128	404.863	102.966	
2.	Tisa - Someş	-	5.880	48.971	312.281	
3.	Timiş - Mureş Inferior	-	34.114	693.520	95.141	
	Total	*251.410*	*50.122*	*1.147.354*	*510.388*	

The large drained areas are due to the restoration works for draining the area started by the former Habsburg Empire, ever since the beginning of the 18th century.

As far as the sources of financing the land reclamation activities are concerned, they come from income - fees for water and other services, as well as from the state budget.

a) For irrigations:

- annual fees for the maintenance and exploitation of the irrigation works from the ANIF-RA administration received from beneficiaries of lands with irrigation systems supplemented by subsidies from the state budget granted under Law 138/2004;
- water supply fees from the source of the water to the point of takeover from the beneficiaries, fees partially covered by subsidies from the state budget;
- water delivery fees by organizations to members of the organization or other beneficiaries who have lands served by facilities owned by a water users' organization.

b) For the defense, drainage and CES (soil erosion control) activities, the exploitation, maintenance and reparation costs are fully covered by the state budget. They were never used, but even if this was the case they would not have been sufficient. Sub-financing of these works has led to numerous degradations, broken dams, clogging and even destruction of crops. In fact, the phenomenon of degradation was present everywhere.

Regarding the economic situation of the branches visited by subcommittee no. 1, it is presented overall as follows:

- revenues from water and maintenance fees.... 1,181 thousand lei
- total expenses on all branches ....2,603 thousand lei
- financial results (losses) .... 1,422 thousand lei

The losses of the current year are added to the previous year's losses (2008) for Maramureş branch, and those of 2007, amounting to 5,121 thousand lei. Also, it is noteworthy that about half of the expenses are living expenses.

3.5. Subcommittee no. 2's findings about the management of irrigation facilities and other land reclamation sectors

Geographically, subcommittee no. 2 has been active in the central and southeastern areas of Romania, in the Alba, Hunedoara, Sibiu, Brașov, Mureș, Covasna, Harghita, Gorj, Mehedinți, Dolj, Vâlcea and partially Olt counties.

From an administrative point of view, the exploitation, maintenance and reparation of the land reclamation works in the above mentioned perimeter is organized in three territorial branches of ANIF RA, namely:

- *Mureş - Olt Mijlociu branch* for land reclamation works in the Alba, Hunedoara and Sibiu counties, based in Alba Iulia city
- *Mures - Olt Superior Branch* for land reclamation works in Braşov, Mureş, Harghita and Covasna counties, based in Braşov city
- *the Danube-Olt branch* for land reclamation works in Gorj, Mehedinţi, Dolj, Vâlcea and partially Olt counties, based in Craiova city.

Table 2

Land reclamation works situation in the Subcommittee no. 2's analyzed area

No. char.	Branch	Capacities (ha)				Observations
		Flood protection	Irrigations	Drainage	Soil erosion control	
1.	Mureş Olt Mijlociu		8.194	50.646	152.236	
2.	Mureş Olt Superior	54.458	6.744	149.642	165.772	
3.	Dunăre Olt	112.322	562.709	248.439	248.940	
	Total	*166.780*	*577.647*	*448.727*	*566.838*	

Source: 16

From the data presented in Table 2, the prevailing activity in the Dolj branch is that of irrigation and flood protection on the Danube, and for the Mureş-Olt Mijlociu and Mureş-Olt Superior branches the basic activity is soil erosion control and, to a lesser extent, drainage. Within the activity range of Mureş-Olt Mijlociu and Mureş-Olt Superior branches the irrigation activity is reduced, occupying only an area of 14.938 ha. The irrigation activity in the entire area is low, with irrigation facilities occupying an area of only 50.122 ha. The subcommittee also points out that there are no water requests in the first two branches and proposes scrapping (The author believes that irrigations were not even economically justified in these Transylvanian counties).

In connection with the drainage works the degradation or even the decommissioning of some exhaust stations is signaled. The lack of funding for maintenance is addressed. However, it is considered that about 50% of the works are functional.

Regarding soil erosion control works, they have been degraded or even destroyed due primarily to Law 18/1991 of the Land Fund which favored the fragmentation of the facilities. It is appreciated that for this type of works there is a need for a new strategy in line with the market economy.

3.6. Subcommittee no. 3's findings concerning the management of irrigations facilities and other land reclamation sectors

The scope of activity of subcommittee no. 3 was aimed at the analysis of the land reclamation facilities from the ***Olt-Danube-Siret*** geographical area and their administration in three territorial branches of ANIF-SA:

- ***Olt-Argeş*** branch, based in Giurgiu, divided into four Management Units (Teleorman, Giurgiu Vest, Giurgiu Est and Ilfov);
- ***Argeş-Buzău*** branch, based in Ploieşti, divided into four Management Units (Argeş, Dâmboviţa, Prahova and Buzău);
- ***Argeş-Ialomiţa-Siret*** branch, based in Brăila, divided into five Administration Units (North Brăila, Brăila Sud, Great Brăila Island, Ialomiţa and Călăraşi).

The areas equipped with land reclamation works analyzed by Subcommittee no. 3 are as follows (Table 3).

Table 3

Land reclamation facilities in Olt-Dunăre-Siret area

- ha -

Territorial branch ANIF	Irrigations (107 systems) net area	Drainage (153 systems) net area	Soil erosion control (79 works)	Flood protection >850 km
Olt-Argeș	679.939 (45%)	330.761 (31%)	11.365 (6,5%)	116.965 (34%)
Argeş-Buzău	126.017 (9%)	250.292 (23%)	163.157 (93,3%)	1.812 (0,5%)
Argeş-Ialomiţa-Siret	690.899 (46%)	488.773 (46%)	339 (0,3%)	224.360 (65,5%)
TOTAL	*1.496.855 (100%)*	*1.069.826 (100 %)*	*174.861 (100%)*	*343.137 (100%)*

The subcommittee no. 3's speaker, researcher, designer at the time of the inquiry, university professor, happens to be an old acquantaince of the author and collaborator in some studies on the cost of water at different pumping stages (heights) in one of the largest irrigation systems in the country "*Carasu*" from Constanța County. In the introduction of the analysis, the subcommittee mentions the rapid evolution of the facilities in this area, including, in particular, the Danube Floodplain and the lower course of the river where over 418 thousand hectares have been drained in order to extend the irrigated arable area (5).

Table 3 shows that there were about 33,000 ha in the area in 1977, and in 2004 an area of 1456700 ha was set up (46% of the total irrigated area in Romania), out of which 14,448,8 ha were placed in gravitationally fed hydrotechnical systems. These are located in the counties of Buzău, Dâmbovița, Ilfov, Argeș and Prahova. Therefore, only 10% of the area is gravitationally fed, for the remaining 90% (water is pumped against any economic concept from the Danube at great distances on three terraces with three pumping stages that can exceed the height of 270 m (3).) Subcommittee 3's report appreciates as a performance of that time the fact that in a relatively short time about one and a half million hectares have been equipped for irrigation.

In fact, the speed at which the so-called national irrigation system has been built has increased rapidly since 1965, when N. Ceaușescu practically led the state. In 1965, only 230,000 ha were set up in Romania, accounting for just over 2% of the country's arable land area, which means that in only 24 years 3 million hectares have been set up for irrigation, with over 120 thousand hectares per year on average (7).

According to the operative records of the builders, in some years the setting up of over 200 thousand ha was being reported. The price of this performance was reflected during the exploitation period when the technical and economic design parameters were not reached even by 50% (7).

The Danube was targeted as a safe source of water for more than ¾ of the irrigation systems in Romania, invoking the dry character of the area, the purpose for which the entire string of lakes and ponds on the left bank of the Danube was previously drained, including the two main premises Balta Brăilei and Balta Borcei, amounting together about 1300 thousand hectares. This is shown in Table 3, in the Argeş-Ialomiţa-Siret area, where over 70% of the irrigation facilities were built on previously drained land (in fact the two categories of works were carried out simultaneously).

In the irrigation field, the subcommittee lists the main causes for which systems are only used to a limited extent, namely at a utilization rate of 9.5%, compared to a minimum of 70%, the proportion that would make the irrigation systems become cost-effective. These causes could be:

- lack of necessary watering equipment;
- lack of sprinklers required to move 18-22 hours / day watering facilities;
- lack of self-propelled watering installations (of linear, pivot-center, drum and hose type);
- failure to complete delivery / receipt protocols on unidentified owner (non-eligible) areas;
- the high value of the annual fees for maintenance and reparation;
- the high value of water delivery fees depending on the pumping stage, the source, etc.

Due to these and other unspecified causes, not even the area for which water user organizations have been set up is being irrigated, and even these are constituted only for an area representing 34% of what could be irrigated. Specifically, the water delivery fee for irrigations depends on:

- Source water pumping height at the point of delivery for the OUAI organization;
- Running capacity of the pumping stations, which is below 60%, due to wear;
- Reduced efficiency of water transport in the supply network, which can reach below 30% due to reduced water demand;
- The utilization rate of the set up area is very low (below 20%) according to the tables;
- Irrigation rules reduced below the required average size (1,800-2,055 m^3 / ha).

The dependence of the water supply fee on the stage of pumping, respectively the pumping height makes the fee between the pumping at the first stage of 38 lei / 1,000 cubic meters to increase to 267 lei / 1,000 cm per second stage and to 1,000 lei / cm per the third stage, that is over

26 times (Pietreni system, Galați County); in other irrigation systems it reached 1,800 lei / 1,000 cm.

Regarding the state of land reclamation facilities it differs from one system to another and from one type of facility to another. For example, for drainage facilities, if 77% of the area is maintenance-friendly, on the rest of the surface, the drainage canals are not properly maintained due to both the lack of money and of the staff.

In the anti-erosion facilities, a degradation of the administrative works is noted, claiming the lack of money, of the human resource, but also of the specific equipment. In the flood protection facilities, respetively the dams, which measure 1.158 km on the Danube, maintaining under control the infiltrations through these bodies is being endeavoured. The floods in 2006 were a test of their effectiveness. In some areas, the dams gave in and the respective sites were flooded, in other cases artificially breaking the dams and flooding of the respective enclosures were necessary.

Returning to the subject of irrigations, subcommittee no. 3 considers that the drainage of the Danube Floodplain and the equipment for agriculture within an irrigated system are justified by the superior fertility of the lands and by the results of the research units in the area. In fact, the harvests obtained during the exploitation phase of the works were far lower than the design and research data (7).

Regarding the legislative and institutional evolution of the land reclamation sector, the report draws a comparison between the situation prior to 1990 and post-1990, finding the former much more complete and rational, and, as was the case for the other three subcommittees, it blames Law 138/2004, whose provisions greatly damaged the sector. The report ends with a detailed analysis of the staff, considering that the ratio between the indirectly productive administrative staff and the directly productive staff, in a smaller number, is a mistake.

3.7. Subcommittee No. 4's findings from the Parliamentary Commission of Inquiry on the irrigation systems situation, as well as other land reclamation sectors

The Report of Subcommittee no.4 of inquiry differs from the previous ones since its expert and rapporteur had participated starting with 1990 in commissions of inquiry to many analyses of land reclamation works. As a researcher at the Institute of Agrarian Economy of the Agricultural and Forestry Academy, he had done his own studies and analyses regarding the evolution of land reclamation works, as well as their behavior in the exploitation phase in all aspects, including their technical and economic performance. In addition, since 1991 he participated in joint teams, on the part of Romania, with foreign firms that carried out rehabilitation studies of land reclamation works in Romania. We consider that all of these can contribute to understanding the findings and proposals of the 2009 parliamentary inquiry.

The area of inquiry of Subcommittee no. 4 includes the ANIF branches:

- Dobrudja, with Constanța and Tulcea counties and three administration units: Tulcea, Constanța North and Constanța South.
- Moldova South, with Galaţi, Vrancea, Vaslui and Bacău counties and five administrative units: Galaţi South, Vrancea, Bacău, Vaslui and Galaţi North.
- Moldova North, with Iaşi, Botoşani, Suceava and Neamţ counties and four administrative units: Iaşi, Botoşani, Suceava, Neamţ.

Table 4

Areas set up with land reclamation works
in the branches of ANIF Moldova South, Moldova North and Dobrudja

Branch	Irrigations	Drainage	Soil erosion control	Embankments
Moldova South	222.098	168.151	638.009	31.206
Moldova North	76.438	107.555	310.810	7.613
Dobrudja	582.508	52.127	91.651	45.756
T o t a l	***881.044***	***327.833***	***1.040.470***	***84.575***

Source:

According to the reports submitted by the three branches, they manage the following facilities capacities, expressed in terms of areas (Table 4). The data source for the irrigation facilities (agricultural area) are Romania’s statistical yearbooks, and for the drainage and CES facilities - the departmental statistics, as for these categories of works there are not even to this day data approved by the official statistical system.

The facilities for the maintenance and exploitation of the areas mentioned in Table 4 are represented by infrastructure works, equipment installations and works of art, specific to each category of works. In terms of the share of the four categories of facilities, the branches differ significantly :

- irrigation facilities are dominant in Dobrudja, where hydro-ameliorative facilities twice exceed the set up areas in the other two branches;
- drainage facilities are dominant in Moldova North and Moldova South branches;
- anti-erosion facilities in Moldova North branch occupy a larger set up area than the other two branches together;
- embankments have the highest share in Dobrudja and Moldova South.

Table 5

Areas equipped for land reclamation works on counties in Moldova and Dobrudja

County	Irrigations ha	Drainage ha	Soil erosion control ha
Bacău	24042	3623	108786
Botoşani	23684	10541	9514
Constanţa	430247	15491	35889
Galaţi	145116	59218	161220
Iaşi	52950	47512	127671
Neamţ	9496	11131	36397
Suceava	3864	48698	83192
Tulcea	159881	32790	56612
Vaslui	30401	41186	177120
Vrancea	37384	54174	51898
T o t a l	*917065*	*324364*	*933896*

Source: ISPIF Bulletin, year II/1992

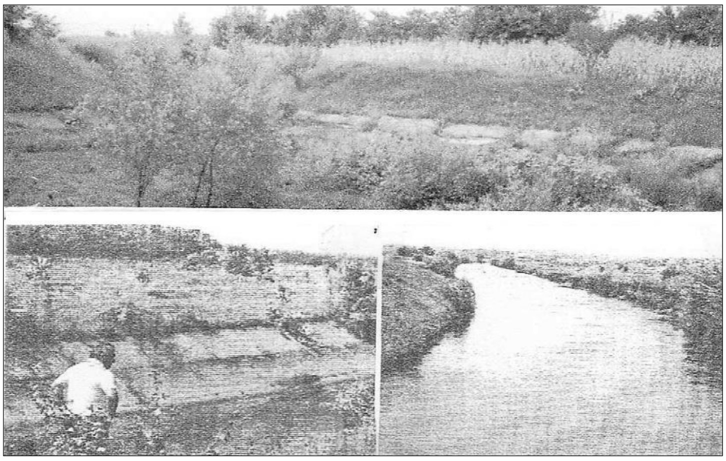
We note that the figures included in the table differ, with some exceptions (in the case of irrigations - from Romania's statistical yearbook for the end of 1989, and in the case of drainage and erosion control - from data published by the Land Reclamation Department. In fact, the parliamentary inquiry takes place almost 20 years after the data considered official at the end of 1989.

We find interesting the fact that the two Dobrudja counties of Constanţa and Tulcea hold about 2/3 of the area set up for irrigation for the entire eight counties analyzed by subcommittee no.3. This happens although at least the southern part of Moldova has the same degree of aridity as Dobrudja.

3.8. The state of land reclamation works in Dobrudja and Moldova

The 2009 parliamentary inquiry is willy-nilly a *photograph taken* of the situation during the period in which it was made, but what has been noticed is the consequence of a past period that influenced in many ways the state seen and recorded in 2009. This past period is variable from one work to another, which does not result from the findings of the inquiry.

At the beginning of subcommittee no.4's report we mentioned that its rapporteur, A. Lup, is an old researcher in the field of land reclamation at a national level and some of the information and data he possesses can explain many of the findings made by the parliamentary commission in 2009, not only regarding the status of the land reclamation works, but also the mode of exploitation, including technical and economic results obtained on lands



Source: Author’s archive

Figure 1. The main penstock for the irrigation system Carasu-South Constanţa county (100 thousand ha) in 2009 (up) and in 1991 (down)

equipped for reclamation works.

Subcommittee no. 4 finds, similarly to the previous three committees, a state of degradation of the works' infrastructure. In most cases, degradation is due to exploitation and maintenance, but also in most cases some deficiencies arise from their construction or set up.

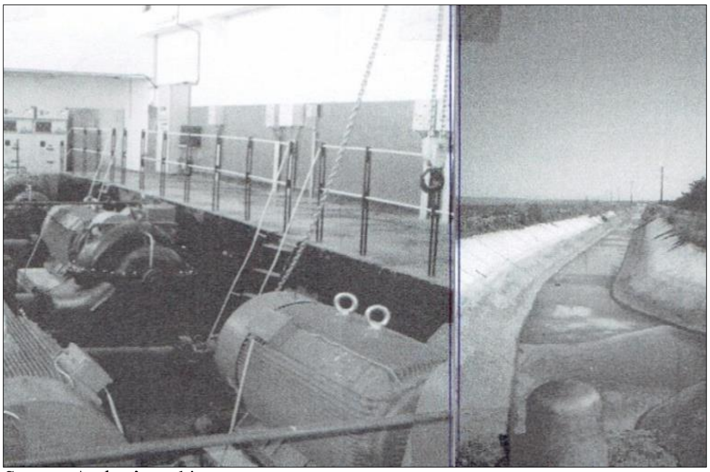
As an example, we present the case of the main penstock and irrigation system Carasu in Constanța county. The parliamentary commission of inquiry finds it in 2009 dry and abandoned (up), but in 1991 it was full and provided water for an area of over 100 thousand hectares, only it was not lined since its construction and it operated in this manner for 20 years with a water loss of 30-60% (1990 Report). Or the base pumping station of the same system, one of the most powerful in Europe (fig. 2). In 2009, it was (and still is) preserved, it can be turned on, only that the yield does not correspond to the figures in the catalog (11).

Source: Author's archive

Figure 2. Base pumping station of the Caras-South irrigation system in conservation

In the Moldova South branch, out of the 259 irrigation pumping stations 64% are functional, 28% are not and 8% require rehabilitation. In the Moldova North branch, out of 175 pumping stations 10.4% are functional, 64.8% not, and 24.8% require rehabilitation. In the North Moldova branch, out of the 175 irrigation pumping stations 10.4% are functional,64.8% are non-functional and 24.8% require rehabilitation.

In Dobrudja, only 5.8% of the irrigation pumping stations are functional, 52.4% are not, and 41.8% require rehabilitation. In all cases, that is in all three branches of Dobrudja, Moldova South and Moldova North, comprising an area of 860 thousand hectares equipped for irrigation, the distribution network requires rehabilitation in proportion of over 90%. As a consequence, the inquiry reveals some works for the rehabilitation of the pumping stations and irrigation water distribution network (Figure 3).



Source: Author's archive

Figure 3. Rehabilitation works of a pumping station and a water distribution channel in the Carasu system Constanța county

Before 1990, when major reclamation systems were built, a special attention was given to irrigations compared to combating excess moisture or erosion, unless the latter two were constituent parts of the irrigation facilities, or even overtook them, as was the case in the Danube Floodplain, where the lands to be set up for irrigation were first drained. The report of the 1990 governmental commission expressly mentioned the priority given to irrigations: *The works have been carried out since 1966, at unreasonable rhythms, in the last 15 years, in particular the extension of the irrigated areas has been pursued*. The priority given to irrigations was also reflected in the volume of expenditures incurred for their exploitation. In 1992, for example, for the 461.4 thousand ha irrigated, 12470 thousand lei were spent, returning 27025 lei / ha, for 3058 ha drainage 3455 thousand lei were spent, returning 1130 lei / ha (almost 24 times less), and for 1795 thousand ha of anti-erosion facilities, 297.5 thousand lei were spent, returning only 166 lei / ha, that is over 162 times less than for irrigations, which did not prevent the managers of the RAIF subsidiaries (Autonomous Land Reclamation Authority at that time) to complain about the lack of funds. It is no surprise, thus, that in 2009 the parliamentary commission of inquiry would come across drainage stations as shown in Figure 4 or drainage channels as those in Figure 5.

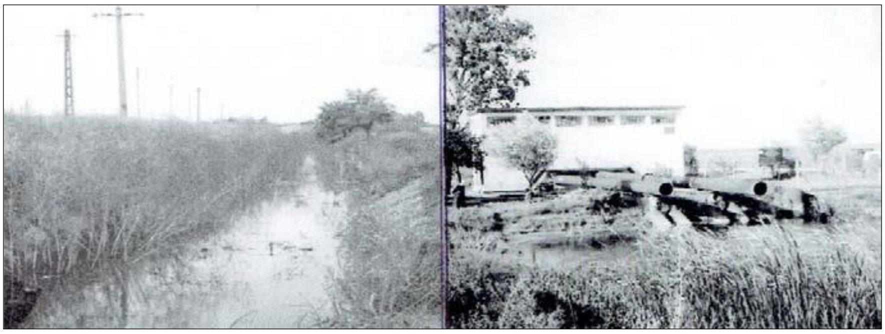


Figure 4. Drainage channel in the Carasu complex of Constanța county and the Hârșova drainage station in Constanța county (Author's archive)

Figure 5. Drainage channel in Iași county, non-lined (2009) (Author's archive)

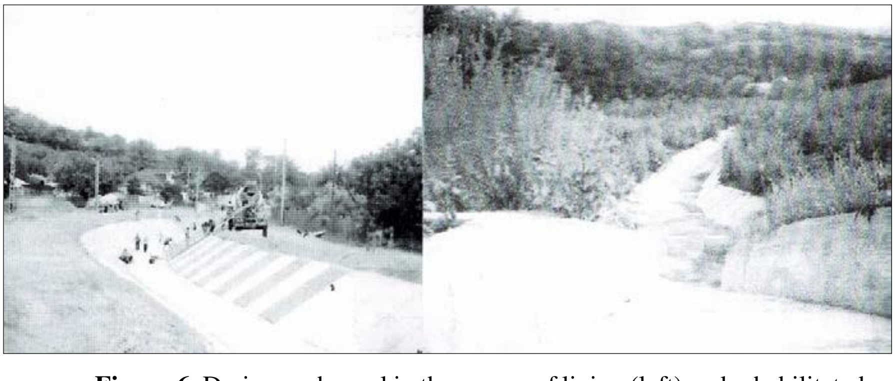


Figure 6. Drainage channel in the course of lining (left) and rehabilitated coastal channel (right) in Iași county (2009) (Author's archive)

In 2009, members of the commission of inquiry noted an intense activity of rehabilitation of land reclamation works. In the images of Figure 6, on the left side a drainage channel is being lined, and on the right a coastal channel was just lined in order to collect rainwater and prevent soil erosion.

3.9. Exploitation of the irrigation systems during the analyzed period

Table 6

Set up areas, functioning areas, and areas on which OUAI was established (2009)

Branch	Functioning areas - ha	Functioning areas total - ha	Share of functioning areas %
Moldova South	93.250	207.136	45,0
Moldova North	12.026	76.439	15,7
Dobrudja	162.391	582.508	27,9
T o t a l	***267.667***	***866.083***	***30,9***

Source: 16

The data centralized in Table 6 show that the share of functional areas, meaning irrigable, of the total surface area is 45.0% in Moldova South branch, 15.78% in the Moldova North branch and 27.9% in Dobrudja, the average of subcommittee no.4 being 30.9%. On the other hand, OUAI were established on areas that differ from the areas assessed as functional, as follows:

- 71,302 ha: 75.6% in Moldova South branch
- 1,395 ha: 11,6% in Moldova North branch
- 24,597 ha: 15,5% in Dobrudja branch

The areas on which the OUAI were established were not fully surrendered to the latter, but only in a proportion of:

- 82.6% in Moldova South branch
- 15.7% in Moldova North branch
- 27.8% in Dobrudja branch
- 66.2% average of subcommittee 4

Areas irrigated during 2006-2009. In the 2006-2009 period, the area contracted by the beneficiaries increased in all three branches: 186.4% in Moldova South branch, 8.7 times in Moldova North branch, 163.8% in Dobrudja, the average of the three branches being 185.0%. In contrast, the actual irrigated area was much lower than the contracted area and variable from one year to the next (Tables 7-9).

Table 7

Areas contracted during 2006-2009

Branch	2006	2007	2008	2009
Moldova South	42.425	81.525	108.800	121.521
Moldova North	420	3.608	3.546	3.660
Dobrudja	14.202	41.260	36.364	37.470
Total	***57.047***	***126.393***	***148.710***	***162.651***

Source:16

Table 8

Irrigated areas (watering I) during 2006-2009

Branch	2006	2007	2008	2009
Moldova South	16.570	49.055	32.642	40.661
Moldova North	106	2.444	1.295	1.814
Dobrudja	4.281	27.012	13.819	18.415
Total	***20.957***	***78.511***	***47.756***	***60.890***

Source:16

Table 9

Share of areas actually irrigated, compared to those contracted during 2006-2009

Branch	2006	2007	2008	2009
Moldova South	39,1	60,2	30,0	33,5
Moldova North	25,2	67,7	36,5	49,6
Dobrudja	30,1	65,5	38,0	49,1
Total	***36,7***	***62,1***	***32,1***	***37,4***

Source: 16

In 2006, 39.1% of the contracted area in Moldova South branch was actually irrigated; 25.2% - Moldova North; 30.1% - Dobrudja, with an average of 36.7% on the entire analyzed area. In 2007, an area over two times larger than in 2006 was contracted, and an almost four times larger area was irrigated, which is explainable by the severe drought that year. In 2008, although an area almost 18% larger than in 2007 was contacted, a 40% smaller area was actually irrigated than in the previous year. In 2009, both contracted and actually irrigated areas increased, but the difference compared to the functional areas, thus, irrigable, is huge. On the entire analyzed area, only slightly more than a fifth of the irrigable areas were irrigated in 2009.

We note that although the actual watering situation in 2009 is dated at the beginning of July, it is conclusive, because for the 2007-2008 agricultural year, even if new areas appeared after this date, they are insignificant in the assessment of the phenomenon. Comparing the actual irrigated areas with those for which watering equipment is available shows that there was less irrigation actually done than it would have been possible with the existing equipment, with 4,164 ha in Moldova South branch, 501 ha in Moldova North branch, and 25,450 ha in Dobrudja. On the entire area, the actual irrigated area in 2009 was 30.115 ha more than what could have been irrigated with the existing equipment. However, this area is still much smaller than the contracted area, resulting in a significant shortage of watering equipment.

It is estimated that one of the reasons for which irrigation is reduced is the shortage of watering equipment. For the patrimony area on the entire analyzed area, the share covered by irrigation equipment is 11.2%, and for the subsidiaries - 3.0% for Moldova South, 20.1% for Moldova North and 8.8% for Dobrudja. In contrast, for the OUAI established areas, the situation is somewhat better, 32.7% for the entire area, 21.7% for Moldova South, 27.2% for Moldova North and 42.3% for Dobrudja.

3.10. The extention of land reclamation works in the the second half of the 20th century

Table 10

The evolution of irrigation facilities, compared to the works of embankment-drainage and soil erosion control

- thousand ha -

Years	Irrigations	Embankments	Drainage	Soil erosion control
1944	-	622,2	358,0	-
1950	42,0	642,0	368,1	2,0
1955	93,1	668,8	404,4	9,4
1960	199,6	827,1	505,7	100,0
1965	229,9	856,7	587,0	197,5
1970	731,3	1331,9	1111,4	435,3
1975	1474,2	1455,2	1965,5	983,1
1980	2301,0	1545,0	2462,5	1609,7
1985	2956,3	-	2948,8	2095,5
1990	3187,8	-	2959,3	2134,5
1995	3211,0	-	3199,5	2208,2

Source: DGEIFCA, Romania's Statistical Yearbooks

Throughout the paper, we have stated that the 2009 parliamentary inquiry was one of the most extensive both in terms of duration, and due to field trips and the actual view of the status of different categories of works across the entire country.

We have also stated that subcommittee no.4's report would be much broader, including a series of additional data prior to the inquiry, but contributing to a better understanding of the state of the facilities in 2009. However, in 2009 the inquiry repeats - in an extensive form, regardless - numerous analyses, discussions, symposiums, conferences on land reclamation, and especially on irrigations, considered one of the main problems of Romania's agriculture. And, also as in previous analyses, the inquiry has as its subject the legacy left by the totalitarian communist regime at the end of 1989.

How did the pro-communist regime, installed on March 6, 1945, have the necessary resources, this is another story that will have to be written in an economic history of the Romanian agriculture of this period. We note that in the first 20 years of governance, 1945-1965, the achievements in this field are modest: 230 thousand ha of irrigations, 587 thousand ha - drainage and only 197,5 thousand ha - soil erosion control. Although at least in the case of irrigations following the model of the Soviet Union, the first program launched in 1950 (8) would be called the "*Electrification Plan*", as about 300 thousand ha of agricultural land would be irrigated from the reservoir of the hydro-electric plant to be built. (The hydro-electric plant was built, but no hectare has ever been irrigated from the Bicaz reservoir. A change would happen in 1965, when N. Ceausescu would lead the Communist Party and Romania.

The creation of facilities would continue, at a cracking pace we could say, in some years more than 250 thousand ha being reported to be operational. Unhappy even with this rhythm, in 1983 the Great National Assembly (the Parliament of Romania of that time) elaborated and approved the most ambitious program of land reclamation that would largely solve the requirements in the field assessed by the experts of that time.

The provisions of this program had to reach the following figures at the end of 1989: 5500 thousand ha of irrigations; 5530 thousand ha of drainage (including combating excess humidity) and 5300 thousand ha of soil erosion control works (Table 11) and it was called "*The National Program for ensuring safe and stable agricultural productions by increasing the productive potential of the land, better organizing and unitary use of agricultural land, of the entire area of the country, performing irrigations on approx. 55-60% of the arable land, drainage and soil erosion control works*" (9).

Table 11

The 1983 program's provisions

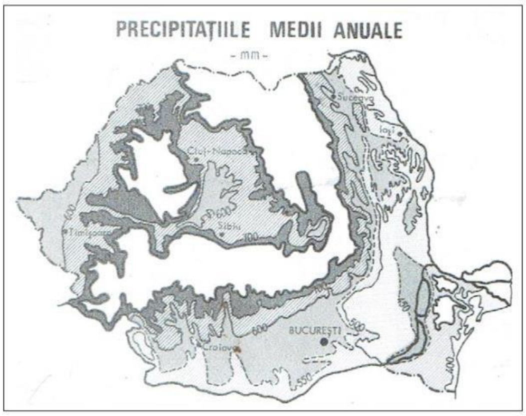
\- thousand ha -

Action	Area to be set up (potential)	Set up area at 31 dec.1982	Area left to be set up
Facilities for irrigations	5500	2380	3120
Drainage	5530	2576	2954
Soil erosion control	5300	1718	3582

Source: DGEIFCA data and Romania's statistical yearbooks

The text of the program explicitly states that it was elaborated *according to the guidelines and instructions of comrade Nicolae Ceaușescu*. As at the end of 1982, 2380 thousand ha were equipped for irrigations, 2576 thousand ha for drainage and 1718 thousand ha for anti-erosion works, what would be set up in the next 6-7 years surpassed everything that had been set up throughout the entire history of land reclamation in Romania. Moreover, the program stipulated that by the end of 1985, the counties of Constanța, Tulcea and the Ilfov agricultural sector would be fully equipped for irrigations, and in the counties Maramureș, Satu Mare, Sălaj, Bihor, Arad, Timiş, Caraș-Severin and Braşov the entire area with excess moisture would be drained.

A special case would be Dobrudja which, unlike the plain on the left bank of the Danube, consists of a sum of plateaux. Without achieving the program's provisions, the arable land was set up in 82.4% of Constanța county and 54.8% of Tulcea county (7). And the water pumping heights, respectively the energy consumption for this pumping 916 kWh / 1000 cm of water in Constanța county and 1207.3 kWh / 1000 cm in Tulcea county exceeded more than 2 times the country average of 484 kWh / 1000 cm.



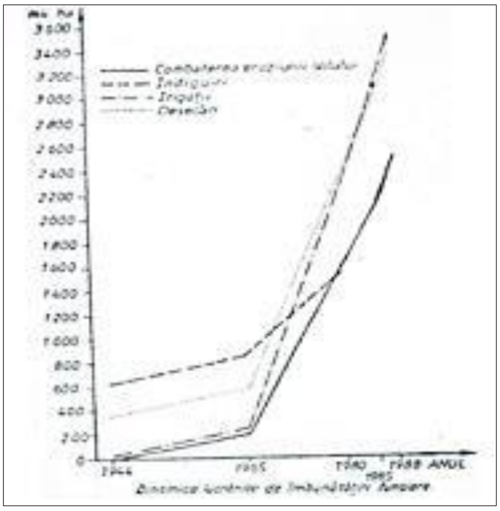
Source: 4

Figure 7. Territorial distribution of annual average rainfall in Romania

The explanation lies in the aridity of the most severe area, as results from the line linking the lowest rainfall points 400 mm annually (fig.7), but also the insistence of a local chief of state agriculture and deputy minister of agriculture at that time.

The program launched in 1983 was not implemented, at the end of the year 3109 thousand ha were equipped for irrigations (56.5% of the program), 3085 thousand ha for drainage (55.8% of the program) and 2222 thousand ha for anti-erosion works (41.9% % of the program). After 1989, state policy on land reclamation focused on the rehabilitation of areas set up till that date, both due to wear and degradation of the works' infrastructure, and especially due to the low level of completion of the works even during the period in which they were done.

The governmental commission for the analysis and solving of problems related to land reclamation works (the author of the present paper was a member of this commission) explains thus the quality of the hydro-ameliorative facilities and especially the speed with which they were carried out (fig.8).



Source: IGEFCOT

Figure 8. The extention of land reclamation works (1944-1988)

The works have been carried out since 1966 at unreasonable rhythms, in the last 15 years in particular the expansion of irrigated surfaces was pursued, in some cases abandoning technical requirements in design and execution and environmental protection requirements. About 40% of the irrigation channels are not lined, water losses reaching 30-60%, the pumping aggregate yield is below the catalog values, the watering equipment has a low reliability, others are technically outdated (11).

After 1983 little was set up, only 729 thousand ha of irrigations instead of 2380 thousand ha, 509 thousand ha of drainage instead of 2954 thousand ha and 504 thousand hectares instead of 3582 thousand hectares of anti-erosion works, on the whole 1742 thousand ha instead of 8916 thousand ha, that is over five times less. In fact, in 1981 Romania would become insolvent, and N. Ceaușescu's ambition to liquidate external debts would put agriculture to the test and the population of Romania would suffer deprivations of all kinds.

Not only due to speed, but also to lack of financial resources parts or essential components such as automation, water volume measurement, drainage, water recirculation system were abandoned. All this would negatively impact on the technical and economic performance during the exploitation phase.

The fall of the communist-totalitarian regime at the end of 1989 stopped the program from 1983, the level reached as we have shown before being 3109 thousand ha of irrigations, 3085 thousand ha - drainage and 2222 thousand ha - anti-erosion works, figures that would constitute after 1990 subjects of studies, inquiries, rehabilitation projects. The program of 1983 also contains figures spread out on counties, and the achievements are also known (table 12).

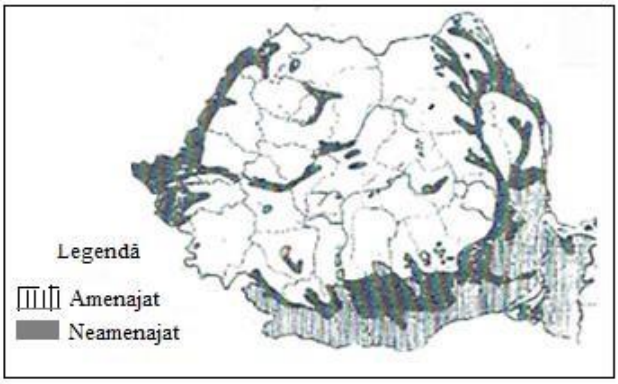
Table 12

Irrigated areas in the years 2007, 2008 and 2009, compared to the surface set up in 1989

County	Set up in 1989	Irrigated			County	Set up in 1989	Irrigated		
		2007	2008	2009			2007	2008	2009
1	*2*	*3*	*4*	*5*	**6**	**7**	**8**	**9**	**10**
Total country	***3167262***	***319998***	***257666***	***287999***	Harghita	305	0	0	0
Alba	4676	0	0	0	Hunedoara	9652	0	0	0
Arad	29130	1721	2625	3539	Ialomița	203238	26699	22192	33199
Argeş	35083	641	0	20	Iaşi	52950	2241	1259	1463
Bacău	24042	1296	420	709	Maramureş	330	0	0	0
Bihor	12851	0	0	0	Mehedinți	79878	0	0	0
Bistrița-Năsăud	23684	300	36	575	Mureş	3466	0	0	0
Botoşani	2653	0	0	0	Neamț	9496	0	0	0
Braşov	379579	111776	90307	109670	Olt	178161	8908	9286	8727
Brăila	31500	2113	1541	1172	Prahova	17782	238	111	16
Buzău	445	0	0	0	Satu Mare	7180	0	0	0
Caraş-Severin	371961	48025	19648	23918	Sălaj	1160	0	0	0
Călăraşi	10721	0	0	0	Sibiu	2700	0	0	0
Cluj	430247	9306	6382	6281	Suceava	3864	0	0	0
Constanța	4789	993	961	1296	Teleorman	241514	11439	6033	9019
Covasna	38272	0	0	0	Timiş	15379	0	64	64
Dâmbovița	316625	29949	56015	21557	Tulcea	159881	17538	7437	16156
Dolj	145116	43266	30518	39352	Vaslui	30401	414	1404	5303
Galați	1336	0	0	3853	Vâlcea	11697	0	0	0
Giurgiu	0	0	0	0	Vrancea	37384	1020	1360	2040
Gorj	0	0	0	0	Mun.Bucureşti	62490	0	0	0

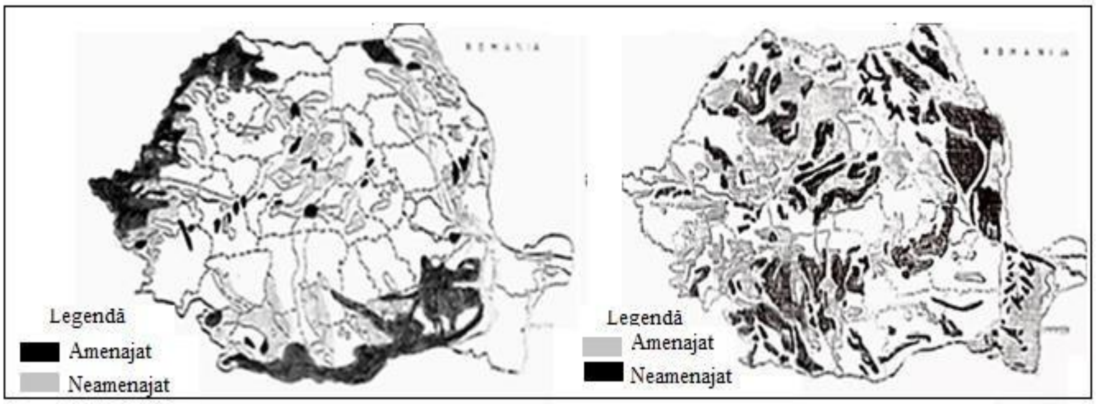
Source: DGEIFCA

The data presented in Table 12 show that from the ANIF's patrimony area, namely 3167,3 thousand ha, in 2007 320 thousand ha (10,1%) were irrigated, in 2008 258 thousand ha (8,1%) were irrigated, and in 2009 288 thousand ha (9.1%) were irrigated, the average on the three years being 9.1%. On the other hand, the reporting of the irrigated area to the three million hectares inherited from the communist-totalitarian regime in 1989 is purely formal because with all the rehabilitation programs (within one of these, ANIF aimed to rehabilitate 2,2 million hectares by 2007, and even 3 million hectares by 2011), ANIF reports in 2009 an area of 2998 thousand hectares set up in the entire country, out of which only 1535 thousand ha viable (51.2%). In relation to the viable area, the share of the actually irrigated area in the analyzed period would double, that is 18.2%, still being too little. From the same table we can see that in 16 counties, comprising 206814 ha set up during the analyzed period, no hectare was irrigated, and for some of these the respective subcommittees propose scrapping.Figures 9-10 show the territorial location of the three categories of land reclamation: irrigations, drainage and soil erosion control.



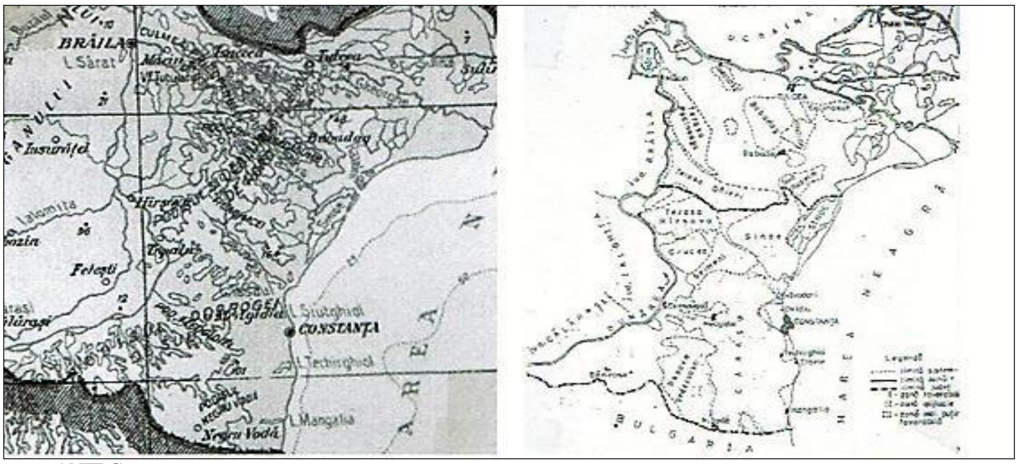
Source: DIF-ANIF
Figure 10. Lands affected by drought in Romania and the degree of set up at the end of 1989

The set up and not set up lands mean in figures the provisions of the program of 1883, that is 5500 thousand ha of irrigations, 5350 thousand ha of drainage and 5300 thousand ha of anti-erosion works, and the lands which according to the legends on the maps are set up represent the achievements up till the end of 1989, the not set up ones represent the difference from the 1983 program’s provisions.



Source: DGEIFCA
Figure 9. Lands with excess moisture (left) and eroded lands (right)

The case of Dobrudja. In the history of anti-drought facilities in Romania, Dobrudja is a special case. The province was equipped for irrigations in a similar large proportion to the plain counties of the Danube Floodplain, although the relief of the province is far from being flat - in fact it is true that the whole province is a sum of low plateaux (fig. 11), but less suitable for large set ups. For example, Constanța county was set up in a proportion of over 82% comparable to the Calarași plain county (86%), and Tulcea county with Măcinului Mountains was set up in a proportion of almost 55% comparable to Ialomiţa county (54%). The main argument for this economic policy decision was the drought, but also the reference to the recommendation of Romanian agronomist savant Ion Ionescu de la Brad to the sultan of the Ottoman Empire following his trip to Dobrudja in 1850, when Dobrudja was still a part of the empire. Here is the so-called recommendation of Ion Ionescu: *Plants suffer more from lack of water than of nutrition. This country's main flaw lies in the lack of water, so on an environment of plenty, cheap water depends the entire improvement of this country's agriculture.* Even if the Danube had provided plenty of water it would not have been cheaper as we will see in the following pages.



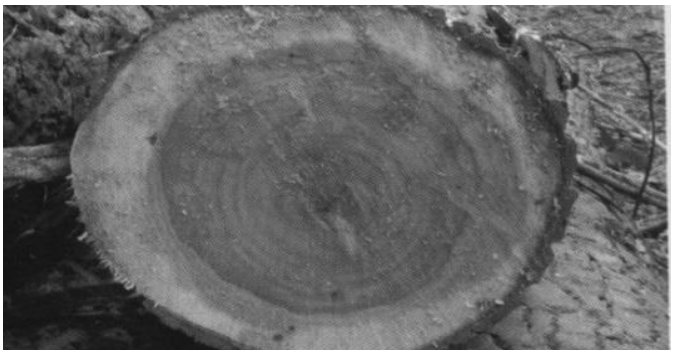
Source: ANIF Constanța

Figure 11. The relief of Dobrudja compared to the plain - also cleared- on the left of the Danube

The solution for a lot of cheap water would have been the forest, only the empire had cleared Dobrudja, a fact confirmed by a resident of Dobrudja of that time: *An old Tartar made a rather fair climate observation: Nowadays, the villages in Dobrudja are only established where there are water springs, but if there are no more villages, that proves that the springs have dried up, and we know that springs do not dry up where large forests stand (6).* And in Dobrudja there are no longer forests. The Ottoman Empire, both prior to the visit of Ion Ionescu de la Brad, but also afterwards, and then the Romanian railway constructors continued taking care to compensate the province.

At present the share of forests within the total area is 5.5% in Constanța county, 11.2% in Tulcea county and 8.6% in Dobrudja. Nor are there forests in the Danube Floodplain: Dolj county 10.9%, Olt county 10.9%; Teleorman county 5.1%; Giurgiu county 10.7%; Călărași county 4.2% and Ialomița 5.8%, knowing that the minimum share of the forest in any territory is 20.0%. In Dobrudja, in order not to disturb the future network of irrigation channels, even the curtains for forest protection were cleared.

Figure 12. Hill tops with up to date rocks suitable for afforestation in Tulcea county (Author's archive)



Source:5

Figure 13. The quality of Euramerican poplar trunks from the floodplain area of the Danube, suitable for superior use

In the report of ANIF's Dobrudja branch it is stated that in Dobrudja the main activity is irrigation, although in the province there are still over 100 thousand ha of little productive pastures and hill tops with up to date rocks as in figure 12.

Afforestation of these areas would improve the rainfall regime and we would have *a lot of cheap water* as required by Ion Ionescu de la Brad in 1850. The situation is similar in the Danube Floodplain.

The Danube Floodplain and the Danube Delta.

Unlike Dobrudja, both the floodplain of the Danube and the Danube Delta were relatively well afforested, did not suffer from drought and were also flat. Here, the very forests and excess water were hindering their transformation into high productivity agricultural lands. The fact that the Danube Delta was a public property, and the floodplain of the Danube had long before been owned by the state constituted premises favorable to their transformation into cultivated lands of the state. To this end, by a decision of the Council of Ministers (signed by Prime Minister Ion Gheorghe Maurer at that time) since 1962, about 300,000 hectares were to be drained, in order to be protected by the periodic or annual floods of the river (10). Over a length of more than 1100 km a non-submerged dam was built, and behind it, on the drained lands large state-owned agricultural enterprises were constituted.

The forests were cleared - 43 thousand ha. The ponds were drained, over 50 thousand ha (5). Thus, from a damp environment, the floodplain of the Danube became a dry environment which, in order to be cultivated, had to be imperatively irrigated. More than 100 water pumping stations for irrigation have been built along the Danube, and as many for drainage due to infiltrations through the dam (5). In the Danube Delta, also, nearly half of its area was to be drained - more than 200 thousand ha. A single enclosure of about 30,000 ha was drained.

Source: 5

Figure 14. Euramerican poplar logs for rotary cutting, obtained from the floodplain area

3.11. Analysis of the Land Reclamation Works of 1990

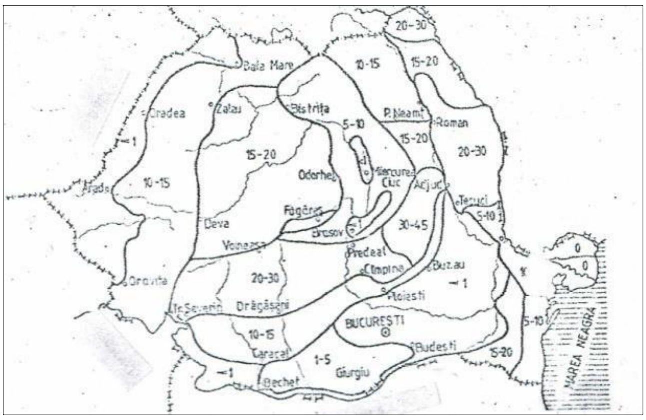
At the end of 1989, when the totalitarian-communist regime fell, the program of 1983 in the field of land reclamation was in full swing, with the known areas (5500 thousand ha -irrigations, 5530 thousand ha - drainage, 5300 thousand hectares - soil erosion control). At that time, more than half of the program's provisions for irrigation and drainage and about 40% of anti-erosion facilities were implemented. The fall of the dictatorial political regime was the beginning of the transition to the market economy in which the financial resources were to be distributed according to the principles of market economy, so investments in land reclamation works that accounted for over 1/3 of the total investments in the country were questioned. However, not only the investments, but also the human resource involved in this field, about 85 thousand people from research, design, constructions. Through the branch syndicate and the leadership of the respective institutions, their representatives addressed the state power institutions: the Government, the Senate, the Chamber of Deputies, asking for clarification regarding their future fate.

In response to these requests, the Prime Minister (Petre Roman, at that time) appointed a *Commission for the analysis and resolution of the problems related to land reclamation works.* Made up of specialists in the field representing the relevant ministry, specialized university education, profile research, state agriculture as the main beneficiary, the commission had two months to draft a report with the proposed solutions (11).

In the first part of the works, the commission composed of seven members, including the author of the present paper, compiled an inventory of the works: 705 objectives (actually, work sites) classified by type of work: irrigation, drainage, soil erosion control, and at the same time by execution phases, as follows:

- works to be finalized in 1991;
- works sealed for preservation;
- works with a minimum volume of works proposed for completion;
- works completely shut down (45 irrigation objectives, 36 drainage works and 1245 soil erosion control facilities).

Also in the first part of the report after the enunciation of the patrimony: 3188 thousand ha - irrigations, 3036 thousand ha - drainage, 2263 thousand ha - anti-erosion works, appraisals are made about the necessity of the works (11). The report furthermore justifies the need for each category of work. The drought is first: *it affects more than 3 million hectares in 7 out of 10 years,*



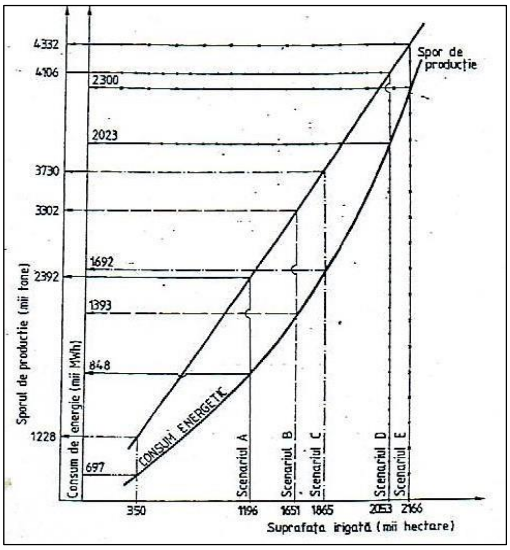
Source: 11

Figure 14. Zoning of annual soil losses due to erosion

the humidity deficit reaching 80% of the planet's water supply demand in July-August, leading to harvest losses of up to 50%, excess moisture which, especially during rainy years, occupies an area of over 3 million hectares in the meadows of the inner rivers and of the Danube and in the western part of the country, at present, excess moisture has also appeared on some irrigated surfaces without drainage works; soil erosion, which is the most serious phenomenon, affecting more than 40% of the agricultural area with disastrous effects, annually there are losses of more than 150 million tons of soil, reaching 50 tonnes / ha / year while the soil recovery capacity is 2- 6 tonnes / ha / year (Figure 15).

The agricultural production is drastically reduced annually, the reservoirs are clogging (on Argeș and Olt some reservoirs have become deltas), highways, roads, bridges are becoming depreciated, landslides happen. These cloggings act alongside the ecological imbalance produced by the anthropic factor. The exaggerated cutting of forests and the abolition of forest curtains have led to an increase in the desertification of entire areas from the south of the country to the Moldova plateau. Erosions in the hillock areas have increased, especially in Vrancea and Buzău counties, and in Dobrudja.

About the land erosion control works, considered the most necessary, the report of the governmental commission states that they have been lagging behind, not being exploited or maintained properly (11). The commission continues to be concerned about the areas that could be irrigated in 1992. This is after recognizing that: *the soil erosion control facilities, the most needed in the land reclamation complex, have been lagging behind... (11).* Then a technical analysis and of efficiency elements in the use of existing facilities is performed. It is considered that *out of the approx. 3.2 million hectares approx. 823 thousand ha cannot be used in 1984 primarily due to the lack of watering installations, as well as due to excessive water loss...* (11).



Source: 11

Figure 15. The graphic of the relationship between production growth, energy consumption and area equipped for irrigations

For an area of 2,380 million hectares the energy consumption and the possible production growth were determined (fig.16). The area of 350 thousand ha from Constanțacountyisnotincluded (from 4302 thousand ha, that is 81,4%), with specific energy consumption of over 2000 kWh / ha. The production growth considered - 2000 kg / ha of cereal equivalent.

In fact, according to another ISPIF study, from an area of 1332 thousand hectares, comprising the main irrigation systems in Romania, 405 thousand hectares with high energy consumption (over 2,100 kWh / ha), respectively 30% belong exclusively to Constanța county.

An analysis of all irrigation systems in Romania places them among the largest energy consumers. The same government commission report from the beginning of 1990 classifies irrigation systems in Romania according to the energy required for water pumping at 1000 cm and per hectare (tab.13), a classification which shows that 17.4% of the areas belonging to the systems of irrigation in Romania require an energy consumption of more than 700 kWh / 1000 cm of water and 2000 kWh / ha. Energy consumption, in its turn, is determined by two other characteristics of the irrigation systems in Romania, the size and height of water pumping.

According to a scale in which irrigation systems larger than 500 ha are *large systems*, practically everything that has been set up in Romania belongs to the *giant* domain. From a classification on this criterion results the following:

- 4 systems larger than 100000 ha;
- 13 systems with sizes between 50000 and 100000 ha;
- 18 new systems between 25,000 and 50000;
- 29 systems between 10000 - 25000 ha and 39 systems with an average of 5018 ha, the country average being of 28144 ha (7).

Table 13

The need for electric energy for irrigations in 1990, per 1000 cm of water and per hectare, differentiated by pumping steps

Pumping levels kWh		Area -ha-	Share of total area (%)
at 1000 m^3 water	Per hectare		
300	774	719135	23,5
400	1032	0	27,2
500	1290	570703	18,6
600	1548	118399	3,8
700	1806	291414	9,5
800	2064	157186	5,1
900	2322	112199	3,6
1000	2580	66965	2,2
1100	2838	36667	1,2
1200	3096	25362	0,8
1300	3354	36351	1,2
1400	3612	9194	0,3
1500	3878	12525	0,4
> 1500		32797	1,1
40*		45528	1,5
483,9		*3062024*	

Source: 11

As far as the water pumping height is concerned, the irrigation systems in Romania are also among those with the highest heights and distances, especially due to the choice of the Danube as the main source of water and, to a certain extent, to the size of the systems requiring very large transport distances. Almost everywhere in the world irrigations are done from water accumulations from dams on water sources upstream of irrigated surfaces, for example, the dam from the mouth of Rhône in France (fig.17).

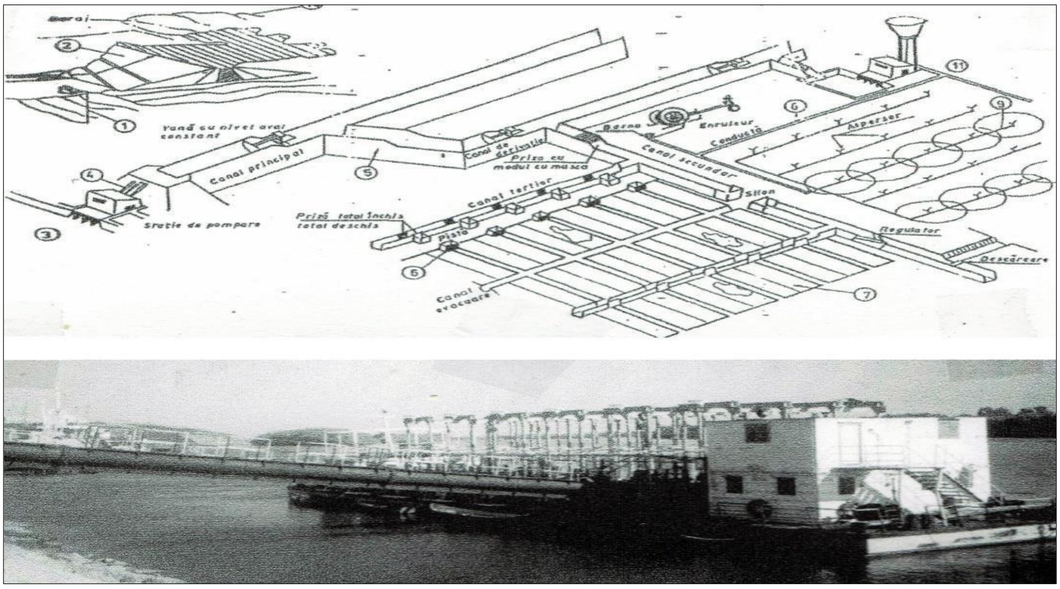


Figure 16 The scheme of the dam on Rhône-France and the downstream irrigated land (up, source 1) and the floating base station of the irrigation system Hârșova, Constanța county pumping water upstream (down, Author's Archive)

The 1990 Governmental Commission hoped that in 1991 an area of 2380 thousand ha would be irrigated, for which all calculations, including energy consumption, were made. In fact, in 1991 only 192 thousand ha were irrigated, that is over 12 times less.

In conclusion, the 1990 governmental commission considers that land reclamation works need to be extended in view of their economic efficiency, but taking into account environmental protection. For irrigations it proposed to continue the works at the Siret-Bărăgan Channel, the Olt-Argeş branch, the Moldavian plateau and the Covurlui Plain.

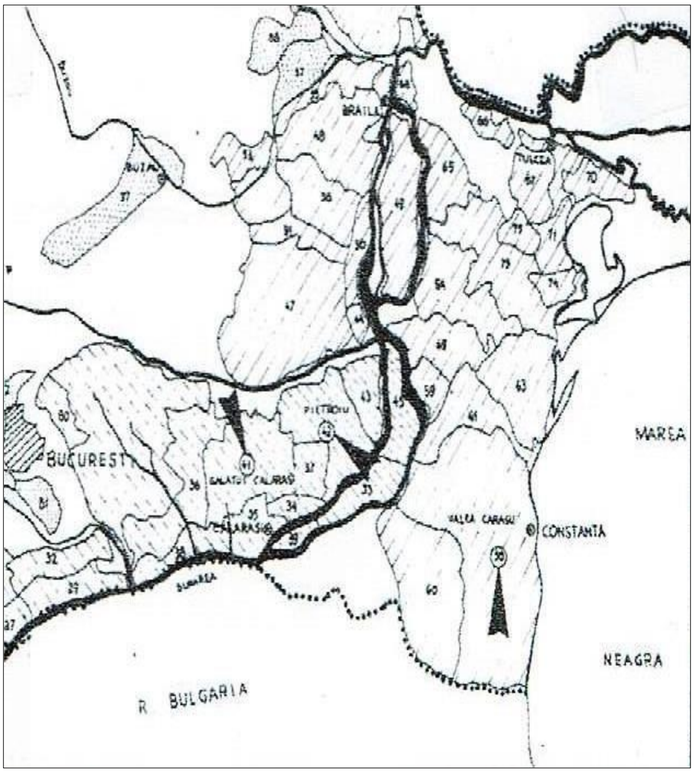
Combating erosion is a priority in the counties of Vrancea, Buzău, Vaslui, Iaşi, Argeş, Vâlcea, taking into account the fact that soil losses are irrecoverable. The expenditures for the three categories of works were also calculated for 1991: irrigations 3.7-9.9 billion lei; drainage 0.8 billion

billion lei and soil erosion control 0.45 billion lei. Per objectives, totaling over 750, the commission selected 212 objectives worth 0.68 billion lei to be finalized in 1991; the continuation of the works on another 230 objectives amounting to 2.7 billion lei (11).

3.12. Studies and projects for the rehabilitation of land reclamation works after 1990

At the beginning of the previous chapter we stated that only the areas set up at the end of 1989 were taken into consideration, without taking into account a continuation of the program of 1983, which provided 5500 thousand ha for irrigation, 5530 thousand ha - drainage and 5300 thousand ha - anti- erosional facilities, although the figures for the 1983 program were foreseen by certain governments, but for a distant future.

The issue then was the use of existing facilities at the end of 1989, and the governmental commission set up in December 1990 proposed and called on the government to fund the existing works that were considered viable. Still, in 1990, began the collaborations with foreign firms specialized in rehabilitation studies of irrigation systems or complex works such as irrigations, drainage, erosion. The first of these was a collaboration with France (fig.18).



Source: 12

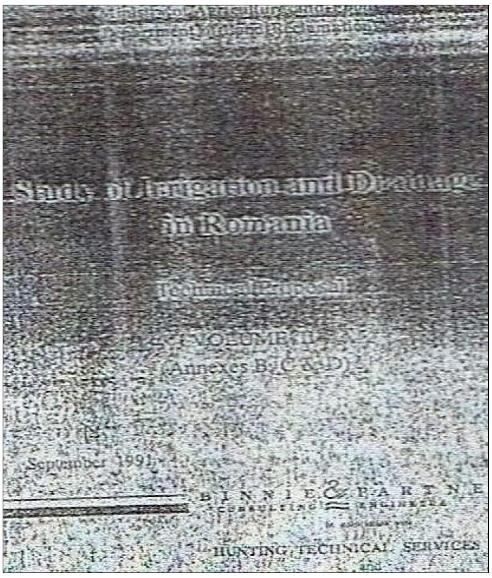
Figure 17. Location of the Carasu irrigation systems in Constanța county, Gălățui and Pietroiu, Călăraşi county

The project Rehabilitation of the Pietroiu and Gălățui in Călărași county and Carasu in Constanța county irrigation perimeters (12). Based on a collaboration protocol between ISPIF-SA Romania and BRL (Bas Rhône Languedoc company-France), it was agreed to jointly develop a study of *Rehabilitation of Carasu irrigation systems, Constanta county 200,000 ha; Pietroiu-Ștefan cel Mare 55,000 ha and Gălățui 85,000 ha Călărași county* on the basis of a non-reimbursable loan from the French state to cover the expenses incurred by BRL.

The study was carried out between the autumn of 1990 and the summer of 1992 with the investments: 3100 USD / ha for the Carasu system; 2867 USD / ha for the Gălăţui system and 2798 USD / ha for the Pietroiu-Ştefan cel Mare system. Finally, an additional net value of 400-455 USD / ha was calculated outside the water price which would be partially subsidized by the state in the coming years. The following percentages of internal profitability for a 45-year period ensued:

Instalment	Pietroiu	Gălățui	Carasu*	Carasu (total)
1	12	10	10	7,5
1+2	10	8,5	8,5	6,5
1+2+3	8	7	6	5,5
1+2+3+4	8,5	7	7	7
1+2+3+4+5	8	7	6	6,5

*) Only for the lower parts. (The author of this paper was part of the ISPIF Romania team and contributed to the economic completion of the study)



Source: 13

Figure 19. Cover of the study *Irrigation and Drainage in Romania*

The next one was the Irrigation and Drainage Study in Romania (13). It was developed by a team from BINNIE-PARTNER and HUNTING TECHNICALSERVICES LTD companies in the UK and ISPIF Bucharest. The aim of the study was to provide the Ministry of Agriculture and Food with investment plans for the rehabilitation and modernization of the irrigation and drainage sectors. It took place between September 1992 and July 1994, being the most extensive in this area for the first years since the political decision to adopt the principles of market economy. Unlike the previous study *The rehabilitation of the Pietroiu, Gălăţui, Carasu irrigation perimeters,* with a total area of 340 thousand ha, the new project would analyze for almost two years (22 months) the entire surface set up with hydro-ameliorative systems, which at this date amounted to more than 3100 thousand ha, out of which a large part is located on drained lands, especially in the Danube Floodplain and with excess moisture (fig.19). A total of 104 hydro-ameliorative systems would be analyzed, out of which an area of 1361 thousand hectares would be selected, for which a rehabilitation program and a 10-year investment plan (1994-2004) had been prepared (fig.20).

Source: 15

Figure 20. Location of hydro-ameliorative facilities in Romania

One of the constructive features that had great influence on the operating costs was (still is) the water pumping height. The synthesis report would highlight: *A large part of the irrigation systems are located at heights higher than the water source. There are situations in which the systems were executed to irrigate lands located more than two hundred meters above the water source, so that the energy requirements for pumping, repumping and putting under pressure for sprinkler irrigation were considerable* (13). In fact, the height of water pumping from the source would be one criterion for excluding from irrigations some set up areas. English specialists analyzed all of the 104 irrigation systems in terms of energy consumption. Finally, an area of nearly 3000 thousand ha was grouped by energy consumption per set up hectare into four groups, as follows:

- low energy consumption …….. 0-700 kwh/ha 292838 ha …. 10.0%
- ,, ,, ,, medium ……. 700-1400 ,, 838180 ha …. 28,6%
- ,, ,, ,, medium-high …1400-2100 ,, 1409927 ha ….48,2%
- ,, ,, ,, high ……..over2100 ,, 385989ha…13,2%

Total …………………………………………….. 2926934 ha ... 100,0%

It is worth noting that of the area of 385989 ha with consumption of over 2100 kwh / ha, 379173 ha representing 98.2%, are in Dobrudja, and the rest of 6816 ha (1.8%) are in Moldova. The consumption of electricity for water pumping is directly related to the pumping height, and a classification of the areas where the economic viability is directly related to the water pumping height (tab.14) has also been drafted (tab.14).

Concerning the group of irrigation systems with the highest energy consumption totaling 385989 ha, 379173 (98.2%) are in Dobrudja and 329412 (85.3%) are in Constanța county. For Romanian specialists, however, the selection criterion for hydro-ameliorative set up was not energy consumption, but the degree of aridity of the area, a criterion that at that time also influenced political decision.

Table 14
Economic viability of the area equipped for irrigations according to the geodetic height (Hg) towards the water level of the source

Hg(m)	Set up area (million ha)	Economic viability
0-10	0,50	Exceptional
10-30	0,25	Very good
30-45	0,25	Good
45-55	0,25	Satisfactory
55-65	0,25	Satisfactory/ unsatisfactory
65-90	0,60	Unsatisfactory
>90	1,00	Disastrous

Source: 13

The Study *Irrigation and Drainage in Romania would come* to the following conclusion in connection with the technological upgrade of irrigation systems: *The following areas would be maintained or developed for the implementation of irrigations within the ten-year program:*

- *the 1361000 ha area with viable irrigation facilities (45 systems or parts thereof) would be rehabilitated);*
- *depending on the efficiency of the irrigation, an area of 203,000 ha in the Danube Floodplain would be maintained;*
- *after studying in detail, another 172000 ha, which are currently equipped for irrigations, and which would prove viable, can be rehabilitated (13).*

Thus, the maximum area on which irrigations could develop in Romania would be of about 1736 thousand ha. In the field of institutional and political implications, the study recommends:

- correlating rehabilitation works with the evolution of ownership and exploitation structures;
- deterring the application of irrigations if they are not viable. This fact is essential in minimizing subsidy costs;
- the progressive withdrawal of Government's involvement in the management of exploitation activities;
- establishment of commercially-based organizations responsible for the efficient provision of irrigation services and the recovery of exploitation and maintenance costs;
- implementing a policy of progressively reducing irrigation subsidies and liberalizing the price of water as a way of balancing supply and demand, as well as directing investments towards economically efficient areas (13).

We recall that according to this study the maximum area that irrigated agriculture in Romania could be practiced under conditions of economic efficiency would be of about 1700 thousand hectares, and the rest of over 1,300 thousand ha would return to the non-irrigated agriculture system, but with optimal technologies. Though in the view of the Romanian specialists, represented especially by the designers and constructors of the more than 3 million set up hectares, the surface had to be rehabilitated entirely at the end of 1989, that is 3 million hectares and even more.

Subsequently, Romanian specialists reproached to the study that the selection of the 1361 thousand ha proposed for rehabilitation as viable under the conditions of the market economy was made on a single criterion, the specific consumption of electric energy per hectare depending directly on the pumping height. Subsequent studies using several criteria would, however, select approximately the same areas of about 1.5 million hectares and also in locations with low pumping heights.

Feasibility study of the Irrigation Project Rugineşti-Pufeşti-Panciu, Vrancea county. The study was conducted by Japan's *Japan International Cooperation Agency* (14). With a view to reaching 5.5 million hectares of irrigated land by the end of 1989, in 1985 started the works on what would be called *the Siret-Bărăgan Channel Project*, which was to unite the accumulation on the Siret River from Călimăneşti Vrancea county with Dridu lake Ialomiţa county. The channel, about 200 km long, crossed the driest area in southern Moldova and Bărăgan, and would provide the water source for irrigations for an area between 500 and 700 thousand hectares.

Compared to most irrigation systems in Romania where water was pumped bottom-up with high electricity consumption, in this case the energy consumption would be minimal, most of which only needed for water pressurization in watering equipment. The objectives of the study were as follows:

- increasing production on irrigated crops in order to meet national food requirements;
- increasing the export of agricultural products;
- encouraging the farming system in small, private agricultural units, including individual farmers and family associations;
- developing and / or maintaining irrigated agriculture where it is viable;
- promoting a free market economy in the agricultural sector and reducing the Government's direct role in financing agriculture.

The location of the study in this area - the northern end of the Siret-Bărăgan Channel Project (Figure 21) had the reasoning that, on a length of 5.7 km from the channel's direction itself, the construction works were completed. The project also includes a study on soil conservation, bearing in mind that there were vineyards in the area on sloping land. An area of 22300 ha set up in the Rugineşti-Panciu area in Vrancea county was studied, out of which 9700 ha eroded and requiring soil conservation measures.

Resultsofthestudy. The choice of location for the study in the area, as well as its location recommends it as a pilot unit for the conditions in Romania, where over 2/3 of the agricultural area is subject to erosion. Apart from the problem of soil erosion, the study also includes other issues: economic and social problems of the rural communities (exploitation anf property of the land, livestock, trade, credits and agriculture funding, etc.).

In the second part of the study the project itself is described and quantified: investments, exploitation costs, economic efficiency indicators and, finally, the socio-economic assessment of the multifunctional environment.

Table 15

Financial effects of the study's implementation

- Monetary unit: 10^3 $ SUA -

Article	With project	Without project	Growth	
			value	%
Gross production value	64071	11763	52308	544,7
Production costs	17767	4036	13710	381,6
Net production value	46305	7707	38598	600,8

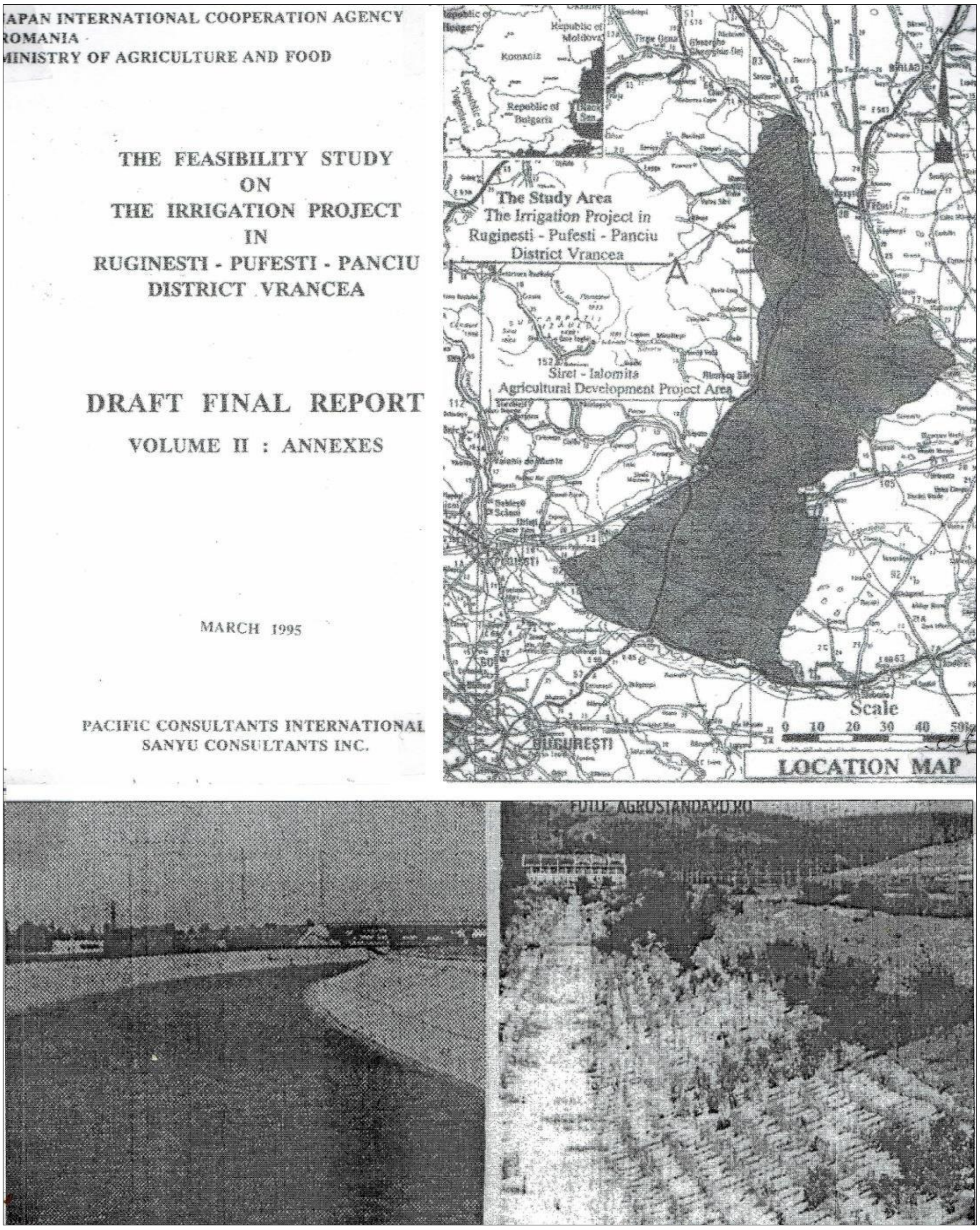
Source: 14

Data presented in Table 15 show that a 5.4 times increase in value production and 3.8 times in costs results in a net production value of more than 6 times. And the last recommendation: *Emergency implementation of the project*.

Ten years after the Japanese study, *Evenimentul Zilei* newspaper (06.01.2012) headlines:

The channel that beats the drought and brings yachts to Bărăgan. The same newspaper also says that by 2012 135 million euros would have been invested in this project.

The Siret-Bărăgan channel project has always been in the attention of the competent authorities without much progress, as shown in the program presented in Table 16.



Source: 14

Figure 18. The JICA study and its location (the shaded part) of the proposed area
to be irrigated from the channel (up); The channel built on a length of 5.7 km (left, the newspaper *Evenimentul zilei* of 06.01.2012) and the image of the same channel in 2015 (right, newspaper *Evenimentul zilei* of 15.05.2015)

Table 16

PROGRAM
to make new irrigation installations with the Siret-Bărăgan main channel source stage I (up to 50 km) in order to reduce the exploitation expenses due to the reduction of electricity expenses for the operation of the pumping stations

Set up	The area to be set up ha	Estimated costs - thousands of lei				
		2009	2010	2011	2012	2013
Rugineşti-Pufeşti –Panciu, judeţ Vrancea	22295	100000	100000	100000	0	0

Investment Strategy in the Irrigation Sector (15). It was the last extensive field study - known by the author and adapted to the principles of market economy. During 2007-2008, a DHV Netherlands (Fidman Merk-at) consortium conducted an economic analysis of the irrigation sector, a component of the Irrigation Sector Rehabilitation and Reform Project titled *The Investment StrategyintheIrrigationSector*, which we continue to outline below.

The total set up area of 2,933 thousand hectares was studied and analyzed in terms of financial viability - financial benefit / cost ratio B/CF and economic benefit / cost ratio B/CE. Following these criteria, the 2933 thousand ha were grouped into two *viable* categories (including the marginally viable ones that became viable after rehabilitation), 1502 thousand ha (50.1%) non-viable and 1,431 thousand ha (49.9%). This is the numerical result of this analysis, accounting for about 550 system positions and parts of irrigation systems *Classification of ANIF systems according to the opportunity of Viable / Non-viable investments*. In this case as well as in the analysis carried out by the BINNIE team from UK - which came 15 years ago to similar results 1300-1700 thousand ha suitable for rehabilitation - the water pumping height was a major criterion in the assessment of viability, as shown by the irrigation systems in Dobrudja, which are non-viable in a proportion of over 90%.

Finally, an area of 1482,060 ha was recommended to be included in the investment plan. As the authors consider that the tehnological upgrade of an area of nearly 1.5 million hectares is a long-term problem, another selection is made based on a set of criteria, including the areas actually irrigated in 2008 and 2009. Depending on all these criteria three scenarios were proposed, each of these materialized in a certain area for which the rehabilitation investment needed was assessed. For the three scenarios, the total investment is € 425,609 for scenario 1, € 646,301 for scenario 2, and € 1,141,484 for scenario 3, respectively € 1,627/ha, € 1,490/ha and € 1,366/ha for the three scenarios. The largest share belongs to the rehabilitation of the main infrastructure, that is the state.

- scenario 1: Maximum irrigated area in 2008-2009: 250,757 ha
- scenario 2: Maximum irrigated area in 2008-2009 for each system, but not less than 51% of the system: 433.723 ha;
- scenario 3: All viable area: 835,725 ha.

In order to establish the priority order, a number of criteria were selected:

a) *Crop structure* - 25 points for systems in which at least 60% of the area is cultivated with species suitable for irrigations and 0 points below the 30% limit. The list of plants suitable for irrigations would include: seed lots, vegetables, fruits, fodder, soy, sugar beet, maize, rice.

b) *Share of G.U. use* - 20 points for a degree of use of at least 70%, a point for a use rate of less than 20%.

c) *TL water supplier's delivery fee*. A score of 1 to 2 points calculated according to the share of the average fee for viable systems.

d) S*hare* of *OUAI and GW coverage* - 10 points for systems in which the main infrastructure serves at least 70% of the surface, and the secondary one is integrated and a point when the main section serves 0% of the interior design.

f) *Aridity Index* (IA) - 8 points for IA below 21 and one point for IA> 28.

g) *Protection curtains* - 7 points when the area is provided with at least 40% protection curtains and one point for a share over 10%.

The author considers this set of criteria in which only the last aridity index is a constant to be questionable. An *eligible* system to be rehabilitated according to this criterion, after a year may no longer meet the required score, but the investment cannot be undone. The system will continue to operate without meeting the financial or economic efficiency parameters.

The issue of crop structure is also questionable. The territorial distribution of different crops or groups of crops is subject to other criteria. In Romania there is such a work that all the research institutes of the Academy of Agricultural and Forestry Sciences have worked on for years, namely *The zoning of agricultural production by counties, 1980, 1985, 1990.*

The comparison with warmer Mediterranean countries and other agricultural structures also seems inappropriate. The privatization of the Danube Floodplain and the former Borcea and Brăila ponds is required by big commercial companies that produce for neither drought control nor for food security, but to maximize their own profits. The strategy only speaks of the rehabilitation of the irrigation infrastructure, however it is known that the entire area proposed for rehabilitation faces serious problems of excess humidity and erosion, reported since the early 1990s both in the French BRL team and the English firm BINNIE studies, in which the Romanian side collaborated through ISPIF.

3.13. Economic efficiency of land reclamation works

Irrigations. Governmental Commission from 1990 calculated a minimum increase of 2000 kg / ha grain equivalent except for Dobrudja and in particular of Constanța county with very high energy consumption.

Drainage. An average increase of 20% was taken into consideration and the works were considered efficient considering that for 50% of the set up areas discharging excess water is gravitational.

Soilerosioncontrol. In standard perimeters, production increase reach up to 100%, but the effects of Law 18/1991 destroyed most of the set up areas.

Overall, the economic efficiency of land reclamation works was minimal or even lacking, with multiple causes ranging from not finalizing projects to inappropriate exploitation. In the case of irrigations, energy was provided at 50% of the necessary, fertilizers, pesticides, watering equipments, as well. The concrete economic efficiency calculations were made for the period before 1990, both by the author and by the Economic Department of the Ministry of Agriculture.

Tables 17-18 show the average yields and expenditures on the main crops in the state agricultural enterprises trust of the in Constanța county. With the exception of wheat, maize, soy and sunflower recorded losses due to small yields per hectare.

Table 17

Cultivated area, average yields on physical ha and STAS and financial results obtained in some cultures by IAS in the Constanta county Trust in 1988

Cultivation	Cultivated area ha	Average production kg / ha		Income million lei	Production costs million lei	Financial results	
		physical	STAS			million lei	Return lei/ha
Wheat	36950	6645	3562	237451	158500	+78951	+2137
Maize	43655	9166	1738	117761	277841	-160080	-3667
Soy	11302	1147	542	23702	50822	-27120	-2400
Sunflower	15814	1324	1002	47145	68681	-21536	-1362

Source: Report of AGR 1 of the IAS Constanta Trust for 1988

Table 18

Economic efficiency of irrigated and non-irrigated crops (1986-1988)

Area	Average production kg/ha	Production value lei/ha	Costs lei/ha	Profit/ losses lei/ha	Average production kg/ha	Production value lei/ha	Costs lei/ha	Profit/ losses lei/ha
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Wheat				*Maize*			
I Total	2880	5243	4906	337	3656	5583	6520	-937
I Irrigated	3073	5592	5237	355	3816	5827	7005	-1178
Country average	*2957*	*5381*	*5244*	*137*	*3097*	*4728*	*5290*	*-562*
	Sunflower				*Soy*			
I Total	1621	5013	4461	552	764	2491	3894	-1403
I Irrigated	1603	4955	4584	371	765	2493	3982	-1489
Country average	*1652*	*5108*	*4589*	*519*	*983*	*3203*	*4271*	*-1068*
	Sugar beet				*Potato*			
I Total	22901	8683	10399	-1716	9717	9514	16718	-7204
I Irrigated	23909	9097	10852	-1755	10167	9884	17130	-7246
Country average	*19341*	*7761*	*8707*	*-946*	*13178*	*12391*	*15137*	*-2746*

Source: Romania's Statistical Yearbook 1990 and the Ministry of Agriculture and the Department of State Agriculture

At a zonal level the results are similar. Even in the area of maximum irrigation concentration – Dobrudja, the Danube Floodplain and the Romanian Plain - differences in yields between irrigated and non-irrigated are insignificant, however on irrigated lands the costs are much higher so that losses happen with the very crops suitable for irrigation: maize, soy, sugar beet, potatoes.

Table 19

The average yield obtained by some state-owned agricultural enterprises located on drained land

kg/ha

Specification	Average 1986-1988	
	Wheat	Maize
Dunăreni Dolj county (Bistreț)	3430	2819
Corabia Olt county (Potelu)	3015	5607
Zimnicele Teleoman county (Suhaia)	4614	2506
Prundu Giurgiu county (Greaca)	3087	3644
Făcăieni Ialomița county (Balta Borcei)	2148	2958
Great Brăila Island Brăila county	3317	3396
IAS Ialomița trust (average)	*3154*	*3637*
IAS Brăila trust (average)	*3252*	*3694*

Source: 7

Due to poor drainage and in the case of drained lands the yields are small, similar to the average of the agricultural enterprises trusts in the area (Table 19).

Non-submerged embankment for high water floods was inefficient in the case of dams' infiltration and since efficient drainage was provided only on about 5% of the area under cultivation in the Danube Floodplain, excess water from different sources negatively influenced the yields.

CONCLUSIONS

Romanian agricultural lands is affected on more than half of the surface by three factors with a major influence on the technical and economic performances of agriculture. These are: climatic, hydrological factors and orography or land relief. To combat their effect, studies and even concrete actions have been carried out over time: irrigation facilities, drainage and even anti-erosion works on a small scale however, with the exception of the Banat and west of the country of over one million hectares. In the first 20 years of the totalitarian-communist regime, the achievements in this field were modest: in 1965 230 thousand ha of irrigations were set up, 587 thousand ha - drainage and 198,000 ha - anti-erosion facilities. Since 1965, according to two consecutive programs, over 3 million ha of irrigation and drainage have been set up, but only 2,2 million hectares of anti-erosion works, although soil losses of about 150 million tonnes per year are irrecoverable.

After 1989, numerous studies and analyses of land reclamation works were carried out during the transition to market economy, including in collaboration with specialists from France, Great Britain, USA or Japan. In the studies conducted in collaboration with foreign teams, free water is not recommended, on the contrary, the progressive reduction of subsidies and the liberalization of the price of water are suggested in order to direct the investments to areas with low pumping heights, thus more economically efficient.

Contrary to these recommendations, projects such as the Siret-Bărăgan Channel are delayed indefinitely, absolute priority being given to the Danube Floodplain where the drought was artificially created by drainage, without the problem of excess humidity being solved.

Overall conclusion. The communist-totalitarian regime invested heavily in creating production capacities without providing the resources needed for rational exploitation. Hence the differences between the projected and the realized parameters.

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STATISTICAL ANALYSIS OF THE SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF RURAL AREAS IN ROMANIA AFTER EU ACCESSION

CIPRIAN IFTIMOAEI[1], IONUȚ CRISTIAN BACIU[2]

Abstract: *Today's socio-economic development leads to a dilution of the "border" between rural and urban areas, especially if we look at economically developed economies, members of the OECD and/or the most powerful economies in the world united in the G7. Technology and computerization of agriculture and related industries, urban-like living spaces, reducing disparities in quality of life between urban and urban have generated a lot of controversy around the concept of "rural space". In Romania, more than half of the population lives in rural areas above the EU average. The contribution of agriculture to GDP formation is only 4%, while the employed population in this sector is 25%. Romanian agriculture remains predominantly subsistence and large agricultural holdings administer the majority of agricultural land. External migration and migration to the urban environment have led to an aging population in rural areas. Rural areas well connected to utilities and transport infrastructure has a much greater chance of economic development. The proximity of rural settlements with large urban agglomerations is also an extra chance for rural development. Statistical analysis of the socio-demographic and economic characteristics of the Romanian rural area after the accession to the EU (2007-2017), based on the data provided by the National Institute of Statistics and EUROSTAT, complemented by a SWOT analysis will highlight recent trends and prospects on short-term rural development from a human resource perspective.*

Keywords: *statistical analysis, rural space, rural development, agriculture*

JEL Classification: *C10*

INTRODUCTION

Due to the broad use of the concept of rural space and to achieve the comparability of data at European level, three types of regions have been established at Union level since 2010 based on a population grid and total population analysis: predominantly rural regions (rural population is over 50%), intermediate regions (20% to 50% of rural population) and predominantly urban areas (the rural population is below 20%). If a region is originally classified as predominantly rural, but it also includes a city with more than 200,000 inhabitants, whose share in the total regional population represents 25% of the total, then it becomes an intermediate region. Also, if an intermediate region includes a city with more than 500,000 inhabitants, which gives over 25% of the total population of the region, then it becomes a predominantly urban region.[3] According to this methodology, 53.8% of the Romanian population lives in predominantly rural areas, 33.1% in intermediate regions and 13.1% in predominantly urban areas. In other specialized papers (Kerekes, 2010), the rural economy and social area is divided into the following categories: peri-urban rural space (includes the area around the big cities, being a very dynamic area), intermediate rural space (the economic structure is dominated by agricultural activities) and peripheral rural space.

From an administrative point of view, Romania's territory is organized at NUTS 5 level in 320 localities (of which 103 municipalities - the most important cities) forming the urban area and 2,861 communes, which constitute the rural area, according to Law 350/2001 on Territorial Settlement and Urbanism and Law 351/2001 regarding the approval of the National Plan for Territorial Arrangement. In most of them, the communes are made up of several villages (with a total of 12,957 villages), which do not have administrative responsibilities. Cities and communes are grouped in counties (NUTS3 level), which have administrative functions. At present, the 42 counties are grouped in 8 development regions (NUTS2), which do not have administrative functions, with statistical and geographic functions only.

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[1] PhD., Deputy Executive Director, Iasi County Directorate of Statistics/Associate Lecturer, “Al. I. Cuza” University of Iasi, Faculty of Philosophy and Social-Political Sciences, Ciprian.Iftimoaei@iasi.insse.ro.
[2] PhD., Economic Statistics Office of Iasi County Directorate of Statistics, ionut.baciu@iasi.insse.ro.
[3] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Urban_rural_typology.

MATERIAL AND METHODS

In this study, we will make the forecast the evolution of the employment rate of the Romanian population in the agricultural sector through the autoregressive-moving-average processes (ARMA). Autoregressive patterns (AR) are characterized by the fact that the value of the variable Y at a time t depends on the previous values of the variable. A moving average process is a linear combination of residual terms.

The general formula of an autoregressive-medium moving model (ARMA) is the following:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \ldots + \beta_p Y_{t-p} + \varepsilon_t + \alpha_1 \varepsilon_{t-1} + \ldots + \alpha_q \varepsilon_{t-q},$$

where: **p** is the order of the autoregressive part, **q** is the order of the moving average and represents the term error.

The values of the analyzed variable (population occupancy rate in agriculture -%) are influenced by the last evolution of the phenomenon (the autoregressive component), and the shocks produced on the variable are quantified by the average mobile component. The data used are recorded annually for the 2007-2017 period, taken from the EUROSTAT database. The necessary steps for estimating an ARMA model are (Jemna, 2012): identifying the model type, estimating and testing the parameters, and making predictions based on the chosen model.

RESULTS AND DISCUSSIONS

Romania is distinguished from other EU Member States by the high share of the employed population in agriculture. According to Table 1, in 2017, 22.9% of the employed population was in the agricultural sector, compared to the EU average of 5%.

Table 1. The employment rate of the population in the agricultural sector (% of the total employed population) in the countries of the European Union and the share of agriculture in the Gross Domestic Product (% of GDP) in the countries of the European Union

Ţara	Year 2007		Year 2017	
	Employment Rate	Share in GDP	Employment Rate	Share in GDP
UK	1.4	0.6	1.1	0.5
Germany	2.3	0.7	1.3	0.6
Belgium	1.9	0.9	1.3	0.6
Estonia	4.8	3.0	3.9	2.5
Ireland	5.5	1.0	5.4	0.9
Greece	11.3	3	12.1	3.5
Cyprus	4.4	2	3.5	1.8
Latvia	10.2	3.3	7.5	3.4
Luxembourg	1.8	0.4	1	0.3
Netherlands	3.0	1.8	2.2	1.9
Austria	5.5	1.4	4.3	1.1
Malta	1.8	1.7	1.3	1.1
Slovenia	9.9	1.9	4.9	1.8
Croatia	12.4	4.1	7.5	3.3
Denmark	3.0	1.2	2.6	1.1
Lithuania	11.3	3.5	7.8	3.1
Sweden	2.2	1.4	1.9	1.1
France	3.5	1.6	2.9	1.5
Italy	4.0	1.9	3.9	1.9
Finland	4.5	2.4	3.9	2.3
Spain	4.5	2.4	4.1	2.6
UK	4.6	3.4	5.0	3.3
Germany	7.5	4.6	6.3	3.7
Belgium	11.8	2.0	6.8	1.9
Estonia	14.7	3.0	10.6	1.7
Ireland	4.2	3.6	2.9	3.3

Greece	3.6	2.0	2.9	2.2
Cyprus	**29.5**	**5.4**	**22.9**	**4.4**

Source: http://databank.worldbank.org/data//reports.aspx?source=2&Topic=1

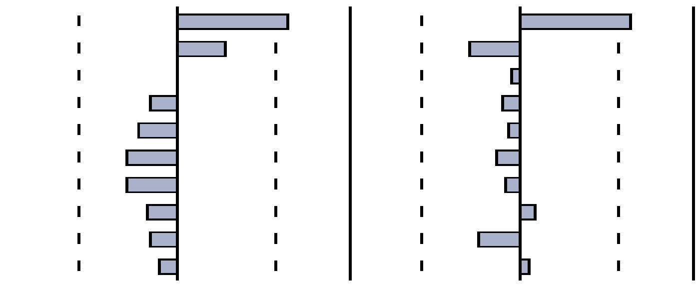
Even if there is a decrease of the employed population in agriculture compared to 2007, Romania is at a considerable distance from Greece and Poland, the following ranked countries. Although the employed population in agriculture has a high share, the contribution of the agricultural sector to GDP formation is low for Romania (4.4% in 2017). The explanation is that the agriculture practiced in Romania is subsistence, determined by the faulty use of production factors, the lack of involvement of the decision makers, the technically overbuilt infrastructure. Also, a high percentage (about 85%) of the agricultural labour force is non-salaried (working on the farms). Countries with a higher number of agricultural workers (Spain, Germany, France) also get the best return on agricultural production.

In the first quarter of 2007, according to the International Labour Office (ILO), the unemployment rate was at national level of 7.2%, in the urban area of 8.2%, and in the urinary environment by 5.9%. Unemployment in Romania declined significantly, so that in the first quarter of 2018 the unemployment rate according to ILO at the national level was 4.7%, in the urban area of 4.1% and in the rural area by 5.3%. The decrease of the unemployment is explained by the upward trend in economic growth in 2012 and the increased demand for labour.

In order to forecast the evolution of employment rate in agricultural sector, through autoregressive and medium moving processes, we need to identify the type of econometric model that we will estimate. Correlograms of autocorrelation and partial autocorrelation provide information about the evolution of the time series.

Table 2. Autocorrelation and partial autocorrelation functions of the population occupancy rate in the agricultural sector

Sample: 2007 2020
Included observations: 11



	AC	PAC	Q-Stat	Prob
1	0.669	0.669	6.4076	0.011
2	0.280	-0.305	7.6514	0.022
3	0.008	-0.065	7.6525	0.054
4	-0.162	-0.110	8.1856	0.085
5	-0.245	-0.081	9.6107	0.087
6	-0.296	-0.142	12.114	0.059
7	-0.302	-0.083	15.380	0.031
8	-0.185	0.091	17.005	0.030
9	-0.160	-0.257	18.825	0.027
10	-0.108	0.057	20.507	0.025

Source: E-views processing

According to Table 2, the autocorrelation function decreases abruptly to zero after the third term, anticipating an MA(3) process, and the value of the partial autocorrelation function drops to zero after the first term, indicating an AR(1) process. Based on the results obtained in the previous stage, we consider for our analysis several autoregressive and medium moving models. Using the Akaike, Schwarz, Hannan-Quinn information criteria, the model is chosen with minimal values.

Table 3. Values of the information criteria

	R^2	AIC	Schwarz	Hannan-Quinn
ARMA (1,1)	0.75	3.99	4.08	3.89
ARMA(1,2)	0.75	3.99	4.08	3.89
ARMA(2,1)	0.77	4.09	4.16	3.95
ARMA (1,3)	**0.9**	**3.05**	**3.14**	**2.95**

Source: E-views processing

According to the value of the information criteria and the determination ratio, we will choose the ARMA model (1,3). The order of the autoregressive component is p = 1, and the order of the moving average component is q = 3.

Table 4. ARMA Model Estimate (1,3)

Sample (adjusted): 2008 2017
Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4453.615	3251307.	0.001370	0.9989
AR(1)	1.000266	0.195137	5.125966	0.0014
MA(3)	-0.964320	0.130779	-7.373674	0.0002

R-squared	0.905452	Mean dependent var	27.70000
Adjusted R-squared	0.878438	S.D. dependent var	2.827248
S.E. of regression	0.985742	Akaike info criterion	3.052481
Sum squared resid	6.801815	Schwarz criterion	3.143257
Log likelihood	-12.26241	Hannan-Quinn criter.	2.952901
F-statistic	33.51806	Durbin-Watson stat	2.262860
Prob(F-statistic)	0.000260		

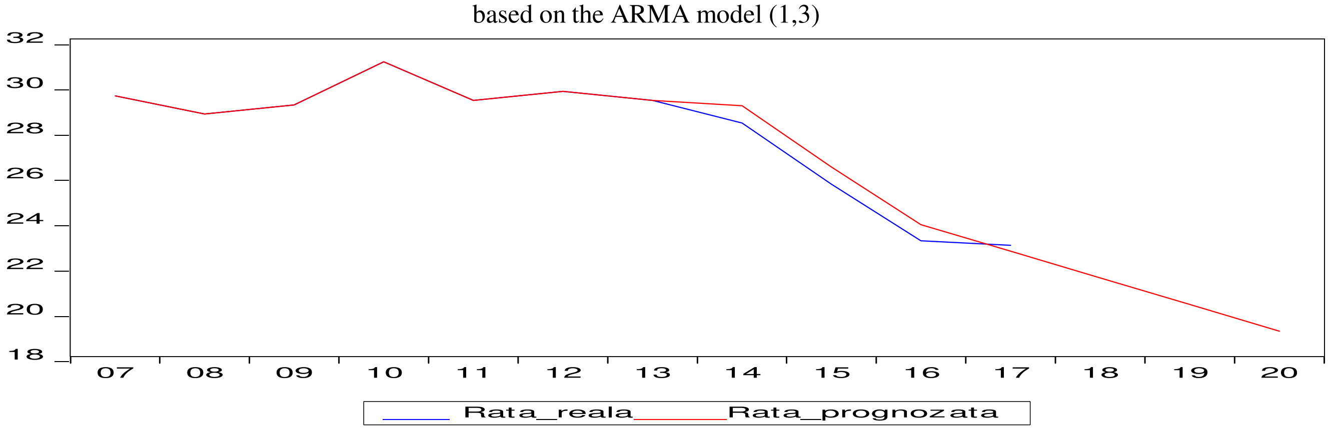
Source: E-views processing

The equation of the model is as follows:

$$\mathbf{Yt= Yt\text{-}1 + \varepsilon t - 0.964\varepsilon t\text{-}3}$$

According to Table 4, the coefficients of the model are significantly different from zero (the probability of the t-Student test is less than the significance threshold of 0.05). The constant term of model (C) was not included in the equation because it is not statistically significant. Based on the chosen model, we have made the forecast of the occupancy rate of the population in agriculture in Romania for the period 2018-2020.

Figure 1. The forecast of the evolution of the employment rate in agricultural sector for the period 2018-2020 based on the ARMA model (1,3)



Source: E-views processing

Figure 1 shows that the evolution of the agricultural employment rate in Romania for the period 2018-2020 will continue to decrease, reaching the projected value of 19.1% in 2020. The main limit of the ARMA models is the non-inclusion of the influence of the other factors determinants of the phenomenon analyzed. The prognosis of the time series is based only on the previous values of the studied variable.

In a modern economy that wants to align with EU standards, certain strategies need to be implemented by which part of the population working in agriculture is relocated to the industrial and services sector where there is a deficit and the contribution of these sectors to growth in the current context is significant. In Romania, after joining the EU, the share of those working in the services sector had an upward trend, reaching 46.3% in 2017 (the European average being 73.9%).

As far as the industry sector is concerned, the share of persons working in this field is 29.9% in 2017 in Romania, compared to the EU average of 21.6%. This gap is explained by the fact that in our country the labor cost is lower compared to the other EU member states.

The rural environment in Romania faces important socio-economic imbalances, many of which are consequences of the overall situation in the whole country. Rural areas have a considerable gap with urban areas in terms of economic development and social welfare. In Romania, the prosperity is polarized around the big cities of the county (Bucharest, Cluj-Napoca, Timisoara, Iasi, Constanta, Oradea, Sibiu, etc.) and their metropolitan areas.

Romania is characterized by a high percentage of the rural population (about 46%) compared to other EU countries (the EU average is 28.5%). At the time of Romania's accession to the EU on 1 January 2007, the resident (stable) population of the country was 21130503 inhabitants, of which 9413931 resided in rural areas, representing 44.56%. After more than a decade of European integration, on 1 January 2018, the country's stable population dropped to 19523621, of which 9025562 were resident in the countryside, accounting for 46.23%. Compared to 2007, the stable rural population declined by 4.12%, amid the intensification of external migration, rural-urban migration and declining fertility. These factors also led to an increase in the aging of the rural population, relative to the urban population (Rotariu, 2012). On 1 January 2007, the stable rural population (65 years and over) in the rural area represented 18.64% of the total rural population, and on 1 January 2018 the rural population increased to 20.25% of the total rural population. We therefore see an increase in demographic aging in rural Romania – an irreversible trend that will severely affect all social and economic aspects of rural communities.

The main factors of the negative demographic trend in rural areas are external migration and negative natural growth (Rotariu, 2010). By age category, as compared to 2007, 0-14 year old rural population declined by 13.8% (from 1751786 in 2007 to 1509417 in 2017). Instead, the over 65 age group had a 2.38% upward trend (from 1780912 in 2007 to 1823470 in 2017).

The rate of natural growth - a demographic indicator that measures the algebraic difference between live-birth rate and the mortality rate of the population - was in 2007 at national level of -1.7 ‰, in urban by + 0.2 ‰ and in rural area by -4 ‰. At the level of 2018, the natural growth rate evolved to "negative", being -3.1 ‰ at national level, -1.5 ‰ in the urban area and -5.2 ‰ in rural areas. In other words, at 2018, in rural areas, the rate of natural growth is negative, with 5.2 more deaths than births per thousand inhabitants.

The survey on the quality of life carried out by the National Institute of Statistics (NIS) shows that the share of rural households that in 2007 could not have made some expenditure on time was 22.4%, and in 2016, the share of rural households with the same problem increased 35.3%, which means a worsening of the financial situation of the population in this rural areas. According to the same NIS survey, in the last decade (since Romania's accession to the EU) the situation current expenditures of the rural households is declining in terms of welfare.

Table 5. The structure of households by the ability to make ends meet in rural area

The ability to make ends meet	Year 2007	Year 2016
With high difficulty	25.3%	19.2%
With difficulty	29.1%	29%
With some difficulty	33.5%	40.4%
Rather easily	8.3%	8.8%
Easily	3.3%	1.9%
Very easily	0.5%	0.7%

Source: National Institute of Statistics - TEMPO, Households Living Conditions Survey

As can be seen from Table 6, in the year 2017, 109,403 Romanians (a rate of 7 per 1000 place) moved from the city to the rural area while only 87097 people (a rate of 11.3 per 1000 place) migrated from rural to urban. This aspect of increasing the share of those who leave the city to the village has positive consequences only if these people go and invest in rural areas. Otherwise, we can not talk about economic development of the rural environment through migration from the city to the village.

Table 6. The internal migration flow from Romania during 2007-2017

Internal Migration Flow	From rural to urban		From urban to rural	
Year	Number of people	Rates per 1000 inhabitants	Number of people	Rates per 1000 inhabitants
2007	80235	6.3	118237	12.1
2008	78671	6.2	124828	12.8
2009	70246	5.5	96513	9.9
2010	96201	7.5	133052	13.7
2011	66784	5.3	97013	10
2012	74470	5.9	118383	12.2
2013	74023	5.9	102710	10.6
2014	78411	6.2	110658	11.4
2015	77878	6.2	106647	11
2016	82612	6.6	120950	12.5
2017	87097	7	109403	11.3

Source: National Institute of Statistics, www.insse.ro

A population category, the elderly, prefers to change their residence in the countryside, because daily spending is lower, enjoys an environmentally and naturally enhanced comfort compared to large urban agglomerations. The higher the number of people migrating from the city to the village is explained by the massive departure of the rural population abroad, to the detriment of accepting a job in the city in Romania (thus reducing the potential of migration from rural to urban). Another important aspect is that urban / rural migration is mostly done to rural areas close to big cities with high economic potential. Thus, peri-urban areas have developed, where the population has experienced significant growth.

Compared to the EU-28 average, the contribution of agriculture to GDP formation is higher in Romania, as most of the economies were based on industrial growth driven by the industrial sector. Productivity in the agricultural sector in Romania is very low (20%), compared to the EU average (36%). The poor yield of agricultural production is caused by several factors, among which[4]:

- fragmentation of agricultural holdings (92% of holdings are under 5 ha) and large share of those without legal personality; this leads to difficulties in accessing internal or external financing lines, hinders the development of farms, the introduction of new technologies;
- low level of agricultural labour training, most workers have a low level of training, incomplete to perform in the agricultural field;
- Deficient, expensive irrigation system; agriculture in Romania is dependent on weather conditions, influencing farmers' incomes;
- low level of capitalization of agricultural holdings due to fragmentation of farms and poor technological facilities. According to the survey, the average capital invested per hectare is 858 euro / ha, below Poland, Hungary;
- increasing tax evasion in the agricultural sector, both in terms of black work and trade in unprocessed agricultural products.
- lack of cooperation between farmers.

In intermediate rural areas, infrastructure remains poor; population is declining due to external migration. In the long run, it is difficult to predict the dynamics of migratory flows on residence areas, as there are many factors of influence both nationally and internationally. Also, the

[4] *** (2017). *Potential of Agricultural Sector Development in Romania*, PricewaterhouseCoopers Report.

survey of the INS-TEMPO database shows that the labour force in agriculture was 3460 annual work units (UAM) in 1998, then dropped to 2205 AMU in 2007, and in 2017 it was 1601 UAM.[5]

The SWOT analysis method is often used as a starting point for preparing rural development strategies. A feature of this analysis is the study of the influence of the internal and external environment, with the relief of both positive factors and negative factors.

Table 7. The SWOT matrix of the rural environment in Romania

Strong points:	**Weaknesses:**
- the existence of a very complex and valuable cultural and immaterial cultural patrimony; - a rich array of traditional activities and local produce made by the rural population; - extension of utility networks in rural areas: water - sewage - gas. Weaknesses - aging rural population, negative demographic trend; - increasing the external migration of the labor force; - increasing the phenomenon of school dropout; - low income per household; - poor rural infrastructure; - a large proportion of the population is at risk of poverty; - lack of financing to combat the degradation of historical monuments and settlements of cultural value.	- aging rural population, negative demographic trend; - increasing the external migration of the labour force; - increasing the phenomenon of school dropout; - low income per household; - poor rural infrastructure; - a large proportion of the population is at risk of poverty; - lack of financing to combat the degradation of historical monuments and settlements of cultural value.
Opportunities:	**Threats:**
- support for rural development through national and European funding programs: transport infrastructure, public services, educational-cultural-social infrastructure; - projects funded through the Local Action Groups; - accessing services for the elaboration and implementation of European funded projects provided by companies with expertise in the field of European funds.	- trend of decrease of active population in rural areas; - demotivation, lack of initiative, inability to work for productive activities; - limited financial resources for the development of rural projects; - altering traditions; - the manifestation of negative phenomena in local communities: alcoholism, domestic violence, dependence on social aid etc.

According to the demographer Vasile Gheţău (2018), the structure of the employed population in our country is characteristic of a developing country, with a considerable segment of the employed population in agriculture - 23%, compared to only 4% in the employed population of EU28 and 2.6% the population of the 15 more developed countries that comprised the EU15 before the 2004 enlargement. And in the secondary sector we have a higher proportion than in the EU28, and the synthesis of the country's employment and development is mirrored by the proportion of the population employed in services 47%, compared with 72% in the EU27 occupied population and 75% in the EU15 countries. At present, the rural population is 2164500, out of which 301700 are employed and 1862800 are self-employed. NIS data shows that labour productivity in the primary sector (agriculture and related branches) was of 8.8 RON/ hour at the level of 2015, while the labour productivity per total economic branches was 41.2 RON/ hour. At the level of the same reference year, labour productivity in the construction sector was 35.1 RON/ hour, and IT&C was 113.6 RON/ hour. These data demonstrate that agriculture is not an attractive area for young people and other working age categories, which are likely to migrate to the city or go abroad to work.

CONCLUSIONS

Modernization and technology of farms, diversification of agricultural and food production, better management of agricultural holdings would increase the competitiveness of the

[5] According to the National Institute of Statistics, the volume of labor force in agriculture, expressed in thousands of annual labor units (UAM) represents the ratio between the total number of days worked by the employees and non-employees in the branch of agricultural activity, in one year, and the annual labor unit expressed in days. The annual work unit is the work carried out by a person in full-time equivalent to one year in agriculture (245 working days of 8 hours per day).

rural sector in Romania. Human resource is the central element for increasing the development of rural competitiveness. Priority needs are training courses and a good integration of research results. Also, creating new jobs, raising living standards, reducing poverty are major objectives that need to be met to diminish the disparities between rural and urban areas. Simplification of administrative procedures, greater involvement of rural population can lead to increased competitiveness in the field of agriculture and rural development in Romania.

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AN OVERVIEW OF ROMANIAN AGRICULTURAL INDICATORS IN THE LAST YEARS

BULARCA (OLARU) ELENA[1], TOMA ELENA[2]

Abstract: *The main purpose of this study is to present and analyze a number of technical and economic indicators of Romanian agriculture during 2005-2016. The main indicators monitored are the land fund development, area and crop production, livestock and livestock production, number of agricultural holdings, economic accounts and prices in agriculture and agro-environmental indicators. It was found that over time in Romanian agriculture were produced important changes both in terms of quantity and quality, both in crop farming and in livestock. Common Agricultural Policy attempts to provide a reasonable level of living of farmers and residents of countries default and especially for this reason, through the indicators analyzed, this study aims to provide a broad picture of progress or regress in Romanian agriculture in lately. The best perspective on agriculture is provided by economic accounts because they provide information about the composition and structure of agricultural production, the income received by farmers, the relationships between prices and inputs, the value of the standard output production, intermediate consumption, gross value added and subsidies practically with the help of these indicators is carried out an analysis of the economic efficiency of agriculture.*

Keywords: *economic indicators, agriculture, efficiency.*

JEL classification: *Q11, Q12, Q17, O11, O13.*

INTRODUCTION

Agriculture is a very important sector for the Romanian economy. Unlike most European Union countries, agriculture has been and continues to be a sector of prime importance in Romania, both through its contribution to the economy and the share of the employed population [1]. The agricultural land exploitation structure in Romania has not changed significantly during the last decade, maintaining the same fragmentation and extreme polarity, major impediments to the growth of the sector's competitiveness. The main means of production in agriculture, the land, is characterized by a series of specific features that distinguish it from other means of production that have a significant influence on the agrarian policy.

The agricultural system practiced in our country has the role of ensuring, on the one hand, the rational use of all categories of agricultural land use in order to obtain high-quality harvests and, on the other hand, the achievement of those conditions and measures that would contribute to the increase soil fertility. In the context, however, it is necessary to study the composition, structure and productive capacity of the lands.

At the national level, agriculture is one of the important sector of the Romanian economy. The contribution of agriculture, forestry and fish farming to the formation of the Gross Domestic Product is around 6% of GDP, and in the EU Member States it is around 1.7% [6].

The aim of this paper is to investigate the potential of Romanian agricultural sector to contribute and grow to economic development of Romania, based on indices, indicators and trends for the last years.

MATERIAL AND METHODS

In order to set up this article, the following agricultural indicators have been analyzed: Arable land; the number of agricultural holdings; livestock by species; the value of Agricultural production; the crop production; the livestock production; the Gross value added.

These agricultural indicators were analyzed in their dynamics in the period 2007-2013 using the data supplied by the National Institute of Statistics Tempo Online Data base [4,5] and

[1] PhD student, Bularca (Olaru) Elena, University of Agricultural Sciences and Veterinary Medicine from Bucharest, email: bularca_elena@yahoo.com
[2] Conf. PhD, Toma Elena, University of Agricultural Sciences and Veterinary Medicine from Bucharest, email: elenatoma2001@yahoo.com.

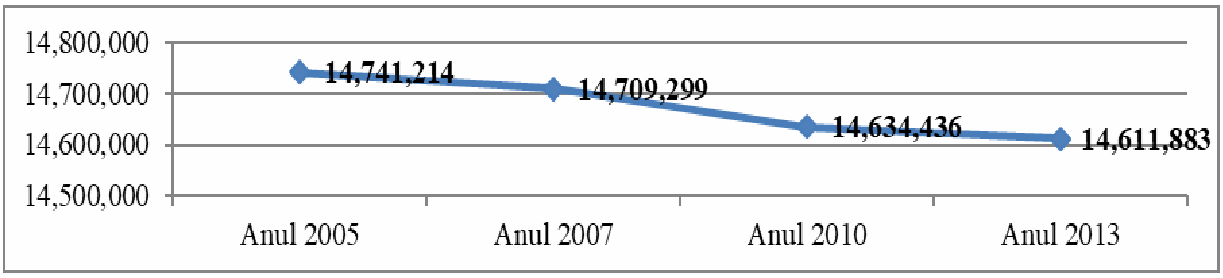
Eurostat DataBase [3]. In the study there were used different methods for processing the empirical data as follows:

- The fixed basis index, $I_{FB} = (X_n/X_0)100$, where X_n is the value of the variable X in the year n, and X_0 is the value of the variable X in the first year taken into consideration.
- The structural index , $S_{\%} = (x_i/X_T)\ 100$, where X_i = the value of the variable n and X_T= the sum of the values of the variables
- The absolute differences, $\Delta X = X_1 - X_2$, where X_1 = the value of the variable 1 and X2 = the value of the variable.

RESULTS AND DISCUSSIONS

The occupation and the use of land is closely interdependent with the relief units present on the territory of the country. Romania enjoys a very varied relief (28% of mountains, 42% of hills and plateaus and 30% of plains), which leads to a diversity of land use possibilities. The geographical distribution of the relief is reflected in an uneven territorial distribution of the types of land [4]. Romania has a surface area of 23,839,071 hectares. Of this total of land, more than 61% is held by arable land.

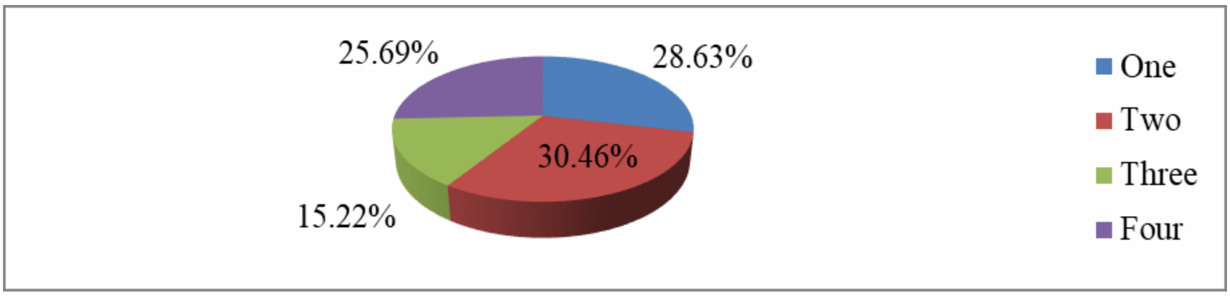
Figure 1. Evolution of arable land in Romania in 2005- 2013 period



Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2005-2013, NIS

At the level of Romania's four macro-regions, the distribution of the lands is the same in the all analyzed period. The largest part of the lands is occupied by the macro-region two (7,261,153 ha), followed by the macro-region one (6,826,018 ha) and four by 6,124,486 ha.

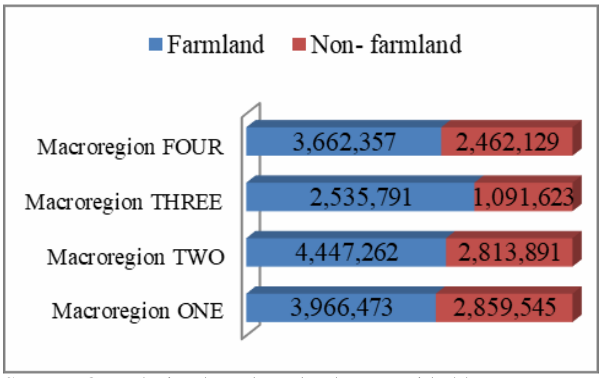
Figure 2. Distribution of lands in Romanian macro region level in 2005- 2013 period



Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2005-2013, NIS

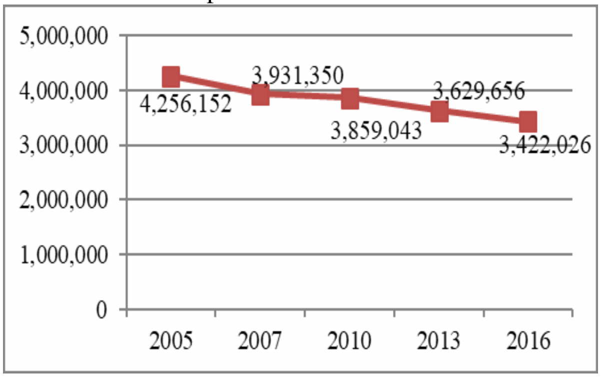
The figure below illustrates the fact that at the level of Romania's four macro-regions, arable land occupies the largest share, the macro-region three holds the highest percentage of 70% due to the high agricultural potential of this macro-region.

Figure 3. Distribution of 2013 land use in Romania



Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2005-2013, NIS

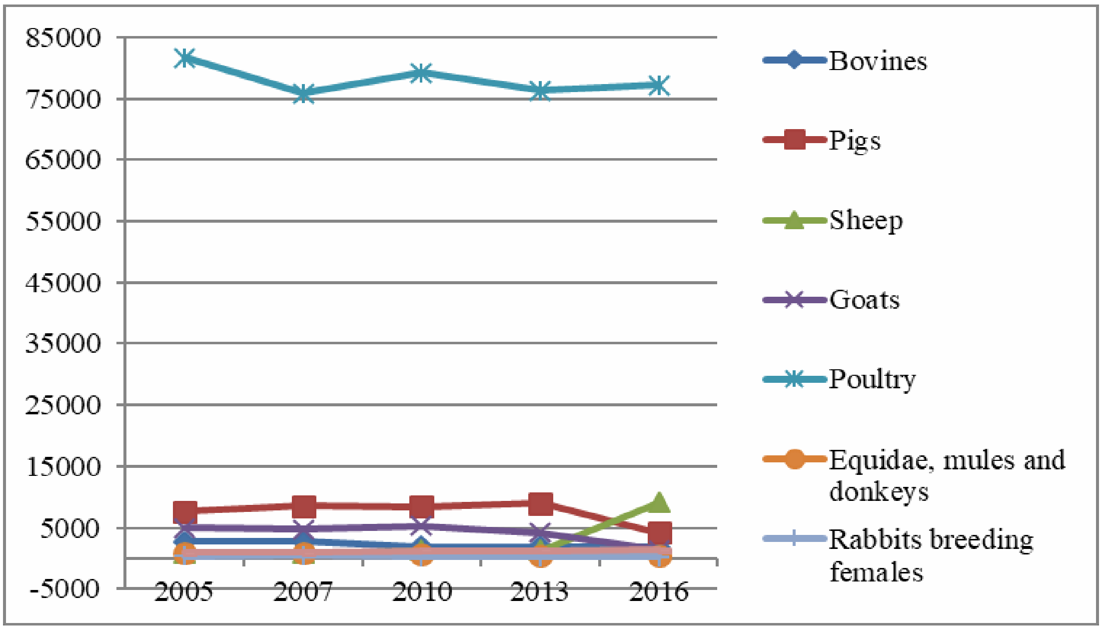
Figure 4. Evolution of Agricultural Holdings during the period 2005-2016



Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2005-2016, NIS

The number of agricultural holdings has continuously decreased from 4,485 million in the year 2002 to 3,422 million in the year 2016, as a result of land concentration, meaning a decrease of 24% [2].

Figure 5. The evolution of livestock numbers by species in Romania in 2005- 2016 (thousands)



Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2005-2013 NIS

The livestock number from 2005 to 2013 is significantly decreasing in equidae, mules and donkeys (-62%), pigs (-46%) and bovine (- 33%). The number of sheep and bee families has increased in 2016 compared to 2005.

Between 2007 and 2016 there is an increase in the value of agricultural production from 47.67 billion RON in 2007 to 69.3 billion RON in 2016. In the agricultural sector, the crop production has the biggest contribution in agricultural output, over 60% of the value of agricultural production. The value of crop production advanced by 57% in 2016 compared to 2016. At the same time, the value of livestock production increased by only 27%.

[1] PhD student, Bularca (Olaru) Elena, University of Agricultural Sciences and Veterinary Medicine from Bucharest, email: bularca_elena@yahoo.com
[2] Conf. PhD, Toma Elena, University of Agricultural Sciences and Veterinary Medicine from Bucharest, email: elenatoma2001@yahoo.com.

Table 1. Value of Agricultural production in 2007-2016 period

Agricultural sectors	Years							
	2007		2010		2013		2016	
	Thousand RON	%	Thousand RON	$	Thousand RON	%	Thousand RON	%
Total	47,699,916	100.00	64,452,571	100.00	78,464,416	100.00	69,348,614	100.00
Crop	28,723,475	60.22	43,488,480	67.47	53,843,812	68.62	45,155,180	65.11
Livestock	18,291,624	38.35	20,406,840	31.66	23,876,547	30.43	23,293,590	33.59

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2007-2016, NIS

The table below summarizes the value of agricultural production on the total and on the two agricultural sectors between 2007 and 2016. It is also a comparison of the value of agricultural production in 2016 as compared to 2007. It is noted that the value of the agricultural production presents a positive situation in all four macro regions, being recorded significant increases, and the most significant increase is reported at the level of the macro-region three, by doubling the value of the crop production obtained in 2016 compared to 2002.

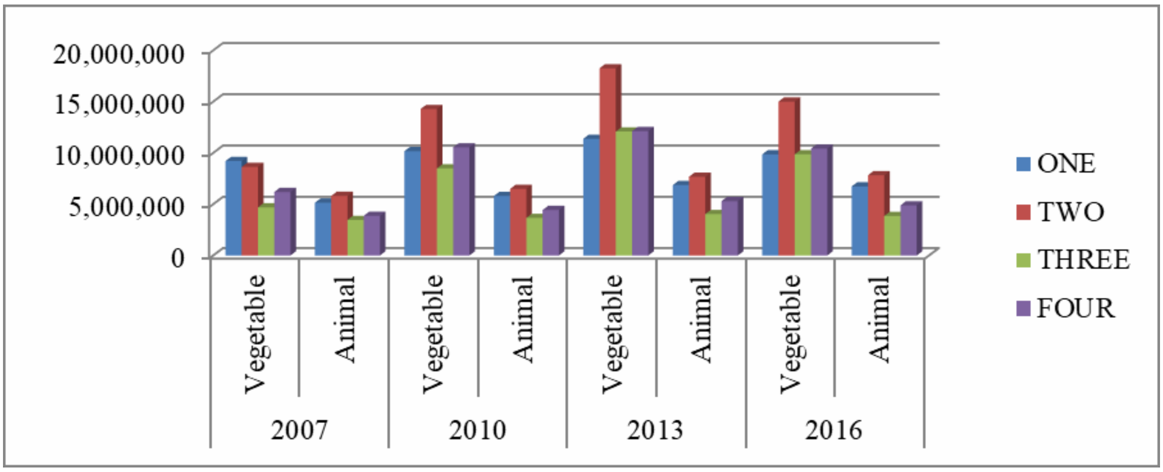
Table 2. Value of Agricultural production in Romanian Macro regions in 2007-2016 period

Macroregions			ONE	TWO	THREE	FOUR
Years	2007	Total	14,430,045	14,773,254	8,299,820	10,196,797
		Crop	9,208,389	8,636,355	4,689,619	6,189,112
		Livestock	5,155,994	5,814,369	3,456,829	3,864,432
	2010	Total	16,068,917	21,021,229	12,288,393	15,074,032
		Crop	10,174,919	14,281,751	8,492,526	10,539,284
		Livestock	5,803,055	6,496,130	3,667,899	4,439,756
	2013	Total	18,297,104	26,279,212	16,363,789	17,524,311
		Crop	11,372,362	18,253,541	12,088,018	12,129,891
		Livestock	6,866,980	7,671,648	4,038,025	5,299,894
	2016	Total	16,647,658	23,161,016	14,105,203	15,434,737
		Crop	9,862,265	15,007,026	9,868,260	10,417,629
		Livestock	6,734,480	7,822,830	3,849,553	4,886,727
	2016/2007 %	Total	115.37	156.78	169.95	151.37
		Crop	107.10	173.77	210.43	168.32
		Livestock	130.61	134.54	111.36	126.45

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2007-2016, NIS

Analyzing the values of the vegetal and livestock production by macroregions of development, it is noticed that the TWO macroregion is the largest contribution both in the crop and animal sector in Romania.

Figure 6. Evolution of Agricultural production value in Romanian Macroregions in 2007- 2016 period



Source: Own design based on the data provided by Farm Structure Survey and Agricultural Census Data Base, 2007-2016, NIS

In the analysis of the agricultural crop production obtained by categories of products during the period 2005-2016, it is noted that there are significant increases in the majority of crops, except in the production of rye (- 49%), soybean (-16%) and potatoes (-28%).

Table 3. Evolution of Romanian Crop Production in 2005-2016 period

Main Crops	Years					Difference 2016-2005
	2005	2007	2010	2013	2016	
	Thousand Kilograms					
Cereals for grains	19,345,464	7,814,825	16,712,883	20,897,076	21,764,816	**2,419,352**
Ryes	48,962	20,583	34,281	23,812	25,931	**-23,031**
Wheat	7,340,664	3,044,465	5,811,810	7,296,373	8,431,131	**1,090,467**
Barley	579,564	231,918	777,074	930,515	1,267,722	**688,158**
Hop	194	374	232	172	208	**14**
Oatmeal	377,456	251,633	304,462	373,783	381,359	**3,903**
Grain maize	10,388,499	3,853,918	9,042,032	11,305,095	10,746,387	**357,888**
Pulses	80,913	36,185	61,344	74,214	99,312	**18,399**
Industrial Plants	1,803,080	1,046,558	2,377,651	2,966,621	3,596,831	**1,793,751**
Sunflower	1,340,940	546,922	1,262,926	2,142,087	2,032,340	**691,400**
Colza	147,566	361,500	943,033	666,097	1,292,779	**1,145,213**
Soia Bean	312,781	136,094	149,940	149,931	263,380	**-49,401**
Sugar beet	729,658	748,839	837,895	1,029,209	1,012,186	**282,528**
Potatoes	3,738,594	3,712,410	3,283,866	3,289,722	2,689,733	**-1,048,861**
Fresh Vegetables	3,624,612	3,116,801	3,863,617	3,960,990	3,358,389	**-266,223**

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2005-2016, NIS

Analyzing livestock production by the main categories of animals, it is noticed that in 2016 compared to 2005 there is a significant decrease in beef production of -46%. Significant decreases also occur in the production of cow's milk (-21%), egg production (-15%). At the opposite, the increase is in the production of chicken (+ 38%), wool production (+ 21%) and honey production (+20%).

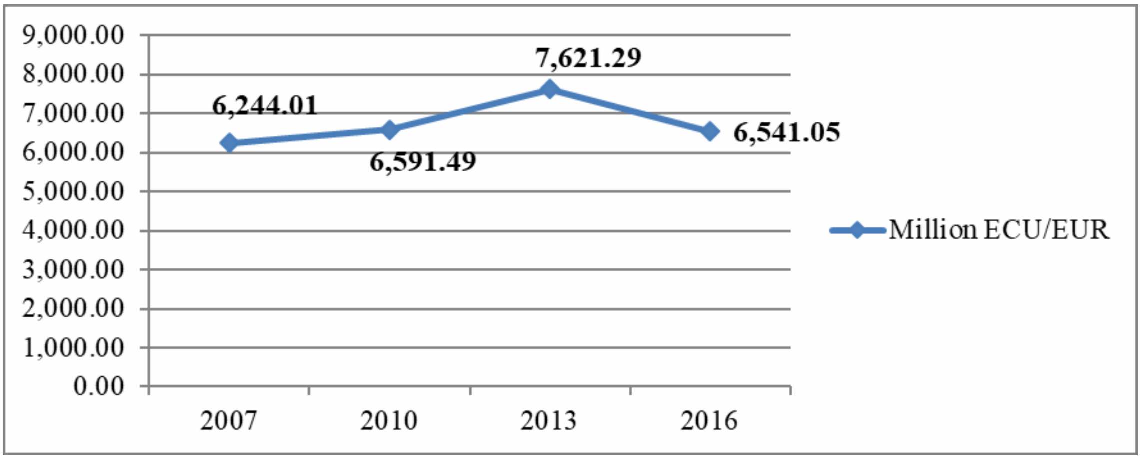
Table 4. Evolution of Livestock Production in 2005-2016 period

Livestock Production	Measure units	Years									
		2005		2007		2010		2013		2016	
		No	%	No	%	No	%	No	%	No	%
Beef production	**live weight (tons)**	382,764	100	333,282	87.0	205,347	53.6	192,206	50.2	205,957	53.9
Pork production	**live weight (tons)**	605,220	100	641,505	106.0	552,734	91.3	546,530	90.3	588,085	97.2
Sheep and goats production	**live weight (tons)**	113,938	100	110,188	96.7	99,524	87.4	103,619	90.9	113,850	99.9
Chickens production	**live weight (tons)**	401,456	100	416,193	103.7	446,387	111.2	456,632	113.7	554,922	138.2
Production of bovines milk	**Thousands Hectoliters**	60,614	100	61,048	100.7	49,129	81.1	48,728	80.4	48,133	79.4
Production of sheep and goats milk	**Thousands Hectoliters**	5,280	100	6,173	116.9	6,305	119.4	6,135	116.2	6,113	115.7
Production of wool	**Tons**	18,390	100	21,025	114.3	20,457	111.2	20,719	112.7	22,277	121.1
Production of eggs	**Million pieces**	7,310	100	6,522	89.2	6,199	84.8	6,388	87.4	6,182	84.6
Production of honey	**Tons**	17,703	100	16,767	94.7	22,222	125.5	26,678	150.7	21,202	119.8

Source: Own calculation on the basis of data from Farm Structure Survey and Agricultural Census data base 2005-2016, NIS

The evolution presented in the below figure it is noted that the Gross Value Added of the Romanian Agricultural Industry has increased in 2013 by about compared to 1,377 million Euro, after which there is a deacreasing by -14%.

Figure 7. Evolution of Gross value added of the Romanian agricultural industry in 2007- 2016 period



Source: Own design based on the data provided by Eurostat, https://ec.europa.eu/eurostat/data/database.

CONCLUSIONS

In conclusion, we can say with certainty that the agricultural sector in Romania has stabilized and increased slightly in the economy of the country. The Romanian agriculture is optimally structured, but has a low profitability. It is necessary to convert a part of the largest production plant for animal products, making it a safe and economical way to increase the profitability of agricultural production in general.

After having analyzed some key indicator and factors of agricultural dynamics in Romania, we can affirm that there are still many weaknesses in the Romanian agricultural sector that prohibit its sustainable development.

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BIOECONOMY CONCEPT – CHALLENGES AND PERSPECTIVES FOR AGRICULTURE

STELIANA RODINO[1]

Abstract: *This paper aims to broadly develop the concept of bioeconomy from the perspective of agricultural producers, presenting an analysis of the current challenges as well as the future trends in this field. In the coming period, the world economy is moving towards increased competition for limited natural resources or a low rate of regeneration. Globally, it has been estimated that a 70% increase in food supply is needed to meet the needs of a population of around 9 billion by 2050. As a consequence, agricultural producers are encouraged and forced to increase productivity, which may have different meanings, depending on the way of interpretation. Therefore, it is considered necessary to initially address the sustainable use of resources by defining the responsible bio-economy concept. Modern farmers are not only agricultural producers but also quality food suppliers and ecosystem managers. From a practical point of view, the concept of multifunctional agriculture has already been incorporated into business models and rural development strategies, thus enhancing the quality of life in rural areas. Moreover, the implementation of this development system has allowed farmers to maintain a fair share of the added value of production, thus contributing to the diversification of the rural economy.*

Keywords*: Bioeconomy, multifunctional agriculture, European strategy*

JEL Classification: *P48, Q01, Q16*

INTRODUCTION

In February 2012, the European Commission official reports released the first version of a strategy dedicated to the bioeconomy. Up to the present, most of the Western and Northern Europe member states, have presented and adopted their own national and regional strategy papers supporting the sustainable use of available resources towards accomplishing the specific goals set for the implementation of circular bioeconomy.

The bioeconomy includes the innovative actions taken to produce food, feed, bio-based materials and bioenergy resources and to optimise and develop these products from renewable biological resources. Practically, it encompasses a wide range of industrial sectors such as agriculture, food forestry, fisheries, pulp and paper production. The innovative and sustainable technologies used represent the technological transfer of the most recent findings from chemical, biotechnological and energy industries. Considering the prediction of population growth for the 2050 horizon to approximatively 9 billion, it becomes pretty clear that the pressure on natural resources will continue to grow, unless a proper strategy will be adopted. Therefore, improving the uptake of bioeconomy seems to come as a reasonable choice for overcoming the possible bottlenecks.

The present study aims to present an overview of the concept of bioeconomy, its approaches, goals and the underlying principles from the perspective of agricultural producers, showing an analysis of current challenges and future trends in this field.

MATERIALS AND METHODS

The present research study has a conceptual and a methodological dimension. The information was subjected to qualitative research methods, processed through observation, analysis, assessment and comparison of data originating from official EC reports and scientific works. This paper aims to broadly develop the concept of bioeconomy from the perspective of agricultural producers, presenting an analysis of the current challenges as well as the future trends in this field.

[1] Dr. CS II, Steliana RODINO, Institute of Research for Agriculture Economy and Rural Development, Bucharest, Romania, e-mail: steliana.rodino@yahoo.com

The concept of bioeconomy – a view through its history

Several definitions of the bioeconomy may be observed for approaching the concept. For example, the Organisation for Economic Co-operation and Development (OECD) has used an early form of the notion of bioeconomy back in 2004, stating that "*A biobased economy is defined as a concept that uses renewable bioresources, efficient bioprocesses and eco-industrial clusters to produce sustainable bioproducts, jobs and income*" (OECD, 2004). Five years later, the same institution defined the bioeconomy as as the process of "*transforming life science knowledge into new, sustainable, eco-efficient and competitive products*" (OECD, 2009). This definition was pointed towards the potentials of innovations in the transformation and more efficient use of bio-based resources.

In the USA definition of the concept, although the sustainability aspect was not highlighted, the main idea was similar to the one above, namely: "*A bioeconomy is one based on the use of research and innovation in the biological sciences to create economic activity and public benefit*" (White House, 2012).

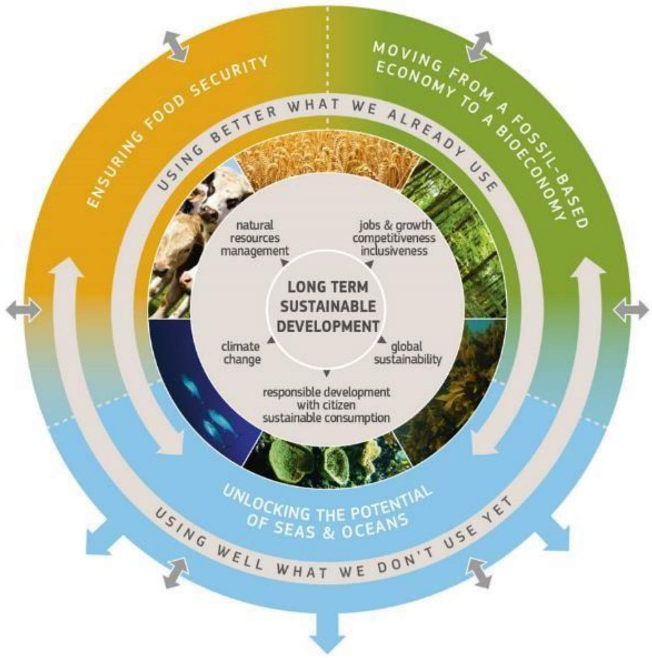

Figure 1. The bioeconomy graphic
*Source: https://ec.europa.eu/research/bioeconomy/images/bioeconomy_graphic_full.jpg

At European level, European Commision released in 2012, the EU strategy on Bioeconomy, defining it as "*the production of renewable biological resources and the conversion of these resources and waste streams into value- added products, such as food, feed, bio-based products and bioenergy*" (EC, 2012). With this strategy, Europe established the theoretical foundations for a resource-efficient and sustainable economy (Figure 1). Bioeconomy was designed to focus on the methods of conversion of raw material into value added products with the goal to reach an innovative, knowledge based and low-emissions economy (EC, 2012). A recent review of this strategy was recently published, in November 2017.

All in one, bioeconomy is the knowledge-based production and utilization of biological resources, innovative biological processes and principles to sustainably provide goods and services across all economic sectors (GBS, 2015). While most of the Western and Northern European countries have adopted national strategy papers supporting bioeconomy, the Eastern and Central countries lack this kind of strategy. As a first step toward bioeconomy, the countries in Central and Eastern Europe included it in their smart specialisation strategy. Depending on the regional available resources, bioeconomy comprises industrial sectors such as food, agriculture, green industry, energy or ecology.

Integration of agriculture in the Bioeconomy concept

Agriculture is a significant sector in the European bioeconomy contributing with 0.38 trillion EUR to Europe's turnover in 2014 (Figure 2.). In Romania, Greece, Poland, Slovenia, Ireland, Portugal and Croatia, agriculture employs more than 60% of the total people employed in the bioeconomy (Ronzon, 2015). Globally, to meet the needs of a population of around 9 billion by 2050 it was estimated that farmers will have to increase by 70% the food production. As a consequence, agricultural producers are encouraged and forced to increase productivity, which may have different meanings, depending on the way of interpretation.

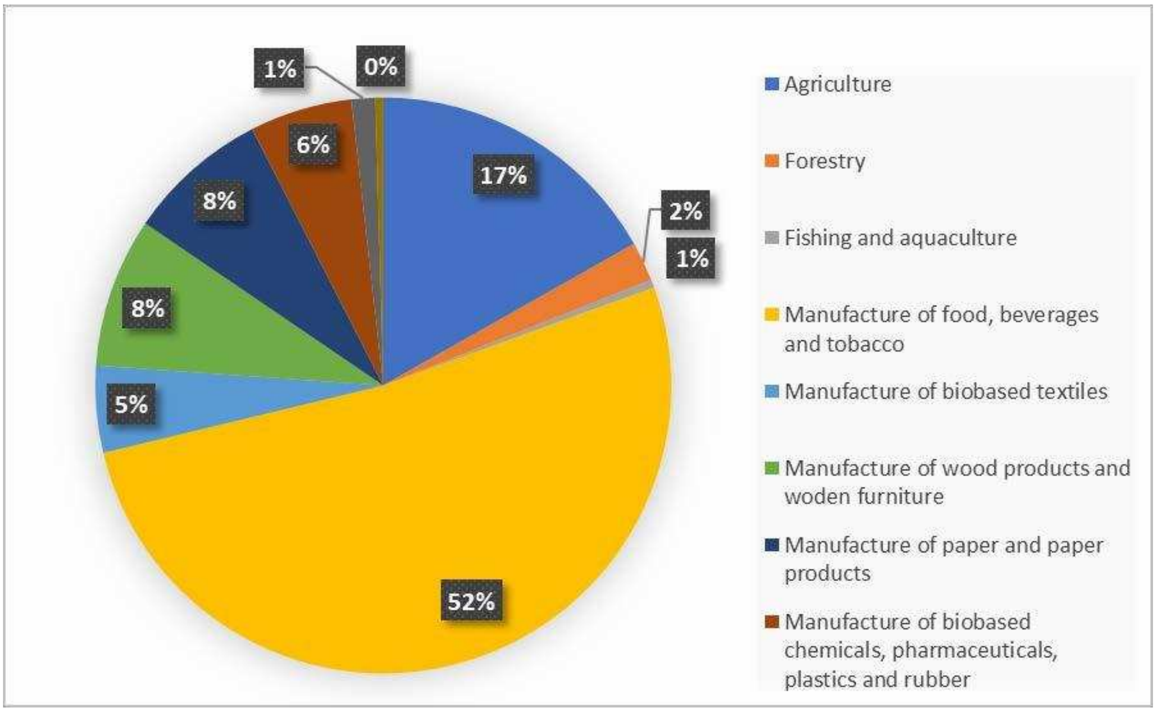

Figure 2. Turnover of Bioeconomy sectors across Europe, as for 2014.

*Data adapted from Ronzon ,2017

Therefore, it is considered necessary to initially address the sustainable use of resources by defining the responsible bio-economy concept with respect to agriculture sector. However, most areas of the available farmland were used over the time in an unsustainable way decreasing productivity throughout methods leading to soil erosion and water and nutrients depletion. Therefore, mmodern farmers must be not only agricultural producers but also quality food suppliers and ecosystem managers.

Bioeconomy offers many opportunities to be explored when speaking about crop and animal production. An optimal use of biological resources implies in the same time a logical sequence of steps, such as proper inventory, evaluation, utilisation and valorisation of waste, residues and by-products from agricultural production systems, starting from cradle to grave, from the production, harvesting, processing, transport and marketing of food, feed and bio-based products (Lainez, 2018).

Biomass production is seen as an important sector composing the bioeconomy, in most of the European countries. The agriculture sector together with forestry and fisheries and aquaculture represents the main supplier of biomass. Competing uses of biomass as well as overexploitation of resources as a response to the increasing demand for biomass for non-food uses (e.g. biofuels) puts a severe pressure on the agricultural resources. Continued conflicts between different sectors of the bioeconomy and their use of biomass for food, material and energy production can be expected in the near future. This can be avoided by focusing on the by-products and waste streams of food production and developing smart sustainable farming, fisheries and aquaculture (Mathijs E et al, 2015; EU 2012). For example, Thorenz et al 2018 indicated that the agricultural sector produces large amounts of residues utilizable for bioeconomic purposes. Straw shows the highest potential, with approximately 95 Mt of LCF, of which the promising are wheat straw (46 Mt), barley straw (16 Mt) and rape seed straw(14 Mt). Apart from straw, significant quantities of maize stover (31 Mt) can be extracted from grain maize production (Thorenz, 2018).

Challenges of the agricultural bioeconomy

Producing more food with limited resources is a challenge to be faced worldwide. This can be achieved by optimal use of agricultural inputs on the one hand, and the efficient utilisation of resulted by-products and waste recovery, as a key factor driving to competitiveness and sustainable value chains.

In the same time, to reach the revitalisation of rural economies, the concept of multifunctional agriculture will have to be included in the future rural business models. More competitive results will be obtained by increasing agriculture productivity. However, the agricultural productivity relies heavily on two of the earth's primary resources: soil and water (Sarkar, 2018). It is generally accepted the fact that environmental sustainability is the only path to obtain renewable organic material. This particularly applies to the efficient use of natural resources, especially water and soil bioeconomy as primary resources of the traditional economic sectors (agriculture, forestry, aquaculture and fishery) (Lainez, 2018). Agriculture requires essential and limited resources to produce biomass, such as land, fertile and functioning soils, water and healthy ecosystems, but also external inputs in the form of resources such as minerals and energy for the production of fertilisers (EC, 2012).

A key area of intervention in agricultural bioeconomy is the climate impacts mitigation by climate-smart technologies with the aim to reduce the negative impact of weather events on food security. Many authors consider that the climate change has a huge impact on impact agricultural productivity.

It is considered that nowadays agriculture is highly energy intensive due to the use of nitrogen fertilisers, chemical pesticides, irrigation, and machinery, as well as feed for livestock production. The replacement of fossil-based inputs by regulating and supporting ecosystem services promises to reduce agriculture-induced impacts while reducing yield gaps (Bommarco et al., 2013; Mathijs E. et al., 2015). All these challenges are closely related to environmental, health and food safety and consumer demands for organic and local food. Moreover, they are driven by the predicted increase of global population, the shift towards animal protein-rich diets, the growing threat of antimicrobial resistance, and crop losses and wasted food, specifically fruits and vegetables and seafood (Sarkar, 2018). In short, it may be stated that the main challenges for setting up an agricultural bioeconomy are: assuring food security; management of natural resources in a sustainable way; mitigation and adaptation to climate change.

In the last decade, the greenhouse gases (GHG) emissions of agriculture reduced, being at this moment nearly 25% less than the 1990 level. However, GHG from agriculture account for almost 10% of the EU's GHG emissions. There is hope for further reduction of this percent, by taking specific actions towards improvement of manure management, enteric fermentation, use of synthetic fertilizers, monitorization and reduction of food losses and recycling of food wastes and meat processing (EC, 2012; EC, 2017) As future prospects, the development of local bio-economies may improve the resilience of vulnerable areas, especially remote rural areas. Farm-sized biogas plants may reduce farmers' dependence on energy while solving the manure management problem. Rural bio-refineries may help remote rural areas to obtain energy and material self-sufficiency (Papendiek et al., 2012).

CONCLUSIONS

As a conclusion, it should be noted that the primary production of biomass (Meyer, 2017) is the center of most of bioeconomy strategies all over the world. The agricultural bioeconomy implications include:

- sustainable use of natural resources (soil, water, nutrients, genetic resources and biodiversity)
- sustainable agricultural production (plant breeding, crop production, livestock) incorprating the latest agricultural technologies (e.g., precision farming);
- optimisation of agricultural production systems in terms of sustainability

Nevertheless, despite intesive awareness raising and governments implication, the potential of many European countries to develop a biobased economy remains a far off concept. largely untapped. Many factors contribute to this situation, including insufficient involvement of stakeholders in designing bioeconomy strategies, due to their lack of practical knowledge regading this concept, technology transfer and exploitation of up to date scientific research**.** Although in Eastern Europe, there are various initiatives on implementation of bioeconomy under European and national grants, to most people the idea of a bioeconomy remains an abstract concept.

Bioeconomy offers many opportunities to be explored when speaking about crop and animal production and agriculture represents a significant sector in the European bioeconomy contributing with an important share Europe's turnover. As future prospects, the development of local bioeconomies may improve the resilience of vulnerable areas, especially remote rural areas.

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LAND RESOURCES – STRUCTURAL EVOLUTIONS AND GAPS AT THE LEVEL OF SUD-MUNTENIA REGION IN THE POST-ACCESSION PERIOD

BUCUR SORINEL IONEL[1]

Abstract: *Among the essential resources of a particular area, the land resources have an important role in the economy, due to their economic importance at local level, in terms of its capitalization, and on the other hand, from ecological perspective, i.e. in terms of environment quality and of ensuring the necessary habitat for various animal species. Without making a clear-cut difference between the two dimensions, i.e. economic and ecological, the present approach aims at making an X-ray of the stock of land resources in the third development region of Romania, namely the Sud-Muntenia region. Consisting of seven counties with different demographic, economic and social characteristics, the region Sud-Muntenia is characterized by divergent evolutions of the stock of land resources, both at inter-county and intra-county level, with direct impact upon the local durability and sustainability and in reducing the gaps between Romania and the EU average.*

Key words: *land resources, gaps, regional dimension.*

JEL Classification: *Q2, Q20, O23.*

INTRODUCTION

Land resources have been a subject of expert debates over time, both in terms of their sustainable use and of their structure and concentration level. Land resources, together with the population, represent the core elements of the economy, the construction of any development strategy, be it national or local, starting from the available stock of resources. Romania's land resources have been subject to significant structural changes, mainly after 1989; these processes have been continued with different intensities at local level both during the pre-accession period and later on.

The radical changes generated by the need to adjust to the EU requirements, as well as the increasing globalization trends have determined reorientations in the economic activities and at social level as well, with impact upon the utilization modality of the existing land resources. The current structure of national land resources is the cumulated result of the modifications produced at regional and local level (i.e. at county or component localities level). From this perspective, the present approach intends to make an X-ray of the modifications produced in the structure of land resources, forestry resources included, in the third region of Romania in terms of size and importance, namely Sud-Muntenia region.

MATERIALS AND WORKING METHODS

In order to capture the main modifications produced in the stock of land resources from Sud-Muntenia region, after 1990, the public statistical data were used, provided by the National Institute of Statistics, through Tempo-Online database. In this context, it is worth noting that national statistics provide quite limited information at county level, in terms of time horizon. Thus, while at the forestry resources level, the information stock has been updated up to 2017, in terms of land resources, the information stops at the level of 2014.

From the methodological point of view, the current approach uses consecrated statistical methods, of comparison, dynamics and structural type, in order to highlight the main changes produced in the structure of land resources from Sud-Muntenia region. Having in view the investigated period (1990 – up to the present), as well as the fact that the analysis is made up to county level, the results were presented under table form, which provide a much clearer visual picture compared to the graphical method.

[1] Ph.D. student, Scientific researcher, Institute of Agricultural Economics - NIER, e-mail: bucursorinelionel@yahoo.com.

RESULTS AND DISCUSSIONS

The period 1990-2014 is characterized by a noticeable structural modification of land resources. Thus, in the 25 years, the agricultural land area decreased by almost 1%, with significant decreases of the land areas under orchards and vineyards. An exception is represented by the counties Giurgiu and Ialomiţa, as predominantly agricultural counties, whose agricultural and arable land area increased. While the agricultural and arable area slightly decreased, to reach a maximum decrease of 4% in Dâmboviţa county, it is worth noting that the land areas under pastures and hayfields increased in all counties, to double in Călăraşi county (Table no. 1). At the opposite pole, the non-agricultural land (including here all the other land areas) increased in the reference period by about 2% per total economy, similarly to the regional trend, with percentages ranging from -2,5% (Giurgiu) to 6,45% (Călăraşi).

Table no. 1. Dynamics of the agricultural land resources in the year 2014 compared to 1990 (%)

	Agricultural	Arable	Pastures+hayfields	Vineyards and vine nurseries	Orchards and nurseries	Other non-agric. land
TOTAL	**-0.9**	**-0.6**	**2.1**	**-24.5**	**-37.2**	1.53
SUD-MUNTENIA	**-0.7**	**-1.1**	**11.2**	**-28.6**	**-35.3**	1.65
Argeş	-0.8	0.8	5.2	-75.6	-29.1	0.83
Călăraşi	-1.2	-2.5	119.3	6.7	-74.8	6.45
Dâmboviţa	-1.0	-4.0	15.1	-76.5	-18.7	1.54
Giurgiu	0.7	0.5	33.2	-33.0	-52.6	-2.52
Ialomiţa	0.4	2.3		-28.4	-83.6	-1.86
Prahova	-3.5	-2.4	4.2	-25.8	-44.5	5.02
Teleorman	0.0	-2.6	69.7	-15.8	-86.4	-0.14

Source: author's own calculations based on Tempo-Online data, 2018.

For the land areas under vineyards and orchards, the strongest diminution trend is noticed in the counties located in the plain (except for Călăraşi county for the land area under vineyards and vine nurseries), while the counties Argeş, Dâmboviţa and Prahova, characterized by important resources and potential from this point of view, have followed a downward trend, to reach a diminution of areas under orchards by about 45% in the case of Prahova county.

From the structural point of view, in relation to the first two categories of resources (agricultural and arable), whose oscillation over 25 years has been quite low, the following aspects are to be considered:

- Compared to the year 1990, in the year 2014, the 2.4 million ha of arable land in the region Sud-Muntenia accounted for 70.6% of total area of the region, slightly decreasing by 0.5%; the high percentage of the agricultural area in the region is determined by the high percentage (over 50%) of the agricultural area in all the seven counties; the counties Călăraşi, Giurgiu, Ialomiţa and Teleorman are by far above the region's average, where (except for the county Giurgiu) the agricultural land area represents over 80% of the total area of the respective counties (Table no.2).

Table no.2. Evolution of the share of agricultural land area in total land area in the period 1990-2014 (%)

Year	TOTAL	SUD-MUNTENIA	Argeş	Călăraşi	Dâmboviţa	Giurgiu	Ialomiţa	Prahova	Teleorman
1990	62.0	71.1	50.6	84.7	61.7	77.6	83.8	59.2	86.0
1991	62.1	71.1	50.6	84.7	61.7	77.6	83.8	59.2	86.0
1992	62.0	71.0	50.6	84.7	61.6	77.6	83.7	59.2	85.8
1993	62.1	71.1	50.6	84.7	61.6	78.2	83.7	59.2	85.7
1994	62.1	71.1	50.5	84.1	61.6	78.7	83.9	59.2	85.7

1995	62.1	71.1	50.5	84.1	61.6	78.6	83.9	59.2	85.7
1996	62.0	71.1	50.5	84.1	61.6	78.6	84.0	59.2	85.7
1997	62.1	71.1	50.5	84.1	61.6	78.6	84.0	59.2	85.7
1998	62.1	71.1	50.5	84.1	61.6	78.6	84.0	59.2	85.7
1999	61.8	71.1	50.5	84.1	61.6	78.6	84.0	59.3	85.6
2000	62.3	71.1	50.5	84.2	61.6	78.6	83.9	59.2	85.7
2001	62.3	71.1	50.5	84.2	61.6	78.6	84.0	59.2	85.9
2002	62.2	71.1	50.5	83.9	61.5	78.6	84.0	59.2	85.9
2003	61.7	70.9	50.5	83.9	61.5	78.6	83.9	57.6	86.3
2004	61.7	71.1	50.5	83.9	61.5	78.9	84.1	58.5	86.2
2005	61.8	71.1	50.5	83.9	61.5	78.8	84.1	58.4	86.3
2006	61.8	71.0	50.5	83.9	61.4	78.8	84.1	58.4	86.2
2007	61.7	71.0	50.5	83.8	61.4	78.6	84.1	58.3	86.2
2008	61.7	70.9	50.5	83.8	61.3	78.5	84.0	58.2	86.2
2009	61.6	70.9	50.5	83.7	61.3	78.4	84.1	58.2	86.2
2010	61.4	70.8	50.0	83.5	61.3	78.4	84.2	57.9	86.2
2011	61.3	70.6	49.3	83.6	61.2	78.3	84.2	57.8	86.1
2012	61.3	70.6	49.6	83.5	61.1	78.2	84.2	57.6	86.1
2013	61.3	70.6	49.6	83.5	61.1	78.2	84.1	57.4	86.1
2014	61.4	70.6	50.2	83.7	61.1	78.2	84.1	57.1	86.0
2014/1990 (%)	**-0.6**	**-0.5**	**-0.4**	**-1.0**	**-0.6**	**0.6**	**0.3**	**-2.1**	**0.0**

Source: author's own calculations based on Tempo-Online data, 2018.

- The counties Călăraşi, Giurgiu, Ialomiţa and Teleorman grow mainly cereals, cereal production being the specific activity of the agricultural sector in these counties; this is put into evidence by the high share of arable land in their agricultural area; thus, in the total area of the four counties, arable area accounts for more than 90%; practically, on cumulated basis, in the year 2014, the four counties had about 75% of the arable area of Sud-Muntenia region (Table no. 3).

Table no. 3. Evolution of the share of arable area in total agricultural land area in the period 1990-2014 (%)

Year	**TOTAL**	**SUD-MUNTENIA**	**Argeş**	**Călăraşi**	**Dâmboviţa**	**Giurgiu**	**Ialomiţa**	**Prahova**	**Teleorman**
1990	64.0	81.3	50.0	97.7	73.0	94.2	92.2	52.6	93.8
1991	63.7	81.0	49.8	97.7	73.0	94.1	91.7	52.6	92.8
1992	63.3	80.7	49.6	97.7	69.8	94.1	92.2	52.6	93.0
1993	63.1	80.5	49.4	96.7	69.8	93.6	92.8	52.6	92.9
1994	63.1	80.2	49.4	96.7	69.8	93.5	92.7	52.6	91.1
1995	63.1	80.2	49.5	96.7	70.1	93.5	92.7	52.6	91.1
1996	63.1	80.3	49.6	96.7	70.3	93.5	92.9	52.6	91.1
1997	63.1	80.3	49.6	96.7	70.0	93.7	93.0	52.6	91.1
1998	63.2	80.3	49.5	96.4	69.9	93.3	93.1	52.6	91.4
1999	63.5	80.2	49.5	96.6	69.9	93.6	93.2	51.6	91.4
2000	63.1	80.2	49.5	96.6	69.9	93.6	93.2	51.6	91.3
2001	63.3	80.2	49.5	96.7	70.0	93.7	93.3	51.6	91.1
2002	63.3	80.3	49.8	96.8	70.0	93.7	93.3	51.6	91.3
2003	64.0	80.7	49.9	97.4	70.1	94.5	93.4	52.8	90.8
2004	64.0	80.6	49.9	97.5	70.1	93.9	93.9	52.6	90.8
2005	63.9	80.7	50.0	97.5	70.2	93.9	93.9	52.8	90.9
2006	64.0	80.7	50.0	97.5	70.3	93.9	93.9	52.7	90.9
2007	64.1	80.7	50.0	97.3	70.3	93.7	94.0	53.0	91.1

2008	64.0	80.7	50.0	97.3	70.3	93.7	94.0	52.8	91.1
2009	64.2	80.8	49.9	97.3	70.5	93.7	94.0	53.0	91.1
2010	64.3	80.7	50.6	96.6	70.6	93.7	93.8	52.9	91.1
2011	64.1	80.8	50.2	96.7	70.6	93.8	93.9	52.8	91.2
2012	64.3	80.9	50.5	96.7	70.7	94.0	93.9	53.1	91.4
2013	64.3	80.9	50.6	96.7	70.7	94.0	94.0	52.9	91.4
2014	64.2	80.9	50.8	96.4	70.7	94.0	94.0	53.2	91.3
2014/1990 (%)	**0.2**	**-0.4**	**0.8**	**-1.3**	**-2.2**	**-0.2**	**1.8**	**0.6**	**-2.5**

Source: author's own calculations based on Tempo-Online data, 2018.

- As regards the land area under pastures and hayfields, in the period 1990-2014, the counties Argeş, Prahova and Dâmboviţa, characterized by the existence of all relief units and pluri-activity oriented, had a significant share of land under pastures and hayfields in total agricultural area, ranging from about 25% (Dâmboviţa) to 43% (Argeş); thus, in the year 2014, the three counties together had no less than 317.8 thousand ha pastures and hayfields, accounting for 80.4% of total area under pastures and hayfields of the region Sud-Muntenia (Table no.4).

Table no.4. Evolution of the share of areas under pastures and hayfields in total agricultural area in the period 1990-2014 (%)

Year	**TOTAL**	**SUD-MUNTENIA**	**Argeş**	**Călăraşi**	**Dâmboviţa**	**Giurgiu**	**Ialomiţa**	**Prahova**	**Teleorman**
1990	32.0	14.5	40.5	1.1	21.7	3.4	5.8	37.3	4.3
1991	32.3	14.6	41.1	1.1	21.7	3.4	5.8	37.3	4.2
1992	32.7	14.8	41.3	1.1	24.9	3.4	5.1	37.3	4.2
1993	32.8	14.8	41.6	1.1	24.9	3.1	4.7	37.4	4.3
1994	32.9	15.3	41.8	1.1	25.0	3.2	5.1	37.4	6.0
1995	33.0	15.3	41.9	1.1	25.1	3.2	5.1	37.5	6.0
1996	33.1	15.4	42.4	1.2	25.0	3.3	5.1	37.5	6.0
1997	33.1	15.4	42.5	1.2	25.4	3.2	5.0	37.6	6.0
1998	33.1	15.5	42.6	1.4	25.6	3.6	4.9	37.6	5.9
1999	32.8	15.7	42.6	1.4	25.7	3.2	4.9	38.8	6.2
2000	33.3	15.7	42.6	1.4	25.7	3.2	4.9	38.7	6.4
2001	33.2	15.7	42.6	1.4	25.6	3.2	4.9	38.7	6.4
2002	33.3	15.8	43.2	1.3	25.9	3.2	4.9	38.7	6.4
2003	32.9	16.0	43.1	1.3	25.9	3.8		39.2	7.3
2004	32.9	16.1	43.1	1.3	25.9	4.3		39.5	7.3
2005	33.1	16.0	43.1	1.3	25.9	4.3		39.4	7.2
2006	33.0	16.0	43.1	1.3	25.8	4.4		39.5	7.2
2007	33.1	16.2	43.1	1.4	25.8	4.6		39.6	7.3
2008	33.1	16.2	43.1	1.5	25.8	4.6		39.8	7.3
2009	33.0	16.2	43.1		25.4	4.6		39.9	7.3
2010	32.9	16.3	42.9	2.2	25.4	4.6		40.4	7.4
2011	33.1	16.3	43.3	2.2	25.3	4.6		40.5	7.4
2012	32.9	16.2	43.0	2.2	25.2	4.5		40.3	7.2
2013	33.0	16.2	43.1	2.2	25.2	4.5		40.5	7.2
2014	33.0	16.2	42.9	2.5	25.2	4.5		40.2	7.3
2014/1990 (%)	1.0	1.7	2.4	1.4	3.5	1.1		3.0	3.0

Source: author's own calculations, based on Tempo-Online data, 2018.

Besides agricultural land resources, the seven counties of the region also have significant forestland resources, with significant oscillations across counties, with a total area of 659.3 thousand ha, which accounted for about 10% of the country's forestland in the year 2017. One should not forget that out of total area of forestland in Sud-Muntenia region, the counties Argeş, Dâmboviţa and Prahova together had about 82% in the year 2017, only the county Argeş having 277.3 thousand ha of forestland (42% of region's total forestland area).

Compared to the year 1990, forestland had a divergent evolution in the seven counties, with a slight overall diminution per total region (by 0.2%), determined by the involution of areas under forests, i.e. deciduous forests (Table no.5).

Table no.5. Dynamics of forestland in the year 2017 compared to the year 1990 (%)

	Total	**Forests**	**Resinous**	**Deciduous**	**Other land areas**
TOTAL	**3.0**	**2.5**	**-0.2**	**3.7**	**33.9**
SUD-MUNTENIA	**-0.2**	**-0.6**	**2.0**	**-1.3**	**17.7**
Argeş	-0.3	-0.3	5.8	-2.7	0.0
Călăraşi	5.2	4.4	0.0	4.4	22.2
Dâmboviţa	0.4	0.3	-3.9	1.0	8.3
Giurgiu	-2.3	-4.9	-50.0	-4.2	100.0
Ialomiţa	1.2	0.0		0.0	44.4
Prahova	-1.9	-1.9	-3.0	-1.6	0.0
Teleorman	3.2	0.8	-33.3	1.1	41.2

Source: author's own calculations, based on Tempo-Online data, 2018.

From the structural point of view, forests cover about 97% of the forestland at region's level, with percentages ranging from 92% (Teleorman) to 98% (Argeş, Dâmboviţa and Prahova), the remaining two percentages being represented by other land categories. It is worth noting that the deciduous forests accounted for more than 70% in the year 2017, ranging from 69.1% (Argeş) to 100% (Ialomiţa), with a noticeably increasing compared to 1990.

As regards the structure and evolution of the forestry fund, as raw material base for other industries, it must be specified that in the period 1990-2017, the volume of timber harvested at national level increased by 10%, about 10% being harvested from the region Sud-Muntenia. By species, the most significant increase is found in resinous, beech and hardwoods species, some counties doubling the volume of timber exploited (Argeş, Dâmboviţa, Călăraşi), while the harvested timber decreased in oak and soft species (Table no. 6).

Table no. 6. Dynamics of the volume of timber harvested in the year 2017 compared to 1990 (%)

	Total	**Resinous**	**Beech**	**Oak**	**Various hard species**	**Various soft species**
TOTAL	**10.0**	**12.3**	**25.3**	**-12.6**	**7.6**	**-11.6**
SUD-MUNTENIA	**16.6**	**64.3**	**54.3**	**-27.6**	**40.4**	**-14.0**
Argeş	24.3	119.5	49.4	-54.9	27.7	-31.8
Călăraşi	14.0			25.0	101.2	-0.9
Dâmboviţa	26.5	124.1	109.5	0.9	37.7	-13.2
Giurgiu	41.3			8.1	65.3	62.1
Ialomiţa	-1.2			-79.1	77.0	-8.9
Prahova	14.4	12.9	48.0	-26.5	26.7	-31.8
Teleorman	-40.2	-50.0		-39.1	-3.4	-51.8

Source: author's own calculations, based on Tempo-Online data, 2018.

The increase of harvested timber volume was not followed by artificial regeneration, and the regenerated area was down by 58% nationwide over the last 25 years, with significant oscillations both by species and by component counties. Thus, overall, significant decreases of the artificially regenerated areas up to 82% were noticed in the counties Prahova, Giurgiu and Dâmboviţa, a noticeable trend by the two species (resinous and deciduous) (Table no.7).

Table no. 7. Dynamics of artificially regenerated areas in the year 2017 compared to 1990 (%)

	Total	Resinous	Deciduous
TOTAL	**-57.9**	**-34.0**	**-71.5**
SUD-MUNTENIA	**-66.1**	**-50.7**	**-69.1**
Argeş	-43.8	-26.4	-66.7
Călăraşi	-59.6	-70.5	-59.6
Dâmboviţa	-73.4		-74.4
Giurgiu	-80.1	-92.8	-80.1
Ialomiţa	-67.7	-71.5	-67.7
Prahova	-81.9	-69.1	-77.7
Teleorman	-65.9	-66.7	-65.9

Source: author's own calculations, based on Tempo-Online data, 2018.

CONCLUSIONS

The importance of agricultural and forest land resources resides in the capacity to be efficiently used in the economic process, on the one hand, due to the newly created gross value added, and on the other hand, to the social and economic impact that has been generated.

The evolution of agricultural and forest land resources, after the turning moment 1990, reveals significant changes in their structure and territorial distribution, as well as in the artificial regeneration capacity of these areas.

In the context of the above-mentioned considerations, any economic development strategy at national level can be regarded at two levels, namely the efficient and sustainable use of the available agricultural land resources and the reconsideration of the importance of forestland in local economy and national economy implicitly, on the other hand.

As regards the first aspect, we must specify that the utilization modality of farmland resources is a component part of the rural development strategy and of forestry development strategy at national level.

The sustainable management of natural resources represents a priority of the rural development strategy 2014-2020, the needs identified as a priority in this strategy having in view the biodiversity and the high natural value areas, sustainable management of forests and accessibility, soil and water quality, greenhouse gas emissions (GGE) and adaptation to climate changes.

In close correlation with rural development, without being viewed in isolation, but rather in an integration process, there is also the forestry development strategy, whose main objective is the harmonization of forest functions with the present and future needs of the Romanian society through the sustainable management of national forestry resources.

Practically, starting from the multi-functional role of forestland (economic, ecological and social), the designed strategies have in view the identification of the best ways of action in order to preserve the role of forest resource in national economy.

The ecological character of the forest, as core element of forest fund, resides in its essential contribution to soil protection against erosion, as well as in ensuring water circuit and balancing the climate, at the same time being the habitat of numerous species, with a primordial role in the preservation and improvement the biodiversity of forest ecosystems.

Yet regardless the programmatic objectives, the implementation modality and the measures taken remain at the discretion of decision makers, who, depending on the prioritizations made, decide on the timing of implementation of any measure targeting the development and preservation of the agricultural and forest land, in the sense of its efficient capitalization on sustainable basis.

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MODERNIZATION AND SOCIO-ECONOMIC DEVELOPMENT OF THE ROMANIAN RURAL AREA – 1995-2016 EVOLUTION

LORENA FLORENTINA CHIŢEA [1], ION DONA [2]

Abstract: *The present paper intends to establish a reciprocity relationship between the modernization and development level of the rural space, as main modernization-development point of the rural household. On the basis of the interdependence relation between rural area modernization and development, the paper aims to establish a typology of the modernization-development potential of rural areas from the socio-economic point of view, starting from the premise that there are significant differences between the rural areas. The starting point in establishing this reciprocity is the development of a theoretical model for the evaluation of the socio-economic modernization and development level of the rural space in terms of the modernization-development potential of the countryside. Having in view the concerns for a balanced economic and social development in the recent period as well as the multi-dimensional character of rural development, we have opted for a set of relevant indicators to reveal the socio-economic development level (in terms of economic performance and living standard) in the rural area across counties. In the paper, each social and economic indicator will be approached to reveal the gap between counties, and finally a hierarchy of counties according to the composite indicators will be established to capture the socio-economic modernization and development level of rural areas, as well as the interdependency between these two phenomena. The entire analysis will be made from the point of view of the main actor: the rural household.*

Key words: *rural area, rural household, sustainable development*

JEL Classification: *R20, Q 01, O2*

INTRODUCTION

Modernization in the rural area emerged as a process in direct relation to the urban area [1]. The amplitude of the modernization process in the rural communities was different, and the main favourable factor was the proximity/accessibility to urban centers. The modernization process was not a constant continuous process, being directly linked to the historical evolution – political influence (change of the political regime).

The necessary elements in the modernization process are the presence of entrepreneurship, of modern infrastructure and of modern attitudes and values. The presence of these elements does not presuppose the loss of rural specificity (of traditions and customs), their valorization being an ideal situation.

Modernization means something different, in relation to the entity or phenomenon we refer to, namely [3]: in economic terms, modernization means high productivity, competitiveness; from the community point of view, modernization means infrastructure and access to utilities; from the social point of view, modernization means access to education, healthcare and information; from the ecological point of view, modernization means environment protection; from the political point of view, modernization means nation-state, with all its functions and organisms; at individual level, modernization means modern personality, in which the person has intellectual openness, detachment from tradition, sense of personal efficiency, desire to be an informed citizen, ability to adapt to new experiences.

The main hypothesis of the paper is that socio-economic modernization and development are two phenomena that are mutually reinforcing, with beneficial effects on all the involved actors. Modernization means development "the modernization concept – a much more comprehensive conceptual relative of economic development – refers to the fact that the technological, economic and ecological changes are spreading all over the social and cultural system" [4]. In other words, development is influenced by the technological progress in the first place.

[1] Scientific researcher, Institute of Agricultural Economics – NIER, E-mail: chitu_lorena@yahoo.com
[2] Prof. Univ. Dr., USAMV București, ion_dona@yahoo.com

Modernization is different from rural development. Development is the last stage of modernization, with deep and long-term changes, presupposing various transformations: economic, social, political, technological and cultural.

MATERIALS AND WORKING METHODS

The working methodology, in the present paper, involved the consultation of recent literature on the classification of three defining concepts (rural household, rural space, sustainable rural development) to clarify the issue of the household's role in the Romanian rural area from the sustainable rural development perspective.

In the development of the theoretical model for the analysis of the socio-economic modernization and development level of the rural area, the following criteria are considered in the analysis: natural and anthropic criterion, demographic criterion, social criterion, economic criterion; a set of specific indicators correspond to each criterion.

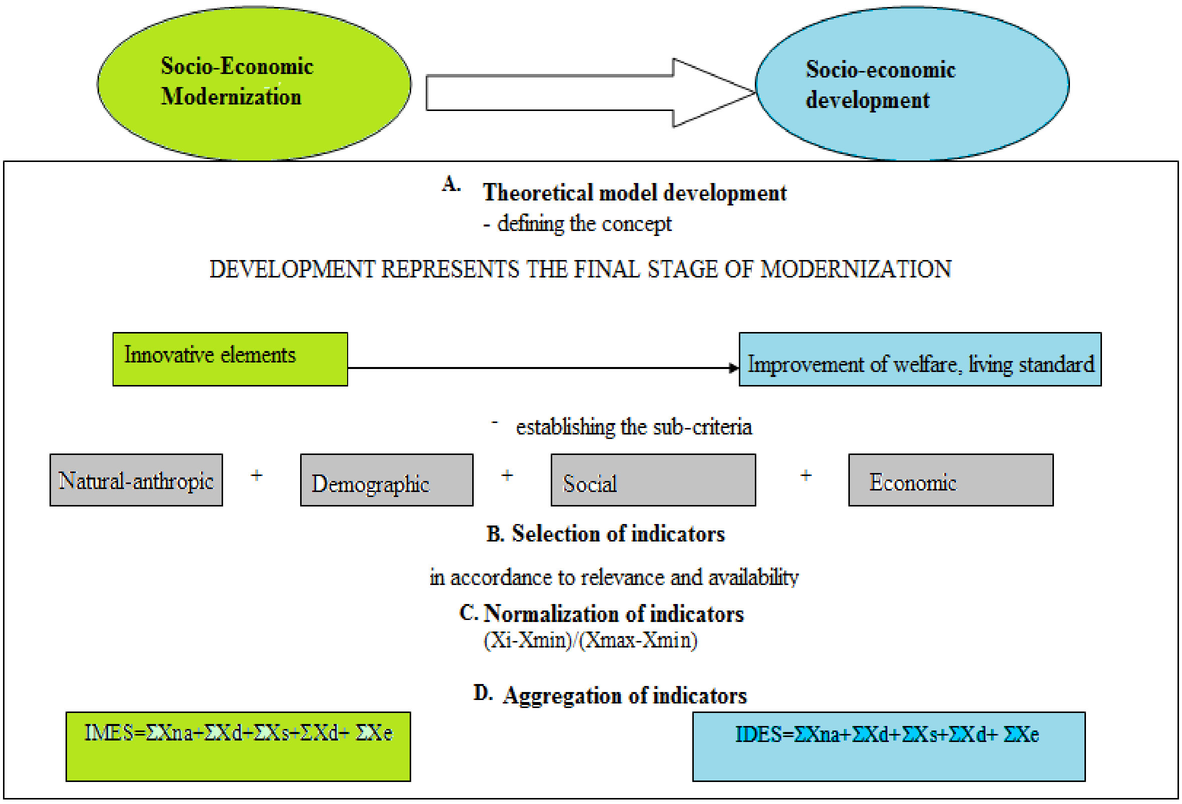

Figure 1: Developing the theoretical model of analysis of the degree of socio-economic modernization and development of the rural area

Source: [6], [7], [8], [9],[10], [11] and [12]

RESULTS AND DISCUSSIONS

The main hypothesis of the paper, i.e. the linkage between the socio-economic modernization and development level in the rural area, has been confirmed. The integration of the modernization elements entails development and implicitly the continuous improvement of life quality and welfare at rural household level.

The correlation between the two indices has been intensified over time, evolving from a significant correlation in the year 1995 to a strongly significant correlation in the years 2005 and 2016.

Table 1: Correlation between the Socio-Economic Development Index and the Socio-Economic Modernization Index of the rural area (Pearson Correlation), 1995-2016

		SEMI					
		1995	2000	2005	2007	2010	2016
SEDI	1995	0.302*					
	2000		0,537**				
	2005			0.596**			
	2007				0.511**		
	2010					0.503**	
	2016						0.636**

Source: authors' own calculations SPSS using NIS statistical data – tempo online
*. Correlation is significant at the 0.05 level (1-tailed).
**. Correlation is significant at the 0.01 level (1-tailed).

From the analysis of the development index, the strongest correlations exist with the social dimension (0.797**), demographic dimension (0.690**) and economic dimension (0.666**); these correlations have been intensified over time. The natural-anthropic dimension has no positive influence on SEDI or on the other component dimensions.

In the year 1995, the influence between the criteria underpinning SEDI index construction was non-significant, and since 2005 significant correlations have emerged between the economic, social and demographic dimensions. The natural-anthropic factor, in the investigated period, did not positively influence any of its components, while in the year 2016 a significant influence on the social dimension emerged for the first time.

The counties with the highest socio-economic development level of the rural area are the following: Timiș, Brașov, Constanța, followed by Suceava, Iași, Ilfov, Arad, Sibiu, Cluj, Bihor, Dolj, Prahova. The following counties are at the opposite pole, with a low modernization level: Teleorman, Sălaj, Olt, Vâlcea, Giurgiu, Gorj, Covasna, Hunedoara, Mehedinți.

In the period 1995-2016, the share of counties with an acceptable and good development level decreased from 17.07% in 1995 to 7.32% in 2006, while the share of counties with low and very low development level increased from 46.34% in 1995 to 70.73% in 2016. This situation reveals the accentuation of disparities across counties in terms of their development level.

From the analysis of the socio-economic modernization index (SEMI) of Romania's rural area, the strongest correlations are noticed with the natural-anthropic criterion (0.877**) and with the demographic criterion (0.787**); these correlations have been intensified over time. The other criteria must not be neglected either, as they have quite a significant influence upon SEMI (social criterion 0.536** and economic criterion 0.405**).

Having in view that all the criteria considered have a significant influence upon SEMI, and no significant linkages are established between these criteria, this reveals a structural and functional dysfunctionality at the rural system level. Only the natural-anthropic criterion correlates significantly with the demographic criterion (0.633**) and with the economic criterion (0.275**).

The following counties have the highest socio-economic modernization level of the rural area: Ilfov, Timiș and Cluj, followed by Brașov, Sibiu, Arad, Constanța and Alba. The counties with the lowest modernization level are Botoșani, Teleorman, Giurgiu, Neamț, Vaslui, Olt, Dolj and Călărași.

In the investigated period, the share of counties with an acceptable and good modernization level decreased from 26.83% in 1995 to 19.51% in 2006, while the share of counties with low and very low modernization level increased from 31.71% in 1995 to 56.10% in 2016.

From the results of the presented model, we can notice as a general trend the fact that the Romanian countryside has a different behaviour depending on the proximity of the large urban centers (see the counties Timiș, Ilfov, Cluj, Sibiu, Constanța, Brașov); the rural households in the proximity of towns have easier access to utilities and more attractive jobs, while their population is more educated. These peri-urban rural areas have a more diversified economic activity, with a mixed economy (agriculture, industry, services), and the agricultural activity is tailored to market demand [2].

The rural household farm is adapted to its environment, it is not competitive, still representing a refuge and a buffer in the face of changes and economic crises. The basic activity continues to be agriculture, with low and unreliable incomes, yet ensuring the survival of rural household on the short term.

Table 2: Classification of counties by the socio-economic modernization and development level, in the year 2016

	Very low modernization level	Low modernization level	Medium modernization level	Acceptable modernization level	Good modernization level
Very low development level	Giurgiu, Olt, Teleorman	Gorj, Hunedoara, Mehedinți, Sălaj	Covasna, Vâlcea		
Low development level	Botoșani, Călărași, Neamt, Vaslui	Dâmbovița, Ialomița, Buzău, Mureș, Satu Mare, Vrancea, Argeș, Brăila	Tulcea, Maramureș, Harghita, Bacău, Galați, Bistrița-Năsăud, Caraș-Severin	Alba	
Medium development level	Dolj	Bihor, Suceava, Prahova	Iași	Sibiu, Arad	Cluj, Ilfov
Acceptable development level				Brașov, Constanța	
Good development level					Timiș

The evolution of the socio-economic modernization and development of the Romanian countryside over time has not led to the consolidation of rural household, but to the perpetuation of subsistence (see SEMI and SEDI map) in most rural areas from the country. The rural household risks to disappear due to the lack of attractiveness of rural areas, the population leaving to town or abroad for a better life, while the elderly people remain in the countryside and have to work after the retirement age, as there are no young people in the family to take over the farming activity [2]. Some other persons add to these, at the age of retirement, who prefer to come and live in their native places or in the peri-urban rural areas, seeking for a quiet and safe rural life. Until this phenomenon stops, the rural households risk to no longer support the existence of rural communities, mainly in the deep rural areas.

Modernization at rural household level in Romania takes place in relation to a multitude of factors present in the rural system, with effect in the entire system and in its component sub-systems (anthropic, demographic, social, economic), and the result of modernization can be seen in the new life patterns that have replaced the traditional ones.

At county level, through the correlation of the two indices (modernization and development), we have the following categories of counties according to the socio-economic development and modernization for the rural households:

1. counties with no socio-economic modernization and development perspectives (SEDI decreased from 3.37 in 1995 to 2.54 in 2016, SEMI down from 4.57 in 1995 to 4.22 in 2016): Giurgiu, Olt, Teleorman;
2. counties with low perspectives of modernization and socio-economic development (SEDI down from 3.87 in 1995 to 3.42 in 2016, SEMI down from 5.39 in 1995 to 4.98 in 2016): Gorj, Hunedoara, Mehedinți, Sălaj, Botoșani, Călărași, Neamț, Vaslui, Dâmbovița, Ialomița, Buzău, Mureș, Satu Mare, Vrancea, Argeș, Brăila;

3. counties in deadlock in terms of modernization and socio-economic development (SEDI down from 3.60 in 1995 to 3.21 in 2016, SEMI up from 4.88 in 1995 to 5.65 in 2016): Dolj, Covasna, Vâlcea;
4. counties with medium perspectives of modernization and socio-economic development (SEDI down from 4.32 in 1995 to 3.72 in 2016, SEMI increased from 5.59 in 1995 to 6.00 in 2016): Tulcea, Maramureş, Harghita, Bacău, Galați, Bistrița-Năsăud, Casaș-Severin, Bihor, Suceava, Prahova;
5. counties with acceptable perspectives in terms of modernization and socio-economic development (SEDI down from 4.32 in 1995 to 4.23 in 2016, SEMI increased from 5.41 in 1995 to 6.33 in 2016): Alba, Iași;
6. counties with net perspectives in terms of modernization and socio-economic development (SEDI increased from 4.93 in 1995 to 5.09 in 2016, SEMI increased from 6.09 in 1995 to 7.81 in 2016): Sibiu, Arad, Cluj, Ilfov, Brașov, Constanța, Timiș.

CONCLUSIONS

At present, the structures operating in Romania's rural area define a complex and very diverse rurality. For this reason, any type of development/modernization must be based on the specificity of rural areas, on those defining phenomena and processes for each area.

The evolution of Romanian rural area modernization and socio-economic development over time has not led to the consolidation of rural household, but rather to the subsistence phenomenon perpetuation (see SEMI and SEDI map) in mot rural areas of the country.

From the results of our model, we can notice as a general trend that the Romanian rural areas have different behaviour depending on the proximity of great urban centers (see counties Timiş, Ilfov, Cluj, Sibiu, Constanța and Brașov), while the rural households in the proximity of cities have an easier access to utilities and more attractive jobs and the population has a higher educational level.

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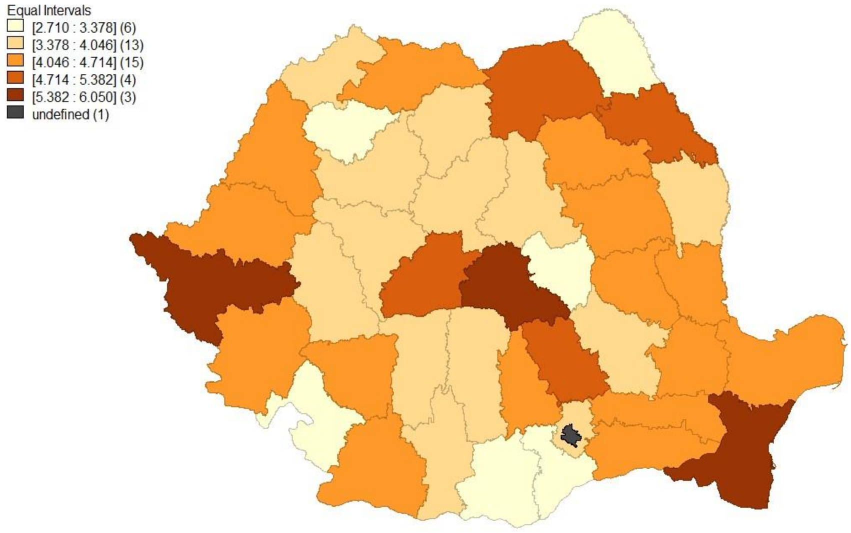
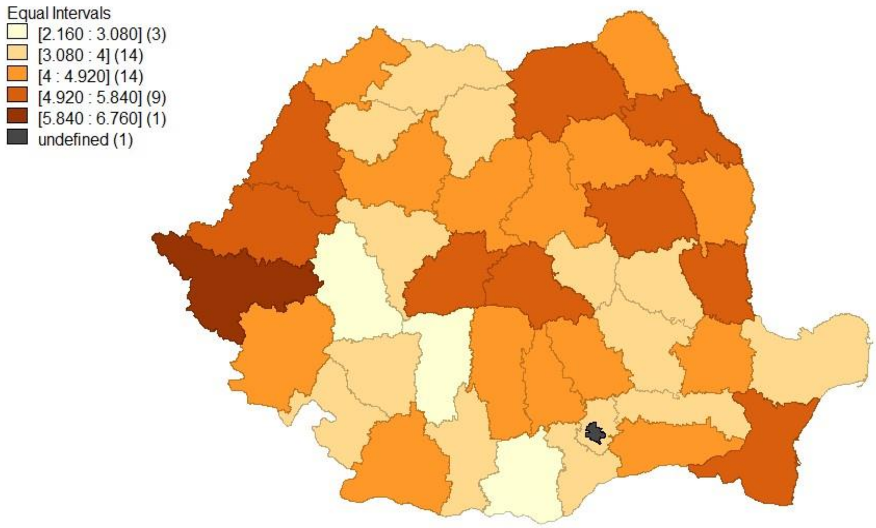
Map 1: Socio-Economic Development Index of the Romanian rural area, in the years 1995, 2005 and 2016

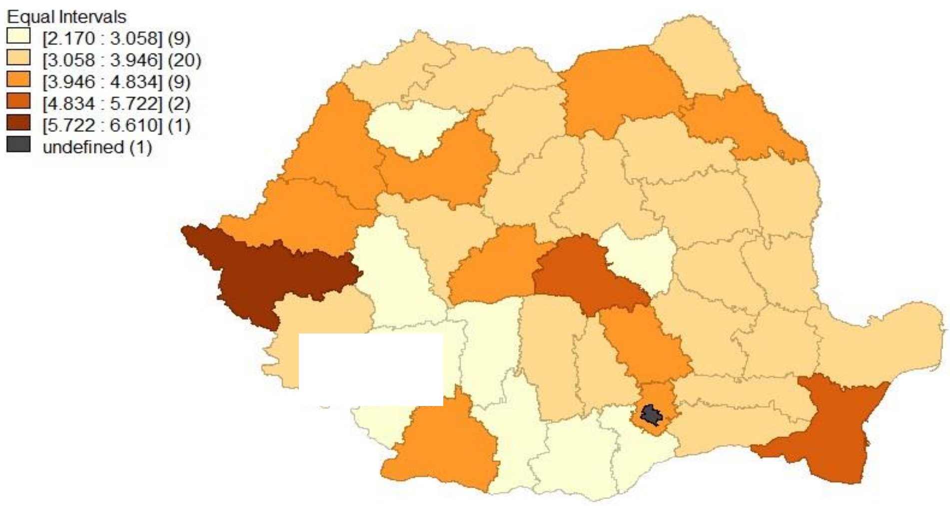
1995



2005



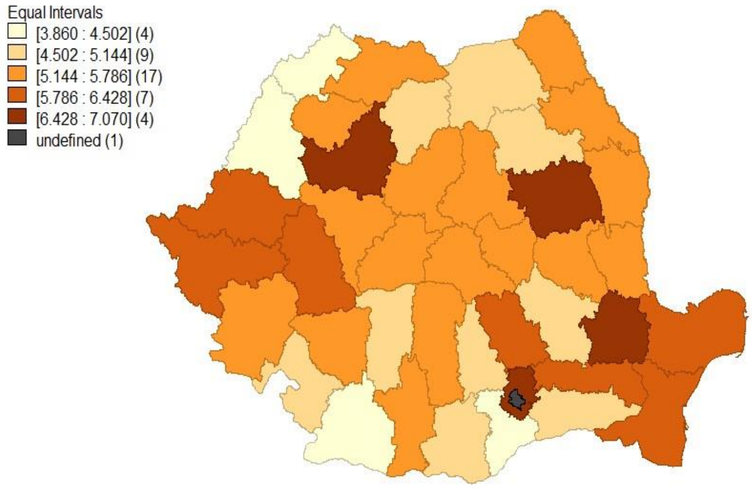
2016



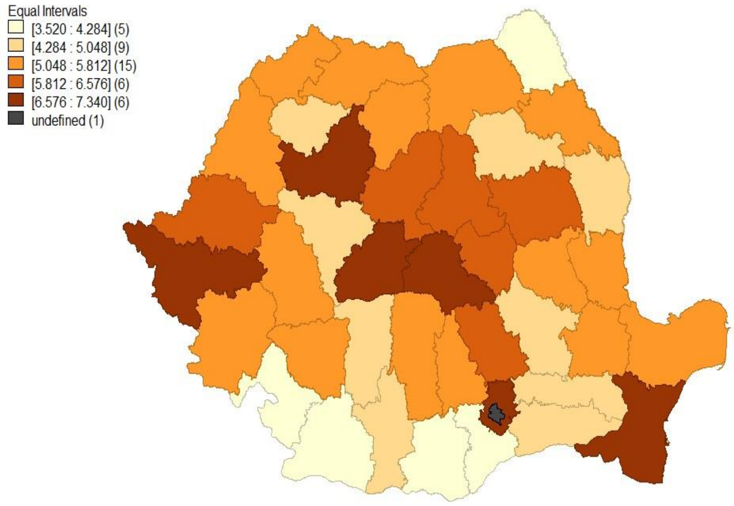
Source: authors' own calculations based on NIS statistical data – tempo online

Map 2: Socio-Economic Modernization Index of the Romanian rural area, in the years 1995, 2005 and 2016

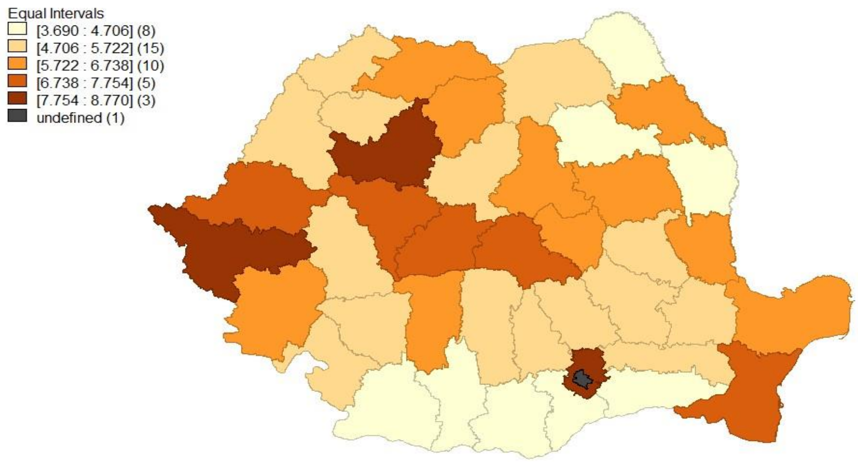
1995



2005



2016



Source: authors' own calculations based on NIS statistical data – tempo online

THE EFFECTS OF THE ACCESSION TO THE EUROPEAN UNION ON THE EVOLUTION OF ROMANIA'S CEREAL SECTOR

MIHAELA KRUZSLICIKA[1]

Abstract: *The paper intends to examine the effects of the accession to the European Union on Romania`s cereal sector, in the period 2007-2016, in terms of evolution of areas cultivated with wheat and maize, production in volume and value terms, consumption and self-sufficiency, exports and imports, as well as the evolution of prices. The results reveal that unlike other sectors, the accession has steadily contributed to Romania`s cereal sector revigoration. Although yields in Romania are still substantially below those of the major European cereal producing countries, a steady growth trend can be noticed after 2007, due to the European funds that have allowed easier access to technological resources on the community market, and to a tendency for land consolidation, these advanced technologies being used more efficiently. The self-sufficiency degree has been reached and the trend is increasing, as it can be seen from the trade balance for cereals.*

Keywords: *production, prices, productivity, cereals, consumption, trade, Romania*.

JEL Classification: *Q01, Q10, Q12, Q13*.

INTRODUCTION

In the pre-accession to EU period the main tool for the funding of the agricultural activities was SAPARD, a program which followed the competitiveness increase and re-rechnologization by acquisition of machines and performing equipments. The main measure by which modernizations were made in the farms- cereal producers was measure 3.1 „Investments in agricultural farms", the sub-measure Field Crops (1,186 projects approved, representing 19% of total projects), having in view, mainly, the acquisition of machines and equipments, and the total allocated value was of 112.5 mill. Euro.

After the EU accession, through the National Rural Development Program 2007-2013 the cereals' sector benefited of 411.1 mill. Euro funding as result of the accessing the following measures: (a) Measure 112 „Young farmers installing", and by sub-measure „Field Crops" there were allotted 83.7 mill. Euro; (b) Measure 121 „Modernization of agricultural farms –field crops" having in view mainly the acquisition of machines and equipments in value of 382.0 mill. Euro; (c) Measure 123 „Increase of value added at agricultural and forestry products" in value of 206.7 thousand euro; (d) Measure 142 „Foundation of farmers' groups- Field", and a value of 8.2 mill. Euro.

The farmers who cropped cereals benefited, starting with the year 2007, of the following support forms as result of Common Agricultural Policy application, which are: The Single Area Payment Scheme (SAPS); the re-distributive payment; the payment for benefcial farm practices for climate and environment u; payment for the young farmers; The simplified scheme for the small farmers; the national transitional aids and the State aid for gas oil. All these support forms obtained by the farmers cropping cereals have permited them to better manage the cash flow at farm's level and be able to purchase inputs without appealing to supply loan, but also they had the possibility toobtain Guarantee letter from APIA for banking loan.

European context

The total EU cereal production in the period 2007-2017 knew an increase of 18%, while in Romania the increase was higher by 255%, mainly due to the average yield increase by 246%. The yields per ha, at cereals, although increasing, are low towards the EU average, hardly in the year 2017 the cereals average yield drew closer to a value of 94.5% towards that registered in the EU 28.

[1] Institute of Agricultural Economics, Romanian Academy, Bucharest, mkruzslicika@gmail.com

After the cereal production, Romania was on the 8-th place in the EU in the year 2007, as in the year 2017 to be on the 4-th place. This thing takes place in the conditions in which the area cropped with cereals was maintained relatively constant in the interval 2007-2017.

Romania situated on the 5-th position by the area cropped with wheat and on the first place by area cropped with maize, place maintained on the whole period 2007-2017.

In Romania the average wheat yield was at the level of 50% from the European one, in the interval 2007-2009, and the increase of the average wheat yield was not in the rate registered in the EU, such that in the interval 2012-2015 the average wheat yield represents only 42% of that registered in the EU. Whereas, the average maize yield had a more stressed increase, such that in the period 2007-2009 it represented 36% of the average EU 28 as in the period 2013-2015 to represent 53% of the average value registered at the EU 28 level. (Table 1).

Table 1. Cereals – area, average yield and total production

	U.M	2007-2009			2010-2012			2013-2016		
		Average Romania	**EU-28 average**	**Rank in EU-28**	**Average Romania**	**EU-28 average**	**Rank in EU-28**	**Average Romania**	**EU-28 average**	**Rank in EU-28**
Total area under cereals	thou. ha	5208	59546	5	5236	57124	5	5456	56685	5
Area under wheat		2078	25850	4	2036	25936	5	2115	26094	5
Area under maize		2435	8765	1	2473	9156	1	2556	9301	1
Average yield cereals	kg/ ha	2500	4900	26	3200	5100	24	3400	5100	22
Wheat average yield		2500	5000	25	2400	4900	24	2400	5000	24
Maize average yield		2700	7500	20*	3700	8000	22	4100	8100	21
Total cereal production	thou. tons	13171	291468	8	16793	286739	7	21005	314413	6
Total wheat production		5143	136099	8	6080	137113	7	7819	149415	5
Total maize production		6559	58675	4	8904	63487	2	9578	63583	2

*Without Denmark and Great Britain that did not report any maize yields for the period 2007 – 2009

Source: calculations based on Eurostat [apro_acs_a]

In the year 2017, the value of cereal production at the European Union level was of 46 billion euro, of which wheat represented 51% and maize 21%.

The first five producers at EU-28 level are totalling 67% of the value of wheat production and 71% of the value of maize production. These results are showing a very high degree of cereal production concentration.

Romania's cereal production value in the year 2017 was of 4.2 billion euro of which 34.2 % represent wheat, and 54% is represented by maize. By the value of cereal production Romania is situating on the 3-rd place in the EU.

With a value of the wheat production of 1.43 billion. Euro, Romania situated on the 6-th place, while at maize it situated on the 1st place with 2.26 billion. Euro.

The total wheat production in the year 2015 at the EU-28 level was of 152.3 mill. tones, Romania situating on the 6-th place with cu 9.8 mill. tones, the first place being occupied by France with 38.7 mill. tones.

The low average yields in the case of Romania towards the big producers countries at European level are caused, on one hand by the extreme weather conditions as: droughts, floods or frosts, but also by the lack of some efficient measures for their melioration, through the development of the irrigation systems, mainly in the zones which are most exposed to the drought's effects. Also, there must be held in view other measures which should have as effect bigger average per ha yields as: enlargement of the high yield tractors and machines' park, the optimization of the fertilizing systems and fight with pests, and also the choice for some hybrids to ensure a higher resistance to the external environmental factors and pests. Another cause of the low average yields is the very high lands' fragmentation.

The existent situation

In Romania the area cropped with cereals in the year 2016 was of 5486.9 thousand hectares of which 39% where cropped with wheat, 47% with maize, 5% with barley, 3% with oat and 5% was represented by other cereals. The areas cropped with cereals remained somehow constant, with smaller variations after the year 2007 while the average yields are registering an increasing trend, fact reflected in the total wheat productions (fig.1). The dependence of the productions on the climate factors made that the cereal production present important variations, on the studied period.

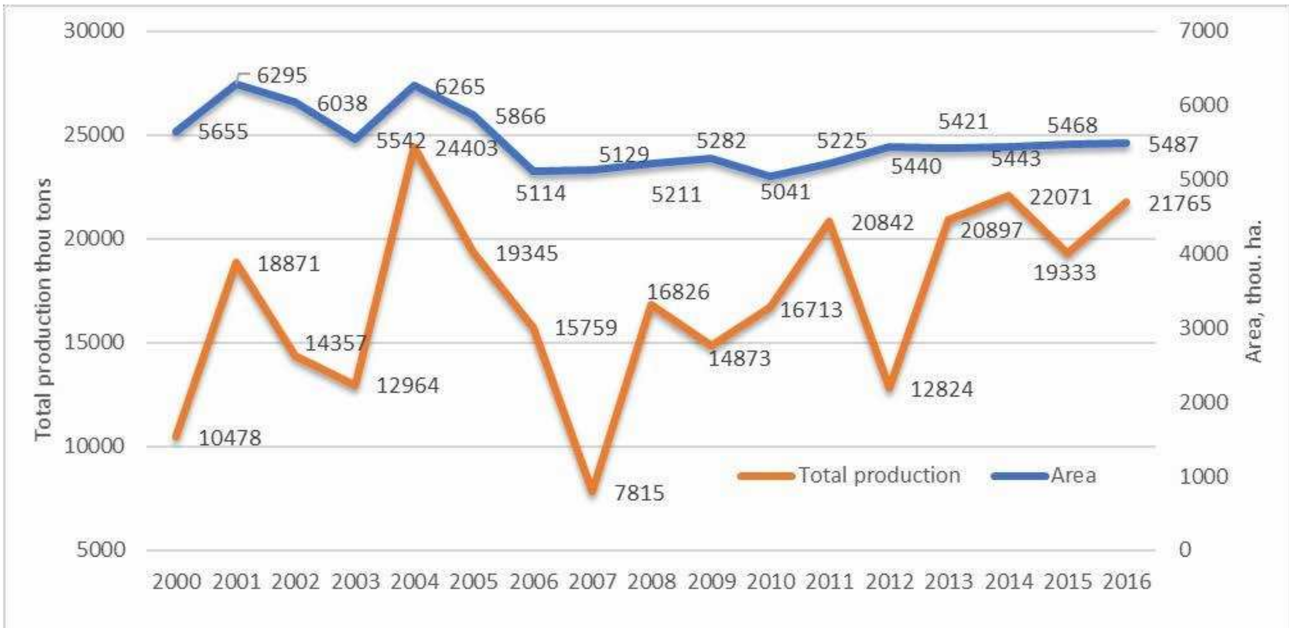


Figure 1. Evolution of areas and cereal production in Romania
Source: tempo-online data, INS 2016 and DG AGRI 2016 data

From the point of view of the structure by size classes for the cereal farms, in Romania, we can see a constant tendency to amalgamate the land areas into medium size farms (20-99,9 ha) and big farms, of over 100 ha. Thus, the number of the medium and big size farms which are cropping wheat increased in the period 2003-2013 by 14.5 % and respectively by 56.4%, the area cropped by these ones registering increases of 37.6%, in case of the average farms and respectively 44.3% in case of the big farms.

Also, the farms specialized in the crops of maize have registered important increases in the interval 2007-2013, of 18.8% in the case of medium farms and 60.6% in the case of big ones, the area cropped by them increasing by 82.8% and respectively by 100.3% in case of big farms.

It is easy to learn that the average yields per ha are higher in case of amalgamated land areas, the farms with big areas of land, due to a centralized management, the employment of specialists, a better technical endowment than in the case of small size farms, the big farms having a more easy access to loans for investments in technological reshaping and warehouse capacities, obtaining a higher value added in the end.

On the other hand, the pre-accession to EU funds (SAPARD) and subsequently the National Rural Development Program, have facilitated the acquisition of performant agricultural machines and together with them, the know-how transfer, leading finally to land amalgamation into medium and big size farms.

The economic performance is positively correlated with the farm's economic size, such that: one farm from the smaller class than 2000 euro is producing averagely a value of 2709 euro/year per one work unit, while at a farm producing 500000 euro it produces averagely 59740 euro/year per one work unit, 22 times more than a small farm. This fact is explained by the high technologization degree in the big size farms.

Labour productivity increased at all classes of economic size, but under different percentages. The higher increase is registered in the farms of class: 500000 euro and more (by 110%).

In the analysed period, 2005-2017, the trend for all studied indicators is of agricultural production concentration into big size farms.

Prices

The average producer price, for wheat, in the period 2000-2017 (fig.2), varied in function of the conditions on the internal market (respectively the limited supply because of the un-favourable weather factors) and of the prices' evolution on the international market. If in the period 2000-2007 there were significant differences between the prices practiced in Romania towards those practiced in the EU, the accession to the EU, and also the cereals surplus destined to export had as result the elimination of this gaps. This thing is observed both in case of wheat and also at maize (fig.3).

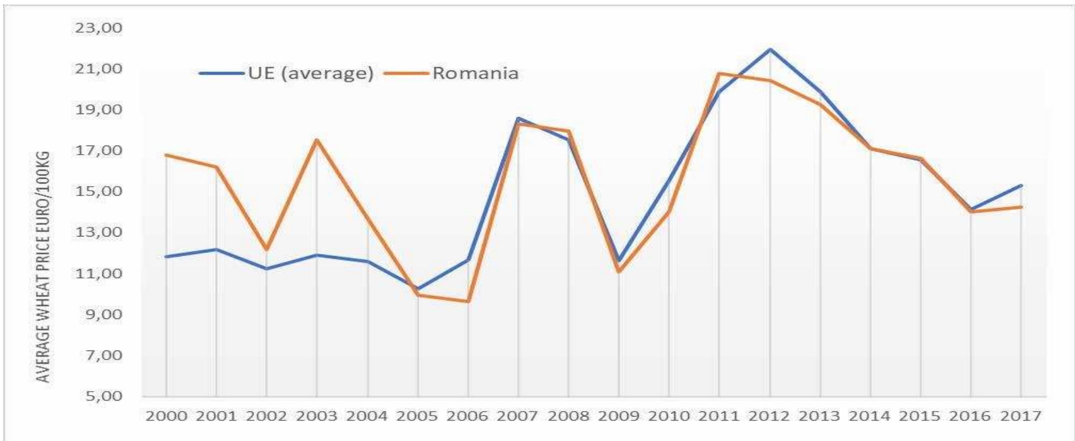


Figure 2. The average producer price at wheat, for the period 2000-2017
Source: Eurostat [apri_ap_crpouta]

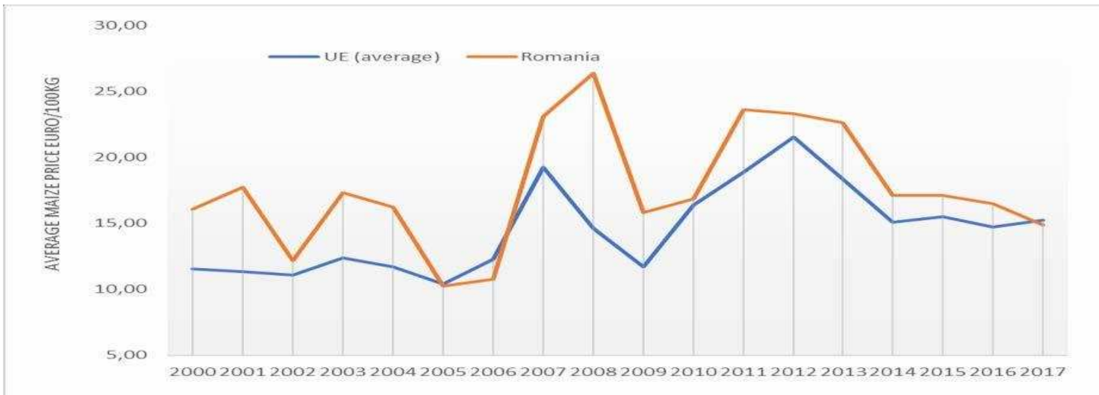


Figure 3. The average producer price at maize, for the period 2000-2017
Source: Eurostat [apri_ap_crpouta]

The self-sufficiency degree

Cereals are from the group of products for which the self-sufficiency degree was reached starting with the year 2005, the only year which had a self-sufficiency degree of under 100% being the year 2007 when a severe drought was registered. The self-sufficiency degree of wheat and maize are registered a constant increasing trend, with maximum values, for wheat, in the year 2016 of 225% and for maize in the year 2015, of 144%. For the total group of cereals, the same trend is maintained, with a maximum of 163% in the year 2014 (fig. 4).

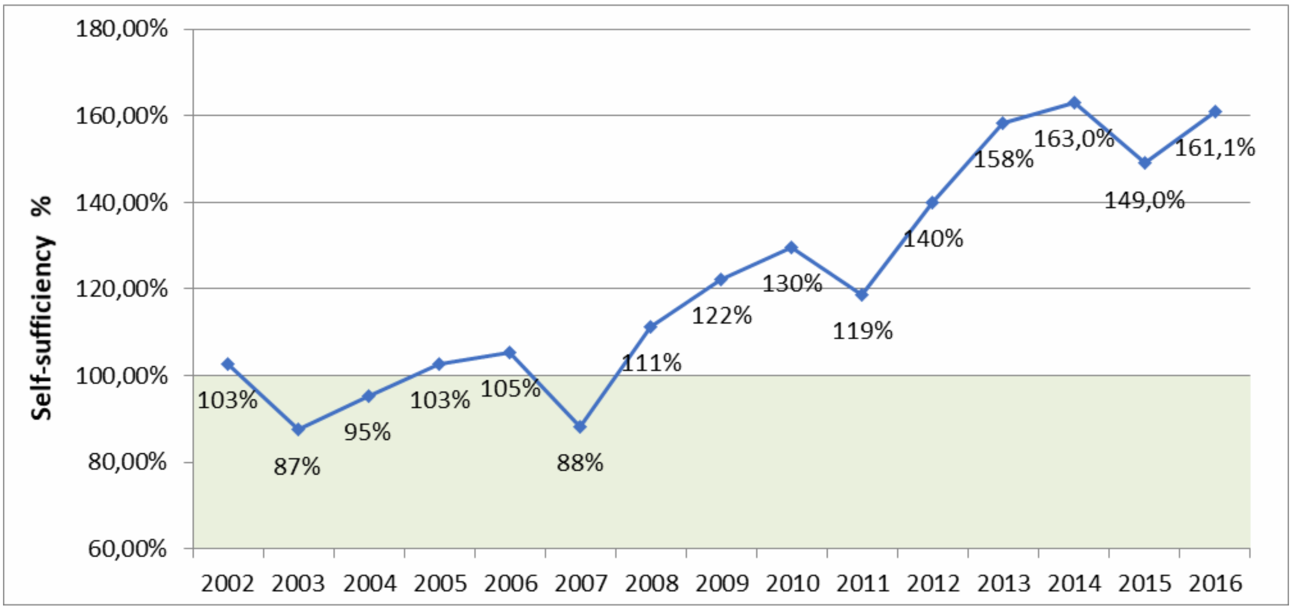


Figure 4. The self-sufficiency degree for cereals and cereal products, for the period 2002-2016
Source: calculations and processing after data in the Food Balances 2002-2016, NSI Bucharest

At total cereals, the internal availabilities for consumption are presenting a decreasing trend in the interval 2000-2016. Once self-sufficiency being reached, on the background of a relatively linear trend of cereals import and of a significant increase at cereal exports, mainly in the interval 2007-2016, the internal consumption availabilities are decreasing.

The human cereal consumption is relatively constant, situating itself at an average of 158 kg/capita /year, the available for human consumption registering small variations in the interval 2000-2016, the average being of 4416 thousand tones.

Also, small variations are met also at the cereals for seeds, these ones being correlated with the areas on which this type of crop was cropped, which having small variation coefficients are generating a relatively constant consumption .

An increasing trend is to be seen at the quantities of cereals destined to industrial processing, in the year 2016 being utilized 731 thousand tones increasing by 133% opposed to the year 2000.

The important variations of the available for consumption, caused mainly by the environmental are taken over by the fodder consumption. An important share in the cereals for fodders consumption is held by maize, which represents 84.4% of the total cereals for fodders consumption, while wheat has a share of only 9.1%.

The average net annual consumption of wheat per inhabitant capita decreased since the year 2000 by 14%, to 122 kg/capita /year in 2016.

The maize consumption per inhabitant capita presented a slight increase trend in the studied interval with a value of 30 kg/capita /year in 2016.

Cereals import and export

In the period 2000–2007 the trade balance in the trade with cereals registered fluctuations, with deficits (in the years 2003: -289.6 mill. euro; in the year 2004: -177.7 mill. Euro and in the year 2007: -118.8 mill. euro), products of internal supply contraction caused by the un-favourable weather conditions, but also with surpluses, the biggest being registered in the year 2006, in value of 84.2 mill. Euro.

Starting with the year 2008 the trade balance account is positive, for the period studied, it is observed a passing from a deficit of 118.8 mill. Euro to a surplus increasing on whole studied period. In the year 2014, the surplus registered is of 1.7 billion. Euro.

Together with the intra-community market liberalization, the trade exchanges intensified and their structure was modified. Thus, if in the period 2000–2007 the intra-community imports did not exceed 60%, after the year 2008 these were situating around the value of 93%. Also, the exports to the European Union diminished starting with the year 2007, reaching from 62% in the year 2007 to 38.6% in 2017, the main selling markets for cereals being the extra-community ones, respectively North Africa and Near and Middle East. Romania has a competitive advantage regarding the export on these markets due to the small transport costs.

The trade balances for wheat and maize are positive, with an obvious increasing trend in the interval 2008–2015, the total surplus at cereals in the year 2016 being of 1.5 billion. Euro, and in 2017 this was of 1.547 billion. Euro (fig.5).

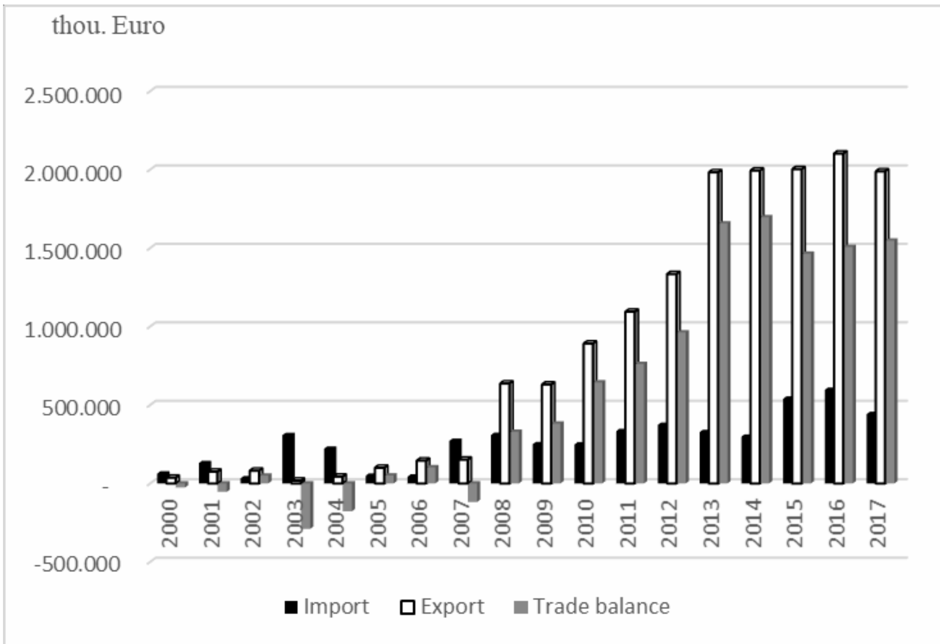


Figure 5. Romania: trade balance in cereals in the period 2000-2017, thou. euro
Source: Eurostat, COMEXT database, Code 10: Cereals.

The wheat imports on the intra-community market are registering an average annual percentage of 94 % in the interval 2008–2015 with maximums of 97% in the years 2008, 2009 and 2014. In general, from the intra-community space we import wheat destined to sowing. The structure of exports in wheat was also modified, such that the ratio of extra-community exports and intra-community ones reversed itself. If in the 2000–2007 the exports to EU were of 64%, on the interval 2008–2015, this reached to 36%. In value terms the trade exchanges registered a substantial increase in the interval 2008–2015 with an average annual value of 550.3 mill. Euro, with peaks in the years 2013 of 976.9 mill .Euro and 2014 of 959.3 mill. Euro opposed to the interval 2000–2007 when the annual average was of 33.04 mill. Euro.

CONCLUSIONS

In Romania, the vastest crop is that of cereals; the average of the last 25 years is showing that over 65% of the total arable area is cropped with cereals.

Although the average yields are still substantially under those of the European countries- big cereals producers-, after the year 2007 we can observe a trend of constant increase of them due to the easier access to technological resources on the community market, but also due to a tendency for land amalgamation, these advanced technologies being more efficiently utilized .

The trend in the case of small farms is decreasing, the number of medium and big farms obviously increasing. Even in such conditions the inland cereal production is relatively, strongly influenced by the climate factors, mainly drought, which leads to the conclusion that we must find new efficient modalities to stimulate irrigation of some bigger land areas taking advantage of the increase of big farms' number. Labour productivity, on the economic size of the farm, but under different percentages is increasing more in the case of big farms due to a coherent management of crops and technologies utilized in cereals cropping, of the high economic capacity, used in the renewal of the technological park and the use of high quality genetic material, but also the possibility to easier access to European Funds for the activity's development.

By accessing the projects within RDNP it was wished both the attraction of young farmers- in the rural space, and the modernization of agricultural farms together with the foundation of the farmers' groups. Also, of these projects there benefited the economic agents, who followed the increase of the value added of agricultural and forestry products, but also the subsistence farms.

The cereals' foreign trade knew a reshape in the period 2007-2017 opposed to the previous period, the trade exchanges intensifying themselves, the trade balance in the trade with cereals being positive and registering an increasing trend starting with the year 2008. Thus, if cereals' import are mainly made from the community market, the exports are done mainly towards countries outside the community space.

Starting with the year 2005 the self-sufficiency degree is of 100% and registers a constant increasing trend. Thus, the higher dynamics of the cereal production and the trend for constant decrease of cereal consumption led to a self-sufficiency degree of over 100% starting with the year 2008.

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TAKING A CLOSER LOOK AT RURAL EDUCATION

MARIOARA RUSU[1]

Abstract: *In a globalized, knowledge-based economy, education and training is of great importance for increasing economic and social progress: an adequately trained workforce can face competition in terms of productivity, quality and innovation. According to Eurostat, Romania allocates less money to education than most European Union countries. These allocations reflect the low level of attention paid to the education and training system. This paper analyses the situation and trends that have been registered in the Romanian education system in the EU's post-accession period. The set of indicators has been selected to cover both education levels and the types of predominantly rural, intermediate and predominantly urban regions. The following dimensions were considered: participation in education, the human and material resources involved and, where possible, the results.*

Key words: *education, rural regions, Romania*

JEL Classification: *I21, I29, R10*

INTRODUCTION

In a globalized, knowledge-based economy, education and training are of great importance for economic and social progress. Studies conducted in recent years, focusing on education and vocational training, show that there is a strong correlation between the low level of education and the economic and social problems faced by Romania (Apostu et al., 2015; WB, 2010; Fartuşnic, 2014 OECD, 2017). Education and training are two of the most powerful weapons in the fight against poverty (FAO, 2003).

Romania, as a Member State of the European Union (EU), has rallied to the Europe 2020[2] Strategy and has developed five national strategies, which are also found in the Law on Education and which aim at: i) reducing the phenomenon of early school leaving; ii) increasing the quality of tertiary education; iii) development of lifelong learning; and iv) investing in the infrastructure of educational institutions with the highest exposure to poverty. Although, over the years, were developed several strategies, and many governments have declared education a national priority, the main feature of the Romanian education system is a chronic under-financing (for example, in 2015, Romania has spent 2% of GDP value much lower than the EU28 average, 4.9% respectively). The 2011 Education Law set a target of 6% of GDP for public spending on education. This provision has not materialized so far, affecting mainly schools in rural areas.

MATERIAL AND METHOD

The hypothesis on which this paper is that education and training are important factors in the development of a competitive knowledge-based economy, and the investments made in this field contribute to the stimulation of economic growth and, implicitly, to the growth of rural well-being. The analysis presented in this paper is based on data from different statistical and documentary sources (National Institute of Statistics -NIS, Eurostat, Ministry of National Education -MNE, etc.). The analysis was based on the defined rural-urban typology at NUTS3 level in the EU. It comprises three types of regions: *predominantly urban regions* (Bucharest and Ilfov County), *intermediate regions* (counties: Arges, Bacău, Bihor, Braşov, Brăila, Cluj, Constanţa, Dolj, Galati, Hunedoara, Iasi, Neamt, Prahova, Timiş), *predominantly rural regions* (counties: Alba, Arad, Bistrita-Nasaud, Botosani, Buzau, Calarasi, Caras-Severin, Covasna, Dambovita, Giurgiu, Gorj, Harghita, Ialomita, Maramures, Mehedinti, Mures, Olt, Satu Mare, Sălaj , Suceava, Teleorman, Tulcea, Vâlcea, Vaslui, Vrancea). Data availability, lack of relevant variables, incomplete data

[1] Senior researcher, Institute of Agricultural Economics, Romanian Academy, Bucharest, rusu.marioara@gmail.com

[2] Employment Strategy for 2010-2020

series, limitations on classification of data by type of region, etc. have narrowed the aim of analysis we have proposed.

RESULTS AND DISCUTIONS

In Romanian society, it is well known that the school has regressed constantly in recent years, a decline that has been much more pronounced in the case of rural communities: children no longer attend school, many schools in the rural area have been closed, teachers are poorly trained, etc. The analysis carried out in this paper reveals the main difficulties and problems related to participation in education, human and material resources and, where possible, results.

In Romania, total school population comprises about 3.6 million pupils and students, of which 13.31% are located in predominantly urban regions, 47.44% in intermediate regions and 39.25% in predominantly rural. As regards their distribution on types of education, it can be noticed that predominantly urban and intermediate regions have relatively close proportions (40-45%). Only in the case of university education the situation is different: the students are placed into the intermediate regions and especially in the predominantly urban ones, the share of the students from the predominantly rural regions being very low (10.85%). Compared to 2006, the school population registered a decrease of 16.18%.

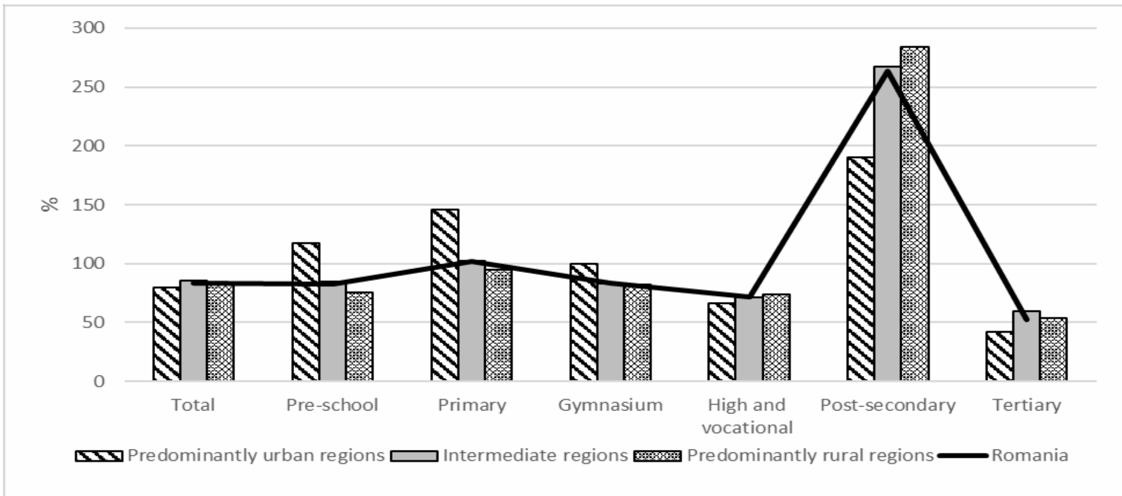

Figure 1. Evolution of school population by educational levels and types of regions (2015 vs. 2006)
Source: author's data processing after NIS, TempoOnline Database, 2017

By type of regions, a more pronounced decrease is observed for predominantly urban regions (20.15%) and close to the national average for predominantly rural regions (16.77%). In predominantly rural regions, with the exception of post-secondary education and foremen, there is an obvious decrease in the total school population in all forms of education - with the highest decreases in pre-primary, primary and secondary education. This state of affairs is primarily a direct effect of demographic trends (natality, migration, etc.).

The enrolment rate in all levels of education highlights the general level of participation in education of the population and has registered a low fluctuation trend between 71.23% and 75.20% at national level (2006 -2015 period). Predominantly rural regions have the lowest value for this indicator over the entire period, reflecting the reduced capacity of the education system in these regions to allow access to all levels of education, and in particular to higher education. Predominantly urban regions have a high gross enrolment rate, which generally indicates a high level of participation at all levels of education, particularly high school and university. In addition, in predominantly rural regions, if we take as a reference the pre-accession period, the trend is downward.

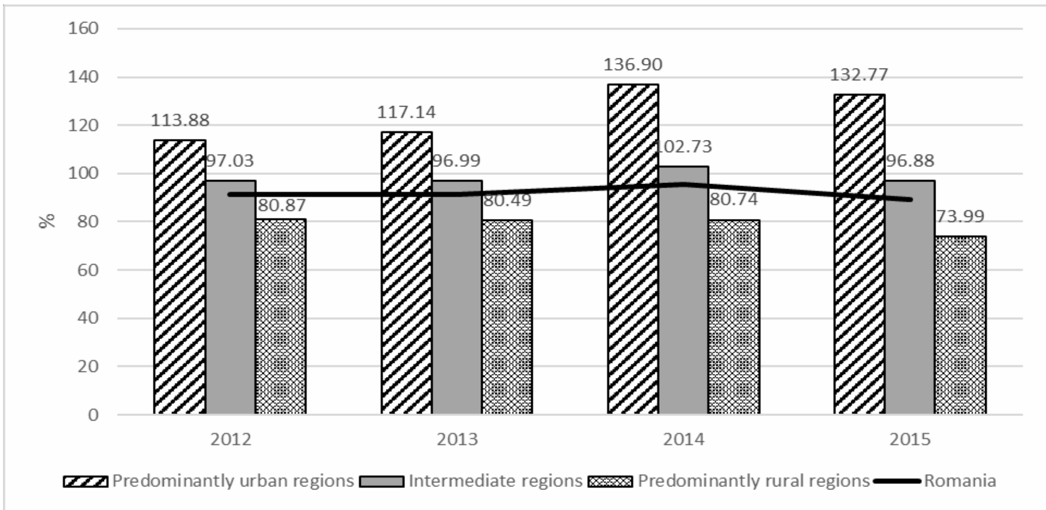

Figure 2. Evolution of the gross enrolment rate in all levels of education, by type of region
Source: author's data processing after NIS, TempoOnline Database, 2017

The situation of graduates of pre-university education records a similar course to that of the school population. Thus, in Romania, in 2014, there were 554,418 graduates, of which 14.63% were in predominantly urban regions, 46.82% in intermediate regions and 38.55% in predominantly rural regions. At national level and at the level of each type of region, compared to 2006, there was a decrease in the number of graduates, the most significant being in the predominantly rural regions (21.34%). Regardless of the type of the region it is noted the increase of the dropout rate as the level of training increases. However, the graduation rate is consistently higher in predominantly urban areas in primary and secondary education relative to predominantly rural and intermediate regions.

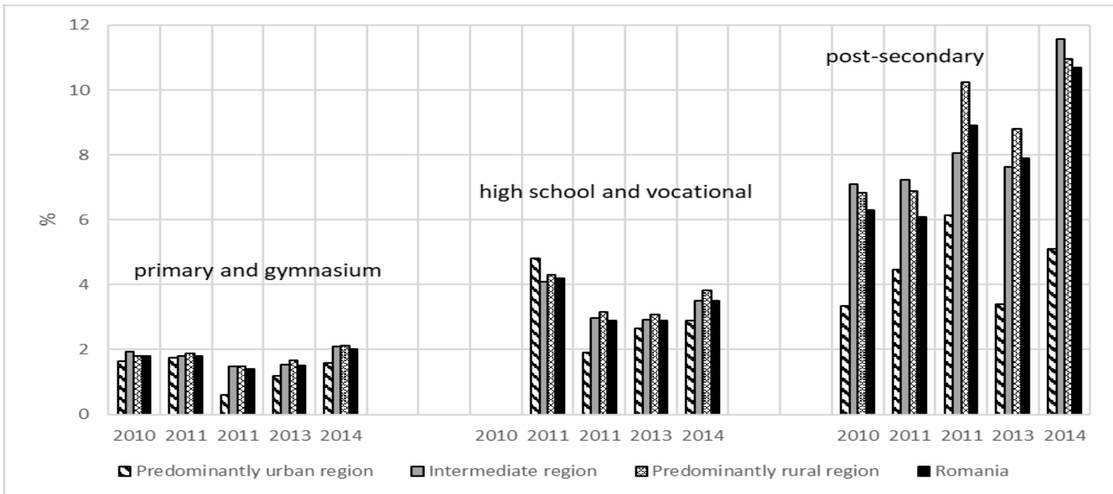

Figure 3. Evolution of school drop-out rate by educational levels and types of regions
Source: author's data processing after NIS, TempoOnline Database, 2017

The number of agricultural high school graduates (including agricultural, forestry, veterinary and agro-mountain high schools) was 4,891 in 2014, which represented 2.58% of the total number of high school graduates. Compared to the reference year 2006, the number of graduates of agricultural high schools represents only 68.13%. By type of region, the most significant decrease was recorded in predominantly rural regions (59.76%) followed by predominantly urban regions (56.04%). Reporting the number of graduates of high schools with agricultural profile to the total number of high school graduates by type of region, it is observed that over the whole analysed period in the predominantly rural regions their share was above the national average. For many students in predominantly rural regions, agricultural high schools were chosen because of regional specificity or in other cases was the only one option.

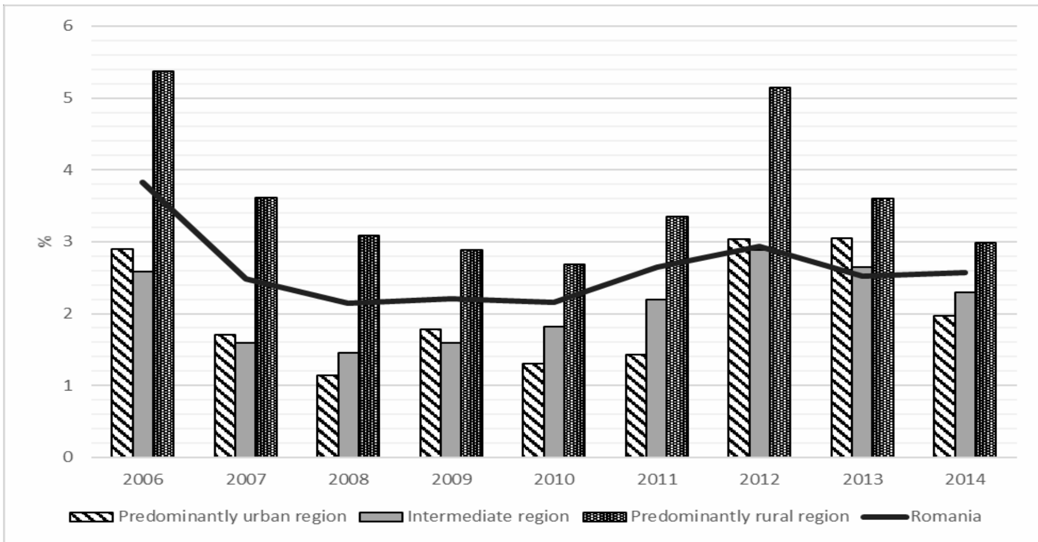

Figure 4. Evolution of the share of agricultural high school graduates
in total high school graduates, by type of region
Source: author's data processing after NIS, TempoOnline Database, 2017

The graduation degree in the baccalaureate exam of pupils who have completed high school education registered very low values during the investigated period. Thus, at national level, this weight ranged between 54.62% in 2010 and 62.32% in 2014. This increase should be correlated with the fact that many 12th grade students do not register anymore in the baccalaureate exam. This phenomenon has intensified in recent years as a result of the strict control measures implemented in the education system and the perception that the baccalaureate exam has a very high degree of difficulty. The baccalaureate success rate is higher than the average in predominantly urban and intermediate regions and is below the national average for predominantly rural regions with the lowest baccalaureate graduation rates throughout the analysed period.

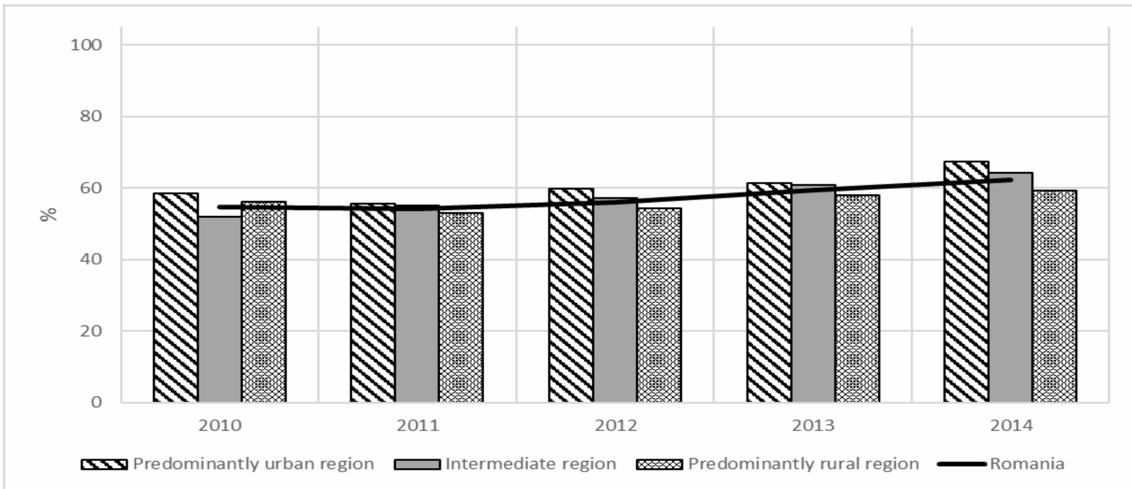

Figure 5. The share of graduates from baccalaureate, by type of region
Source: author's data processing after NIS, TempoOnline Database, 2017

Of the total number of pre-university education staff (210,498 teachers), 14.63% operate in predominantly urban regions, 46.82% in intermediate regions and 38.55% in predominantly rural. Between 2006 and 2015, their number decreased by 36,421 people. In predominantly rural regions, there is the largest drop in teaching staff. A significant contribution to this decline is brought to pre-primary, primary and secondary education. Predominantly urban regions have, in turn, lost the highest number of high school, vocational and foremen teachers.

The number of pupils on number of teacher’s ratio in a school year is used to measure the level of human resources allocated in relation to the number of pupils. The value of the student /

teacher ratio to positively influence the quality of the learning process and must not be higher than the established official norms. The quality of teaching and learning is not only reflected by this indicator but must be considered in the context of differences in teacher education / training, pedagogical training, experience and status, teaching methods, available teaching materials, etc.

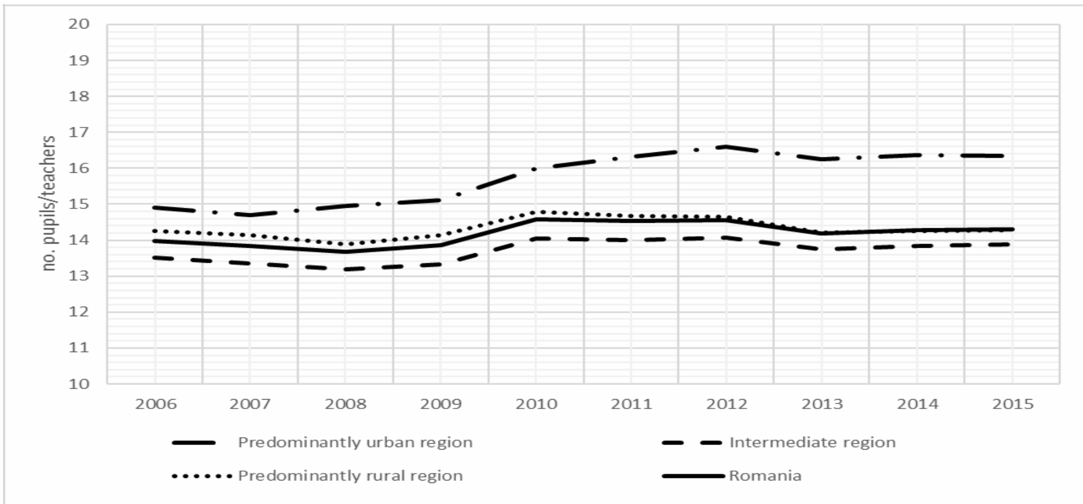

Figure 6. Evolution of the number of pupils on the teachers, by type of region
Source: author's data processing after NIS, TempoOnline Database, 2017

The educational infrastructure analysed from the perspective of two indicators - the number of laboratories per school unit and the number of pupils and students on a computer allows to appreciate the quality of the didactic process, from the perspective of providing the necessary material basis. Both indicators indicate that predominantly rural regions have a less developed educational infrastructure than the other types of regions. This situation leads to a lower level of training for young people in rural areas, a situation that affects the social and economic development of human capital but also social inclusion. Among the most important causes of this situation are the poor financing of the Romanian education system. Moreover, for predominantly rural regions, there is also a limited capacity of public administrations to access and manage European funds and investments.

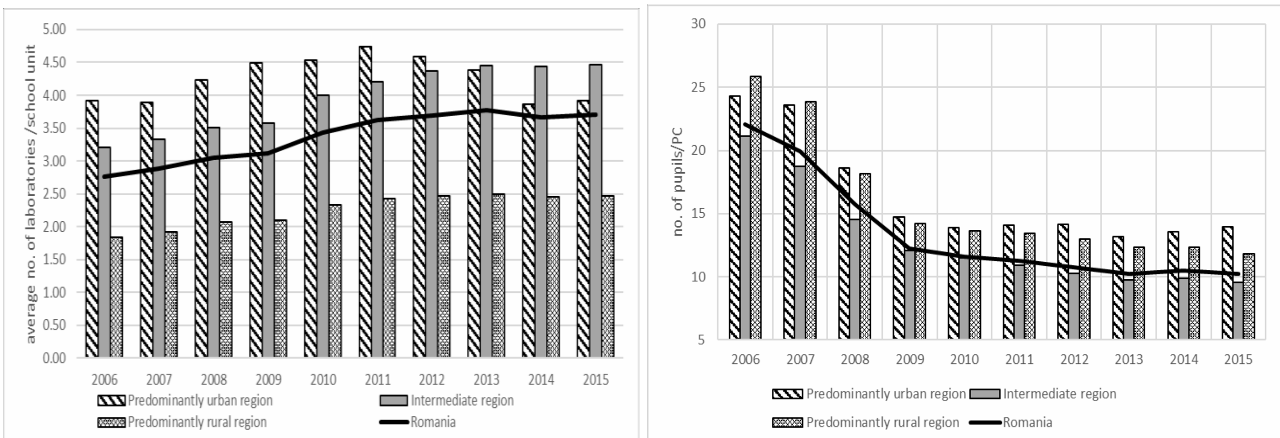

Figure 7. Evolution of the number of laboratories per school unit (left) and the evolution of the number of students on a PC (right), by type of region
Source: author's data processing after NIS, TempoOnline Database, 2017

CONCLUSIONS

Following the analysis, we can conclude that the predominantly rural regions are below the national average. Preparing a highly skilled rural labour force geared towards productivity, quality and innovation is more a desideratum than a reality. The lack of financial and human resources is one of the main reasons for the situation in the poor education of the rural school population. The current education system faces not only numerical decreases but also high problems of efficiency, equity, quality and relevance to the knowledge economy (Stanef, 2013). Equal access to quality education of rural young people is the basis for inclusive development but, in Romania, many young people lack basic skills: according to the PISA (International Student Assessment Program) - almost half of Romanian pupils (40%) do not have the basic cognitive skills that they would need for productive employment (OECD, 2016).

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SECTION 2

ECONOMY, MANAGEMENT AND AGRICULTURAL MARKETING

BREAKEVEN POINT ANALYSIS AT CUCUMBER CROP IN THE CONVENTIONAL AND ECOLOGICAL AGRICULTURAL SYSTEM

NECULA (ILIE) DIANA MARIA[1], BEREVOIANU ROZI LILIANA[2]

Summary: *Cucumber is found amongst vegetables grown for 3000 years and is of particular importance because of its nutritional value with a very low caloric intake. Cultivation of cucumbers is one of the most widespread in our country and can be consumed in both crudest and preserved state. In the present paper, based on some technical and economic indicators, an estimation of the economic efficiency for the cultivation of cucumbers cultivated in protected areas for conventional and ecological agriculture was made. Economic efficiency has been estimated in terms of applying modern technology to the production process and the rational use of material, human, financial resources to provide superior products at a low cost. Actions taken on agricultural holdings are permanently guided by the economic efficiency of crops.*

Key words: *economic efficiency, profitability, cucumber culture, conventional system, ecological system*

JEL Classification: *O12, Q14, Q57*

INTRODUCTION

An important part of agriculture in our country is represented by vegetable growing. The beneficial effect of eating vegetables on the human body is demonstrated in countless studies over time. It represents important source of food and, as well as an important source of income for producers. To meet consumption needs, vegetables are grown both in the field and in protected areas (greenhouses, solariums, etc.) ensuring the need for vegetables on the market for a longer period. The vegetable market has grown considerably due to the increased demand for vegetables throughout the year and the consumer's orientation towards domestic products.

An important share among crops of vegetables grown in our country, holds the cucumber crop. According to EUROSTAT statistics, the areas cultivated with cucumbers grown in protected areas increased, ensuring the growing consumption of cucumbers in the off season. Cucumber consumption has increased in recent years due to its low-calorie intake of just 20 kcal per 100g.

It is necessary to support and increase the production of vegetables to ensure the nutritional needs of the population. This goal can be achieved by developing the vegetable sector grown in protected areas where large yields can be achieved on small areas. To achieve this goal, agricultural research needs to support producers by providing them with the most efficient technological and economic solution.

MATERIAL AND METHOD

The production technology encompasses all agrophytotechnical, agrochemical and phytosanitary measures and works applied to a culture that materializes in the technological value. On the basis of the technological estimate, the revenue and expenditure budgets are drawn up and operational plans of the agricultural holdings are drawn up.

The structure of the budget per culture refers to the detailed presentation of all the components, as follows:

- Production value - is calculated taking into account average yields per hectare and estimated domestic market prices for the main production as well as the value of secondary production;
- Subsidies - represents the state's financial support in the harvest year for the producers in the vegetal sector;

[1] Dr.ing. CSII – Institutul de Cercetare pentru Economia Agriculturii și Dezvoltare Rurală, necula.diana@iceadr.ro
[2] Dr.ing. CSI – Institutul de Cercetare pentru Economia Agriculturii și Dezvoltare Rurală, berevoianu.rozi@iceadr.ro

- Gross product - is calculated by adding subsidies from the budget to the grant amount;
- Intermediate consumption - is the sum of the value of inputs and services that contribute to the production of agricultural products, including seed and planting material, fertilizers and amendments, pesticides and other materials, mechanical works, irrigation, supply costs, labor costs, and management, interest on loans, insurance, amortization for buildings and utilities.
- Taxable income - is calculated by subtracting the principal production value of intermediate consumption for the main production;
- Net income - is obtained by deducting from the taxable income the related tax value;
- Net income + subsidies - is calculated by summing the subsidies granted by the state budget to the net income.
- Rate of taxable income - is expressed as a percentage and is calculated by reporting the taxable income at intermediate consumption for the main production;
- Rate of Net income + subsidies - is expressed as a percentage and is calculated by dividing net income + subsidies on intermediate consumption for main production;
- Cost of production - is obtained by reporting the expenditure for the main product to the main crop production;
- The foreseeable domestic market price is the price at which the capitalization production will be made in the harvest year considered.
- *The yield threshold* is expressed by the average production limit (Kg / ha), from which the profitability of the crop begins, is determined by the following formula :

PR (kg / ha) = Ch (lei / ha) / Pv (lei / kg)

In which: PR - profitability threshold Kg / ha ; Ch - main production expenses lei / ha ; Pv - sale price RON / Kg

- *The rentability rate* is expressed as a percentage (%) and is determined by comparing the total benefit to the overall expenditure of the culture for the main product, or by reporting the benefit per tonne to the cost of production per tonne multiplied by 100 by the formula:

Rr = (B (lei / tonne) / Cost (lei / tonne)) x 100

In the paper we used indicators such as the average rate and the annual growth rate, having the formula:

$$r2012 - 2016 = \sqrt[4]{\prod (p1/p0)} - 1$$

where: r 2012 - 2016 = annual rate; Π p1 / po = chain-linked growth indicators.

The data used were as follows : Eurostat , https://ec.europa.eu/eurostat/data/database and data from the literature.

RESULTS AND DISCUSSIONS

1. Grown surfaces, outputs and sales prices for cultivated cucumbers in field and in protected areas

Romania in 2017, according to official data from EUROSTAT, is in the top of the countries with the largest areas cultivated with cucumbers in field and protected areas in the EU. In 2017, Turkey cultivated the largest cucumber areas of 36,000 ha, Spain cultivated 7,480 ha and Romania 5,440 ha. Romania cultivated cucumbers in field on surfaces with 84.9% lower than Turkey, 28.3% lower than Spain but 9 times larger than Netherlands. However, there is a much lower production in Romania than in these countries. Thus, we get an average production per hectare of 17.07 t / ha, while Turkey gets 50t / ha, Spain approx. 84t / ha, and the Netherlands 667 t/ha. And in the case of cucumbers grown in protected areas, the Netherlands obtains the highest production per hectare of about 689 t/ha, Denmark and Belgium about 400 t/ha, while Romania, even if it is in the top of those who cultivate the most large cucumber areas in the EU get an average production of 50 t/ha.

Table no. 1 The analysis of cucumber surfaces and production in field during 2012-2017

Category	MU	2012	2013	2014	2015	2016	2017	Average rhythm (%)	Annual growth rate (%)
Surface	1,000 ha	6.69	6.32	6.44	5.73	5.70	5.44	88.58	-4.05
	%	100	94.47	96.26	85.65	85.20	81.32		
Production	1,000 t	102.54	103.76	115.31	102.47	88.75	92.91	98.15	-1.95
	%	100	101.19	112.45	99.93	86.55	90.61		

Source: EUROSTAT, https://ec.europa.eu/eurostat/data/database , accessed 08.10.2018

As it can be seen from the data presented in Table 1, in Romania the area cultivated with cucumbers in field is decreasing, being in 2017 with 18.7% lower compared to the reference year 2012, with an annual growth rate of - 4.05%. In the analyzed period 2012-2017, the production has the same decreasing trend as the areas cultivated with cucumbers, being approx. 10% lower in 2017 compared to 2012, falling at an annual rate of -1.95%, but are higher by 4.7% compared to the previous year.

Table no. 2 The analysis of areas and total productions of cucumbers cultivated in protected areas during 2012-2017

Category	MU	2012	2013	2014	2015	2016	2017	Average rhythm (%)	Annual growth rate (%)
Surface	1,000 ha	1.09	1.12	1.24	1.23	1.22	1.16	109.54	1.25
	%	100	102.75	113.76	112.84	111.93	106.42		
Production	1,000 t	35.95	33.69	44.62	56.97	52.98	57.51	136.73	9.85
	%	100	93.71	124.12	158.47	147.37	159.97		

Source: EUROSTAT, https://ec.europa.eu/eurostat/data/database , accessed 08.10.2018

From the data presented in table no. 2 it is observed that the area cultivated with cucumbers in protected areas in 2017 increased by 6.42% compared to the first year of the period, with an annual growth rate of 1.25%, but compared to previous years it decreased about 5%.

The productions increased considerably compared with the first year of the period with a faster growth rate of 9.85%. If in 2013 the production had a downward trend (by 6.3%) compared to the previous year, starting with 2014 it increased by 59.97% higher than in 2012.

Table no. 3 The analysis of the sales price of cucumbers grown in field and protected areas in the period 2012-2017, expressed in euro / 100kg

Price euro /100kg	2012	2013	2014	2015	2016	2017	Average Rhythm%	Annual growth rate %
Cucumber in the field	49.34	48.88	48.83	46.12	55.90	52.09	102.08	1.09
	100.00	99.07	98.97	93.47	113.30	105.57		
Cucumber in protected areas	62.12	53.63	48.38	52.64	45.65	80.55	90.42	5.33
	100.00	86.33	77.88	84.74	73.49	129.67		

Source: EUROSTAT, https://ec.europa.eu/eurostat/data/database , accessed 08.10.2018

The selling price of cucumbers cultivated in field falls as evidenced by data analysis in Table 3 in the first part of the period under review, reaching in 2015 with aprox. 7% lower than in 2012. In the following year it increases by 21% compared to the previous year and by 13%, compared to 2012.

In 2017 the sale price of cucumbers cultivated in field reaches 52.09 euro/100kg, representing an increase of 5.57% compared to the first year.

The price of cucumbers cultivated in protected areas until 2016 decreased compared to the reference year, but in 2017 it grew by 76% compared to the previous year and 30% more than in 2012.

2. **Incomes and Expenses Budget**

Agricultural research has to come to support the vegetable producers, so that under ADER 1311, developed by ICEADR, production technologies for the main vegetable crops, including cucumbers cultivated in protected areas under conventional farming systems and ecological, with the support of SCDL-Buzău.

On the basis of the technological estimates, the "Incomes and Expenses Budgets" have been compiled with "Total Expenses" consisting of "Fixed Expenses" and "Variable Expenses".

The share of Variable Expenses in Total Expenses is 62.69% in the conventional system and 67.41% in the ecological system, and the Fixed Expenses have a share of 37.31% in the conventional system and 32.59% in the ecological system.

Table no. 4 The comparative analysis of variable costs for cucumber crop cultivated in the solarium in conventional and organic agriculture system

No.	Indicators	Conventional System Estimated production = 100 tonnes / ha		Ecological system Estimated production = 75 tonnes / ha		Deviations	
		lei	%	lei	%	lei	%
1	Variable Expenditures	89,523.1	100	97,310.1	100	7,787.0	109
2	- Expenditure on raw materials and materials	71,243.3	79.58	78,609.8	80.78	7,366.5	110
3	- Expenditure on mechanized works	3,136.6	3.50	2,397.0	2.46	-739.6	76
4	- Expenditure on irrigation	2,343.9	2.62	2,740.5	2.82	396.6	117
5	- Heat expenses (2 months)	3,000.0	3.35	3,000.0	3.08	0.0	100
6	- Supply costs	7,124.3	7.96	7,861.0	8.08	736.7	110
7	- Insurance	2,675.0	2.99	2,701.9	2.78	26.9	101

Own calculations

From the comparative analysis of variable expenses presented in Table 4, it follows that:

- the variable costs in the ecological system are 9% higher than those in the conventional system;
- in both systems of culture the largest share, about 80% of the variable expenses are the expenses with raw materials and materials (it is observed that in the ecological system they are 10% higher than the conventional system);
- Most of the costs incurred in the organic farming system are higher than the conventional system, except for mechanized works that are lower by 24%.

Table no. 5 Comparative analysis of the raw material costs for the cultivation of cucumbers in solarium in conventional and organic agriculture system

No.	Indicators	Conventional System Estimated production = 100 tonnes / ha		Ecological system Estimated production = 75 tonnes / ha		Deviations	
		lei	%	lei	%	lei	%
1	Expenditure on raw materials and materials	71,243.3	100	78,609.8	100	7,366.5	110
2	- seed and planting material	8,190.0	11.50	50,400.0	64.11	42,210.0	615

3	- organic / natural fertilizers	9,000.0	12.63	10,000.0	12.72	1,000.0	111
4	- chemical / foliar fertilizers	6,765.0	9.50	1020.0	1.30	-5,745.0	15
5	bstances for combating diseases and pests	44,455.8	62.40	14,034.8	17.85	-30,421.0	32
6	- other materials	2,832.5	3.98	3155.0	4.01	322.5	111

Own calculations

The most important category of expenditures within the variables are the expenditures on raw materials and materials that have the highest weight.

In the conventional system, the largest share of raw material and material expenditures has 62.4% spending on pest and disease control substances. In the case of the ecological system where it is not allowed to apply chemical treatments, the expenditures on planting material are 64.11%, which is much more expensive than the conventional one.

Comparing the same categories of expenditure in the two crop systems, there are significant differences, so that in the ecological system the expenditures are higher for those with seed and planting material about 6 times the conventional ones, and for the fertilizer expenses and pest and disease control agents are much lower by 85% and 68%, respectively.

Table no. 6 Comparative analysis of fixed expenditures for the cultivation of cucumbers in the conventional and organic farming system

No.	Indicators	Conventional System Estimated production = 100 tonnes / ha		Ecological system Estimated production = 75 tonnes / ha		Deviations	
		lei	%	lei	%	lei	%
1	FIXED EXPENDITURES	53,270.5	100	47,050.3	100	-6,220.2	88
2	- Expenditure on permanent labor	46,900.1	88.04	40,484.4	86.04	-6,415.7	86
3	- General and management costs	3,343.7	6.28	3,377.3	7.18	33.6	101
4	- Loan interest	1,236.2	2.32	1,242.3	2.64	6.1	100
5	- Amortization for buildings and utilities	1,790.5	3.36	1,946.2	4.14	155.7	109

Own calculations

Comparing fixed expenditures between the two cultivation systems is found that in the ecological system, the expenditures are lower by 12% compared to the one in the conventional systems.

Within these expenditures, in both systems of culture, the share of the permanent workforce, namely 88% in the conventional system and 86% in the ecological system, accounts for the largest share, with the difference between the two systems being of 14%.

3. Economic synthesis indicators

Table no. 7 Comparative analysis of economic indicators for cucumber culture in protected spaces in the conventional and ecological agriculture system - estimates 2018/2019

Nr. crt.	Economic indicators of synthesis	UM	Conventional system	Ecological system	deviations	
					UM	%
1	Average production per ha	to / ha	100	75	-25	75
2	Production value per ha	lei / ha	171,352.30	180,450.50	9,098.2	105.31
3	Subsidies	lei	542.8	2,525.40	1,982.6	465.25
4	Gross product	lei	171,895.10	182,975.90	11,080.8	106.45
5	Production costs per hectare	lei / ha	142,793.60	144,360.40	1,566.8	101.10
6	Unit cost of production	lei / to	1,427.90	1924.80	496.9	134.80

7	Cost of capitalization	lei / to	1,713.50	2406.00	692.5	140.41
8	Productivity of work in physical expression	man-hours / ton	29.3	33.6	4.3	114.68
9	Profit or loss per unit of production	lei / ha	28,558.70	36,090.10	7,531.4	126.37
10	Profit or loss per unit of product	lei / to	285.6	481.2	195.6	168.49
11	Rate of return	%	20	25	5	125.00
12	Profit threshold in units of value	lei	111,549.60	102,119.40	-9,430.2	91.55
13	The threshold of profitability in physical units	to	65.1	42.4	-22.7	65.13
14	Rate of exploitation risk	%	65.1	56.6	-8.5	86.94
15	Security Index (Is)		0.3	0.4	0.1	133.33

Own calculations

The above table data presents an analysis of economic synthesis indicators for the crop of cucumbers cultivated in the solarium for both systems: conventional and ecological. From this analysis it follows that:

- The ecological production is 25% lower than in the conventional system, but the value of organic production exceeds with 5.31% compared to the conventional system due to the higher unit price of the product in the case of culture in an ecological system, with 40.41%.
- The synthetic reference indicator for expressing the economic efficiency of expenditure by product, the production cost is 1,427.90 lei / ton in a conventional system, and in the organic system it is 34.8% higher.
- With regard to labor productivity, it is noted that for one tonne of conventional product, 29.3 hours per person are consumed, of which 0.8 hours / t for mechanical works and 28.5 hours / t for manual works, in while a tonne of product required in the organic system a total of 33.6 hours-person, of which 0.8 hours / t for mechanical works and 32.7 hours / t for manual works.
- The rate of profitability was 20% in the conventional system and 25% in organic systems, producing cucumber culture in the solarium system has proved economically efficient.
- In case of cucumbers cultivated in conventional systems, the profitability threshold in physical units is 65.1 t /ha, having a value equivalent of 111.549,6 lei / ha, and in a green system the physical threshold is 42.4 t / ha with the corresponding value threshold of 102,119.4 lei/ ha.
- The rate of exploitation risk consists of a synthetic indicator that evaluates the risk in the case of non-realization of the estimated production. In cucumber culture in the solar, this indicator is 65.1% in the conventional system and 56.6% respectively in the ecological system.
- The security index refers to the existing security margin by building the culture, increasing it in the same way as the value of the security index. For cucumber crops, this index is 0.3 and 0.4 for the two crop systems respectively.

CONCLUSIONS

- The cucumber culture holds an important share among vegetable crops grown in our country, being a vegetable that can be eaten throughout the year, both in the raw and preserved state.

- Romania in 2017, according to official EUROSTAT data, even if it is in the top of those who cultivate the largest areas of cucumbers in the EU, obtained an average production of 50 t/ ha while production in the Netherlands was about 689 t/ha , in Denmark and Belgium about 400 t / ha.

- In Romania, the area cultivated with cucumbers in protected areas in 2017 increased by 6.42% compared to the first year of the period, and the obtained productions increased considerably compared to the same year by about 60%.

-In 2017 the sales price of cucumbers grown in protected areas by 2016 decreased compared to the reference year, but in 2017 it grew by 76% compared to the previous year and by 30% compared to 2012.

- In order to support the vegetable producers, technological records of cucumbers were produced in the solarium system in a conventional and ecological farming system, on the basis of which the economic indicators were computed. Their analysis shows that the situation of cucumber culture in the sun is favorable and, as a decisive argument, the real value of the turnover exceeds the profitability threshold expressed in units of value by 53.6% and 76.7%, respectively.

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DEVELOPMENT OF THE CATTLE RAISING SECTOR ON THE LONG TERM FROM THE PERSPECTIVE OF TRADE WITH LIVE ANIMALS

MARIANA GRODEA[1]

Abstract: *In the period 2003-2017, Romania's exports of live cattle significantly increased, both in the intra-Community area (twice) and mainly in the extra-Community area (9 times). The import from the intra-Community area, mainly consisting of reproduction animals doubled in the period 2007-2017, as against the pre-accession period. From the food security perspective, beef is not a traditional product in the Romanian consumers' diet, yet with its share of 9.3% in total meat consumption structure in the year 2016, it is an important product for dietary diversification. Of course we cannot speak for the moment about a beef market in Romania that can constantly absorb the domestic beef production at profitable prices, yet the foreign demand is sufficient for the Romanian farmers to continue and initiate new investments on beef farms. From this point of view, the paper intends to identify new development opportunities for the sector on the long term, both for relaunching domestic production and consumption increase and for creating export availabilities.*

Keywords: *trade with bovines, herds, production*

JEL Classification: *Q10, Q13, Q19*

INTRODUCTION

The world beef production (carcass equivalent) was up by 61.6 million tons in 2017 as against 2016 (+1.8%), mainly due to the increase of production in Argentina (+6.7%), the United States (+3.7%) and Brazil (+2.9%).

Beef imports worldwide increased from 7705 thousand tons in 2016 to 7953 thousand tons in 2017 (+3.2%). In the year 2017, 39.5%, i.e. 3149 thousand tons of beef production, at world level, was absorbed by the United States, China and Japan, which are the main three great importers on this segment [1]. USA is at the same time the largest beef producer and consumer in the world, as well as the greatest beef importer (17%). The main beef suppliers for the USA are Australia and Canada, as well as New Zealand. Yet the most important growth of beef imports in recent years was in China and Hong Kong, due to the significant growth of beef consumption, the forecasts indicating a continuous increase of beef demand in China, under the background of stagnating domestic production.

Besides these three great importers worldwide, there are also countries like Canada, Mexico, Venezuela, Chile, Egypt, Malaysia, Saudi Arabia, Philippines, Iran, Israel and Taiwan, where beef demand is increasing, resulting from the economic growth behind the increase of the much more diversified beef consumption, consisting of a wide range of beef-based products and, in certain cases, the insufficient production that cannot cover the domestic needs in these countries.

Beef exports worldwide will continue to rise due to the ever-increasing demand in the Asian countries [2]. The estimates for 2018 being 10565 thousand tons, as against 9969 thousand tons in 2017 (+ 0.9%). The most important three exporters in the year 2017, with a total volume of exports of 5191 thousand tons (65% of total exports) were Brazil (1856 thousand tons), India (1849 thousand tons) and New Zealand (1486 thousand tons).

MATERIAL AND METHOD

The researches for the period 2007-2016 focused on a broad area of study and had as main objective the identification of Romania's advantages and disadvantages in the trade with live animals. For this purpose, data were collected, processed and analysed, referring to the trade with

[1] Dr. CSIII MARIANA GRODEA, Institute of Agricultural Economics, INCE, Romanian Academy, Calea 13 Septembrie no. 13, sector 5, Bucharest, phone/fax:021/3182411; e-mail: marianagrodea@yahoo.com

live cattle between Romania and the EU-28 member states and non-EU countries. The performance indicators were also analysed in the cattle raising sector from Romania, i.e. beef production, cattle herds, beef consumption as well as self-sufficiency in this product, from the perspective of finding solutions to support the development of the sector on the long term, both for meeting the domestic needs and to face the challenges at European and world level. In this approach, we used the foreign trade statistical data provided by the National Institute of Statistics, EUROSTAT and FAOSTAT. The documentation and synthesis of the main ideas necessary for this study were based on the consultation of national and world literature in the field of trade with live cattle.

RESULTS AND DISCUSSIONS

At the European Union level, in the period 2007-2016, bovines accounted for between 35.5% (2007) and 33.5% (2016) in total value of animals [3]. The main countries that together contributed by 57% in the total value of bovines, in the year 2016, were France, United Kingdom, Germany and Italy. These countries together account for 57% of slaughter meat production of the EU and have 52% of the beef cattle herds slaughtered in specialized units (Table 1).

Table 1. Main beef producers in the European Union (slaughter meat)

	2007-2009 average		**2010-2012 average**		**2013-2016 average**	
	Share (%)	**Rank**	**Share (%)**	**Rank**	**Share (%)**	**Rank**
France	18.7	1	19.4	1	19.2	1
Germany	14.8	2	14.9	2	15.0	2
Italy	13.4	3	13.1	3	10.5	4
United Kingdom	10.7	4	11.7	4	11.7	3
Romania	*1.8*	*11*	*0.4*	*20*	*0.5*	*19*

Source: DG Agri

Romania's slaughter beef production (carcass weight) permanently decreased in the period 2007-2016, both in volume and in value terms, as compared to EU-28 production: in the year 2016, Romania ranked 15th and 16th respectively in EU-28, by number of slaughtered bovines and beef production, this situation being explained by the low slaughtering weight.

The lower the weight at slaughtering (2017), like in Romania's case (215 kg/head as against 295 kg/head – EU-28 average), the lower the beef production. The poor quality of carcasses results from the fact that in Romania the cows have a very high share in the category of adult animals (59.9%), as against the EU-28 average, where cows account for only 31.2% (Table 2).

Table 2. Structure by age of bovines slaughtered in slaughterhouses, in Romania and in the European Union, in the year 2016 (%)

Age category	European Union	Romania
heifers	15.1	3.7
cows	31.2	59.9
bulls	31.3	14.1
bullocks over 1 year	9.2	2.1
calves 8-12 months	5.0	17.3
calves under 8 months	8.2	2.9

Source: Eurostat

A negative aspect noticed in Romania, compared to the European Union, is the fact that the slaughter weight of categories “bulls” and “bullocks over 1 year” is lower in Romania, compared to the EU-28 average (Table 3).

Table 3. Average weight at slaughter by categories of age of bovines slaughtered in specialized units, in Romania and in the European Union, in the year 2016 – kg/head (carcass weight)

Age category	European Union	Romania
heifers	301	170
cows	310	228
bulls	366	235
bullocks over 1 year	367	240
calves 8-12 months	225	199
calves under 8 months	142	104

Source: Eurostat

Although beef production (animals for slaughter for human consumption) was down from 163 thousand tons carcass weight in 2007, to 101 thousand tons carcass weight in 2016 (-38.1%), we can mention as a positive fact that in the same period beef production obtained in specialized slaughter units (slaughterhouses) had an upward trend, and its share in total production for slaughter meat for consumption increased from 26.6% in 2007, to 57.1% in 2016.

For the next period, having in view the legislative measure establishing minimum operation conditions for low-capacity slaughterhouses (2017), we expect a steady increase of slaughter meat production.

Under the background of the domestic production decrease, corroborated with the fact that beef does not represent a traditional product in Romanian consumers' diet, the share of beef consumption also decreased in the structure of total meat consumption, from 17% in 2000, to 12.8% in 2007 and 9.3% in 2016 [4].

As regards self-supply level (indicator expressing the self-sufficiency rate), self-sufficiency in beef decreased both in the European Union and in Romania, in the period 2000-2015, from 103% to 99%, and from 99% to 80% respectively [5].

According to the calculations made on the basis of Eurostat statistical data, at intra-Community level, in the year 2016, in the *export of live bovines*, in value terms, Romania ranks 6th (with 2.67%) in the hierarchy of EU-28 countries and 15th (0.56%) *in the import of live bovines* [6].

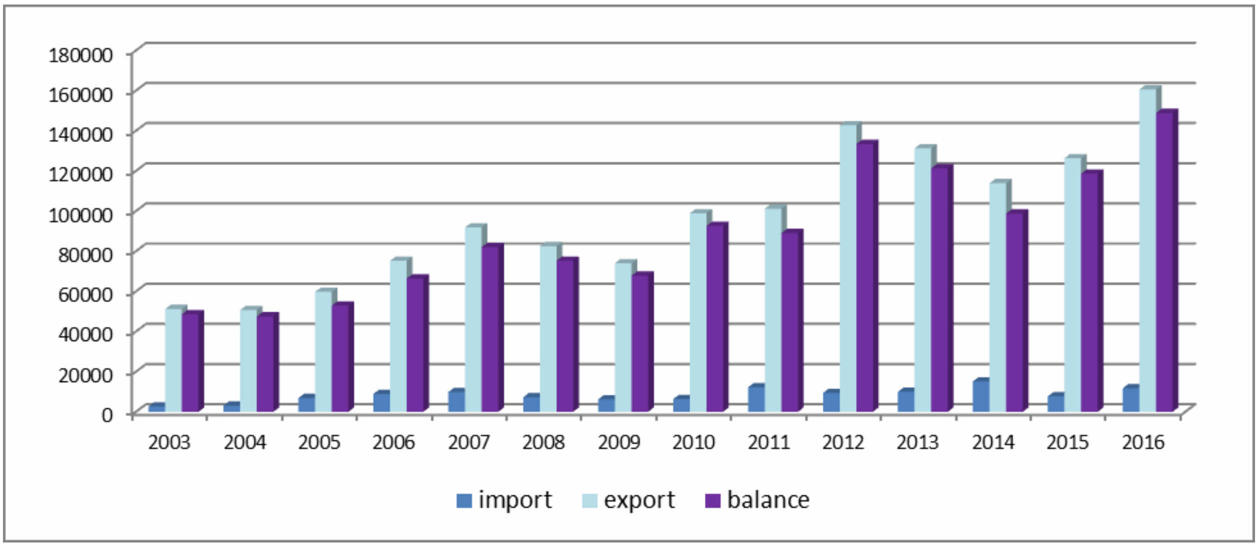
In the year 2016, at extra-community level, the main destinations of Romania's exports were Israel-46%, Lebanon-16%, Turkey-13% and Jordan 9%. At intra-Community level, the Romanian exports were directed to Croatia -56%, Italy-11% and Hungary-11%.

The import of live bovines had as main EU suppliers Germany-39%, followed by Hungary-17%, the Czech Republic-11% and France-10%.

The most important category of live bovines imported from the intra-Community area was represented by the category "live breeding animals". Although as share in total live bovines, this decreased from 67.5% in 2012, to 44.2% in 2016, we can conclude that the import of live bovines was mainly directed to breeding animals with high genetic potential.

In the period 2003-2016, the trade balance in live cattle was positive, the highest trade balance being reached in the year 2016 (148843 thousand euro), higher by 25% than in the previous year (Figure 1).

Figure 1. Trade balance – live cattle – 2003-2016 (thousand euro)

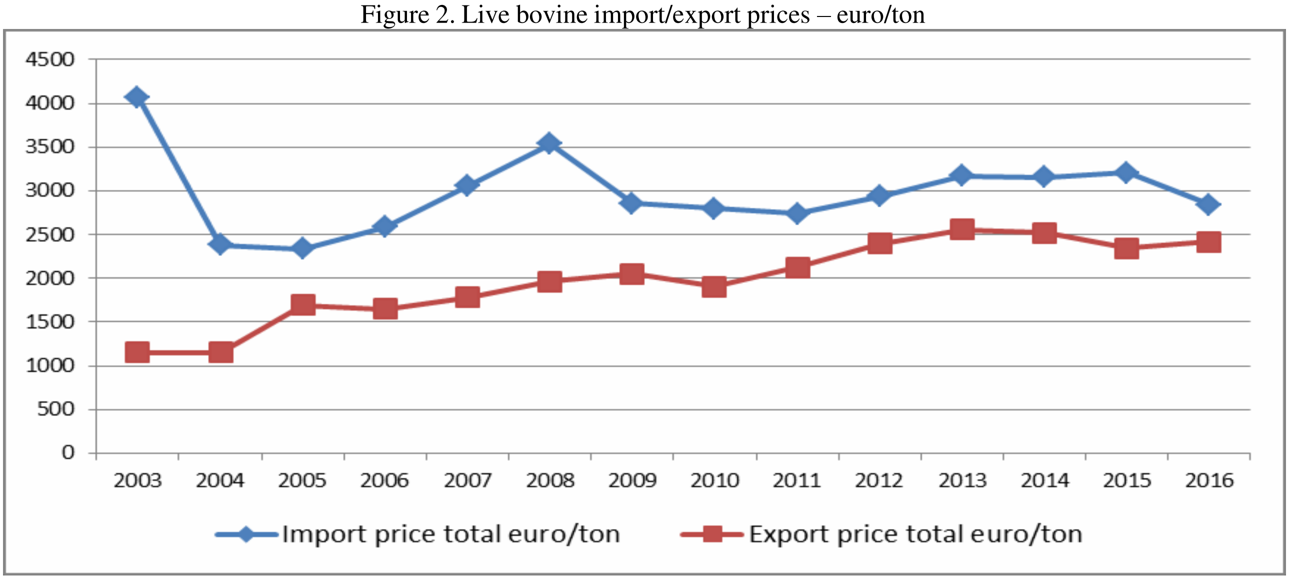


Source: http://exporthelp.europa.eu

In the period 2007-2016, the value of live bovine imports from the intra-Community area increased by 19%, while the value of exports decreased by 25%. The spectacular increase of exports to the extra-Community area is worth noticing, from 11.2 million euro, in 2007, to 100.2 million euro in 2016 (about 9 times).

As it can be seen from the figure below, live bovine import price is higher than the live bovine export price (Figure 2).

Figure 2. Live bovine import/export prices – euro/ton



Source: http://exporthelp.europa.eu

The largest amplitude was in 2003, when the import price was significantly higher than the export price, but since 2009, the two prices have had the tendency to get closer, so that in the year 2016, the difference was very low, i.e. 2844 euro/ton – import price and 2420 euro/ton – export price.

In dynamics, in the period 2003-2016, the import price followed a significant decreasing trend, from 4072 euro/ton to 2844 euro/ton (-30.1%). As regards the export price, we mention the increasing trend throughout the investigated period, from 1148 euro/ton in 2003, to 2420 euro/ton in 2016.

CONCLUSIONS

Although beef production (from animals for slaughter for consumption) was down from 163 thousand tons carcass weight in 2007, to 101 thousand tons carcass weight in 2016 (-38.1%), the positive fact is that in the same period beef production obtained in specialized units (slaughterhouses) had an increasing trend, while its share in total slaughter production for consumption increased from 26.6% in 2007, to 57.1% in 2016.

Under the background of domestic production decrease, corroborated with the fact that beef is not a traditional product in Romanian consumers' diet, the share of beef consumption in total meat production also decreased, from 17% in 2000, to 12.8% in 2007 and to 9.3% in 2016.

The trade balance in live bovines was permanently positive in the period 2003-2016, with the highest trade balance in the year 2016 (148843 thousand euro), higher by 25% than in the previous year, due to the increase in imports of 1.7 times and in exports of 1.2 times.

According to calculations based on Eurostat statistics, at intra-Community level, in the year 2016, in the *export of live bovines*, in value terms, Romania ranked 6th (2.67%) in EU-28 and 15th (0.56%) in the *import of live bovines.*

The analysis of data and information reveals that among the main determinants of success on the export markets we can mention the better knowledge of foreign competitors and a higher quality of products compared to the similar products from foreign markets.

The main growth modalities of foreign trade with live animals and processed products are the following: diminution of production costs, increasing the processing level of products, increasing the quality of products and services for export, labour productivity growth, identification of niches and specialization of products that go to export, increasing the complexity and diversification of products for export, modernization and adaptation of export product presentation to meet the foreign market requirements.

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RESEARCH REGARDIND TO THE IMPROVEMENT AND OPTIMISATION OF SOIL CONSERVATION SYSTEM "NO TILLAGE" FOR WHEAT CULTURE, SPECIFIC PEDO-CLIMATIC CONDITIONS OF THE TRANSYLVANIA PLAIN AREA

FELICIA CHEȚAN[1], CORNEL CHEȚAN[2], ALINA ȘIMON[3]

Abstract: *Production data registered at winter wheat Ariesan cultivar in 2007-2017 period, indicates suitability for cultivation in system with no ploughing, the difference in production between the two systems classic and conservative is just 81 kg/ha thus, in the classic system the average yield was 5671 kg/ha and in "no tillage" system 5590 kg/ha. Application of "no tillage" system at wheat culture requires a fuel consumption of 34.8 l/ha at the price 181 lei/ha compared with the classical technology which consumed 77 l/ha at the price 404 lei/ha, the economy achieved in 223 lei/ha in favor of "no tillage" system.*

Key words: *direct seeding, clime, yield, efficiency, wheat.*

Clasification JEL: *Q 01, Q 15, Q 16.*

INTRODUCTION

From the first experiments carried out at ARDS Turda in 1968-1974, was followeed the plowing replacement by with superficial works with a disc harrow (8-10 cm), the preparation of the germinative bed and the sowing in the optimal time. Was no found to exist major production differences. On the tillage with a disc harrow the yield was 44.6 q/ha and in the clasic system with plow (at 15-18 cm deepth), the production was 46.1 q/ha. The system without works (direct sowing) involves direct sowing on the debris of the preemergent plant by opening ditches in which the seeds and the fertilizers are introduced simultaneously (Chetan et al., 2011, Ignea et al., 2011, Chetan, 2012.). The sowed was done with the Directa seed drill -400, the seed reserve has the capacity of 680 kg and 750 kg the fertilizer (it resembles large areas and does not require many refueling stations), the two dispensers work in the same concoction, the seed and fertilizers are dosed and unloaded into the seed tube that descends them into the coulter so that the future plant has the necessary substances for growth and development in the first vegetation period. The hilly orography of the land with numerous erosion-degraded soils or the temporary excess of humidity in the Turda area imposed protection measures against the loss of the fertile soil layer. Thus, at ARDS Turda, during 1981-1983, an anti-erosion design was carried out, comprising all the organizational systems, depending on the slope of the terrain and the pedo-climatic specific conditions. It is considered that this erosion control system is an integral part of soil conservation in the area and ARDS Turda is representative of the hilly area in the center of Transylvania.

MATERIAL AND METHODS

Through the experiment set up within the ARDS Turda in 2007, we proposed first the conservation of soil (soil resources), the reduction of soil erosion, the reduction of inputs, the

[1] PhD. Eng Cheţan Felicia, SR III, AGRICULTURAL RESEARCH AND DEVELOPMENT STATION TURDA e-mail:felice_fely@yahoo.com
[2] PhD. Eng. Cheţan Cornel, SR, AGRICULTURAL RESEARCH AND DEVELOPMENT STATION TURDA
[3] PhD. Eng. Șimon Alina, SR, AGRICULTURAL RESEARCH AND DEVELOPMENT STATION TURDA

consumption of fuel and the labor force, and obtain the production at least close to those production obtained in the classical system (plowing).

The biological material was represented by the autumn wheat Arieşan variety (created at ARDSTurda), which, although not a very new variety, is productiv and adapts more easily to the harsher conditions of cultivation in unprocessed soil (it has a easy genetic polymorphism).

The experiments were carried out on the vertic faoziome soil with pH between 6.30-7.00; humus 2.21-2.94%; total nitrogen 0.162-0.124%; phosphorus 9-5 ppm; potassium 126-140 ppm, values were determined in the depth 0-40 cm in soil (OSPA Cluj). The experience has been established on a fertile soil but also with a susceptibility to rapid compaction at the passage of large agricultural aggregates or when working mechanically in high humidity conditions.

Experimental Factors: The factor A - system of work with two graduations: a1-conventional (with plow); a2 - no-tillage (direct seeding); Factor B: The experimental years: b1-2007, b2-2008, b3-2009, b4-2010, b5-2011, b6-2012, b7-2013, b8-2014, b9-2015, b10-2016, b11-2017.

The sowing was carried out with the GASPARDO Directa-400 seed drill in both soil cultivation systems, in the conservative system the sowing was carried out directly in the debris of the soyb crop. The seed was treated with the REDIGO PRO 170 FS fungicide (0.5 l/tonne seed), sowing density of 550 g/m^2, 18 cm distance between the seed and the depth of seed incorporation of 5 cm. Fertilization of the crop was carried out in two phases, with $N_{40}P_{40}$ kg/ha in the autumn in same time with sowing plus an additional fertilization with N_{40} kg/ha in the spring at resume the wheat vegetation. Treatments for weed control, pests and pests at ARDS Turda were performed with MET 1500 in two stages of wheat development: at the end of the breed: herbicides SEKATOR PROGRES OD (0.15 l/ha) + DMA 6 (0.5 l/ha) + fungicide IMPULSE PRO 425 EC (0.7 l/ha) + insecticide BISCAYA 240 OD (0.2 l/ha) + growth regulator STABILAN 750 SL (1.4 l/ha) + adjuvant TREND (0,25 l/ha) in a volume of 280 l/ha water; at the bladder: fungicide NATIVO 300 SC (0,8 l/ha) + insecticide FASTER 10 CE (0,15 l/ha) + adjuvant TREND (0,25 l/ha) in a volume of 280 l/ha water.

The experimental data were processed by variant analysis (PoliFact, 2015) and limit differences determination (LSD 5%, 1%, 0.1%).

The evolution of the thermal and pluviometric regime at ARDS Turda for the last 61 years, respectively since 1957, the date of foundation of the resort until now is presented in Figure 1 and Figure 2. The research area is caracterized by a mean annual temperature of 9.1°C and 531 mm multiannual average rainfall (Turda meteorological station, longitude 23°47', latitude 46°35', altitude 427 meters).The pluviometric regime has increased in the Turda area in the last time, the most rainy years was 2010, 2014 and 2016. Year 2016 was the most rainy years in the last 61 years, with the value of 816.8 mm, with a deviation of + 303.2 l/m2 but with an uneven distribution of precipitation. The average value of 609.8 mm, in the last years, is maintained in the area with medium aggressiveness. The highest rainfall values are obtained in the summer months, especially in June, which is the rainy month of the year.

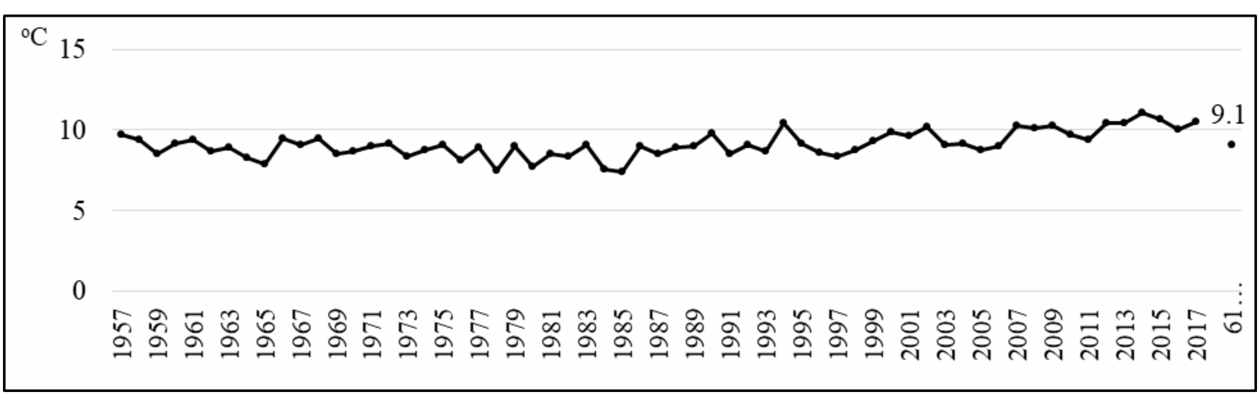

Figure 1. The thermal regime at ARDS Turda, 1957-2017

Specifically, for the 11 year studied, was the uneven distribution of precipitation, was recorded the periodes with drought, with extended pedologicals droughts (2009, 2011, 2012), followed by torrential rains, which although they had large quantities of water, did not have often managed to restore the water reserve in the soil, the drought dominating this whole period of time.

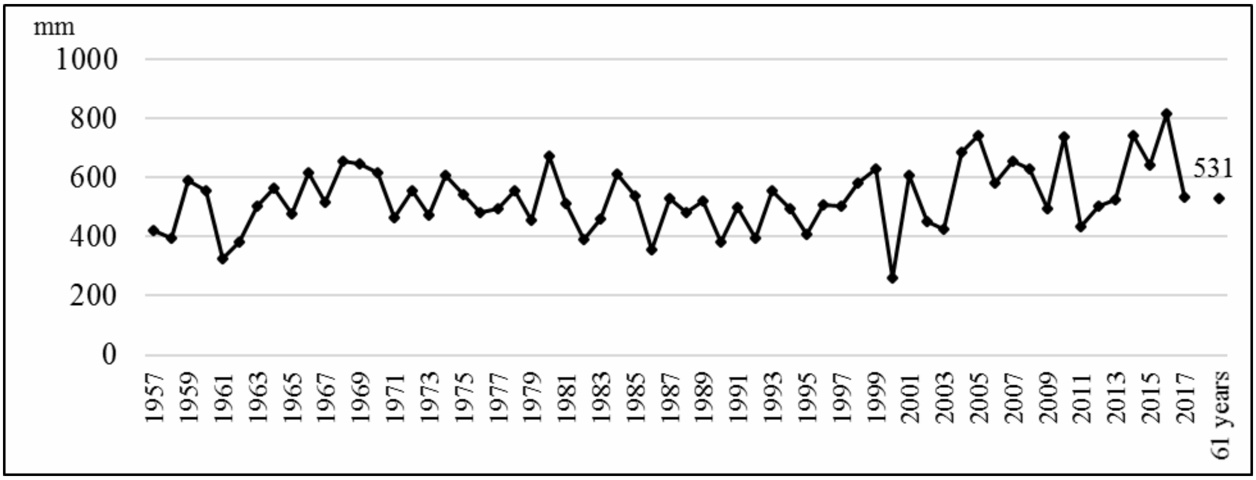

Figure 2. The pluviometric regime at ARDS Turda, 1957-2017

RESULTS AND DISCUSSIONS

The autumn wheat variety Arieşan responded favorably to the conservative technology, the average production of 5591 kg/ha recorded in the 11 years experimental with a value close to the production of 5672 kg/ha that was made in the classic system, at a difference of only 81 kg/ha, but which has statistical assurance, that significantly influence the production of wheat (Table 1).

The crop of autumn wheat is economically, agro-technically and socially motivated in all areas when the culture where it has minimal growth and development conditions. This crop also contributes to the reduction of agricultural land degradation and contributes even to the preservation and enhancement of soil fertility, by the large amount of vegetal remains left on the soil in the form of vegetal mulch or superficially incorporated in the soil (Cheţan et al., 2017).

Table 1. The influence of tillage system on winter wheat production, 2007-2017

A- System of work	**Yield kg/ha**	**%**	**Differences**	**Semnification**
a_1- clasic (CS)	5672	100.0	0.00	Mt.
a_2- no-tillage (NT)	5591	98.6	-80.95	0
LSD (p 5%) = 18;	LSD (p 1%) = 42;		LSD (p 0.1%) = 122.	

Comparing the productions obtained in the wheat variety Arieşan in the 11 years it can be stated with certainty that the primary role in the productions obtain is the climate factor or, in other words, the year of culture (Table 2). The drought years 2009 and 2011 have significantly negatively influenced the wheat crop, with outputs ranging from 3272-4653 kg/ha. The drought started in August 2011 continued in the first nine months of 2012 (except in February and very cold in March), all the other months were hot and during the summer months of June-August an burning strong lasts for 21 consecutive days, the days with temperatures above 32°C, temperatures that affected the biological processes of the plants, with negative influence on the production of wheat (4871 kg/ha). In the first experimental years (2008, 2010), production had higher values, these two years influencing production very positively. Alternating between excessively rainy and excessively droughty, however, the spring months of 2013 were beneficial to wheat crops offering the moisture reserve, a good development of culture, that resulted in a production of 4902 kg/ha, very close to the control variant, with a difference of only 5 kg/ha.

The year 2014 was a climate-favorable for wheat crop, the alternation of months with normal temperatures and warm were beneficial to passes the vegetative stages of wheat, with a very significant positive influence on the production, 7094 kg/ha. The year 2015 - warm and rainy and 2016 - excesive rainy and warm have also significantly influenced the wheat crop, which is influenced by production values of over 7000 kg/ha. The very positive influence of climate conditions and crop technology in 2017 produced a yield of 7079 kg/ha compared with the control variant (2007). As can be seen from Table 2 and analyzing the whole experimental period, the production increase achieved in six years out of the 11 reaches the value of 363 kg/ha to 2329 kg/ha compared to 2007, taken as a witness.

Table 2. The influence year on winter wheat production, 2007-2017

B-year	**Yield kg/ha**	**%**	**Differences**	**Semnification**
b_1- 2007	4897	100.0	0.00	Mt.
b_2- 2008	5537	113	640	***
b_3- 2009	3272	67	-1625	000
b_4- 2010	5261	107	363	***
b_5- 2011	4653	95	-244	000
b_6- 2012	4871	100	-27	0
b_7- 2013	4902	100	5	-
b_8- 2014	7094	145	2196	***
b_9- 2015	7151	146	2253	***
b_{10}- 2016	7226	148	2329	***
b_{11}- 2017	7079	145	2182	***
LSD (p 5%) = 26;	LSD (p 1%) = 36;		LSD (p 0.1%) = 49.	

According to the literature, energy consumption is different for each crop, so in wheat growing technology, the highest energy consumption per unit area is attributed to soil preparation (plowing, disk, rotary harrow, combining). The energy consumed during the mechanical works is influenced by the climatic and soil conditions, the working depth of the machines and equipment, the working speed, the area of the plot, the degree of mechanization, the proper use of the equipment to perform the quality works, the plot area and implicitly productivity at lower costs.

Wheat harvesting in both systems was carried out with the John Deere W540 high-capacity combine, in to the conservative system the harvesting was done by chopping and spreading on the soil surface the straw (vegetal mulch), making a significant reduction in fuel compared to the conventional system which the straw is left in the furrows to be then bundled and transported from the field.

The burning of straw is a dangerous environmental measure and is prohibited by Good Agricultural Practice, and those who do not comply with these rules will be sanctioned.

The technological differences of the conservative system reduce the process of degradation of soil by the compacting phenomenon at repeated passes with heavy machinery on the soil surface caused by the phenomenon of compaction at repeated passes with heavy machinery on the surface of the soil.

The economic efficiency of the two variants of tillage was determined according to the number of technological works applied, the fuel consumption (based on the characteristics of the machines and the equipment used, the works performed on a land with 1.19% slope coefficient) and the materials used (seed, pesticides, fertilizers, etc.), per one hectare (prices do not include VAT).

The value of expenditures with materials in the conservative system is 1334 lei/ha and in the classical system 1380.5 lei/ha. Due to the high costs of materials needed to set up crops (especially pesticides) and harvesting (including the bales of straw in the classic system), economic efficiency results more from the fuel economy, making the total economy in NT about 15.7%.

Table 3. Efficiency of crop technologies to set up 1 hectare of wheat

Consumption	**CS**	**NT**	**Differences at NT ±**
Fuel, l/ha	77	34.8	-42.2
Price lei/ha	404	181	-223
Materials (seeds, pesticide, chemical fertilizer, string etc.) lei/ha	1380.5	1334	-46
Total, lei/ha	1784	1515	-269

CONCLUSIONS

To achieve successful results, the best crops rotation combination , soil cultivation method and the best chemical weed control .

The production values obtained in the two systems, clasical and no-tillage, are very close, the difference being only 81 kg/ha.

By applying the no-tillage system, a 15.7% yield per hectare is achieved.

Expression of the production potential of Arieşan fall wheat variety is influenced by the year factor.

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RESEARCH ON THE INFLUENCE OF FERTILIZATION ON YIELD AND ECONOMIC EFFICIENCY AT SOYA CULTURE

ŞIMON ALINA[1] **FELICIA CHEŢAN**[2]**, ALIN POPA**[3]

Abstract: *The purpose of this paper is to evaluate the soybean yield obtained from the application of the additional fertilization and economic efficiency determination. Experimental factors: Factor A - the fertilization:* a_1*-*$N_{20}P_{20}K_0$ *(100 kg/ha), applied simultaneously with sowing,* a_2*-*$N_{20}P_{20}K_0$ *(100 kg/ha), applied simultaneously with the sowing +* $N_{20}P_{20}K_0$ *(100 kg/ha), applied in the 4-6 leaves phenophase,* a_3*-*$N_{20}P_{20}K_0$ *(100 kg/ha) applied simultaneously with sowing +* N_{30} *(100 kg/ha), applied in the 4-6 leaves phenophase and* a_4*-*$N_{20}P_{20}K_0$ *(100 kg/ha) applied simultaneously with sowing +* N_{20} *(100 kg/ha), applied in the 4-6 leaves phenophase; factor B - soybean varieties:* b_1*-Mălina TD,* b_2*-Darina TD,* b_3*-Felix and* b_4*-Onix; factor C - climatic conditions in the experimental years:* c_1*-2015;* c_2*-2016;* c_3*-2017. By applying additional fertilization are obtained a very significant yields of over 120 kg/ha. The Mălina soybean variety achieved an average yield of 2706 kg/ha, in the period 2015-2017, with differences significantly higher than the other three varieties studied under the same conditions. The thermal and pluviometric regime is an important factor in determining the yield of a crop, in 2015 was obtained an average yield of 1912 kg/ha, and in the years 2016 and 2017 achieved the yield of 3447 kg/ha respectively 2329 kg/ha, with significantly higher differences than in 2015. The yield of the four varieties is in direct relationship with the level of fertilization.*

Keywords: *soybean, yield, fertilization, economic efficiency, climatic conditions*

Classification JEL: *Q 01, Q15, Q16*

INTRODUCTION

Daily, human activities affect the climate by using fossil fuels and chemical inputs in high quantities, producing a significant amount of CO_2, but in order to avoid irreversible damage to the environment, a number of alternatives have been found in agriculture, one of the main producers of greenhouse gases that increase temperature, the most important measures being taken in terms of fuel reduction through the use of conservative tillage systems.

Conservative tillage are alternative variants in soil processing to remove risk factors, the introduction of which is determined by the fact that the intense tillage has generated over time the degradation of soils in the arable and sub-arable layer.

The implementation of conservative tillage systems involves, besides knowing the level of soil suitability for different methods of processing, an information base on alternative technologies, a material basis specific to the minimum soil processing and their sustainability (Guş, 1997).

The principles on which conservative agriculture is based are the reduction of the number of agricultural tillage, the optimal rotation of crops, the preservation of at least 30% of the soil vegetal remains (Cheţan et al., 2015), which have a role in soil protection against erosion (Şimon et al., 2016), increasing soil organic matter content (Malecka et al., 2012), biodiversity stimulation, soil water retention (Marin et al., 2015) and the introduction of a leguminous plant in rotation.

Soybean (*Glycine max* (L.) Merill.) is an important and valuable field crop, used as a source of food for both man and animals (Conner et al., 2004), with high agrofitotechnical importance because it plays a special role in crop rotation, being a good precursor to most crop plants and symbiosis relationships with bacteria of the genus *Rhizobium*, contributes to a significant extent to improving soil attributes by raising fertility levels (David, 2005).

[1] SR Dr. eng. Şimon Alina, Agricultural Research and Development Turda, Cluj, România, maralys84@yahoo.com
[2] SR III Dr. eng. Cheţan Felicia, Agricultural Research and Development Turda, Cluj, România,
[3] Phd. eng. Popa Alin, Agricultural Research and Development Turda, Cluj, România,

MATERIAL AND METHOD

The experiment was conducted between 2015-2017 at Turda Agricultural Research and Development Station (ARDS Turda) on a faeozem verticus soil with neutral pH, clay loam texture, medium humus content, good supply of mobile phosphorus and potassium.

The soybean was sown at a distance of 18 cm, with the Gaspardo Directa 400 seed drill at 65 g.s./m^2. The tillage system used in the experiment is the conservative system (chisel variant at 30 cm depth) with the basic work done after the harvesting of the pre-culture and the preparation of the germinating bed with the rotary harrow before sowing. The soybean has been grown in a crop rotation system for 3 years, the pre-plant being corn.

Experimental factors are: factor A-fertilization levels: b_1-$N_{20}P_{20}K_0$ (100 kg/ha), applied simultaneously with sowing; b_2-$N_{20}P_{20}K_0$ (100 kg/ha), applied simultaneously with sowing + $N_{20}P_{20}K_0$ (100 kg/ha), applied in the 4-6 leaves pheno-phase; b_3-$N_{20}P_{20}K_0$ (100 kg/ha) applied at the same time as sowing + N_{30} (100 kg/ha) applied to 4-6 leaves pheno-phase and b_4-$N_{20}P_{20}K_0$ (100 kg/ha) applied simultaneously with sowing + N_{20} (100 kg/ha) applied in the 4-6 leaves pheno-phase; factor B - soybean varieties: b_1-Mălina TD, b_2-Darina TD, b_3-Felix and b_4-Onix; Factor C - climatic conditions in the experimental years: c_1-2015; c_2-2016; c_3-2017.

After sowing, a treatment was performed to control existing or emerging weeds with Tender (1.5 l/ha) and Sencor (0.35 l/ha). Control of monocotyledonous and dicotyledonous weeds was performed with Pulsar herbicides (1.0 l/ha) and Agil (1.0 l/ha) in weed rosette pheno-phase.

To protect the soybean culture against the red spider (*Tetranychus urticae*) a treatment with Omit 570 EW (0.8 l/ha) insecticide was performed, and the fungus disease (*Peronospora manshurica*) was treated with Ridomil Gold MZ 68 WG (2.5 kg/ha).

The obtained results were statistically processed by the variance analysis method and the lowest significant difference was determined - LSD - (5%, 1% and 0,1%) (ANOVA, 2015).

Climate conditions are a determinant of agricultural yield, and the analysis of the evolution of climatic factors is justified in the current context of climate change that is increasingly visible both globally and in our country.

The climatic conditions of the years 2015-2017 are presented according to the Turda Meteor Station located on the longitudinal coordinates: 23^{0}47'; latitude 46^{0}35'; altitude 427 m. During the last 60 years, the recorded multiannual average temperature was 9,1^{0}C (Table 1) and the precipitation amount was 531 mm (Table 2).

The average temperatures recorded during the soybean crop growing months varied over the three years but were higher than the 60-year average with +1,5^{0}C in 2015 being considered a warm year, with +0,9^{0}C in year 2016, a year considered warm and +1,4^{0}C in 2017, year considered hot.

The rainfall during the vegetation period and its uniformity is very important in achieving the yield, so that in 2016 from the emergence of soybean crop to harvest every month the amount of rainfall exceeded the multiannual average, the soybean crop benefiting from the entire amount reflected in significant yield, compared over the other two years, were periods when the lack of rainfall was felt by culture, especially in the fact that during the important times the amount of precipitation was low or lacking.

Table 1. Average air temperature (0C), Turda 2015-2017

Monthly average	2015												Annual average
	Ian.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
	-0.7	0.0	5.5	9.6	15.8	19.4	22.3	21.9	17.3	9.7	6.1	0.7	10.6
Average 60 years	-3.4	-0.9	4.7	9.9	15.0	17.9	19.7	19.3	15.1	9.5	3.9	-1.4	9.1
Deviation	+2.7	+0.9	+1.2	-0.3	+0.8	+1.5	+2.6	+2.6	+2.2	+0.2	+2.2	+2.3	+1.5
2016													
Monthly average	Ian.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
	-2.8	4.6	5.9	12.4	14.3	19.8	20.5	19.6	17.1	8.3	2.9	-2.7	10.0
Average 60 years	-3.4	-0.9	4.7	9.9	15.0	17.9	19.7	19.3	15.1	9.5	3.9	-1.4	9.1
Deviation	+0.6	+5.5	+1.2	+2.5	-0.7	+1.9	+0.8	+0.3	+2.0	-1.2	-1.0	-1.3	+0.9
2017													

Monthly average	Ian.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
	-6.7	1.5	8.4	9.9	15.7	20.7	20.3	22.3	15.8	11.6	4.9	1.0	10.5
Average 60 years	-3.4	-0.9	4.7	9.9	15.0	17.9	19.7	19.3	15.1	9.5	3.9	-1.4	9.1
Deviation	-3.3	+2.4	+3.7	0.0	+0.7	+2.8	+0.6	+3.0	+0.7	+2.1	+1.0	+2.4	+1.4

Source: Turda Meteo Station, longitude: $23^0 47$ '; latitude $46^0 35$ '; altitude 427 m

Table 2. Recorded precipitation (mm), Turda 2015-2017

Month. amount	2015												Annual amount
	Ian.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov	Dec	
	12.3	20.9	12.8	32.2	66.0	115.7	52.2	72.2	172.6	45.4	32.0	6.9	641.2
Av. 60 years	21.8	18.8	23.6	45.9	68.7	84.8	77.1	56.5	42.5	35.6	28.5	27.1	531.0
Deviat.	-9.5	+2.1	-10.8	-13.7	-2.7	+30.9	-24.9	+15.7	+130.1	+9.8	+3.5	-20.2	+110.2
2016													
Month. amount	Ian.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov	Dec	
	25.0	23.8	47.0	62.2	90.4	123.2	124.9	91.0	24.6	152.2	45.3	7.2	816.8
Av. 60 years	21.8	18.8	23.6	45.9	68.7	84.8	77.1	56.5	42.5	35.6	28.5	27.1	531.0
Deviat.	+4.2	+5.0	+23.4	+16.3	+21.7	+38.4	+47.8	+34.5	-17.9	+116.6	+16.8	-19.9	+285.8
2017													
Month. amount	Ian.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov	Dec	
	2.6	19.2	46.1	65.2	65.4	30.6	110.2	36.1	56.2	49.2	30.8	20.7	532.3
Av. 60 years	21.8	18.8	23.6	45.9	68.7	84.8	77.1	56.5	42.5	35.6	28.5	27.1	531.0
Deviat.	-19.2	+0.4	+25.5	+19.3	-3.3	-54.2	+33.1	-20.5	+13.7	+13.6	+2.3	-6.4	+1.3

Source: Turda Meteo Station, longitude: $23^0 47$ '; latitude $46^0 35$ '; altitude 427 m

RESULTS AND DISCUSSIONS

Although soybean is a leguminous plant, it reacts very well to additional fertilization, bringing production yields of 245 kg/ha in the variant with 100 kg/ha of $N_{20}P_{20}K_0$, 160 kg/ha in the variant with 100 kg/ha of N_{30} and 112 kg/ha in the version where 100 kg/ha of N_{20} was applied, compared to the control variant where only basic fertilization was applied, these differences being statistically assured as very significant positive. From the data presented in Table 3, it can be seen that soybean is best harnessing the additional fertilization containing complex fertilizers.

Similar data was also obtained from the experiments performed by Cheţan et al. (2017), suggesting that an additional fertilizer of N_{40} kg/ha can bring a significant increase in production of more than 85 kg/ha of soybeans.

Table 3. Influence of fertilization factor on soybean production, Turda 2015-2017

Fertilization variant	Yield (kg)	Difference (kg)	Significance
$N_{20}P_{20}K_0$ (100 kg/ha) (control variant)	2461	-	mt.
$N_{20}P_{20}K_0$ (100 kg/ha) + $N_{20}P_{20}K_0$ (100 kg/ha)	2703	242	***
$N_{20}P_{20}K_0$ (100 kg/ha) + N_{30} (100 kg/ha)	2621	160	***
$N_{20}P_{20}K_0$ (100 kg/ha) + N_{20} (100 kg/ha)	2573	112	***
LSD (p 5%) 13 LSD (p 1%) 29 LSD (p 0,1%) 57			

In the period 2015-2017 the soybean genotypes created at ARDS Turda recorded significant average yields, the highest being obtained by Mălina TD (2706 kg/ha), with a very significant increase in yield compared to the other three varieties studied during this period, the recorded yields of these varieties ranging from 2518 kg/ha to 2599 kg/ha, as can be seen from the data presented in Table 4.

The research done by Mureşanu et al. (2014) during the period 2007-2013 show that, following the yield results obtained by the four varieties created at SCDA Turda, the Felix and Onix varieties recorded slightly lower yields than Mălina TD, but Darina TD was noted for yield higher by about 42 kg/ha compared to Mălina TD.

Table 4. Influence of the variety factor on soybean yield, Turda 2015-2017

Variety	Yield (kg)	Difference (kg)	Significance
Mălina TD (control variant)	2706	-	mt.
Darina TD	2534	-172	000
Onix	2518	-188	000
Felix	2599	-107	000
LSD (p 5%) 6 LSD (p 1%) 18 LSD (p 0,1%) 36			

The climatic conditions of the growing season of an agricultural crop play an important role in achieving total production, the uniformity and the amount of rainfall correlated with the temperatures of the important vegetation pheno-phases being decisive in the formation of yield.

Drought is the main factor of abiotic stress that limits the productivity of culture worldwide, and the availability of water plays a major role in regulating the quantitative parameters of a culture. The water stress of the pods formation and the filling phase of the grain has the greatest negative effect on the number of pods per plant and the number of grain in the pod, being considered a major threat to soybean yield worldwide.

The significant amount of rainfall at each important moment in the soybean development period meant that in 2016 the yield was significantly higher than in the other two years studied and implicitly on the average of the three years considered as a control variant after as shown in Table 5.

Cheţan et al. (2013) conducted research on the influence of fertility level factors, soil cultivation system and climatic conditions on soybean yield, suggesting that in soybean crops, significant yields of up to 4047 kg/ha could be achieved.

Table 5. Influence of the year factor on soybean yield, Turda 2015-2017

Experimental year	Yield (kg)	Difference (kg)	Significance
Average years (control variant)	2589	-	mt.
2015	1912	-667	000
2016	3447	858	***
2017	2329	-260	000
DL (p 5%) 20 DL (p 1%) 45 DL (p 0,1%) 144			

The economic efficiency of an agricultural production activity is an essential aspect because it is important for the proper functioning of the recovery of the expenses and the obtaining of the profit. The bulk of the expenditure for the establishment of one hectare of soybean comes from the materials used, followed by fuel consumption expenditure required for all mechanical works and salary mechanized, as shown in Table 6.

Table 6. Total expenditures and economic efficiency

Fertilization variant	Hand works (lei)	Materials cost (lei)	Fuel cost + salary mechanized (lei)	Total costs (lei)	Economic efficiency (lei)
$N_{20}P_{20}K_0$	93,62	1339,62	490,2	1923,44	-
$N_{20}P_{20}K_0 + N_{20}P_{20}K_0$	101,72	1482,62	507,35	2091,69	168,25
$N_{20}P_{20}K_0 + N_{30}$	101,72	1450,72	507,35	2059,79	136,35
$N_{20}P_{20}K_0 + N_{20}$	101,72	1413,65	507,35	2022,72	99,28

Soybean, besides being one of the most important plants in food and agro-technical use, it is also one of the most profitable agricultural crops, because even under unfavorable climatic conditions it produces profits. From the data presented in Table 7, it can be noticed that the resultant sales result in an important profit, even a main yield of more than 1100 kg/ha can bring profit, without taking into account the secondary production obtained by baling the residues plant.

Table 7. Profit obtained on the basis of the level of fertilization and the average yield obtained during the period 2015-2017

Fertilization variant	Total costs (lei/ha)	Yield (kg/ha)	Price soybean (lei/kg)	Revenues selling soybean (lei/ha)	Profit (lei/ha)
$N_{20}P_{20}K_0$	1923,44	2461	2	4922	2998,56
$N_{20}P_{20}K_0 + N_{20}P_{20}K_0$	2091,69	2703	2	5406	3314,31
$N_{20}P_{20}K_0 + N_{30}$	2059,79	2621	2	5242	3182,21
$N_{20}P_{20}K_0 + N_{20}$	2022,72	2573	2	5146	3123,28

CONCLUSIONS

The soybean culture responds positively to the application of additional fertilization, especially by the application of complex fertilizers, obtaining very significant yield increases as compared to the yields obtained from basic fertilization.

Soybean is an important crop in both human and animal nutrition as well in crops rotation, but it is also economically profitable, especially in years where yields exceed 2000 kg/ha.

Of the four varieties studied, the most profitable was the Mălina TD variety, which recorded the highest average production of 2015-2017 at 2706 kg/ha.

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12. ***Staţia Meteo Turda

THE EVOLUTION OF MAIZE PRODUCTION IN ROMANIA

POPESCU MIHAI[1], STELICA CRISTEA[2], CHIRIAC ANDREEA-RALUCA[3], ȚEICAN DANIELA-IOANA[4]

Abstract: *Agriculture is an important economic sector in all countries, being the main source of food for the population and a major supplier of raw materials for the manufacturing and export industries. Maize (Zea mays L.) is the most important crop in Romania as harvested area. Its expansion is due both to the particularities of food culture, food, and agrofitotechnical peculiarities. In the current context, due to the significant quantities of maize it produces, Romania plays an important role in the maize market, being in full ascendancy in terms of production and export, reaching in 2017 the largest EU maize producer with a estimated production of 13 million tons. The main purpose of the paper is to highlight the evolution of the areas cultivated with corn and the production achieved in the post-Decembrist period, by presenting the data based on the processing and interpretation of the latest data and information published by the specialized institutions in Romania.*

Key words: *maize, production, surface, agriculture, tones.*

JEL Classification: *Q13, Q11*

INTRODUCTION

In Romania, agriculture continues to play an extremely important role, although it undergoes a vast restructuring process and a profound process of exploitation. Agriculture is one of the main branches in terms of material production. In the current context, both economic and social progress are in a relationship of interdependence regarding the stage of agricultural achievements.

The agricultural sector holds an important place in the Romanian economy, with an important contribution to the creation of gross domestic product (GDP) and also a key role in international trade. The importance of agriculture in the Romanian economy results from its weight in GDP, the labor force and the impact of the rural community. [4]

Romania has become conjectural self-sufficient, because we are surplus to only 5 of the 24 groups of agro-food products. We know a positive balance for cereals, oil seeds and oleaginous fruits, tobacco, live animals, products with raw material nature, and for the remaining agro-food groups we import massive, especially meat, sugars and sugar confectionery, fruits etc. The situation seems to be improving in recent years in terms of the total balance of trade balance, due to the major influence exert by cereals and oil seeds and oleaginous fruits trade. [2]

The main cereals exported by Romania are ***wheat*** and ***maize***, with average annual weights of 45% for wheat and 41% for maize from the total cereal exports of the country (both in volume and in terms of value). [3,8]

Given that today's modern agriculture has to provide people with safe and nutritious food, food to ensure the protection of human health, there is a need to increase the quality and quantity of agricultural production. This can be done by reducing both the causes that lead to the reduction of grain crops and the improvement of agricultural techniques.

Agricultural crops are subject to several stressors: extreme weather conditions, pathogen attack and pests, lack of water, leading to lower production.

It is well known that Romania has a temperate continental climate, but the changes in the last decade of the year fragment this climate into one with nuances of excess. This is due to the high temperature variations between hot and cold, but also between daytime and nighttime temperatures. Besides these aspects, there are extremely large variations in both the total amount of precipitation

[1] Drd. Popescu Mihai, USAMV București, e-mail: mihai_popescu@istis.ro
[2] Prof. univ. dr. Stelica Cristea, USAMV București, e-mail: stelicacristea@yahoo.com
[3] Drd. Chiriac Andreea - Raluca, USAMV București, e-mail: chiriac.andreea25@yahoo.com
[4] Țeican Daniela – Ioana, ISTIS, e-mail: teican.daniela@yahoo.com

from one year to the next and the distribution during the year, which led to high water related deficits and floods compromise large areas. [10]

In today's agriculture, production losses are largely due to unfavorable environmental factors.

In recent years, climate change in our country has experienced annual variations and seasons with high temperature amplitudes, precipitation and other meteorological factors, which have negatively influenced the level and production stability to field crops. [6]

Considering the wide spread of corn, both in Romania and other countries, its cultivation in the area where stress factors produce significant production losses, an important contribution is the creation and cultivation of resistant hybrids in order to reduce the damage . In this sense, the strategic and methodological improvements of the process of creation of inbred lines and of resistant maize hybrids can be considered of great interest in practice.

MATERIAL AND METHODS

Multi-annual average (A):

$$A = \frac{X1 + X2 + X3 + ...Xn}{n}$$

Growth rate (%)[4]:

$$G(\%) = \frac{Xix100}{A} - 100$$

G (%) - Growth rate;
Xi - The main indicator used in the analysis as a cultivated area, production, etc.;
A - Multi-annual average (A).

This paper is based on statistical data provided by FAOSTAT, the National Institute of Statistics and the Ministry of Agriculture and Rural Development.

Also, a number of books, magazines and specialized studies have been consulted to show as much as possible the evolution of cultivated area and maize production.

This evolution of maize production in Romania was made for the period 1990-2017, reflecting the evolution of the cultivated area, total production and average production per hectare.

RESULTS AND DISCUSSIONS

Romania plays an important role in European agriculture due to fertile soil and climate favorable to agriculture, animal husbandry and horticulture. It owns about one-third of the total agricultural land in the European Union, making it a leader in cultivated maize.

The modernization of agriculture and bringing it to a high degree of competitiveness was a desideratum declared since the interwar period, the agrarian economists of that period reluctantly seeking the re-occupation of the leading places from the pre-war period in terms of the cultivated area and the obtained productions, real "Breadbasket of Europe". Building a bridge in time over the communist period, we want followers of intergovernmental agrarian policies to open up to the international community in terms of competitiveness and not food dependence, aware of the often insurmountable difficulties that need to be overcome to bring our agriculture to the level of Western agriculture Europe. [9]

Table 1. The evolution of the areas cultivated with corn, the total production and the average production achieved in Romania, between 1990 and 2017

Specification	1990	1991	1992	1993	1994	1995	1996	1997	1998
Surface (thousand ha)	2466.7	2575.0	3335.9	3065.7	2983.4	3109.3	3277.0	3037.7	3128.9
Growth rate %	- 11.22	- 7.32	20.06	10.33	7.37	11.90	17.94	9.32	12.61
Total production (thousand tons)	6809.6	10497.3	6828.3	7987.5	9343.2	9923.1	9607.9	12686.7	8623.4
Growth rate %	- 27.72	11.43	- 27.52	- 15.21	- 0,82	5.33	1.99	34.67	- 8.46

Medium production (kg/ha)	2761	4077	2047	2605	3132	3191	2932	4176	2756
Growth rate %	- 19.62	18.69	- 40.41	- 24.16	- 8.82	- 7.10	- 14.64	21.57	- 19.77

Specification	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Surface (thousand ha)	3013.4	3049.4	2974.0	2894.5	3199.6	3274.1	2628.5	2520.1	2524.7	2441.5
Growth rate %	8.45	9.75	7.03	4.17	15.15	17.84	- 5.40	- 9.30	- 9.13	- 12.13
Total production (thousand tons)	10934.8	4897.6	9119.2	9399.8	9577.0	14541.6	10388.5	8984.7	3853.9	7849.1
Growth rate %	16.07	- 48.01	- 3.20	- 0.22	1.66	54.36	10.27	- 4.63	- 59.09	- 16.68
Medium production (kg/ha)	3629	1606	3066	3247	2993	4441	3952	3565	1526	3215
Growth rate %	5.65	- 53.25	-10.74	- 5.47	-12.87	29.29	15.05	3.78	- 55.57	- 6.40

Specification	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average 1990-2017 Growth rate (%)
Surface (thousand ha)	2338.8	2098.4	2589.7	2730.2	2518.3	2512.8	2528.0	2581.0	2402.0	2778.52
Growth rate %	- 15.82	- 24.48	- 6.79	- 1.74	9.36	- 9.56	- 9.02	- 7.11	- 13.55	100
Total production (thousand tons)	7973.3	9042.0	11717.6	5953.4	11305.1	11988.6	8871.0	10746.4	14326	9420.59
Growth rate %	-15.36	- 4.02	24.38	- 36.80	20.00	27.26	- 5.83	14.07	52.07	100
Medium production (kg/ha)	3409	4309	4525	2181	4489	4771	3450	4164	5964	3434.96
Growth rate %	- 0.75	25.44	31.73	- 36.50	30.68	38.89	0.44	21.22	73.63	100

Source: The data in the table was taken from the website of the Ministry of Agriculture and Rural Development and of the National Institute of Statistics; Own calculations

In the analyzed period, the highest production of maize was 14541.6 thousand tons in 2004, and the lowest was achieved in 2007, namely 3853.9 thousand tons, resulting in an increase of 54,36% more than the multiannual average (9420.59 thousand tons).

As regards the area cultivated with maize, the largest area was 3335.9 thousand ha in 1992 and the smallest in 2010, respectively 2098.4 thousand ha, resulting in an increase of 20.06% more than the multiannual average (2778.52 thousand ha).

The evolution of total maize production between 1990 and 2007 varied between 3854 thousand tons in 2007 and 14542 thousand tons in 2004 and the highest average production was 4441 kg in 2004.

In the last 10 years, corn production has fluctuated from 7.9 million tons in 2008 to a minimum harvest of 6 million tons in 2012, then to a peak of 12 million tons in 2014. In 2015, production was 8.9 million tons, down 26% compared to 2014. This dramatic decrease of our country's corn crop was determined by the decrease in yield (3.6 tons / ha) due to the extreme drought in the spring and summer of 2015, with 2.5 million hectares (MADR, 2016) maintaining the sown area in the last 3 years.

According to EUROSTAT, the corn-covered area in Romania decreased by 1.5% in the 2016/2017 season as a result of higher exposure of farmers to other cereal-oleaginous plant products. The slight reduction of areas in the current season did not structurally alter the crop level at economy level. Maize remains the most cultivated product of Romanian agriculture with a share of 38.7% of the total areas covered with cereals, seeds and grains oleaginous.

According to EUROSTAT, COCERAL-SEPTEMBER 2016, Romania is traditionally the leader of the European Union according to the areas cultivated with corn. Season 2016/2017 is no exception to this rule, so that the areas covered by maize on site are at least 1 million hectares higher than those of any other direct competitor on the Community market. Maize cultivated in Romania covers 28.2% of the total area cultivated with this product by the 28 EU economies in the current season.

According to EUROSTAT, COCERAL-SEPTEMBER 2016, Romania is traditionally the leader of the European Union according to the areas cultivated with maize. Season 2016/2017 is no exception to this rule, so that the areas covered locally by maize are at least 1 million hectares higher than those of any other direct competitor on the Community market. Maize cultivated in Romania covers 28.2% of the total area cultivated with this product by the 28 EU economies in the current season.

In 2017, maize production was 14326 thousand tons, which placed Romania among the top producers in the European Union, this being done on a fund already known by Romania, since it has occupied in the last years the first position on the surface cultivated with corn and second, after France, to the production.

Romania's domestic maize grains requirement amounts to 4.5 million tons, which offers significant export opportunities, and this is also one of the products in Romania's top trade in agri-food products, after wheat. Only in the first eight months of 2017 was exported to the intra and extra-Community countries a quantity of 1.426 million tons of maize for which 338.2 million euro. [7]

CONCLUSIONS

During the analyzed period, although the area cultivated with maize has been steadily decreasing, from 3335.9 thousand hectares in 1992 to 2098.4 thousand ha in 2010, maize production has registered an essential increase ranging between 3853.9 and 14541, 6 thousand tons, on the basis of the analysis carried out, that there was an increase of 52.07%, more than the multiannual average of 9420.59 thousand tons. Average maize yield per hectare ranged from 1526 to 5964 kg / ha, with an increase of 73.63% over the multiannual average (3434.96 kg / ha).

Climate change mitigation methods, as well as measures to improve agricultural technologies, should start with the use of high biological value seeds and crops that can cope with abiotic and biotic stress factors.

In Romania maize production could increase much more if the areas cultivated with certified corn seed would intensify, as still uncertified corn seed is still used in Romania (salvaged seed). In the period 2012-2015, the areas cultivated with uncertified seed have steadily decreased, the areas in which more land is still cultivated with "seed from the ground" being Moldova, Southeast, West and the center of the country. In the south-eastern part of the country it was found that only small areas are cultivated with salvaged seed. At this time in Romania the area cultivated with maize seed is estimated to be 30%. [5]

Taking into account the current analysis and the current context, Romania will continue to become a key pawn in the European Union in the coming years, given the significant quantities it produces, being in full ascendancy in terms of production and export.

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THE ANALYSYS OF THE TECHNICO-ECONOMIC INDICATORS FOR THE MAIN CROPS IN THE S-W REGION BETWEEN 2009-2017

TUREK-RAHOVEANU PETRUȚA[1]

Abstract: *The agriculture has represented an important source of food for mankind since the ancient times. Romania is a country that has fertile soils and a climate that offers favorable conditions for agriculture. These conditions can also be found in the Oltenia S-W Region where the agriculture represents an important resource having over a million hectares that are used for grain crops and for the oleaginous plants. Within this study we are going to analyze the indicators regarding the evolution of the cultivated surfaces, the productions and the prices of the main crops (wheat, corn, sunflower): the average, the annual growth rate, the deviations in absolute scales.*

Key words: *productions, prices, annual rate, variation parameter*

JEL Classification: *Q10, Q11*

INTRODUCTION

The South-West Oltenia Development Region expands over 29212 km^2, representing 12,25% of Romania's surface. It has a population of 2330792 inhabitants and the main economical branch in the region is agriculture, which is favoured by the agrarian surface of the area, by the favourable climate conditions and the superior quality of the soil.

In the region, the grain crops fill large surfaces, so that in 2017 the wheat crop takes over 35% of total cultivated surface, corn takes 28,6%, the sunflower crop takes 13% and the last studied crop, rape, represents 5%.

The grain crops are cultivated mostly in the South of the region namely, in the Counties Olt, Dolj and in the South of Mehedinti.

MATERIAL AND METHOD

The analysis in this study is based on the statistic data from the publications given by The National Institute of Statistics regarding the surfaces, the productions and the prices of the main crops (wheat, corn, sunflower, rape), in the S-W Oltenia Development Region, between 2009-2017.

In the study there are used indicators that underline the evolution of the studied data through the analysis of the period's average as well as the increases from each year.

The calculation formulas used to calculate the indicators are the following[2]:

Dynamic analysis:

The fix base index: $I_{SC} = (SC_n/SC_0)*100$

The annual growth rate = r2009-2017 = $\sqrt[9]{\pi\left(\frac{p1}{p0}\right) - 1}$;

where: r2009-2017 = the average growth rate; ∏p1/po = chain base index

Standard deviation:

$$\partial = \sqrt{\frac{\sum(\bar{x}-xi)^2}{n-1}}$$

[1] Scientific researcher III – ICEADR, turek.petruța@iceadr.ro

[2] Ceapoiu, N., 1968, Applied statistical methods in agricultural experiments and statistical Ed.Agro-Silva, Bucharest

where:

∂ = standard deviation; xi = average per a number of years
n = the number of analysed years

Variation parameter = $C = \frac{\delta}{\overline{X}} x100$,

where:

C-variation parameter – stated as a percent that can be small (0-10%), medium (10,1-20%) or high (higher than 20,1%).

The study has been conducted through the analysis of the statistic data available from the Eurostat and The National Institute of Statistics data base**.**

RESULTS AND DISCUTIONS

In the South-West Oltenia Development Region, in 2017, there have been cultivated mainly grains for beads which represent over 72% of total cultivated surface with the main crops and the surface that has been cultivated with oleaginous plants represents over 18%, which comes to show that the region has soils and a climate favorable for larger crops.

Table nr.1

The evolution of the cultivated surfaces with the main crops in the S-W Oltenia Development Region 2009 - 2017

Crops	**2009**	**2011**	**2013**	**2015**	**2017**	**Average**	**S dev**	**Variation parameter**		**Annual growth rate**
	k ha	**ki ha**	**k ha**	**k ha**	**k ha**	**k ha**	**k ha**	**%**	**Signif**	**%**
Beads grain	824,76	791,65	819,15	807,71	816,33	807,54	29,50	3,65	small	-0,13
Wheat - total	381,77	350,05	387,17	363,82	404,78	376,04	30,32	8,06	small	0,73
Corn beads	382,34	386,46	346,64	360,47	323,98	355,78	39,64	11,14	medium	-2,05
Oleaginous plants	105,70	138,95	148,13	162,80	210,37	159,28	39,27	24,66	high	8,98
Sunflower	68,40	102,38	132,25	128,56	147,81	121,80	33,71	27,67	high	10,11
Rape	35,59	36,23	15,09	31,63	59,78	35,54	17,42	49,03	high	6,70

Source: NIS, 2018,TEMPO-AGRI108A

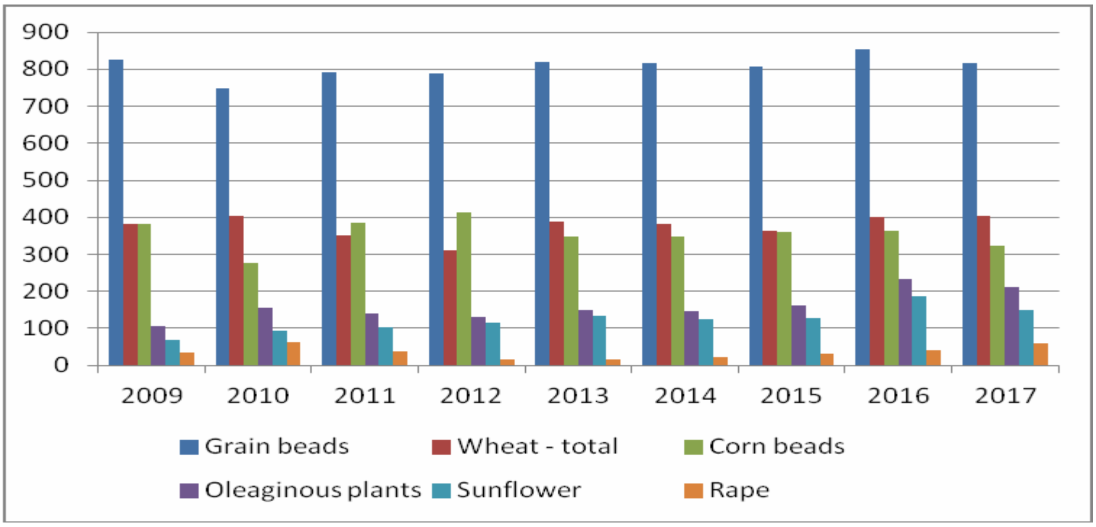
From analyzing the data from table 1 we can see that the surfaces cultivated with grains for beads had a small decrease in the analyzed period by 1% smaller in 2017 compared to the first year of the analyzed period and the oleaginous plants cultivated surfaces had an impressive increase doubling in 2017 compared to 2009.

Regarding the wheat cultivated surface, it represents almost half of the grain cultivated surface. In the analyzed period there has been registered a small increase of 6,03% in 2017 compared to 2009, with an annual growth rate of 0,7 % and a variation parameter of 8,1%.

Another significant ponderosity of the grain cultivated surfaces' total is represented by the surface cultivated with corn, respectively almost 40%. The corn crop from the analyzed period is the only one that registers a decrease of the surfaces so that in 2017 there have been 323.9 thousand ha compared to 2012 when there have been cultivated 414,3 thousand ha, which represents a decrease of 21,8% and compared to the reference year it registers a decrease of approx. 15%, with an annual rate of -2,05%.

Of the oleaginous plants cultivated surfaces, the surface that has been cultivated with sunflower holds over 70% and the one cultivated with rape 28,4%.

Diagram nr.1.
- hectares-



For the sunflower crop, the growth rate is of 10,11%, the surfaces cultivated in 2017 being twice larger than the referance year.

Comparing 2017 to 2009, one can see a significant increase of the rape crop with an annual rate of 6,7 %, a variation parameter of 49,03% representing a high variation of the analyzed data.

Table nr.2

The evolution of production of the main crops in the S-W Oltenia Development Region 2009 -2017

Crops	2009	2011	2013	2015	2017	Average	S dev	Variat. Param.	Signif.	Annual growth rate
	k tons	k tons	k tons	k tons	k tons	k tons	k tons	%		%
Grain beads	2593,18	2836,78	2777,51	2524,01	4330,57	2739,90	740,43	27,02	high	6,62
Wheat - total	995,11	1126,90	1096,19	1210,00	1916,77	1181,97	322,33	27,27	high	8,54
Corn beads	1453,24	1569,29	1475,75	1066,28	2076,78	1347,03	400,87	29,76	high	4,56
Oleaginous plants	162,54	239,47	257,35	286,98	634,42	305,93	146,61	47,92	high	18,56
Sunflower	110,64	178,24	237,43	209,67	466,27	230,00	107,80	46,87	high	19,70
Rape	50,57	60,91	19,16	73,62	162,43	73,14	46,78	63,96	high	15,70

Source: NIS, 2018,TEMPO-AGRI108A

By analyzing the evolution of the production of the studied crops it can be seen that they registered a growth in the analyzed period 2009-2017 (table nr.2) so that:

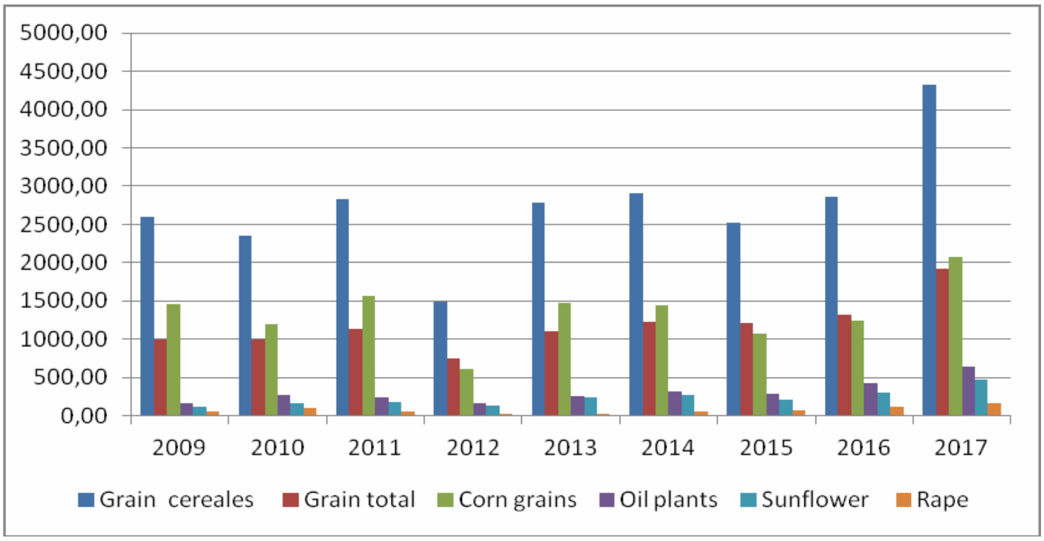
- in 2017, regarding the wheat crop the production is higher by 921,6 thousand tons compared to 2009 representing an increase of 92%, with an annual rate of 8,5%.

- the corn production in this period increases with an annual growth rate of 4,6%, registering a growth of 42,91% in 2017 compared to the reference year and of 67% compared to last year;

- regarding the sunflower crops the production increases at a fast pace of 19,7%, so that in 2017 it's four times higher than the reference year 2009.

- spectacular increases are also highlighted when it comes to the rape crop from 50,57 thousand tons in 2009 to 162,43 thousand tons in 2017, representing an increase of 220%, with an annual growth rate of 15,7%.

Diagram nr.2
-Thousand tons-



As it can be seen, the studied crop productions have increased during the analyzed period, bringing with them price increases for those crops.

Table nr.3

The evolution of the prices for the main crops in the S-W Oltenia Development Region between 2009-2017

Crop	2009	2011	2013	2015	2017	Average	S Dev	Var. Param.		Annual rate
	lei/100kg	lei/100kg	lei/100kg	lei/100kg	lei/100kg	lei/100kg	lei/100kg	%	Signif	%
Wheat	47	88	85	74	65	72,0	14,7	20,4	high	4,1
Corn	67	100	100	76	68	81,8	15,0	18,4	medium	0,2
Sunflower	86	158	159	150	137	141,1	28,3	20,0	high	6,0
Rape	97	162	157	164	158	148,6	25,6	17,3	medium	6,3

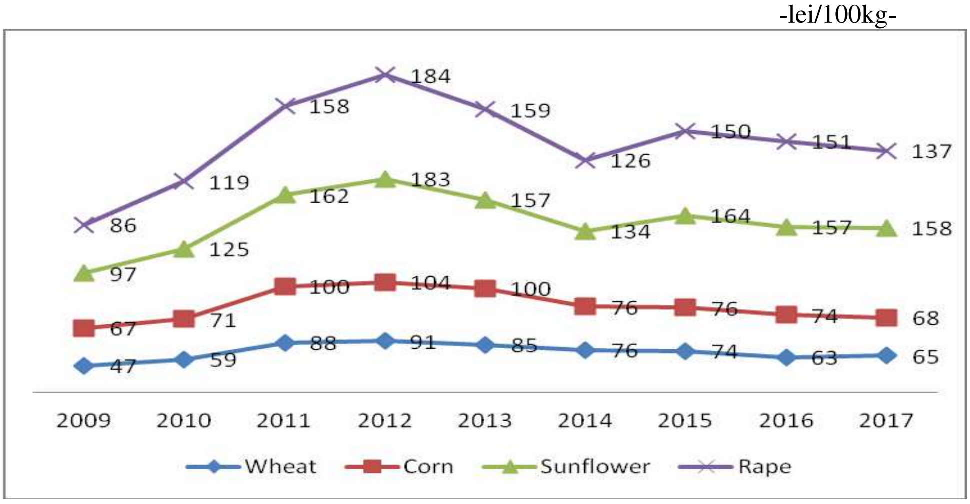
Source: Eurostat

From analyzing the data in table nr. 3, it can be seen that the selling prices have increased during the analyzed period 2009-2017, especially for the rape and sunflower crops by 62,8% , respectively 59,3% in 2017 compared to the first year of the analyzed period.

In the analyzed period the selling price of wheat has values between 0,47 lei/kg in 2009 and 0,91 lei/kg in 2012, representing an increase of 94%. Towards the end of the analyzed period it decreases, though surpassing 2009 by 38,3%.

Regarding the corn crop the price has a peak of 1,04 lei/kg in 2012 only to reach in 2017 the level from the reference year of 0,68 lei/kg.

Diagram nr.3
-lei/100kg-



CONCLUSIONS

From the conducted study it can be seen the region's potential to cultivate the analyzed crops but it's not fully exploited.

The cultivated surfaces from the South-West Oltenia Region together with the main crops from 2009-2017 have increased at an annual rate of 1,2%, reaching from 2009 from 1,03 mil ha to 1,13 mil ha in 2017, representing a growth of 9,65%.

In the South-West Oltenia Region in 2017, given the favorable conditions for large crops there are cultivated especially grains for beads (72%) and oleaginous plants (18%). They hold a ponderosity of 15,7% out of our country's total grains for beads cultivated surfaces and the oleaginous plants hold a ponderosity of approx. 12%.

Regarding the ponderosity of the obtained productions of grains out of the country's total for this type of crops is 15,96% and for oleaginous plants is of 12,72%. It can be seen from analyzing the statistical data an important increase of the oleaginous plants surfaces and their production.

All the productions of the analyzed crops register increases, especially the sunflower crop which is in 2017 4 times higher compared to the first year of the analyzed period due to the increase of the cultivated surfaces but especially due to the increase of the average production from 1617 kg/ha in 2009 to 3154 kg /ha in 2017. All of that is due to the improvement of the technical-material basis and the top of the range cultivation technologies as a result of the support given through the measures from NRDP.

The selling prices have increased during the analyzed period for the majority of the studied crops, the exception being the selling price of corn that decreases in 2017 to the level from 2009, respectively to 0,68 lei/kg.

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ROMANIAN MILK SECTOR IN INTERNATIONAL CONTEXT

CHETROIU RODICA[1]

Abstract: *The paper performs an analysis of the Romanian sector of milk, identifying the status at global level, under various aspects, as part of the worldwide production of milk, with reference to the place our country in the world ranking of cow milk, milk productions, cow farm sizes, milk prices in international context etc. The study also integrates the presentation of some statistical indicators describing the dynamics and variability of cow's herds and milk productions, such as average, standard deviation and coefficient of variability. Our country owns 0.43% of total cows and buffaloes worldwide and 0.6% of milk production, and at the European Union level it provides 5.04% of the flocks and 2.5-2.6% of the cow's and buffalo milk production.*

Keywords: *milk, production, global, farms*

JEL Classification: *O13, Q12, Q17*

INTRODUCTION

Approaching the study of the cow's milk production sector is always a topical subject, given that it is dynamically constant, under the influence of various factors, both inside the system and upstream and downstream.

After the 2014-2016 crisis, both globally and in Romania, a recovery period followed, with farmers looking to adapt to the effects of increased market volatility. In our country, the small size of cows' farms, the poor development of the infrastructure, the competitive economic environment, the technological differences between small milk producers and large farms are very well reflected in the production of milk as well as in its structure [1]. The present study evaluates the position and contribution of the Romanian milk sector in the European and world context it belongs to.

MATERIAL AND METHOD

This study integrates fundamental research methods, the information analyzed in the study having official statistical data - FAO, Eurostat, Ministry of Agriculture and Rural Development, IFCN (International Farm Comparison Network). Statistical analysis tools (statistical indicators), comparative analysis, graphics are used, and also Excel software applications. Taking the time factor as a reference, the data analysis is of longitudinal type, being carried out for a certain time, having both a quantitative and a qualitative character.

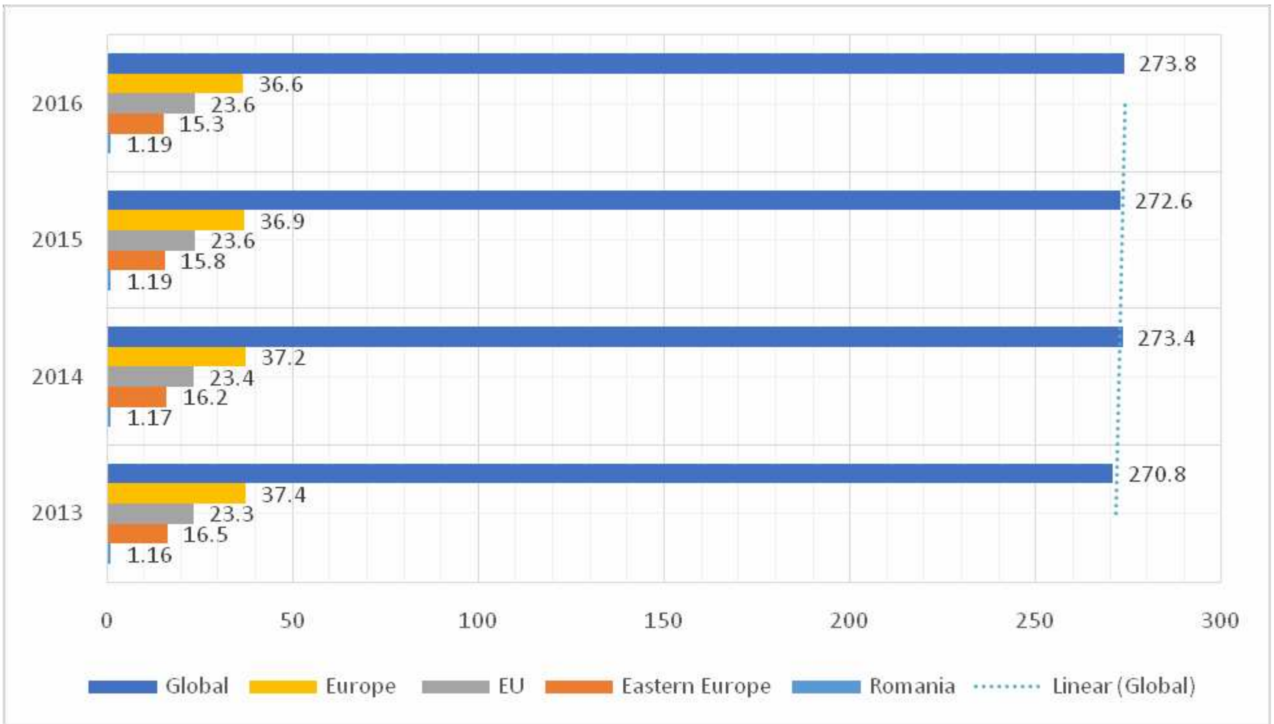
RESULTS AND DISCUSSIONS

According to FAO data, at the world level, there were 273.8 million dairy cows and buffaloes in the year 2016, with 1.1% more than in the year 2013. Europe provides 13.4% of world flocks in these categories, and Romania only 0.43%. Also, our country held only 3.3% of the cows and buffaloes exploited for dairy production in Europe and 5.04% of the European Union in 2016 (see Chart 1).

The calculation of the statistical indicators (Table 1) reveals that the highest variability of cows and buffaloes number during the studied period took place in Eastern Europe (3.26%), with only 0.49 % at the world level. Romania recorded an average variability of 1.27%.

[1] PhD. Chetroiu Rodica, Scientific researcher III – Research Institute for Agriculture Economy and Rural Development, e-mail: rodica.chetroiu@iceadr.ro

Chart 1 – Evolution of number of cows and buffaloes, during 2013-2016 (millions heads)



Source: FAOSTAT[2]

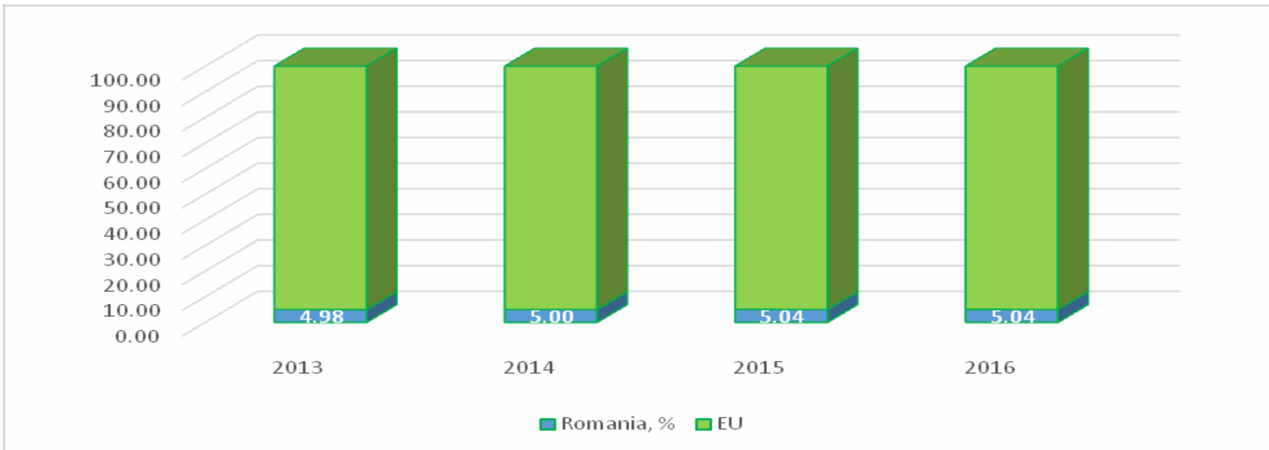
Table 1 – Statistical indicators of bovine number dynamics, 2013-2016

Statistical indicators	**Romania**	**Eastern Europe**	**EU**	**Europe**	**Global**
Average $\overline{X}$	1.18	15.95	23.48	37.03	272.65
Standard deviation s	0.015	0.52	0.15	0.35	1.33
Variability coefficient %	1.27	3.26	0.64	0.95	0.49

Source: Own calculations, based on FAOSTAT data

The representation of our country at the level of the European Union from the point of view of cows and buffaloes is quite poor; however, there was an ascending curve during the analyzed period (4.98-5.04%), as shown in the Chart 2:

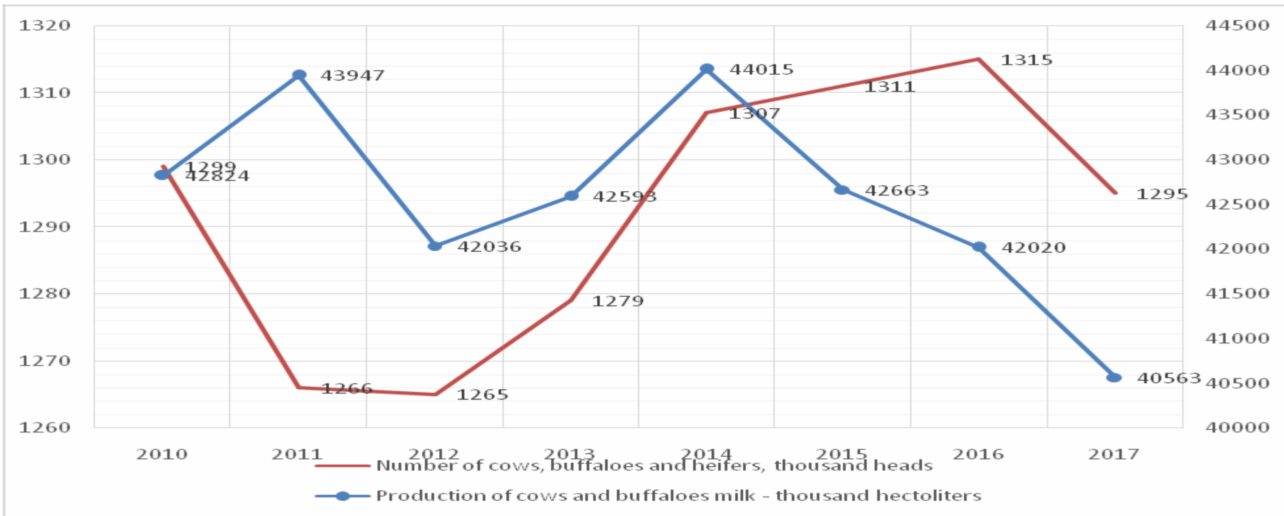
Chart 2 – Share of Romanian number of cows in those of EU



Source: Own calculations

The dynamics of cows, buffaloes and heifers in our country, in parallel with that of milk production (Chart 3), reveals a sinuous evolution, both in terms of flocks and production. It should be noted that the two curves describe similar but not identical forms, which indicate that the increase in milk production was not necessarily a consequence of the increase of the flocks.

Chart 3 – Dynamics of cows, buffaloes and heifers and of milk production in Romania

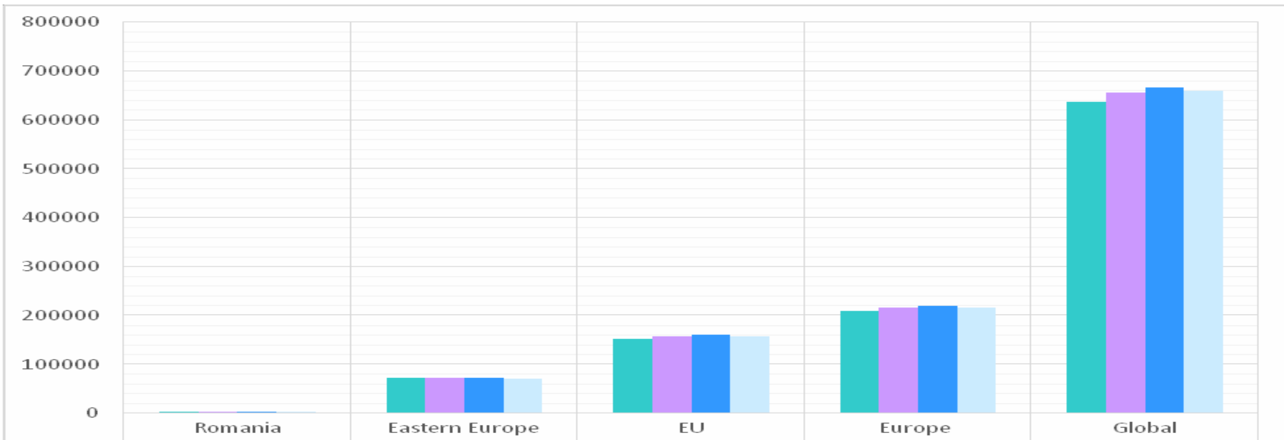


Source: National Institute of Statistics [5]

The calculation of the number and milk production statistical indicators shows that the average of total milk production for 2010-2017 in our country was 42583 thousand hl, with a standard deviation of 1113.1 thousand hl, accompanied by a the average number of flocks of 1292 thousand heads - standard deviation 19.8 thousand heads. The coefficient of variability of 2.6% for milk production was higher than that of flocks, which was 1.5%.

In terms of total milk production, on a global scale, Romania contributes with 0.6% of the quantity, on the background of negative evolutions both internally and in Eastern Europe. Production increases were recorded, but at EU (3.9%), European (2.7%) and global level (3.5%) (Chart 4). It is worth mentioning that, according to data compiled by the International Farm Comparison Network (IFCN), our country was ranked 36th in global milk production in 2016, with 604,000 cows' farms.

Chart 4 – Dynamics of milk production at global, European and our country level (thousand tons)

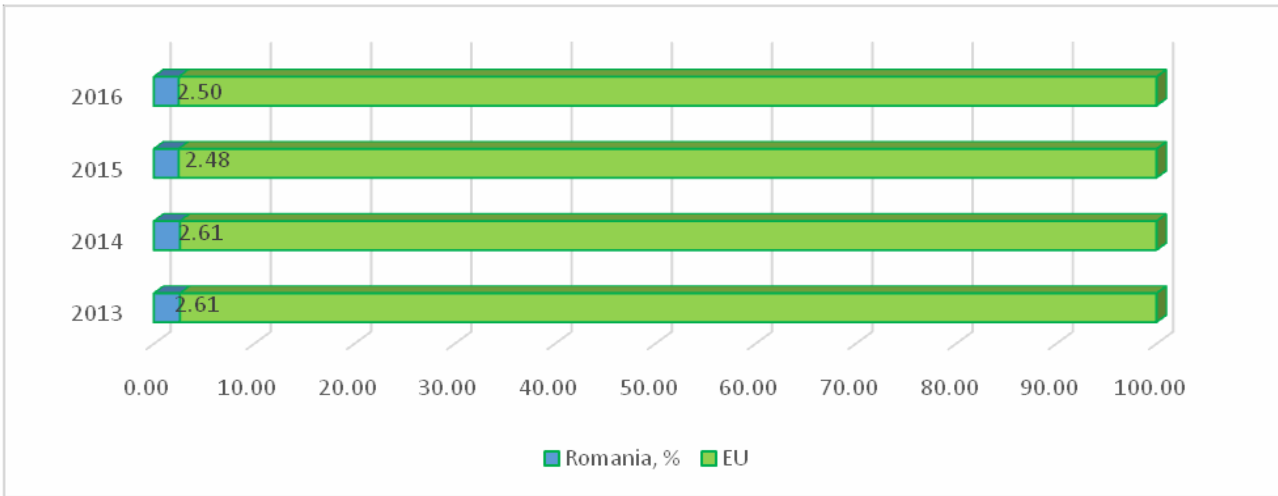


	Romania	Eastern Europe	EU	Europe	Global
2013	3981	72009	152248	210082	636586
2014	4130	72501	158334	216241	656701
2015	4006	72577	161693	219455	666761
2016	3954	71805	158156	215690	659150

Source: FAOSTAT

The share of Romania's milk production from European Union production is modest, ranging from 2.48 to 2.61%, as shown by FAO data (see Chart 5).

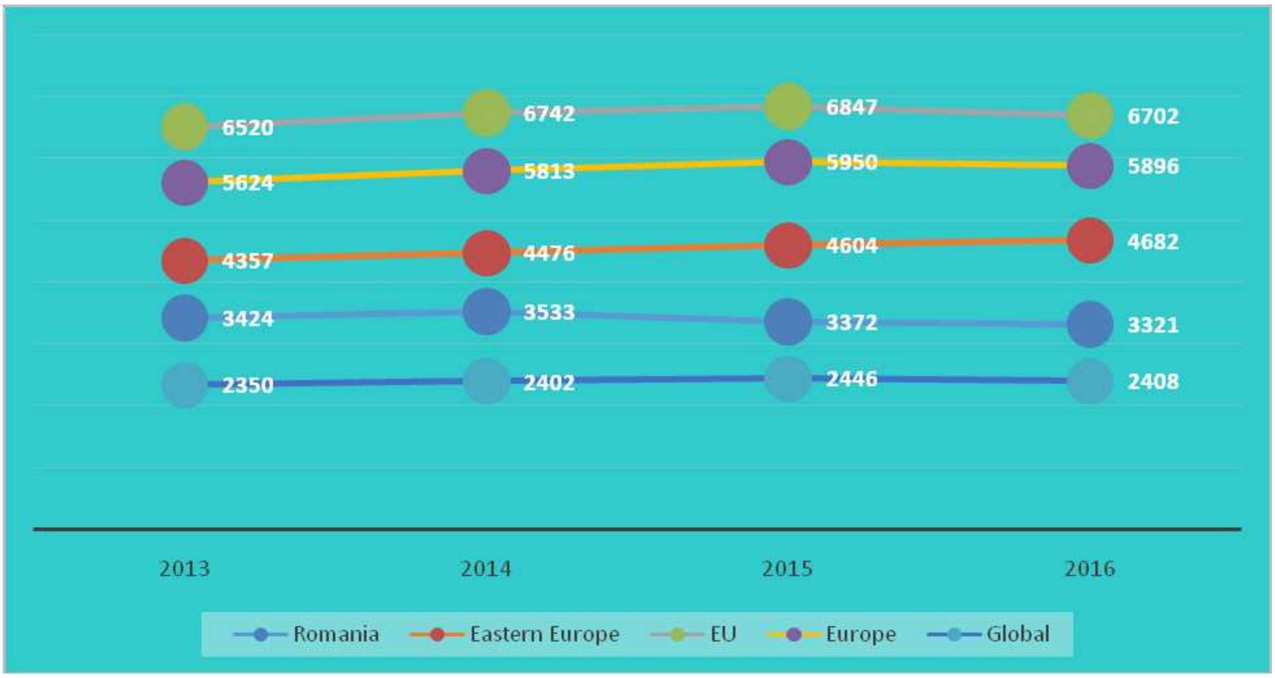
Chart 5 – Share of Romania cows and buffaloes milk production in that of EU



Source: FAOSTAT

In terms of average milk yields, Romania is at half the EU values (3424-3321 kg / cow / year compared to 6520-6702 kg / cow / year, 2013-2016) and even below the average European production (4357-4682 kg / cow / year), but exceeding 38-47% world average (which was 2350-2408 kg / cow / year between 2013 and 2016) (see Chart 6).

Chart 6 – Comparative evolution of the average milk yields (kg/cow/year)

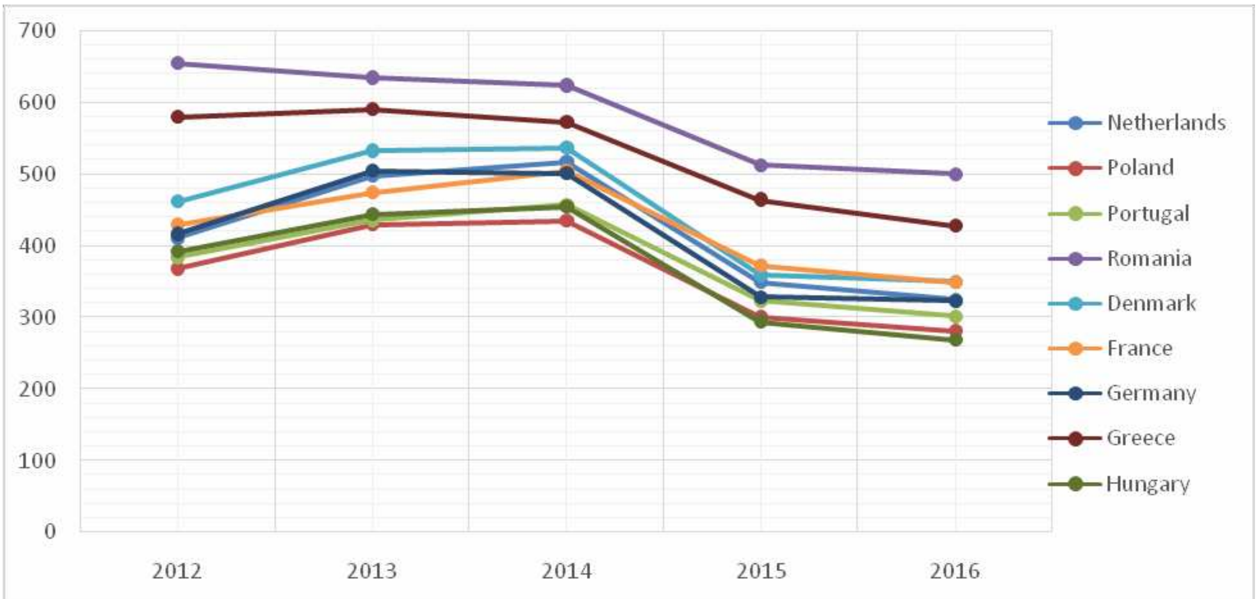


Source: FAOSTAT

As mentioned by the International Farm Comparison Network (IFCN) [3], there is a wide diversity in global milk production due to both geographical and cultural variety and political circumstances. In terms of farm size, the largest are in North America, followed by Oceania and China, while the smallest farms are in Africa (IFCN - Dairy Report 2017). Romania recorded an average of 2.4 cows / farms [4] in 2016, with 84% of the farms belonging to the 1-2 heads category (operative data from Ministry of Agriculture and Rural development [6].

With regard to the producer milk price in a number of countries in Europe, according to FAO data, Romania is at the top and is followed by Greece, while countries close to us, such as Hungary or Poland, are registering lower prices. This ranking can also explain the massive imports of milk that have taken place in our country during the studied period (Chart 7).

Chart 7 – Producer milk price in European countries ($/ton)



Source: FAOSTAT

CONCLUSIONS

The data presented in this paper highlights the fact that our country participates in the world cattle and buffalo herds and in the production of milk under 1%, and at the level of the European Union, with 5% of the flocks and about 2.5% milk production. In dynamics, starting in 2014 curves describing both flocks and milk production in Romania are generally descended, in 2017 registering 1295 thousand cows and buffaloes and 40563 thousand hectoliters of milk respectively. Therefore, the effects of the crisis of 2015-2016 in the milk sector are still felt, and producers aim to rebalance both these technical and economic realities.

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VEGETABLE FARM STRUCTURE EVOLUTION BY STANDARD OUTPUT

CORNELIA ALBOIU[1]

Summary: *The relationship between farm size and land productivity has been widely debated in literature for decades and several reasons and explanations for the inverse relationship between farm size and land productivity .The paper presents the evolution of areas under vegetables by size classes and regions according to standard output. The main methodological tool used is statistical analysis and comparisons among regions. The results reveal the perpetuation of the very small-sized farms, with low economic power, across regions, with a slightly decreasing trend of their number, under the background of increasing the cultivated areas under greenhouses and plastic tunnels.*

Keywords: *farm productivity, vegetable farm structure*

JEL Classification: *Q110, Q13*

INTRODUCTION

Farm size and productivity is a topic largely discussed and there are several factors which affects their relationship among which the imperfect factor markets including failures in the land market, credit market [1], insurance market [2], and labour market [3, 4]. Malfunctioning or absence of these markets leads to suboptimal resource allocation at the farm level implying inefficiencies. An important cause of labour market imperfections in developing countries is labour supervision cost; as hired labour is assumed to be less motivated and effective, it takes more productive family labour to supervise hired labour which decreases overall labour productivity at farm level [5]. This would explain why labour and farm productivity are lower on large farms, which require more hired labour. Assunção and Braido [4] and Barrett et al. [6] argue that the imperfect market hypotheses imply the presence of unobservable variation between households that leads to differences in the input intensity levels which are correlated with farm area. Therefore, they add a set of household-specific characteristics such as household size, dependency ratio, and gender of the household head in testing the inverse relation between farm size and productivity.

Another important question is whether the land productivity between farm size and productivity emerges (or not) from omitted variables. Importantly, differences in soil quality lead to differences in soil productivity which clearly affect output with small farmers being more productive because of having plots of better quality. In addition, farming practices and production methods might vary according to farm size, leading to differences in yields and productivity [4, 7]. All these studies show a decrease in the severity of land productivity when controlling for soil quality [6, 8], but none has found that the land productivity declines. Lipton [5] used differentiation in farm management skills as an explanatory variable of farm productivity using panel data which allows for household-specific fixed effects. However, the evidence does not suggest that managerial skills explain land productivity.

All these studies [9] were reviwed when analysing the relationship between farm size and economic efficiency and the authores concluded in their findings that gains from improving technical efficiency exist in all farm categories but they appear to be much higher on large than on small farms. While small farms tend to use land more intensively in an attempt to alleviate land constraints, the study suggests that the relatively higher level of technical efficiency observed on small farms is largely attributable to the adoption of traditional land saving techniques rather than the use of modern land saving technologies. Small scale farms are found to be more allocatively efficient than the larger farms.

[1]Dr. Cornelia Alboiu, Institutul de Economie Agrara, Academia Romana, e mail: coraalboiu@yahoo.com

MATHERIALS AND METHODS

Studying the economic size of the Romanian vegetable farm from the point of view of productivity and food security is an important objective and has a complex determination, being dependent on both the sectoral agricultural policies and the general macroeconomic framework, the prices on the branches, the income distribution policies, social, fiscal, commercial, etc. Specific statistical indicators such as: variation, mean referring to standard output will be used. These indicators will also be calculated regionally. The data source is represented by various databases such as tempo on-line INS, Eurostat, FAO.

RESULTS AND DISCUSSIONS

Following the analysis of the number of farms by standard output, one can notice that in all regions, in the categories of holdings whose standard output is lower than 2000 euro, 2000-3999 euro, 4000-7999 euro and 8000-14999 euro respectively, the number of farms decreased in the period 2005-2013. In this size group, the largest number of holdings that cultivate vegetables is found in the region South-Muntenia. The eligibility of getting funding from the National Rural Development Program NRDP 2014-2020 is based on the gross standard margin of holding "**SO**" (Standard Output). The economic size of farm is the criterion that determines whether a holding is eligible to get funding under NRDP 2014-2020 and how much money it can get.

Table 1. Number of farms by size classes according to standard output

Farms no	less then 2000 euro		2000-3999 euro		4000-7999 euro		8000-14999 euro		15000-24900 euro	
	Variation	Mean	Variation	Mean	Variation 2	Mean	Variation	Mean	Variation	Mean
Romania	-64%	134488	-64%	84953	-54%	67530	-10%	24.393	45%	6548
North-Wes	-62%	25855	-58%	13100	-42%	9783	18%	3.240	43%	845
Centre	-60%	15395	-56%	6968	-57%	5385	-25%	2.043	53%	538
North-East	-72%	20258	-78%	15183	-70%	10473	-35%	2.985	-7%	798
South-East	-69%	12185	-62%	10100	-59%	10385	-41%	3.950	4%	**1118**
South - Mu	-67%	28438	-61%	15855	-59%	11883	-1%	4.238	**76%**	**1208**
Bucharest	-28%	1383	-22%	1125	-50%	1213	-31%	488	45%	153
South-Wes	-50%	17140	-61%	14498	-32%	10615	26%	4.280	**84%**	1150
West	-69%	13848	-60%	8122,5	-50%	7810	2%	3.173	80%	750

Source: calculations based on Eurostat data, 2018

In the category 25000-49900 euro, the number of vegetable farms significantly increased in all regions, at the highest level in the region South-West Oltenia, while their number decreased only in the region Bucharest-Ilfov (-50%) and Centre (-3%). In the category 50000-99990 euro, the number of vegetable farms mostly increased in the regions Vest, and Sud-Est, followed by the regions Nord-Vest, Centre and North-East, while the number of farms decreased in the regions Sud-Est, Bucharest-Ilfov and South West Oltenia.

The average number of farms throughout the investigated period was the highest in the region South East. In the category 100000-249000 euro, smaller increases in the number of farms were noticed, while the number of farms decreased in the regions Vest, Bucharest-Ilfov; the highest average number of farms was found in the region. In the category 250000-500000 euro, the variation is very low or the number of farms decreased, e.g. in the regions West, South-West and North-West. The highest average number of farms can be noticed in the region South-East. In the category over 500000 euro, no changes were noticed in four regions, the number of farms decreased in 3 regions and an increase was noticed only in the region North-East. The highest average number of farms was noticed in the region South-East.

Table 2. Number of farms by size classes according to standard output across regions
-continued-

Farms no	less then 2000 euro		2000-3999 euro		4000-7999 euro		8000-14999 euro		15000-24900 euro	
	Variation	Mean	Variation	Mean	Variation 2	Mean	Variation	Mean	Variation	Mean
Romania	43%	2920	53%	878	12%	388	-16%	168	-26%	143
North-Wes	17%	403	75%	100	**50%**	25	0%	8	0%	8
Centre	-3%	303	25%	88	33%	33	0%	5	0%	0
North-East	37%	375	-27%	83	33%	40	0%	15	100%	15
South-East	11%	560	**72%**	263	21%	168	0%	73	-29%	55
South - Mu	**141%**	488	**100%**	105	-17%	60	0%	40	-50%	48
Bucharest	-50%	37,5	-50%	13	-100%	5	0%	3	-100%	3
South-Wes	**265%**	420	-14%	135	50%	25	-100%	3	0%	8
West	21%	340	**250%**	98	-33%	30	-67%	18	0%	10

Source: calculations based on Eurostat data, 2018

Table 3. Number of hectares cultivated with vegetables by size classes according to standard output across regions

hectars	less then 2000 euro		2000-3999 euro		4000-7999 euro		8000-14999 euro		15000-24900 euro	
	Variation	Mean	Variation	Mean	Variation 2	Mean	Variation	Mean	Variation	Mean
Romania	-73%	12593	-69%	15850	-70%	25343	-45%	19540	-5%	10485
North-Wes	-66%	1985	-57%	1862,5	-57%	2658	-40%	1835	-33%	1165
Centre	-72%	1260	-63%	1070	-66%	1175	-48%	788	48%	478
North-East	-84%	1898	-87%	3045	-84%	4428	-65%	3458	-69%	1860
South-East	-77%	1623	-66%	2220	-72%	4755	-67%	3743	-30%	2153
South - Mu	-76%	2903	-69%	3315	-79%	5640	-39%	3838	53%	1940
Bucharest	-80%	318	-67%	440	-79%	745	-79%	595	-48%	433
South-Wes	-54%	1460	-66%	2562,5	-46%	3890	25%	3485	102%	1683
West	-69%	1145	-57%	1327,5	-47%	2058	-13%	1800	93%	770

Source: calculations based on Eurostat data, 2018

The number of hectares under vegetables by regions significantly decreased in all categories up to the category 8000-149999 euro inclusively. In the category 15000-24900 euro, the number of hectares cultivated with vegetables increased in the regions West, South-West, South-Muntenia and Centre, the highest share of areas under vegetables being noticed in the region Sud-Est. In the category 15000-24900 euro, the number of hectares increased in the regions Vest, South-West, South-Muntenia and Centre and decreased in the regions North-West, North-East and South-East and Bucharest -Ilfov. The largest areas are found in the region South-East.

Table 4 . Number of hectares cultivated with vegetables by size classes according to standard output across regions
-continued-

hectars	less then 2000 euro		2000-3999 euro		4000-7999 euro		8000-14999 euro		15000-24900 euro	
	Variation	Mean	Variation	Mean	Variation 2	Mean	Variation	Mean	Variation	Mean
Romania	-18%	8308	-3%	4418	-26%	3760	-64%	3545	-67%	8845
North-Wes	-34%	1095	**23%**	483	**114%**	202,5	-38%	68	0%	50
Centre	-77%	688	-61%	368	91%	190	0%	18	0%	0
North-East	-61%	1485	-75%	535	-65%	445	-54%	260	-75%	313
South-East	-37%	1860	17%	1625	-28%	1927,5	-56%	1818	-57%	**4133**
South - Mu	**208%**	1215	**248%**	503	-31%	490	-60%	818	-81%	3115
Bucharest	-85%	145	-92%	48	-100%	22,5	0%	25	-100%	53
South-Wes	**655%**	1160	-11%	498	-37%	292,5	-100%	35	-51%	355
West	46%	658	**133%**	358	-40%	177,5	-100%	340	-51%	343

Source: calculations based on NIS data, Tempo on line

In the category 25000-49900 euro, the areas increased in the regions West, South-West and South-Muntenia, while the areas decreased in all the other regions. The largest number of hectares is found in the region Sud-Est. In the category 50000-99990 euro, the number of hectares under vegetables increased in three regions (West, South-Muntenia and North-East). The largest areas in this category are also found in the region South-East (1625 ha). In the category 100000-249000 euro, the number of cultivated hectares decreased in all regions except for the regions North-West and Centre. In all the other categories the average number of hectares decreased, the highest average number of hectares cultivated with vegetables being found in the category over 5000000 euro in the region South-East.

CONCLUSIONS

The analysis of the areas cultivated with vegetables per farm by farm standard output practically reveals the farm size in terms of standard output and their economic power. The number of farms records the largest share in the category 2000 euro and 4000 euros showing a weak potential for increased productivity and economic growth.

As regards the number of hectares cultivated with vegetables by regions, this decreased significantly in all categories up to the category 8000-149999 euro inclusively. In the category 15000-24900 euro, the number of hectares cultivated with vegetables increased in the regions West, South-West, South-Muntenia and Centre, the highest share of areas cultivated with vegetables being found in the region South-East. The evolution of farms by standard output indicates highest volatility in tomatoes, mainly in the regions North-East and Bucharest-Ilfov.

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THE INFLUENCE OF GRAPES PRODUCTION AND CONSUMPTION ON THE PRICE IN ROMANIA

NICA MARIA[1]

Abstract: *In this paper, it is desirable to determine the influence of production and consumption of grapes on the price in Romania. In order to determine this influence, the areas cultivated with grapes, the production of grapes, as well as their consumption in the last years, will be analyzed. With the help of the National Institute of Statistics website data on average grape prices, annual price differences as well as the difference between the price of table grapes and the price of wine grapes can be ascertained. With this data as well as the correlation coefficient, it will be possible to determine the influence of the production and consumption of grapes on the price of this food.*

Keywords: *production, consumption, grape prices, table grapes, wine grapes*

JEL classification: *Q11*

INTRODUCTION

Grapes are wonderful fruits, meant to be sweet, succulent and refreshing. Full of vitamins and minerals, grapes come in different sizes, colors and types and have enjoyed the whole world for centuries. Grapes are known for their versatility and are used to make juice and wine. They can also be dried and eaten as raisins.

Grapes occupy a predominant position in world fruit production, accounting for about 16% of world fruit production. Total grape production is estimated to be about 68.9 million tons.

The costs of viticulture may vary significantly in a region due to differences in cost for land, labor, equipment and materials, and the costs will also be affected by the type of vineyard, grape variety, vineyard spacing, training, pest struggle, and other cultural practices.

Knowing the costs is not enough to make a decision regarding the production of grapes, the potential and profitability of the vineyard must also be taken into account, the profitability of which is directly related to grape prices. The price of grapes is not only a function of the current market, but it reflects the cultivator's ability to market grapes. (Bordelon, 2010).

In grape production, income or return on investment does not start until the fourth year, however, a cultivator has to wait six years for the living to be mature to produce a full yield. The price a grower receives for the grapes he produces is a both quantitative and qualitative function. The total quantity is represented by the tons of grapes harvested and the quality is represented by the sugar content in the grapes. (Kittilsen, 2008)

Today, fresh grapes are consumed worldwide at 24.1 million tons. China is the largest consumer with over 5 million tons of consumption, followed by India and the United States, with consumption of 2.09 million and 1.21 million tons respectively.

In recent years, there has been a significant increase in fresh grape consumption due to the general tendency towards a healthy diet, increasingly rich in vegetable resources. (Cucu, 2017).

The importance of vine cultivation is a special one because it is one of the oldest plants cultivated by humans and unlike other species, it is an adaptable and drought-resistant plant. Grapes are also important because of sugar, organic acids, mineral salts, vitamins necessary for human life, but also for treating many internal and external diseases or for their use in cosmetics. (Iarovoi, 2010).

MATERIAL AND METHOD

Regarding the grape market in Romania, the data on this will be analyzed, using the website of the National Institute of Statistics, and will analyze the total production of table grapes,

[1] PhD Student Nica Maria – The Bucharest University of Economic Studies, email: nicamaria93@yahoo.com

wine grapes, average grape production, consumption and foreign trade of Romania with this food product, but also the average prices of table grapes and wines for the period 2010-2016.

These data will also be analyzed from the point of view of the correlation and the link between them, using the correlation coefficient, which is determined as follows:

$$r_{xy} = \frac{\sum(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum(x_i-\bar{x})^2\sum(y_i-\bar{y})^2}}$$

RESULTS AND DISCUSSIONS

In order to analyze the grape market in Romania, the evolution of the vines by vineyards, the evolution of the total grape production, the evolution of the average grape production, the evolution of the average annual and total consumption, the average evolution of the table grape prices, as well as of the of wine. This market analysis was carried out for the period 2010-2016 due to the availability of data on the price of grapes, the data being taken over from the National Institute of Statistics.

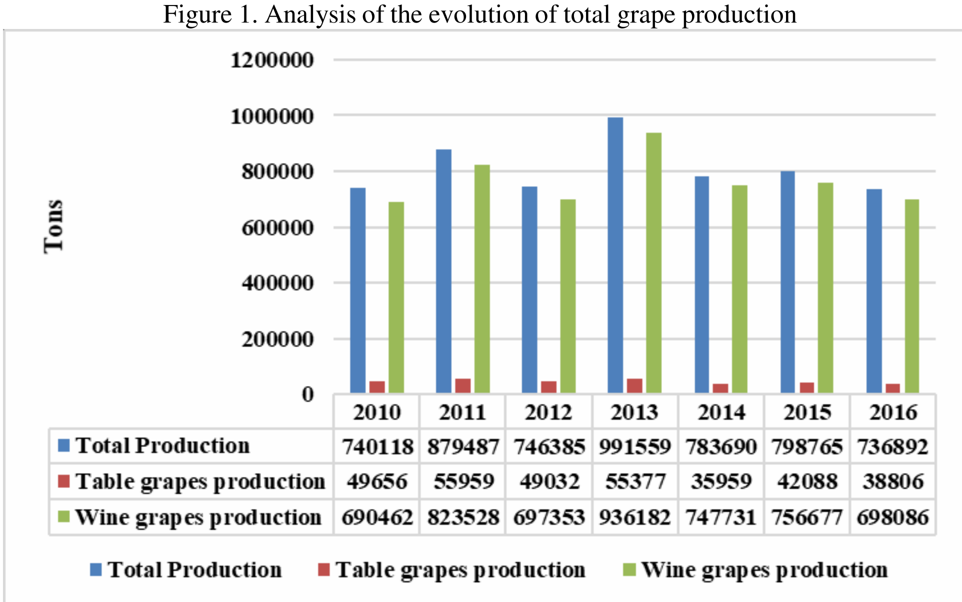
Table 1. Analysis of the evolution of the vineyards on the fruit

The surface of the vineyards on the fruit (ha)	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Total	176991	176616	178654	178378	176675	178118	178151
Table grapes	9571	8452	8700	8050	7183	6786	6918
Wine grapes	167420	168164	169954	170328	169492	171332	171233

Source: http://statistici.insse.ro/shop/

Regarding the areas under vines, during the analyzed period we can see that there was a relatively constant increase, with an average annual growth rate of 0.11%. Areas cultivated with wine grapes are much larger than those grown with table grapes, being 24.75 times more massive than in 2016 table grapes. The areas cultivated with table grapes registered significant decreases, in 2016 the area cultivated with table grapes was 27.72% lower than the surface cultivated with table grapes in 2010, but the surfaces cultivated with wine grapes registered relative increases constantly, being grown in 2016 by 2.28% more than in 2010.

Figure 1. Analysis of the evolution of total grape production

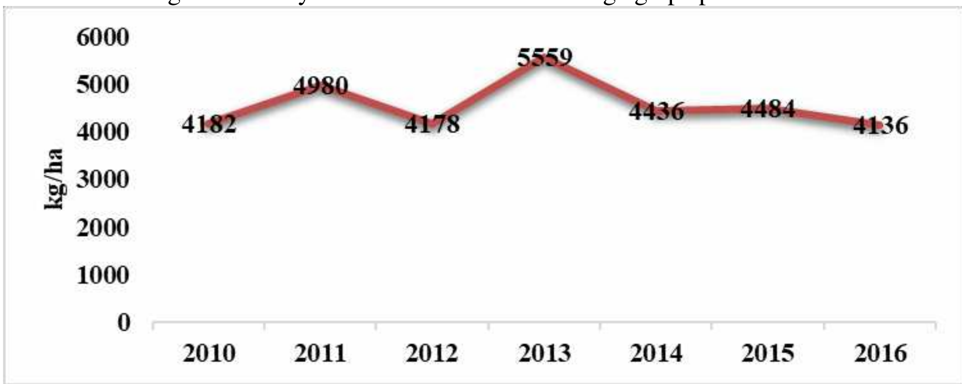


	2010	2011	2012	2013	2014	2015	2016
Total Production	740118	879487	746385	991559	783690	798765	736892
Table grapes production	49656	55959	49032	55377	35959	42088	38806
Wine grapes production	690462	823528	697353	936182	747731	756677	698086

Source: http://statistici.insse.ro/shop/

As we can see in the figure above, the evolution of total grape production was oscillating, in 2013 the largest grape production was about 991559 tonnes, and in 2016 the smallest grape production was recorded at about 736892 tons. By comparing the total grape production from 2010 to 2016, it fell by 0.44%, with a negative growth rate of 0.0727% in the period 2010-2016. The production of table grapes registered a negative growth rate in the analyzed period of 4.0257%, and the production of wine grapes registered an average growth rate of 0.1831%.

Figure 2. Analysis of the evolution of average grape production



Source: http://statistici.insse.ro/shop/

The largest average grape production recorded in the analyzed period, as can be seen in the figure above, is in 2013, respectively 5559 kilograms per ha. of grape, and the lowest average grape production was recorded in 2012 , respectively 4178 kg / ha of grapes.

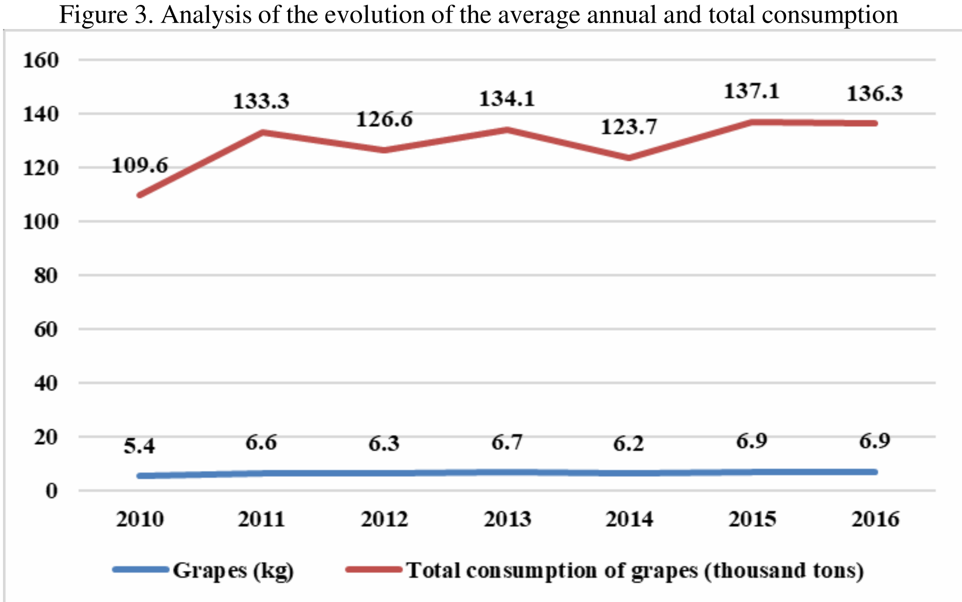
By comparing the average production of grapes in 2010 to that of 2016, it fell by 1.08%, with a negative growth rate of 0.18152% in the period 2010-2016.

The evolution of the total consumption of grapes is oscillating in the period 2010-2016, the highest consumption of grapes was recorded in 2015, ie 137.1 thousand tons, and the lowest consumption registered in 2010, respectively 109.6 thousand tons In the year 2010.

Comparing the 2010 consumption with the 2016 consumption, it increased by 24.41% and the average annual growth rate in the analyzed period was 3.71%. Average consumption of grapes during the analyzed period was 128.7 thousand tons.

Realizing the share of total grape consumption in total production, we can see its proportions. The share of total grape consumption in production oscillated between 13.53% (in 2013) and 18.5% (in 2016).

Figure 3. Analysis of the evolution of the average annual and total consumption



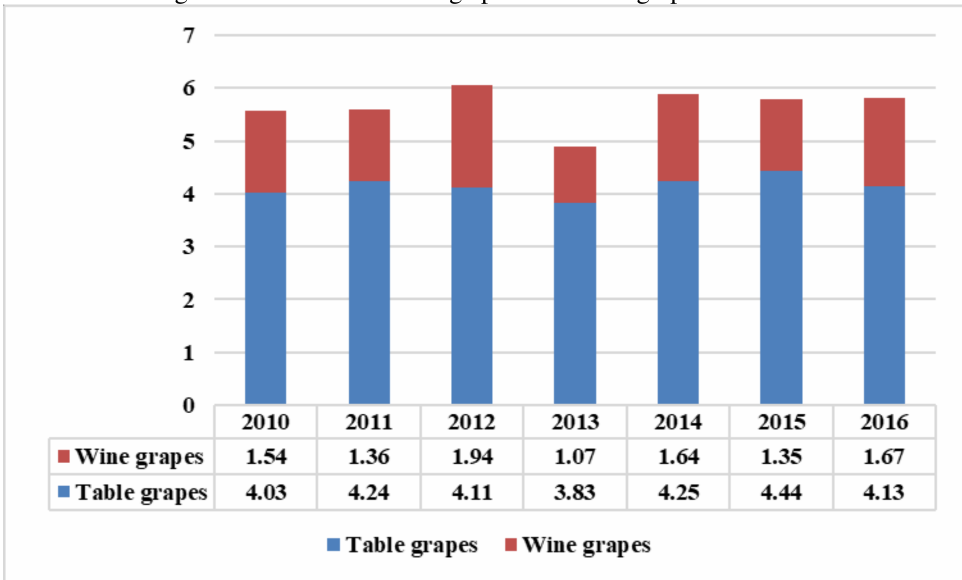
Source: http://statistici.insse.ro/shop/

The average annual consumption of grapes registered an increasing trend during the analyzed period, with an average growth rate of 4.17%. The average of this consumption was 6.4

kilograms of grapes per capita. In 2016, compared to the reference year, 2010, consumption increased by 27.78%.

As for grape prices, as can be seen in Figure 4, table grapes have a price 2 times higher than the price of grapes.

Figure 4. Evolution of average prices of table grapes and wine



Source: http://statistici.insse.ro/shop/

The wine grapes registered the lowest price in 2013, namely 1.07 lei, because this year saw the largest grape wine production in the analyzed period, namely 936182 tonnes, and the highest recorded wine grape price is 1.67 lei in 2016. The prices of wine grapes are much lower than the prices of table grapes because the grapes are purchased in much larger quantities and at acceptable prices because the wine in turn has a reasonable price, and volume.

Table grapes registered the lowest price also in 2013, namely 3.83 lei, although the largest production of table grapes was recorded in 2011, namely 55959 tonnes, this production being very close to that of 2013, respectively 55377 tons, and the highest recorded price of grapes was in 2015, respectively 4.44 lei.

In order to be able to determine precisely the technical factors (the cultivated area and the production obtained) and the socio-economical (consumption) that most influence the price, the coefficient of correlation between these variables was calculated and analyzed.

Table 2 Determination of the types of links between technical indicators and the price of grapes

Correlation coefficient	Total area	Table Grapes Surface	Wine Grapes Surfac e	Productio n	Production of table grapes	Production of wine grapes	Consumption
The price of table grapes	-0.26	**-0.51**	x	-0.42	**-0.51**	x	0.25
The price of wine grapes	0.09	x	-0.02	**-0.84**	x	**-0.85**	-0.32

Source: own calculations based on INS data

As can be seen from Table 2, both the price of table grapes and of grape for wine, with the total area of grapes, table grapes, and wine, correlated with the production , the total, the table grapes and the wine, but also the consumption.

The price of table grapes is influenced by both the cultivated area and the production, but, as expected, those of table grapes. Both the surface and the production influence the inversely proportional price, being in a medium intensity relationship, both having coefficients of -0.51. As the surface and production increase, the price of table grapes decreases, as is economically natural, increasing the offer for this product.

Regarding the price of grapes for wine, it is similarly influenced by the price of table grapes, namely the price of grapes for wine is influenced inversely by the surface and production of wine grapes, but the connection is stronger, being the two coefficients - 0.84 and -0.85. Similarly, the higher the cultivated area and the production (the offer), the lower the price of grapes for wine.

CONCLUSIONS

In the present paper we wanted to discover the influence of grape production and consumption on the market price. In the analysis, reference was made to both table grapes and wine grapes. The first part of the paper analyzed the grape offer, analyzing the cultivated areas and the production obtained from them. Both grape and wine grape varieties oscillated during the analyzed period, generally having a slight downward trend, even though the total cultivated area increased during the study period. Also in this first part of the analysis, besides the offer, the demand for grapes on the market was also assessed as the average annual consumption. It has seen an increasing trend over the period under review with an average growth rate of 4.17%. The average of this consumption was 6.4 kilograms of grapes per capita.

In the second part of the study, grape prices for both table and wine were analyzed, even if the table was much higher than the latter, the price of grapes recorded a high volatility, and this has to be considered and analyzed, given that the grapes for wine have a share of over 95% in the total surface area and production.

Analyzing the components of demand and supply, ie consumption and cultivated area or production, which one of them influences most the price of grapes on the market, the correlation coefficient was calculated, as it was expected, the price of grapes was influenced more of the market offer differently depending on the category of grapes, so for table grapes representing about 5% of the offer on the grape market, there was a coefficient of -0.51, but it was significant, as the increase of the offer the price decreases, and vice versa, and for the price of grape wine, which represents the majority of the grape market offer, the correlation coefficient was -0.85, which is a close correlation between the grape price and the market offer, but an inversely proportional relationship as was economically natural.

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THE EVOLUTION OF SUNFLOWER CROPS IN ROMANIA IN THE CONTEXT OF THE PRE- AND POST-ACCESSION TO THE EUROPEAN UNION

CHIRIAC ANDREEA-RALUCA[1], STELICA CRISTEA[2], POPESCU MIHAI[3], RÎȘNOVEANU LUXIȚA[4]

Abstract: *The agricultural sector holds a major place in the Romanian economy, with an important contribution to Gross Domestic Product (GDP), Romania being an important pawn over oilseeds market because it produces a significant quantity of sunflower for export. The main purpose of the paper is to study the dynamics of sunflower cultivated area, the registered productions, the average yield per hectare, prices, import and export, all of these in the context of the pre- and post-accession to the European Union.The statistical data have been processed based on fixed indices and average annual growth rate. Oilseeds cultivated area has continuously increased in the analyzed period from 654,7 thousand ha in 1990 to 1.629,5 thousand ha in 2016. In the same year, sunflower cultivated area reached 1.039,8 thousand ha, being by 263,44% higher than in 1990 and 124,4% than 2007, after the post-accession to the European Union. Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons) has been determined based on the achievements in 2007 and annual growth rate calculated for the period 2008-2016 whose values have been the following ones: for cultivated area: 2,82%; for yield: 16,42%; for production: 15,77%. Sunflower prices reflected a large variation from a year to another, but mainly a continuous increase starting from the year 2007. The increased price is justified by demand/offer ratio and by the increased demand of oilseeds in the internal and external markets.*

Keywords: *production, cultivated area, fixed basis index, average annual growth rate, price*

JEL Classification: *Q17*

INTRODUCTION

Romania is the 7th largest country in the European Union (EU) in terms of population and the 2nd largest in Central and Eastern Europe (CEE) after Poland. It equals the population of the Czech Republic and Hungary combined, making it one of the largest consumer markets in Europe and an attractive manufacturing and outsourcing hub. As EU member since 2007 and a NATO member since 2004, Romania is currently one of the most dynamic large markets in Europe.

Agriculture is an important economic sector assuring food for population, raw materials for processing industry and agro-food products for export. Its contribution to GDP is 5.6%. It registered a continuous development in the last decade, and its future depends on a modern technical endowment, investments, employment of high qualified persons, a corresponding farm structure able to assure a higher productivity, economic efficiency and competitiveness (8).

The Romanian agricultural competitiveness is a debate full topic in the context of the late sectorial reforms during the country accession and convergence to the EU-28 agricultural model (6).

The agricultural sector holds a major place in the Romanian economy, with an important contribution to Gross Domestic Product (GDP) creation and also a key role in international trade. The importance of agriculture in Romanian economy results from its share in GDP, labour force and rural community's impact (3).

In Romania, the land is cultivated with crops which are competitive on world market: maize, wheat, oil crops and barley. These four categories accounts for almost 80% of arable land and have high competitiveness indices of 7.94, 7.52, 3.51 and, respectively, 9.81. Triticale and

[1] Chiriac Andreea-Raluca, e-mail: chiriac.andreea25@yahoo.com
[2] Cristea Stelica, e-mail: stelicacristea@yahoo.com
[3] Popescu Mihai, e-mail: mihai_popescu@istis.ro
[4] Rîșnoveanu Luxița, e-mail: luxita_risnoveanu@yahoo.co.uk

tobacco are also competitive on world markets, with Balassa indices of 6.65 and, respectively, 4.8, but their shares in arable land are lower 0.87% and, respectively, 0.01. The same products: maize, wheat, oilseeds and barley account for significant shares in agro-food exports: wheat holds the main share of 19%, followed by oilseeds, with 15%, and maize with 14.3% (6).

Romania is the EU's leading sunflower producer. MY (marketing year) 2017/18 total oilseed area planted reached nearly 2 million hectares (ha), a 15% increase over last year. Post expects total oilseed output at almost 5.0 million metric tons (MMT), up by 21% over last season. Precipitation levels improved soil moisture throughout the country and created excellent conditions for germination and spring development. Farmers throughout Romania reported this year's sunflower crop to be exceptionally good, although some farmers in south eastern and western regions reported 10-25% yield losses from last year. Nevertheless, Romanian sunflower production improved in volume and quality over the previous year (14).

Romania is an important pawn over oilseeds market because it produces a significant quantity of sunflower for export. One of the main risk factors in obtaining sunflower crop with stable production is the appearance and evolution of the broomrape.

In Romania, more than 60% of the sunflower cultivated area is infested with broomrape. There are three important areas, as the presence of the broomrape races and infestation degree, situated in Brăila, Constanța and Tulcea locations. The three more spread broomrape populations in the largest area cultivated with sunflower, are very different regarding the virulence and dissemination of the parasite The race G was definitely found in Tulcea and Constanța counties in Romania and latest surveys showed possible appearance of even more virulent race (7).

As (Pricop, Cristea, 2011) the race identification must be a continuous process to support farmers, by recommending sunflower hybrids based on the information concerning the parasite spread and virulence throughout the territory. The identification of the parasite physiological races also supports breeders to develop strategy for improvement programs (9).

Romania's foreign trade with vegetable oils and fats has been developing rapidly during the last 10 years and mainly after the country entry into the EU. In 2007, Romania's export with vegetable oils and fats counted for Euro million 55 being by 10% higher compared to 2006. Also, Romania's import reached Euro mil 108, being 5.4 times higher than in 2006 (12).

Sunflower, rape and soybean are the major oilseeds crops in Romania because of their importance for human food, animal feed and industry. Their high fat content (sunflower 50%, rape 34 % and soybean 20%) make them useful for oil and bio fuel industry. Sunflower main products are represented by refined oil used in human consumption and food industry (margarine, canned products, soap, lecitine, etc.), high protein meals destined to animal feeding, artificial fibres and plastics produced by textile industry, the whole plant utilized in building industry (4, 11).

MATERIALS AND METHODS

The purpose of this paper consisted of the research, analysis and interpretation of the statistical data provided by the National Institute of statistics in Romania, on the surfaces cultivated with sunflower, the registered productions, the average yield per hectare, prices, import and export, in the context of the pre- and post-accession of Romania to the European Union.

The main indicators used in this analysis have been processed using the usual statistical methods such as: fixed basis index, average and average annual growth rate, as presented in the formulas given below (5):

Fixed Basis Index (FBI): $FBI = \frac{X_n}{X_0} x100$;

Average (A): $A = \frac{X_1 + X_2 + X_3 + ...Xn}{n}$.

Average annual growth rate (%): $R = \left(\sqrt[N-1]{\frac{X_n}{X_0}} - 1 \right) \times 100$.

RESULTS AND DISCUSSIONS

Romania is a traditional agricultural country and plays a unique and important part in European agriculture. The soil is fertile and the climate is favourable for agriculture, animal husbandry and horticulture. With a total area of 238,000 sqm, Romania is one of the countries of the most pronounced agrarian profile in the European Union. Having about 15 million ha of farmland, of which more than 9 million ha devoted to arable crops, Romania owns almost 1/3rd of the total agricultural land in the EU (33,5% of all EU farms - EU Commission updates, April 2017)(15). Thus Romania could be (after Poland with 17 million ha of agricultural area) the second largest producer of agricultural products in the CEE region. It is known that agriculture has been and continues to be a sector of prime importance in Romania and at the same time, the sector's contribution to the economy and share of employment, play a significant role in the overall Romanian economy (13).

Table 1. Oilseeds cultivated area structure, 1990-2016 (thousand ha)

	1990	1995	2000	2005	2006	2007	2008	2009
Oilseeds cultivated - total	654,7	806,8	1.067,4	1.205,5	1.297,6	1.340,4	1.239,4	1.253,8
Sunflower	394,7	714,5	876,8	971,0	991,4	835,9	813,9	790,0

	2010	2011	2012	2013	2014	2015	2016
Oilseeds cultivated - total	1.409,7	1.472,5	1.261,1	1.426,9	1.496,5	1.514,7	1.629,5
Sunflower	790,8	995,0	1067,0	1074,6	1001,0	1011,5	1039,8

Oilseeds cultivated - total	**2016/1990%**	248,89
Sunflower		263,44
Oilseeds cultivated - total	**2016/2000%**	152,66
Sunflower		118,59
Oilseeds cultivated - total	**2016/2007%**	121,57
Sunflower		124,40

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

Oil seeds cultivated area has continuously increased in the analyzed period from 654,7 thousand ha in 1990, 1.067,4 in 2000, 1.340,4 in 2007 to 1.629,5 thousand ha in 2016. In the same year, sunflower cultivated area reached 1.039,8 thousand ha, being by 263,44% higher than in 1990, 118,59 than 2000 and also, 124,4% than 2007, after the post-accession to the European Union. In 2016, the weight of sunflower in oilseeds cultivated area represented 63,81% in comparison with 60,29% in 1990, 82,14% in 2000 and 63,7% in 2007 (Table 1).

Table 2. Share of sunflower crops in Romania's cultivated area, 1990-2016 (%)

	1990	1995	2000	2005	2006	2007	2008	2009
Cultivated area (ha)	9.402,1	8.224,6	8.499,8	8.467,9	7.884,0	7.777,0	7.798,1	7.884,1
Sunflower	4,20	7,75	10,32	11,47	12,58	10,75	10,44	10,02

	2010	2011	2012	2013	2014	2015	2016

Cultivated area (ha)	7.807,4	8.081,6	8.058,3	8.166,8	8.232,4	8.265,4	8.409,2
Sunflower	10,13	12,32	13,25	13,16	12,16	12,24	12,37

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

In 2016, sunflower cultivated area reached 1.039,8 thousand ha representing 12,37% of Romania's cultivated area compared to 4,20% in 1990, 10,32% in 2000, 10,75% in 2007 (Table 2.). Cultivated surface with sunflower has continuously increased because of the importance of its seeds for oil production in a country where sunflower oil is still in the top position in human consumption.

Table 3. Yield (kg/ha) and total sunflower production (thousand tons), Romania, 1990-2016

	1990	**1995**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**
Yield (kg/ha)	1.409,0	1.304,0	821,0	1.381,0	1.540,0	654,0	1.437,0	1433,0
Total production (thousand tons)	556,2	932,9	720,9	1.340,9	1.526,2	546,9	1.169,9	1.098,0
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	
Yield (kg/ha)	1.597,0	1.798,0	1.310,0	1.993,0	2.187,0	1.765,0	1.955,0	
Total production (thousand tons)	1.262,9	1.789,3	1.398,2	2.142,1	2.189,3	1.785,8	2.032,3	
Yield (kg/ha)		**2016/1990%**			138,75			
Total production (thousand tons)					365,39			
Yield (kg/ha)		**2016/2000%**			238,13			
Total production (thousand tons)					281,92			
Yield (kg/ha)		**2016/2007%**			298,93			
Total production (thousand tons)					371,61			

Source: Romania's National Institute for Statistics Report, 2016 (10) . Own calculations

Sunflower yield in 2016, registered the lowest gain, only 138,75% reflecting a relatively constant performance per surface unit compare to 1999 and 298,93% compare to 2007. However, sunflower yield was directly influenced by climate conditions. The climate change has resulted in different yield levels. The most serious droughts have been noticed in the years 2000 and 2007 when sunflower production per hectare was the lowest one (12).

Table 4. Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons), during the post-accession of Romania to the European Union

Sunflower	**Achieved 2007**	**Annual average growth rate (%)**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Cultivated area (thou. ha)	835,9	2,82	813,9	790,0	790,8	995,0	1067,0	1074,6	1001,0	1011,5	1039,8
Yield (kg/ha)	654	16,42	1437	1433	1597	1798	1310	1993	2187	1765	1955
Production (thou. tons)	546,9	15,77	1169,9	1098	1262,9	1789,3	1398,2	2142,1	2189,3	1785,8	2032,3

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons) has been determined based on the achievements in 2007 and annual growth rate calculated for the period 2008-2016 whose values have been the following ones: (a*) for cultivated area*: 2,82%; (b) *for yield:* 16,42%; (c) *for production: 15,77%.*

In Table 5. it is presented the evolution of Romania's sunflower imports, during 2007-2016. The quantitative import of sunflower varied between 66,6 and 197,2 thousand tons, and the value one oscillated between EUR millions 32,5 and 138,4.

Table 5. Evolution of Romania's sunflower imports, during 2007-2016

	2007		2008		2009		2010		2011	
Sunflower	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)
	66,6	32,5	89,5	52,2	141,0	72,9	208,2	109,7	237,3	142,6
	2012		2013		2014		2015		2016	
	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)
	131,2	108,9	93,3	101,3	118,9	99,2	189,2	127,7	197,2	138,5

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

As (Arghiroiu, Cristea, 2015), Romania was a net importing country of agricultural products. In 2013 the total trade balance has become a surplus. However, we can say that Romania has become conjectural self-sufficient, because we are surplus to only 5 of the 24 groups of agro-food products. We know a positive balance for cereals, oil seeds and oleaginous fruits, tobacco, live animals, products with raw material nature, and for the remaining agro-food groups we import massive, especially meat, sugars and sugar confectionery, fruits etc. (2).

In the international market, Romania is recognized as a net exporter of oilseeds, oils and meals especially of sunflower origin. Sunflower export has continuously increased, exceeding import and resulting a positive trade balance. In 2020, it is estimated as bio fuels to represent 10 % of all fuel consumed in the EU. Unfortunately, for farmers the subsidy for encouraging energetic crop was available only till 2010 (12).

Table 6. Evolution of Romania's sunflower exports, during 2007-2016

	2007		2008		2009		2010		2011	
Sunflower	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)
	382,6	105,4	471,3	192,2	564,2	146,1	557,4	214,8	1.182,8	508,3
	2012		2013		2014		2015		2016	
	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)	Quantity (thousands tons)	Value (millions EUR)
	652,4	335,6	1.420,1	550,7	1.321,9	452,5	1.099,3	452,2	1.183,7	489,9

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

The exported quantity of sunflower seeds varied between 382,6 and 1.420,1 thousand tons. In terms of value, the year 2013 registered the highest income from sunflower seeds export (550,7 EUR millions). The lowest income from sunflower seeds export was recorded in 2007 (105,3 EUR millions) (Table 6.).

Romania's main trading partners in trade with oilseeds are the EU States members, but also we can observe that we export sunflower in South Africa and Pakistan (1).

Table 7. Average purchasing prices for sunflower, during 2007-2015 (Ron/kg)

Specification	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average (RON/kg) (%)
Sunflower	0,84	1,12	0,86	1,19	1,58	1,84	1,59	1,26	1,5	1,31

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

Sunflower prices presented in Table 6. reflect a large variation from a year to another, but mainly a continuous increase starting from the year 2007. The increased price is justified by demand/offer ratio and by the increased demand of oilseeds in the internal and external markets.

CONCLUSIONS

Oilseeds cultivated area has continuously increased in the analyzed period from 654,7 thousand ha in 1990, 1067,4 thousand ha in 2000, 1340,4 thousand ha in 2007 to 1629,5 thousand ha in 2016. In the same year, sunflower cultivated area reached 1039,8 thousand ha, being by 263,44% higher than in 1990, 118,59 than 2000 and also, 124,4% than 2007, after the post-accession to the European Union.

In 2016, the weight of sunflower in oilseeds cultivated area represented 63,81% in comparison with 60,29% in 1990, 82,14% in 2000 and 63,7% in 2007. In 2016, sunflower cultivated area reached 1039,8 thousand ha representing 12,37% of Romania's cultivated area compared to 4,20% in 1990, 10,32% in 2000, 10,75% in 2007.

Sunflower yield in 2016, registered the lowest gain, only 138,75% reflecting a relatively constant performance per surface unit compare to 1999 and 298,93% compare to 2007.

Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons) has been determined based on the achievements in 2007 and annual growth rate calculated for the period 2008-2016 whose values have been the following ones: (a*) for cultivating area*: 2,82%; (b) *for yield:* 16,42%; (c) *for production: 15,77%.*

The quantitative import of sunflower varied between 66,6 and 197,2 thousand tons, and the value one oscillated between EUR millions 32,5 and 138,4 and the exported quantity varied between 382,6 and 1420,1 thousand tons. In terms of value, the year 2013 registered the highest income from sunflower seeds export (550,7 EUR millions). The lowest income from sunflower seeds export was recorded in 2007 (105,3 EUR millions)

Sunflower prices reflected a large variation from a year to another, but mainly a continuous increase starting from the year 2007. The increased price is justified by demand/offer ratio and by the increased demand of oilseeds in the internal and external markets.

In the coming years Romania will continue to become an important oilseeds producer and exporter in the EU-28.

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STUDY ON THE TOMATO MARKET IN ROMANIA IN 2012-2017

DUMITRU EDUARD ALEXANDRU[1], ȘURCĂ ELENA DANIELA[2]

Summary: *Tomatoes are an important food in the diet of Romanians. The surface, production, sales price, consumption, and the import and export of tomatoes are influenced by a number of factors analysed in this paper. Also, the tomato market, and in general the Romanian vegetable market, presents a difficult situation for which the trade balance with tomatoes shows a significant deficit (about 80 million euros in 2017) and for which a series of measures should be taken to reduce this deficit.*

Keywords: *tomatoes, tomato produce, tomato surfaces*

JEL Classification: *Q10, Q13, Q17*

INTRODUCTION

Given that the population of our country is in a sharp decline and continuous demand of vegetables is on an upward trend due to rising living standards, in conjunction with the disappearance of family farms, which represent u an important source of assurance requirements agricultural products.

Romania benefited from a full range of financial aids, including those for the vegetable sector, both through direct payments and through the possibility of accessing European funds to achieve sector-level investments. However, the investments were not sufficient to ensure the domestic needs of fresh vegetables at the country level, Romania being dependent on imports from countries like the Netherlands, Turkey or Italy.

The problems that vegetable growers complain about relate in particular to the fact that they do not have a safe selling market, and there are periods in which they have failed to sell part of the production, resulting in significant losses.

The areas cultivated with vegetables register a marked decrease from year to year, being replaced by the areas cultivated in protected areas, which have special advantages over the way of cultivation in the field (Table no.1).

Table no. 1. The evolution of the areas cultivated in Romania during the period 2012-2017

Specification	2012	2013	2014	2015	2016	2017	%	Average area
	MU: thousands of ha							
Total area	8058.3	8166.8	8234.4	8265.4	8409.2	8307.3	100	8240.3
Total vegetables grown from which:	258.9	259.0	239.5	239.5	228.1	224.6	2.7	241.6
Vegetables grown in the field	157.6	153.8	136.8	138.9	131.2	128.6	57.3	141.2
Vegetables in solariums and greenhouses	3.3	3.4	4.0	4.0	4.2	4.0	21.1	3.8
Fresh vegetables in family gardens	88.4	93.2	90.0	88.3	86.0	85.6	38.1	88.6

Source: INSE database, access data 27.09.2018;

According to table no. 1. We can see that the total cultivated area has seen an upward trend, except in 2016 when over 8.4 million hectares were cultivated. Regarding the area planted with vegetables from the total arable land, in the year 2017 it has a share of 2,7%, having an area of 224 thousand hectares, decreasing by 13% compared to the area cultivated in 2012 (Table number 1.).

Of the total area planted with vegetables in the year 2017, 57.25% is the area planted with field vegetables, the area continuously decreasing from 2012, when this area was 157 thousand hectares, compared to 128 thousand hectares exploited in 2017 (Table 1).

[1] CS. Eduard Alexandru Dumitru: Research Institute for the Economy of Agriculture and Rural Development;
[2] CS. Elena Daniela Șurcă: Research Institute for the Economy of Agriculture and Rural Development;

Also, the area cultivated in protected areas represents about 21% of the total area cultivated with vegetables, the area growing by about 4% compared to the area cultivated in 2012 (Table 1).

It should be noted that the area planted with fresh vegetables in family gardens still have a significant share of the total area cultivated with vegetables, of 38%, but which is down by 3.2% compared to 2012 (Table 1).

MATERIALS AND METHODS

The research is based on the statistical data collected by the National Institute of Statistics, Eurostat and TradeMap, which will determine the evolutions recorded by the areas, outputs, average outputs, prices, imports and exports using the quantitative and qualitative research methods, and the comparison method.

RESULTS AND DISCUSSIONS

The area cultivated with tomatoes during the analysed period shows a descending trend, so that if in 2012 this was 189 thousand hectares, in 2017 the cultivated area was 177 thousand hectares, decreasing by 6.3% (Table no. 2.).

Table no. 2. The evolution of the area planted with tomatoes in the period 2012-2017 (thousands of hectares)

The country	2012	2013	2014	2015	2016	2017	2017/2012	Average area
Turkey	189,00	189,00	183.00	187,00	181.00	177,00	-6.3	184.3
Italy	91.85	95,19	103.11	107.18	96.78	103.94	13.2	99.7
Spain	48.61	46.62	54.75	58.13	62.72	60.85	25.2	55.3
Romania	29.75	28.07	24.43	24.84	22.71	22,23	-25.3	25.3
Portugal	15.41	15.63	18.46	18.66	20.85	20.87	35.4	18.3

Source: Eurostat database, access data 27.09.2018;

As regards the area under tomatoes, Romania ranks 4th by countries such as Turkey (177,000 hectares), Italy (103,000 hectares) or Spain (60,000 hectares), which cultivate areas significantly larger than Romania, but before Portugal exploiting an area of 20.8 thousand hectares at the level of 2017, by 6.1% lower (Table no. 2).

Table no. 3. Evolution of tomato production in the period 2012-2017 (thousand tons)

The country	2012	2013	2014	2015	2016	2017	2017/2012	Average yield / ha (t / ha)
Turkey	11350.00	11820.00	11850.00	12615.00	12600.00	12750.00	12.3	72.0
Italy	5131.98	5321.25	4498.08	6410.25	5990.52	6437.57	25.4	61.9
Spain	4046.41	3776.80	4888.88	4832.70	5233.54	5184.85	28.1	85.2
Portugal	1394.42	1186.84	1399.54	1407.00	1693.86	1747.63	25.3	83.7
Greece	979.62	1117.56	1132.72	1148.36	1019.88	943.29	-3.7	-
Netherlands	805.00	855,00	900.00	890,00	890,00	910.00	13.0	-
Poland	758.90	761.50	810.60	789.60	866.98	898.01	18.3	-
France	763.48	775.63	786.10	787.88	827.61	771.55	1.1	-
Romania	453.13	509.22	473.86	468.75	425.61	458.18	1.1	22.0

Source: Eurostat database, access data 27.09.2018;

Although Romania is one of the main countries according to the area cultivated with tomatoes, in terms of the production obtained, the situation is changing, with profits going under other countries such as Turkey, Italy, Spain, Portugal or Greece. It should be noted that the evolution of the obtained produces a oscillating trend, thus showing the dependence on weather conditions. Also the average production recorded in year 2017 to 22 t / ha, well below average yields achieved by Turkey (72 t / ha), Italy (61.9 t / ha) and Spain (85.2 t / ha) (Table no. 3).

Table no. 4. The evolution of the area under tomato cultivated in protected areas during the period 2012-2017 (thousands of hectares)

The country	2012	2013	2014	2015	2016	2017	2017/2012	Average area
Turkey	25.00	24.00	23.00	25.00	26.00	28.00	12.0	25.2
Spain	18.48	19.72	21.13	19.41	19.98	18.95	2.5	19.6
Poland	2.20	2.20	3.10	3.10	3.25	3.23	46.8	2.8
Greece	2.80	2.98	3.06	2.82	2.59	2.21	-21.1	2.7
France	1.98	2.11	2.07	2.03	2.21	2.09	5.6	2.1
Serbia	0.00	0.00	0.00	0.00	1.50	1.84	-	0.6
Netherlands	1.69	1.77	1.78	1.76	1.78	1.79	5.9	1.8
Romania	1.40	1.47	1.62	1.65	1.73	1.71	22.1	1.6

Source: Eurostat database, access data 27.09.2018;

Romania has an increase in the area cultivated with tomatoes in protected areas (except in 2016), so that if in 2012 a 1.4 thousand hectares were exploited, in 2017 it was 1.71 thousand hectares, in an increase of 22.1%. Also, the largest area cultivated with tomatoes in protected areas is owned by Turkey in 2017, operating an area of 28,000 hectares, up 12% over the area planted in 2012 (Table no. 4).

Table no. 5. Evolution of tomato production in protected areas during 2012-2017 (thousand tons)

The country	2012	2013	2014	2015	2016	2017	2017/2012	Average annual yield / ha (t/ha)
Turkey	3096.00	3118.00	3203.00	3315.00	3522.00	3796.00	22.6	135.6
Spain	-	-	-	1835.31	2027.86	1846.99	-	97.5
Netherlands	809.00	855,00	900.00	890,00	890,00	910.00	12.5	508.4
Poland	-	-	538.70	553.20	606.59	643.46	-	199.2
France	534.31	567.01	580.10	589.32	625.18	560.36	4.9	268.1
Greece	325.76	365.08	384.19	340.77	319.25	272.61	-16.3	123.4
Belgium	-	249.80	249.25	253.05	259.54	259.69	-	-
Romania	49.57	60.23	75.93	79.41	98.52	100.49	102.7	58.8

Source: Eurostat database, access data 27.09.2018;

Together with the growth of tomato-growing areas, we can see that total production also has an upward trend, so that if in 2012 the production was 49 thousand tons, in 2017 it was over 100 thousand tons, increasing by over 100% (Table no. 5).

It should be noted that the average annual production is much under other countries, being 58.8 t / ha, compared to the average annual production of the Netherlands by 508.4 t / ha or France 268 t / ha (Table no. 5).

Table no. 6. Evolution of the sales price of tomatoes grown in the field during 2012 -2017 (euro / 100 kg)

The country	2012	2013	2014	2015	2016	2017	2017/2012	Average sales price
Malta	66.89	61.55	67.47	96.34	78.22	98.15	46.7	78.1
Czech Republic	82.91	69.59	73.72	87.32	91.07	86.23	4.0	81.8
Italy	72.24	68.17	69.47	81.12	78.70	79.10	9.5	74.8
Slovakia	68.79	66.7	66.48	63.91	68.78	71.31	3.7	67.7
Romania	67.5	53.63	72.24	60.74	68.37	69.82	3.4	65.4
Portugal	68.46	62.05	67.84	72.67	82.22	64.06	-6.4	69.6
Croatia	61.42	46.58	54.06	44.17	58.45	56.44	-8.1	53.5
Hungary	63.66	52.12	59.35	24.23	62.70	53.33	-16.2	52.6
Greece	47.45	45.45	45.33	48.35	45.06	47.32	-0.3	46.5
Poland	30,26	35.82	40.19	43.13	32.63	38.37	26.8	36.7
Bulgaria	32.47	23.94	45.94	23.66	32.27	33.32	2.6	31.9

Source: Eurostat database, access data 27.09.2018;

In 2017, the highest price of tomatoes grown in the field was recorded in Malta, of about 1 euro / kg of tomatoes, up 46.7% compared to 2012. The opposite was Bulgaria, where the price of selling tomatoes grown in the field was 0.33 euro / kg, slightly higher than in 2012 (Table no. 6).

Regarding Romania, it is noted that the evolution of the sale price of tomatoes shows an oscillating trend, with significant variations between 0.53 euro / kg (in 2013) and 0.72 euro / kg (registered in 2014) (Table no. 6).

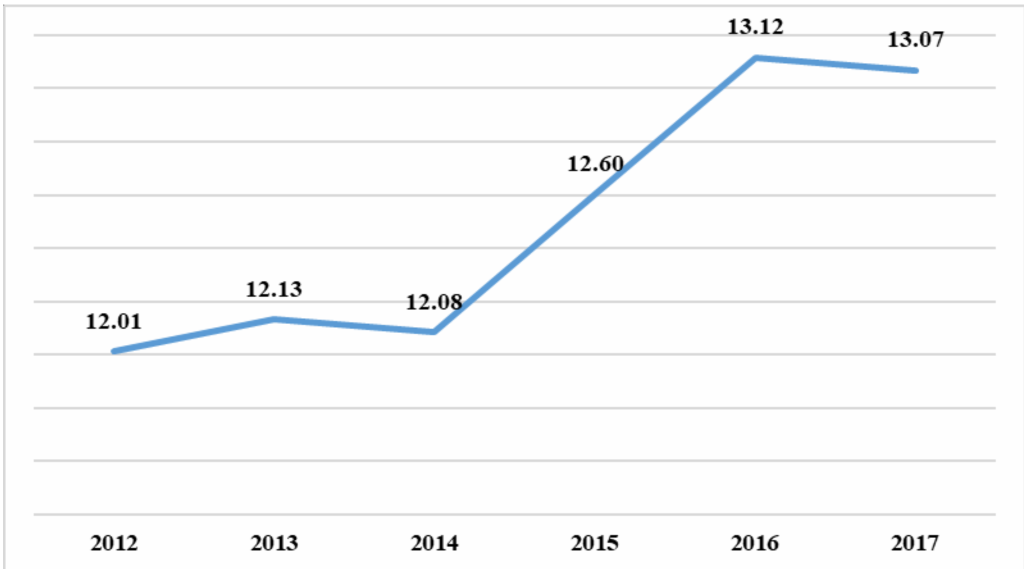
Table no. 7. Evolution of the sale price of tomatoes grown in protected areas during 2012 -2017 (euro / 100 kg)

The country	2012	2013	2014	2015	2016	2017	2017/2012	Average sales price
Finland	173.88	176.6	168.69	168.13	169.33	172.04	-1.1	171.4
Ireland	130	130	140	140.00	140.00	140.00	7.7	136.7
Sweden	128.67	135.7	141.36	143.63	135.94	137.37	6.8	137.1
UK	97,22	69.08	74.85	68.73	60.12	130.15	33.9	83.4
Latvia	114.68	100.96	103.68	128.04	129.64	125.99	9.9	117.2
Denmark	104.59	101.7	107.1	111.41	126.76	112.64	7.7	110.7
Romania	89.48	107.49	96.54	101.23	63.91	94.12	5.2	92.1
Cyprus	57,00	53.60	56.80	56.90	80.20	91,00	59.6	65.9
Austria	76.3	86.38	74.87	88.19	84.65	85.50	12.1	82.6
Lithuania	83.16	68.84	81.30	84.86	77.21	83.93	0.9	79.9
Hungary	75.68	68.37	74.55	77.83	69.58	77.20	2.0	73.9
Croatia	80.97	71.25	79.45	83.52	72,58	72.38	-10.6	76.7
Belgium	74.22	60.2	65.23	66.93	68.56	70.21	-5.4	67.6
Netherlands	66	54.28	60.92	72.55	60.53	65.53	-0.7	63.3
Portugal	55.57	51.11	51.40	60.68	56.92	60.56	9.0	56.0
Bulgaria	43.2	53.05	55.78	53.27	48.38	50.83	17.7	50.8

Source: Eurostat database, access data 27.09.2018;

Concerning the price of tomatoes grown in protected areas, we note that at the level of 2017 the highest price was registered by Finland (1.72 euro / kg). Also, high prices of tomatoes grown in protected areas are particularly common in northern countries. Romania ranks halfway with a sales price of 0.94 euro / kg, up 5.2% over 2012 (Table no. 7).

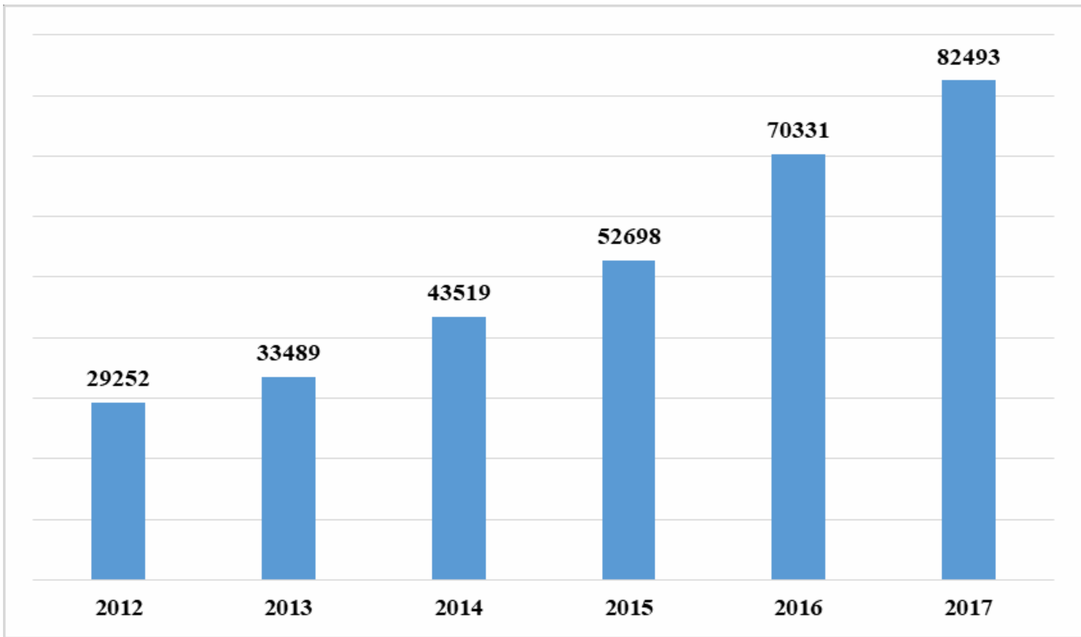
The evolution of the sales price has an oscillating trend, with significant variations between 0.63 euro / kg (in 2016) and 1.07 euro / kg (registered in 2017) (Table no. 7).



Source: INSE database, access data 27.09.2018;

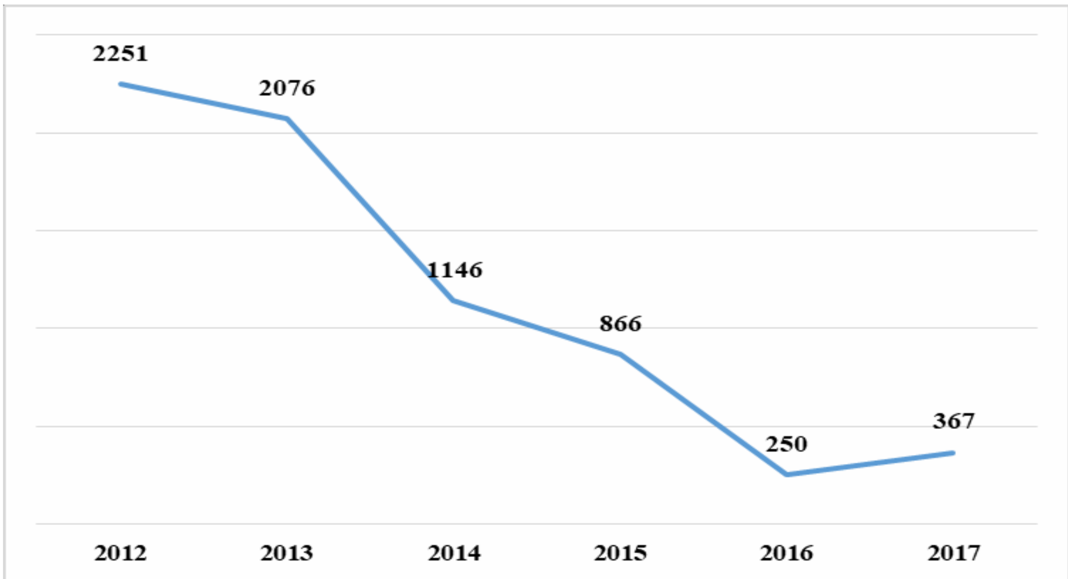
Figure no. 1. Evolution of annual consumption of tomatoes / capita in 2012-2017 (kg / year)

As regards annual consumption of tomatoes per capita, there is a significant increase since 2015, when annual consumption was 12.6 kg / capita, compared to 2014 when it was 12.08 kg / per capita (Figure no. 1).



Source: Trademap database, access data 27.09.2018;
Figure no. 2. Evolution in terms of value of tomato imports in Romania during the period 2012-2017 (thousand euros)

Tomato imports in Romania registered an upward trend, so that if in 2012 their value was 29.2 million euros, in 2017 they exceeded 82.4 million euros. Among the main countries from which Romania imported tomatoes are: Turkey, Germany and the Netherlands (Figure no. 2).



Source: Trademap database, access data 27.09.2018;
Figure no. 3. Developments in terms of value of tomato exports in Romania during 2012-2017 (thousand euros)

As far as tomato exports are concerned, there is a downward trend, so that if in 2012 they were 2.2 million, in 2017 it was only 367 thousand euros, down by about 84% (Figure no. 3).

At the level of 2017, Romania exported to countries like Moldova, Spain or Poland (Figure no. 3).

CONCLUSIONS AND RECOMMENDATIONS

Total crop yields of field tomatoes exhibit significant oscillations, influenced directly by cultivation areas, but also by climatic factors that play a particularly important role in achieving significant production, both quantitatively and qualitatively.

With the growth of tomato-grown areas in protected areas, higher total yields have been achieved, but despite this, the average annual production is well below other states, with the difference being mainly made by the technology used.

It should be noted that although significant amounts of money were allocated in 2017 to support the production of tomatoes in protected areas, this is also not reflected in their sales price, so if in 2016 the selling price was 0, 63 euro / kg, one year later was 0.94 euro / kg, an increase of about 50%. A reason for this increase was due to the weather conditions that affected the infrastructure, thus delaying their production.

Due to the increase in living standards, this is also reflected in the evolution of annual consumption of tomatoes per capita, which is significantly influenced by the fluctuations in the sales price of tomatoes.

Although the production of tomatoes grown in protected area has increased, Romania fails to cover the needs of tomatoes in extra-seasonal periods (especially) and it is necessary to resort to imports from Turkey, Germany or the Netherlands. Also, their lower sales price (due to higher yields) plays an important role in the choice of product by the Romanian consumer.

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STUDY ON THE EVOLUTION OF OLIVE PRICE IN ROMANIA

PETRE IONUȚ LAURENȚIU[1]

Summary: *It is appreciated that the olives in Romania have recorded higher prices, so in this paper it is desirable to analyse exactly the evolution of the prices for the olives, but also the main factors that can influence these changes, such as import prices, the situation of the areas and production in these exporting countries and the correlations between these data. Through the statistical website at European level, Eurostat, it was possible to analyse the price evolutions for olives in the EU member countries, but especially for those from which Romania imports this product. Prices, olive-growing areas in these countries and yields on these areas were analysed. Finally, the relationship between these indicators and the price of olives sold in Romania will be analysed in terms of the intensity of the link.*

Keywords: *olives, price, productions, surfaces, exporters*

JEL Classification: *Q11, Q17*

INTRODUCTION

Although olives are not grown in Romania, because the climate is inadequate for this culture, there is a relatively high consumption of these products, whether we are talking about table olives or about the consumption of olive oil. According to the International Olive Council, in Romania, since the year of its accession to the EU, to date, on average, 22875 tonnes of table olives are consumed annually, which is between 1.1 and 1.2 kilograms per capita, every year. Comparing with other countries, according to the same source, in Romania, more olives are consumed than in Poland, which recorded a consumption in the last year of 10.2 thousand tons, but, surprisingly, the fact that Romania consumes more olives than in Greece, with the latter accounting for an annual consumption of 15,000 tonnes per year. Also in the databases of the International Olive Council, olive oil consumption in Romania is recorded on an average of 3.1 thousand tons annually, being moderate compared to the EU member states.

Thus, the analysis section will only refer to the table olives, its importance due to the high consumption in our country. In the totalitarian period before 1989, there was a phrase in Romania that catalogued this product as the "food of the poor", but now things are not the same, it can be seen that the price level for this product is high and the question of the research is: which factors have influenced this evolution of the price of olives.

The top five producers of table olives on the market in descending order are: Turkey, Spain, Greece, Italy and Portugal. Although Turkey is not yet part of the European Union, it is in the pre-accession period, with official statistical data on the Eurostat website, which can be considered input data, or factors that can influence the evolution of the price for table olives.

Taking into account that this product is not cultivated in Romania, we will analyse data on crops and cultivated areas for countries that have exchange agreements with Romania for this product, namely those that export part of their production to Romania. According to the International Trade Centre, the main exporters of table olives to Romania in recent years are: Greece, Turkey, Egypt, Spain and Italy.

In order to achieve the objective of this research, namely the determination of the olive oil price evolution in Romania, as well as the factors influencing it, the technical and economic situation of the olives sector in these exporting countries, mentioned above, will be analysed.

MATERIAL AND METHOD

To determine the evolution of the table olives price, quantitative and qualitative data will be analysed on the price of olives in the main exporting or producing countries, the cultivated areas

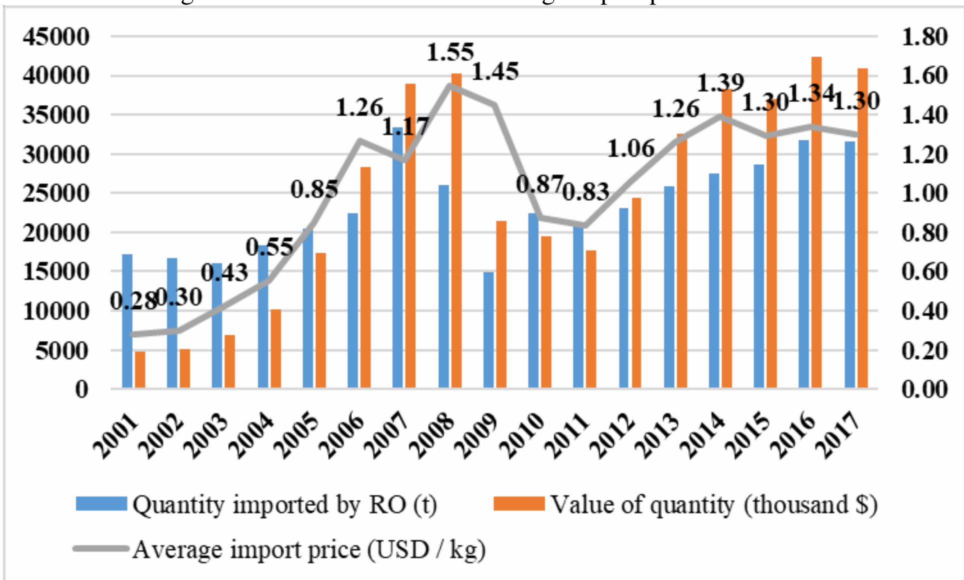
[1] PhD Student Petre Ionut Laurentiu – The Bucharest University of Economic Studies, email: laurpetre15@gmail.com

and the yields obtained in order to determine the existence of factors that can influence this price. European and international databases on olives and areas in the countries concerned will be used. As far as the price in Romania is concerned, it will be determined by reporting the value of imports recorded at the International Trade Centre to the quantity of imported olives registered with the same data source.

RESULTS AND DISCUSSIONS

In order to determine the main factors that can influence the price of olives and their evolution in Romania we must first determine this dynamics. Considering that this product or olives are not produced in Romania, they are not found in the national price databases. In order to determine the evolution of the price, the International Trade Centre database was used from where data could be retrieved with reference to the quantity and value of imported olives by Romania, and the average import price for olives could be determined by reporting these two indicators.

Figure 1. Determination of the average import price of olives



Source: own processing based on www.trademap.org

Figure 1 shows both the evolution of the quantities of olives imported by Romania and the value of these quantities in the period 2001-2017, from which the price of the olives that Romania can buy could be determined.

Regarding the quantity of olives imported by Romania during the analysed period, it can be seen that it has both growth and decrease tendencies, with an oscillating evolution, but an increasing one overall. If in 2001 about 17.1 thousand tonnes were imported in 2017, this quantity almost doubled, increasing by 84%, reaching the level of imports of olives of 31.5 thousand tons. Thus, during the reference period, the imported quantity increased from one year to the next, averaging 3.88%, on average an imported olive oil of 23.4 thousand tons.

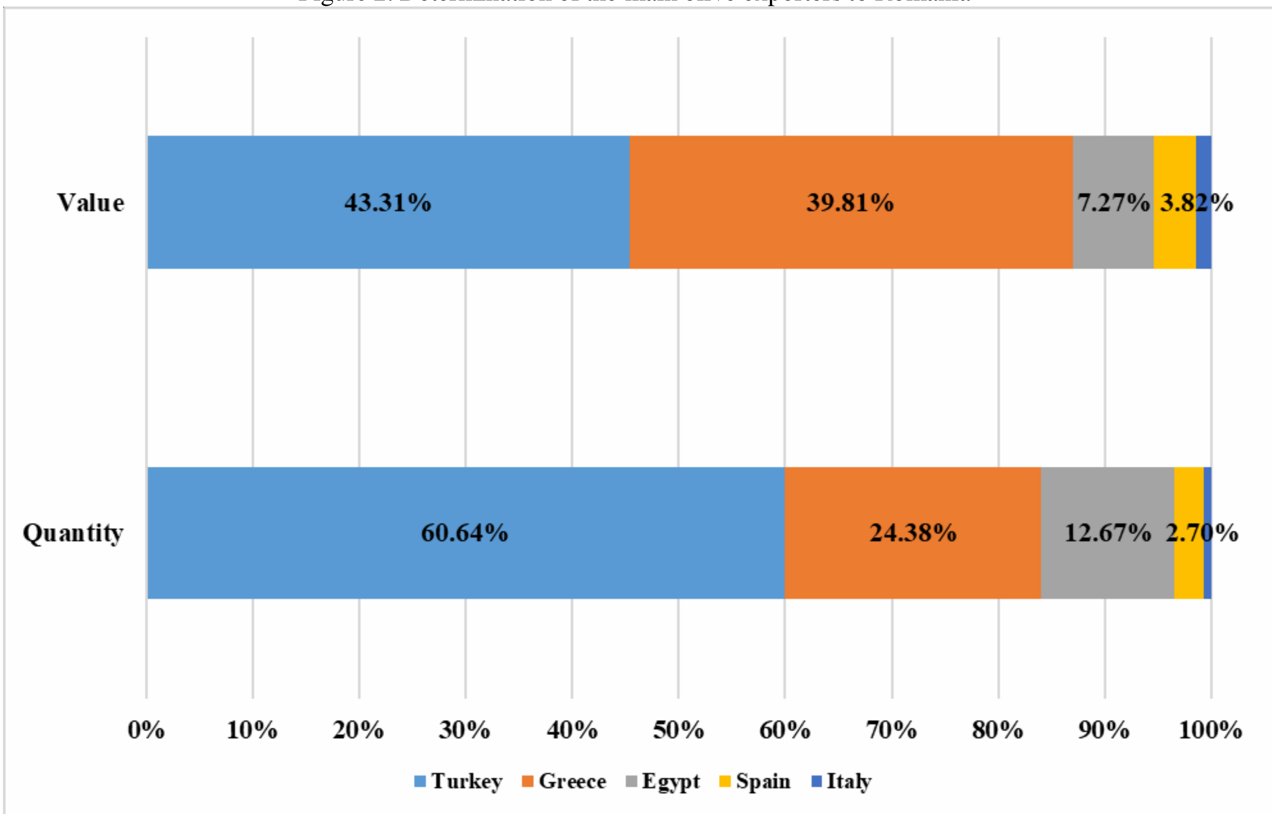
If the volume of olives imported in Romania increased by 84% (or 1.84 times), the value of the olives increased in the analysed period by 8.6 times, thus there is a much higher increase of the value compared to the quantity, which clearly indicates a higher price per unit of product. Continuing the analysis of the value of the olives brought in Romania, it grew annually with an average growth rate of 14.4%, being 10.5 percentage points higher than that of the quantities. On average, during the analysed period, the value of olives imported in Romania for a single year was 25 million dollars.

Regarding the average import price of olives, it can be seen that this trend has been oscillating in the reference period following the evolution of the quantities. Given that Romania is dependent 100% on imports for this product, the price is based on demand, ie the quantity requested. As can be seen when demand increases and the price level is high, and when demand decreases, the price decreases proportionally, a situation easily explained by the economic literature, which is the basis of the demand function. Starting at an average import price of $ 0.28 per kilogram, Romania has imported over the last year under review 4.6 times more expensive, or 1.3 dollars per kilogram, with an average annual rate growth of 10.1%. In 2008, the highest average import price was $ 1.55 per kilo, but achieving an average of the study period resulted in a price of $ 1.01 per kilo of olives.

Thus, it can be seen that the price of olives has increased in Romania in the last 17 years, at a rather high pace, which cannot be just the sign of inflation. This raises questions about the external factors that can influence this price. In order to determine these, we will determine the main countries exporting this product to Romania and the main changes on the olive oil market in these countries in order to correlate these phenomena with the price increase in our country.

Analysing the data from the International Trade Centre, more precisely the structure of the total volume of olives brought in Romania, as well as that of its value, one can distinguish 5 large olives exporting countries to Romania.

Figure 2. Determination of the main olive exporters to Romania



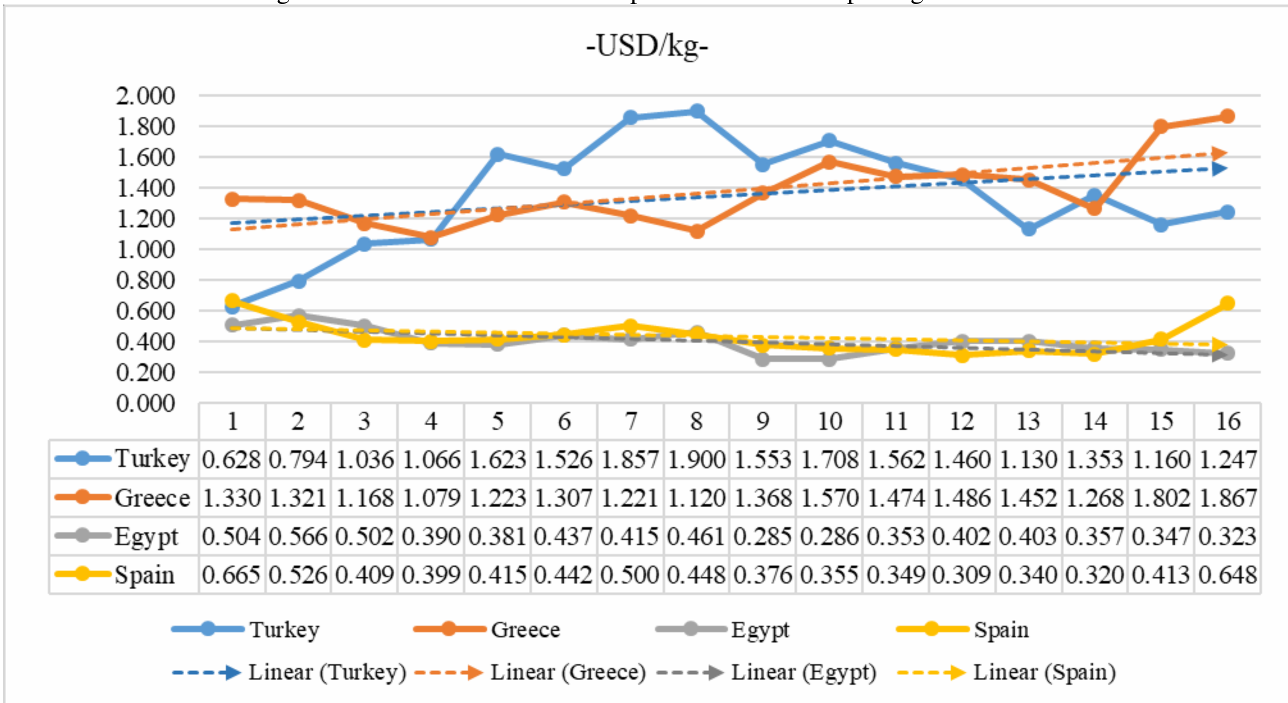
Source: own processing based on www.trademap.org

As can be seen in Figure 2, the countries that export most olives to Romania are determined, both in terms of quantity and value. This structure was made according to the average of the reference years, depending on the years, the ranking may be slightly modified. On average, 60.64% of the olives in Romania come from Turkey, 24.38% from Greece, 12.67% from Egypt, 2.7% from Spain and 0.73% from Italy. Depending on the value of these quantities, the ranking is maintained, with each country occupying the same position, but with different weightings. Thus, for a quantity of more than 60% of the imported one, Turkey has a share of only 43.31%, which leads to a low price for olives of origin. With a smaller share in quantity, Greece has a fairly high share in the value of olives imported in Romania, of 39.81%, which shows a higher price for these olives. Egypt still holds 7.27% of the value, Spain 3.82% and Italy 1.31%.

It is worth mentioning that from 2001 to 2014, Turkey held the largest share of the 5 exporting countries, both in terms of quantity and value, and from 2014 until now Turkey has been overtaken by Greece , currently holding the majority share.

In order to determine possible links between the average import price of olives and the factors that could influence this price, the average selling price of olives in the main exporting countries was analysed.

Figure 3 Determination of olive oil price evolution in exporting countries



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Turkey	0.628	0.794	1.036	1.066	1.623	1.526	1.857	1.900	1.553	1.708	1.562	1.460	1.130	1.353	1.160	1.247
Greece	1.330	1.321	1.168	1.079	1.223	1.307	1.221	1.120	1.368	1.570	1.474	1.486	1.452	1.268	1.802	1.867
Egypt	0.504	0.566	0.502	0.390	0.381	0.437	0.415	0.461	0.285	0.286	0.353	0.402	0.403	0.357	0.347	0.323
Spain	0.665	0.526	0.409	0.399	0.415	0.442	0.500	0.448	0.376	0.355	0.349	0.309	0.340	0.320	0.413	0.648

Source: own processing based on FAOStat and Eurostat

Figure 3 illustrates graphically the evolution of the sales prices of olives in each major exporting country, expressed in dollars per kilogram. An increasing trend can be observed for the two main suppliers of Romania, namely Turkey and Greece. On average, each year, the price of olives grew by 4.67% and 2.28% respectively in these two countries. On average, over the period 2001-2016, the annual price of olives in Turkey was $ 1.35 per kilogram, and in Greece, for this period, the price was $ 1.378 per kilogram.

For the other two exporting countries, namely Egypt and Spain, the price recorded a decreasing trend, with an average annual rate of -2.92% and -0.17%. However, the rather small share of imported quantity and value makes these decreases not to influence the average import price.

There is a significant increase in prices from the first year of the analysis period to the last for the two main suppliers of Romania, so in 2001 in Turkey the price of olives was 0.63 dollars per kilogram and in 2016 it was 1.9 times more, or $ 1.25 per kilogram. Greece's olive oil price has risen steadily over the entire period, 1.4 times, from $ 1.33 per kilo to $ 1.87 per kilo, the highest price for the whole period.

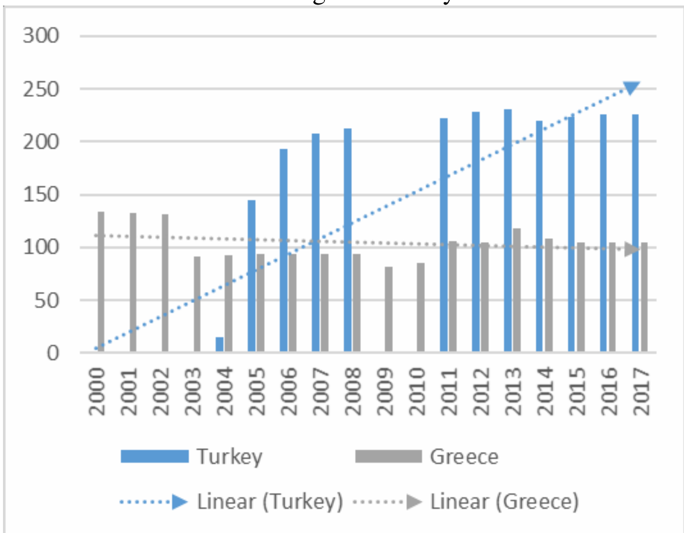
It is worth mentioning that this price is the final one, the selling price, therefore it is higher than the average import price in Romania, which is not the retail price.

Analysing the evolution of these prices and that applied in Romania, an asymmetry can be observed between the evolution of the price in Turkey (the main supplier on average) and the evolution of the import price. Calculation of the correlation coefficient between the average import price and the price in Turkey showed a coefficient of average intensity to the high of 0.644. Between the average import price and the one practiced in Greece there was no significant coefficient of only 0.28. However, between the average import price and the average price of the two exporters (Turkey and Greece), the most closely related correlation was recorded, with a coefficient of 0.724.

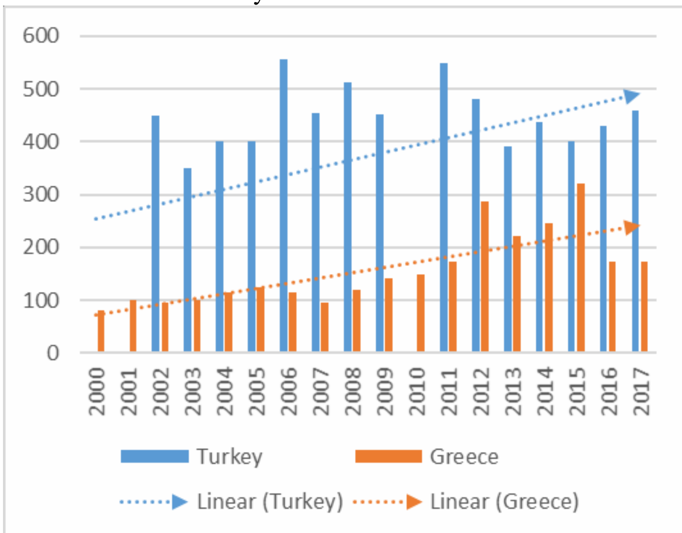
Concluding, it can be said that the price of olives in Romania is influenced, in particular, by that of Turkey, but also that of Greece.

In order to determine the main factors that led to the increase of the olives in Romania, the areas and productions obtained for this culture were analysed in the two exporting countries of Romania.

Figure 4. Analysis of the evolution of olives and olives in Turkey and Greece



(a) Evolution of olives (1000 ha)



(b) The evolution of olive production (1000 t)

Source: own processing based on Eurostat

Analysing the areas under olives in Turkey and Greece, different developments can be observed for the two exporting countries. It can be noticed that this sector of olive cultivation in Turkey has a significant development during the analysed period, but it should be noted that no data were recorded for all the analysed years, but the areas recorded at Eurostat constituted a general trend of growth. The same cannot be said for the olive areas recorded in Greece, which is decreasing in the analysed period, if in 2004 there were about 134,000 hectares, in 2017 there were about 105,000 hectares, with 21,76% fewer . This may be a major reason for rising prices in Greece and, implicitly, in Romania, and the decrease in cultivated areas.

However, by analysing the yields obtained, it can be observed that this theory, by which prices increase due to the low supply, does not prove to be true given that the production has increased on average during the reference period. As we can see, there have been recorded increases in production for both major olives suppliers in Romania, with an average production of 450 thousand tons in 2002, and in the year 2017 there were 460 thousand tons, representing an increase of 2.2%. As for Greece's olive production, a similar trend can be observed, with an average annual growth of 4.64%.

Thus, rising prices for olives in Turkey can be justified by rising inflation, different customs duties and demand on the market. With regard to rising prices in Greece, this phenomenon can be motivated by the reduction of cultivated superpowers, by increasing the rate of inflation and reasons related to consumption (demand).

CONCLUSIONS

In this paper we wanted to determine the evolution of the price of olives in Romania and the main factors that determined this evolution. Reporting the value of imports of olives from Romania to the imported quantity could be determined the average import price. An increasing tendency can be observed in the analysed period. In order to determine the main factors that influenced this trend, the main olives exporting countries were established in Romania, so both the major olive growers and Turkey and Greece depended on the quantity and value.

Analysing price developments for these two countries, price trends were observed during the reference period. By correlating the average import prices with those recorded in these countries, close links could be established between the import price and the price in Turkey, but also between the import price and the arithmetic mean between Turkey and Greece.

In order to determine in more detail the factors that determined this price evolution, the areas and outputs of the two exporting countries were analysed. Analysing these data, it can be said that the rising price of the Romanian market can be attributed to the decrease of olive-growing areas in Greece, to the increase of the inflation rate, and also to motives in the sphere of consumer and demand. The price in Romania is given at the meeting of the demand with the supply, the first one being quite high, which leads to an increase in the price given that there is no internal supply.

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THE EVOLUTION OF THE TECHNICAL AND ECONOMIC INDICATORS FOR CROP RICE IN ROMANIA PERIOD 2006-2016

BĂDAN DANIELA NICOLETA[1]

Abstract: *Romania has been particularly interested in rice culture since the 1930s through culture and biology technology, which has made it possible to capitalize less productive land productivity on other crops. In the present study we will analyze the technical indicators of the cultivated area and the production averages, as well as the economic indicators represented by the prices, the subsidies granted / ha an the trade balance. The research method used will be the quantitative and qualitative analysis of the statistical data series from 2006 to 2016. The aim of the study is to highlight the technical and economic aspects of the studied culture, their dynamics and the importance of rice culture that reflects on the demand of the national market.*

Keywords: *indicators, areas, average output, price*

JEL Classification: *Q10, Q11, Q18*

INTRODUCTION

Rice, wheat and corn are the main cultures in the world that can provide food; together supply more than 50% of all the calories consumed by the entire human population. Rice is part of the main food group of humans, having a wide use in food and in the preparation of medicines. Rice culture occupies the world's second largest area, after wheat, and second in the average yield of corn.

In Europe, the area cultivated with rice is about 580,000 hectares, a small area compared to Asia. The traditional European rice producing countries are Italy, Greece, France, Bulgaria, a, Hungary, Ukraine and Romania.

Our country is located at the northern limit of culture, it allows the cultivation of rice only in favorable areas such as the South-East, in the South-West of the country, Timiș county and in the vicinity of the Danube, requiring abundant water and wet soil.

MATERIALS AND METHODS

The study aims to highlight the importance of rice culture by analyzing qualitatively and quantitatively the evolution of technical and economic indicators during 2006-2017. The statistical data used in the paper was provided by the National Institute of Statistics of Romania, Eurostat, Faostat, MADR, as well as information taken from specialized papers.

The study runs for a period of 10 years, so it is necessary to analyze the areas and total crop yields by processing chronological data series using absolute, relative and average indicators. A chronological series is represented by a series of systematized values, of a characteristic made at successive time intervals, in this case the unit of time being the year. The chronological series of the paper consists of two parallel data strings (surface and production), one stating the variation of the characteristic over time, and the other the variation of the studied feature.

Due to the fact that it will be analyzed over a period of a decade, the comparative method will be used, showing the evolution of the surfaces and productions of this culture by processing chronological series requiring absolute, relative and average indicators.

Absolute indicators indicate the decrease or increase over time (absolute changes).

Absolute changes can be: fixed base ($\Delta t/t\text{-}1=yt\text{-}y1$) and with mobile base ($\Delta t/t\text{-}1=yt\text{-}yt\text{-}1$).

[1] Scientific researcher ICEADR –badan.daniela@iceadr.ro

Relative indicators indicate the dynamics index that shows how many times the variable (area or production) increases or decreases from one unit to the next. They can be: with fixed base (It/1=yt1/y1) or with a base in the chain (It/t-1=yt1/yt-1).

Dynamic rhythm represents the percentage that the recorded level of the analyzed feature has changed over a period of time compared to the base period of comparison. It can be: fixed base (Rt=It1*100-100) or with a base in the chain (Rt/t-1=It/t-1*100-100).

The absolute value of 1% of the growth rate shows how many units return to 1% increase or decrease, and the even distribution of the absolute change on percentages, the relative change rate. It can be fixed base (At/1=y1/100) and in the chain (At/t-1=yt-1/100).

Average indicators will indicate the average level ($\bar{Y}$=∑yt/n) and absolute changes. ($\bar{\Delta}$ = (∑Δt/t-1)/n-1=yn-y1/n-1).

The average dynamic index is calculated according to the formula:

$$\bar{I} = \sqrt{\Pi It/t-1} = \sqrt[n-1]{yn/y1}$$

Average Dynamic Rhythm:

$\bar{R} = \bar{I} * 100 - 100$ expresses how many percent the phenomenon analyzed has changed on average from time to time.

RESULTS AND DISCUSSIONS

Using the data of Table no.1 during the period 2006-2016, the calculation methods mentioned above can be applied.

Table no.1 Evolution of rice areas and production

Specifications	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Surface (ha)	5643	8434	9917	13346	12403	12674	11304	11930	12719	11106	9435
Total production (tons)	18420	27518	48917	72418	61588	65261	50862	54646	45159	49773	43635
Average production (kg/ha)	3264	3263	4933	5426	4966	5149	4499	4581	3551	4482	4625

Surse :INSSE

From the data analyzed in table no.1 it was found that the evolution of the rice-growing areas followed an increasing trend during the period 2006 – 2009 (5.6 thousand ha and 13.3 thousand ha), and by 2016 they will decrease by 29% of 2009. In table no.2 the surface changes can be observed both from one year to the next and compared to the base year (2006).

Regarding the average yield of rice, the maximum value of this period was 5426 kg / ha in 2009, 18.9% higher than in 2016 (4400 kg / ha).

Absolut indicators

Table 2 Absolute changes of the rice surface

Year	Surface (hectares)	Absolute changes (hectares)	
		Whit fixed base Δt/t-1=yt-y1	Whit chain base Δt/t-1=yt-y_{t-1}
2006	5643	-	-
2007	8434	-2791	2791
2008	9917	-4274	1483
2009	13346	-7703	3429
2010	12403	-6760	-943
2011	12674	-7031	271
2012	11304	-5661	-1370
2013	11930	-6287	626

Table no.3 Absolute changes in rice production

Year	Production (tons)	Absolute changes (ton)	
		Whit fixed base Δt/t-1=yt-y1	Whit chain base Δt/t-1=yt-y_{t-1}
2006	18420	-	-
2007	27518	-9098	9098
2008	48917	-30497	21399
2009	72418	-53998	23501
2010	61588	-43168	-10830
2011	65261	-46841	3673
2012	50862	-32442	-14399
2013	54646	-36226	3784

2014	12719	-7076	789
2015	11106	-5463	-1613
2016	9435	-3792	-1671

Source: Data processing based on statistical data

2014	45159	-26739	-9487
2015	49773	-31353	4614
2016	43635	-25215	-6138

Source: Data processing based on statistical data

Analyzing the average dynamics (Table no. 4), a significant change in rice-growing area can be observed, with a sharp drop in the chain in 2015 and 2016 (-12.68% and 15.05%). The absolute value of 1% of the rhythm of the rice surface area compared to 2006 equals an absolute equivalent of 56.43 hectares and the absolute value of 1% of the rhythm with mobile base is a growing amount.

Table no.4 Relative changes of the rice surface

Year	**Surface**	**Dynamics index**		**Dynamic Rhythm (%)**		**The absolute value of a percentage of the dynamics (hectares)**	
		Whit fixed base It/1=yt1/y1	Whit chain base It/t-1=yt1/yt-1	Whit fixed base Rt=It1*100-100	Whit chain base Rt/t-1=It/t-1*100-100	Whit fixed base At/1=y1/100	Whit chain base At/t-1=yt-1/100
2006	5643	-	-	-	-		56.43
2007	8434	1.49	1.49	49.46	49.46		84.34
2008	9917	1.76	1.18	75.74	17.58		99.17
2009	13346	2.37	1.35	136.51	34.58		133.46
2010	12403	2.20	0.93	119.79	-7.07		124.03
2011	12674	2.25	1.02	124.60	2.18	**56.43**	126.74
2012	11304	2.00	0.89	100.32	-10.81		113.04
2013	11930	2.11	1.06	111.41	5.54		119.30
2014	12719	2.25	1.07	125.39	6.61		127.19
2015	11106	1.97	0.87	96.81	-12.68		111.06
2016	9435	1.67	0.85	67.20	-15.05		94.35

Source: Data processing based on statistical data

In the case of rice production, according to the average dynamics, it can be seen in Table no. 5 a significant decrease (of 22.06%) of the value of production in 2012 compared to 2011. In the case of the absolute value of a percentage of the dynamics, it shows us that by analyzing with a fixed base the size of a percentage of rice production of any year compared to the base year is equal to an absolute increase of 184.20 tons, and the absolute value of one percent of chain dynamics is a magnitude that has successive different values.

Table 5. Relative changes in rice production

Year	**Production**	**Dynamics index**		**Dynamic Rhythm (%)**		**The absolute value of a percentage of the dynamics (tons)**	
		Whit fixed base It/1=yt1/y1	Whit chain base It/t-1=yt1/yt-1	Whit fixed base Rt=It1*100-100	Whit chain base Rt/t-1=It/t-1*100-100	Whit fixed base At/1=y1/100	Whit chain base At/t-1=yt-1/100
2006	18420						184.20
2007	27518	1.49	1.49	49.39	49.39		275.18
2008	48917	2.66	1.78	165.56	77.76		489.17
2009	72418	3.93	1.48	293.15	48.04		724.18
2010	61588	3.34	0.85	234.35	-14.95	**184.20**	615.88
2011	65261	3.54	1.06	254.29	5.96		652.61
2012	50862	2.76	0.78	176.12	-22.06		508.62
2013	54646	2.97	1.07	196.67	7.44		546.46

2014	45159	2.45	0.83	145.16	-17.36		451.59
2015	49773	2.70	1.10	170.21	10.22		497.73
2016	43635	2.37	0.88	136.89	-12.33		436.35

Source: Data processing based on statistical data

Average indicators

For the period 2006-2016, the average surface area was 10810.1 hectares and the area of rice increased annually for the analysis period by 2295.759 hectares.

On average, the areas increased by 0.52 times during the period 2006-2016 and the average dynamics indicates that the areas have changed on average by 5.27% annually.

The average production level for the analyzed period was 48927 tonnes and the rice production increased annually by 15643.9 tonnes per year. On average, production increased by 9 percent annually.

Table no. 6 Economic indicators of the rice crop

Specifications	*UM*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*
Average production	Kg/ha	3263	4933	5426	4966	5149	4499	4500	3551	4300	4400
Average purchase price	lei/kg	0.8	1	0.7	0.8	1.2	1.1	1.2	1.1	0.9	1
Income / ha without subsidies	lei/ha	2610.4	4933	3798.2	3972.8	6178.8	4948.9	5400	3906.1	3870	4400
Income / ha whit subsidies	lei/ha	2936.6	5335	4286.5	4532.4	6758.7	7012.3	7453.3	6008.4	6578	7219.1
Production cost / ha	lei/ha	2600	4850	3700	3900	6100	5900	5800	4400	5100	5500
Profit without subsidy	lei/ha	10.4	83	98.2	72.8	78.8	-951.1	-400	-493.9	-1230	-1100
Grant benefit	lei/ha	336.6	485	586.5	632.4	658.7	1112.3	1653.3	1608.4	1478	1719.1
Profit rate without subsidies	%	0.4	1.7	2.7	1.9	1.3	-16.1	-6.9	-11.2	-24.1	-20
Profit rate + Subsidies	%	12.9	10	15.9	16.2	10.8	18.9	28.5	36.6	29	31.3
Subsidies	lei	326.2	402	488.3	559.6	579.9	2063.4	2053.3	2102.3	2708	2819.1

Source: ICEADR ("Impact on Financing of the Agricultural Sector through Support Schemes established on the basis of European Regulations on CAP and Funding of Support Schemes from the National Budget")

Regarding the rice crop economic indicators, according to the study conducted by ICEADR, the average purchase prices ranged between 0.8 lei / kg (in 2007) and 1.2 lei / kg (in 2013), which was influenced by the cultivated area and the yield obtained.

The highest prices were in the years 2011 and 2013 of 1.2 lei per kg, 33.3% more than in 2010, while the average purchase price registered in 2016 is by 16.6% lower than in the years when the maximum value was recorded.

Subsidies per hectare for rice crops increased from one year to another, so in 2016 the amount of the subsidy granted was 2819,1 lei / ha, being 8.46 times higher than in 2007, when the subsidy was of only 326.2 lei / ha.

From Table no. 6 it can be noticed that by capitalizing the rice yields at the farm price, the farmers do not make profit without the subsidies granted. The value of the profit with subsidies increases with the value of the support, from 336.6 lei / ha to 1719.1 lei / ha, so the profit rate is higher (31.3% in 2016).

If we look closely at the 2007-2016 profit-free period, we can see that without the support, the profit is insignificant, in 2007 being 10.4 lei / ha or even negative, in 2016 reaching -1100 lei / ha , transforming this crop into an unprofitable one, which also led to the reduction of rice-growing areas, registering a profit rate of -20% in the last year of study.

Rice is a basic food in people's diet so we can also take into account its per capita consumption, thus determining its importance at national and European level by highlighting rice imports and exports.

Table 7. List of countries importing Romanian rice (tonnes)

Importers	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	1024	1995	3774	12654	49402	54613	28727	24727	15925	11958	14861	9242
Italy	788	642	197	5899	14217	1868	10222	9365	5626	4101	5914	5845
Republic of Moldova	-	29	62	221	2220	1133	647	1054	1611	1441	1188	1724
Czech Republic	-		38	253	483	56	457	1758	1330	1564	650	627
Slovakia	0	0	2	84	226	137	593	767	226	1313	248	402
Bulgaria	40	572	2431	5143	6264	2656	3172	1178	942	595	4502	170
Hungary	0	25	67	760	730	325	2173	24	49	3	4	4
Turkey	0		1	0	23363	46126	5178	4585	846	0	0	0

Source: Trade statistics for international business development –Trade map

According to data provided by Trade Map (table no. 7, table no. 8), Romania imported 4 times more rice than it exported (2017).

The quantity of imported rice decreased from year to year in 2017 to decrease by 53.94% compared to 2006.

The quantities of rice exported by Romania during the analyzed period range from 1024 tonnes in 2006 to a maximum of 54613 tonnes in 2011. The main importing countries are Italy, the Republic of Moldova, the Czech Republic, Slovakia and Bulgaria.

Table no.8 List of countries exporting rice to Romania (tonnes)

Exporters	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
World	80780	53962	57789	45636	49638	114721	43358	47480	54241	57533	54598	43575
Bulgaria	596	5145	16135	26526	18719	24015	21338	19057	27567	21986	28971	23320
Myanmar	-	-	120	-	-	-	-	-	25	1527	600	5625
Greece	176	2789	5314	3800	11203	17665	9485	9977	13555	13811	7272	4298
Spain	178	116	1075	52	2500	500	225	1138	321	1301	2814	2910
Italy	1515	2913	11341	3766	9766	7733	2706	5169	7722	2865	3051	2550
Hungary	13	41	670	480	1202	1008	899	940	1404	1467	1417	2419
Egypt	70610	33591	11182	5116	2874	-	500	3534	299	3044	1948	-

Sourse: Trade statistics for international business development –Trade map

Regarding rice imports, it can be seen that the largest quantity of rice was imported in 2011 of 114.72 thousand tons, the main supplier of Romania being Bulgaria. In 2006, the main rice supplier was Egypt; over the period under review it followed a downward trend.

Following the analysis of imports and exports of rice, we can deduce that this crop is of particular importance at national level due to the quantities imported annually. Thus, it can be argued that domestic demand can not be sustained by its own production, with the need to resort to rice imports to meet demand in the domestic market.

CONCLUSIONS

In the paper were highlighted the technical indicators of the rice crop, the surfaces and the productions obtained in Romania, showing their evolution with absolute, relative and average static indicators.

As can be seen from the average dynamics indicators, the rice areas have undergone an annual change of 5.27% on average and the rice yields increased by an average of 9%, all due to investments made in this culture.

Through the economic indicators of this crop, the average purchase price, the production cost, the subsidies, the income obtained per hectare with subsidies and without the profit of the crop, we could demonstrate that the rice crop is profitable only if the farmers benefit from subsidies granted by the State.

Following the import and export analysis of rice, it can be noticed that Romania can not meet the requirements of the rice on the market being forced to import, although in recent years investments have been made allowing a rebirth of this culture by entering the Romanian market to foreign investors.

Cultivators are encouraged to produce rice by awarding higher grants, so they can also earn considerable gains.

The expansion of rice fields, in the current trend, falls into the category of modern solutions, which present both economic advantages and environmental protection aspects. By rehabilitating the right land for rice cultivation, our country could be among the main European rice producers.

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THE INFLUENCE OF METEOROLOGICAL FACTORS ON THE PRODUCTION OF MAIZE CROP IN THE SOUTH-MUNTENIA REGION

BĂDAN DANIELA NICOLETA[1]

Abstract: *The impacts of climate change on the area's agricultural potential and their economic and social effects on sustainable development in the environment are a topical and future issue. The paper aims at assessing the potential areas in the South-Muntenia Region, identifying, quantifying and qualitatively analyzing climatic parameters such as precipitation, maximum and minimum air and humidity temperatures, measured during the period 2013-2017 for maize crops for see their influence on productions and deliver optimal solutions. The statistical indicators that characterize the average crop production and the correlation coefficients between them and the main climatic parameters that influence the culture concerned will be calculated.*

Keywords: *climatic factors, average production, parameters*

JEL Classification*: Q1, Q15, Q54*

INTRODUCTION

Corn crop is one of the most important crops worldwide due to its multiple use, being indispensable for human life. This culture has a long tradition in Romania being unpretentious, with low water consumption, because it has a highly developed and profound radicular system with the ability to adapt in conditions of yeast.

Agricultural crop yields fluctuate from one year to the next, being significantly influenced by the variability of climatic conditions and in particular, the occurrence of extreme climatic events.

In the last ten years, the area planted with corms in Romania varied between 2.3 and 2.7 million hectares, except when 2010 was the smallest area of only 2.1 million hectares.

The South-Muntenia Region is the most extensive agricultural land in the country, accounting for almost 18% of Romania's total agricultural area. With 2.33 million hectares of agricultural land, this is the most important area of the country from an agricultural point of view.

MATERIAL AND METHOD

For the purpose of my analysis, I have use d data provided by the National Institute of Statistics (NIS), the Ministry of Agriculture and Rural Development (MADR) and data on meteorological factors on the site www.rp5.com, Prognosis and the National Meteorological Administration (INMH) .

In order to achieve the proposed objective, data related to meteorological factors such as rainfall and temperatures in relation to the total and average production per hectare were selected, processed and modeled, and correlated with the cultivated areas and total productions in the South-Muntenia Region . At the end of the paper we study the dependence between the total maize production and the climatic factors that influence it, using the simple linear regression statistic-econometric model.

RESULTS AND DISCUSSIONS

At the national level, the areas cultivated with corn recorded a variation in their values throughout the analyzed period, fluctuating from 2402.08 thousand hectares in 2017 to 2605.17 thousand hectares in 2015.

[1] Scientific researcher ICEADR –badan.daniela@iceadr.ro

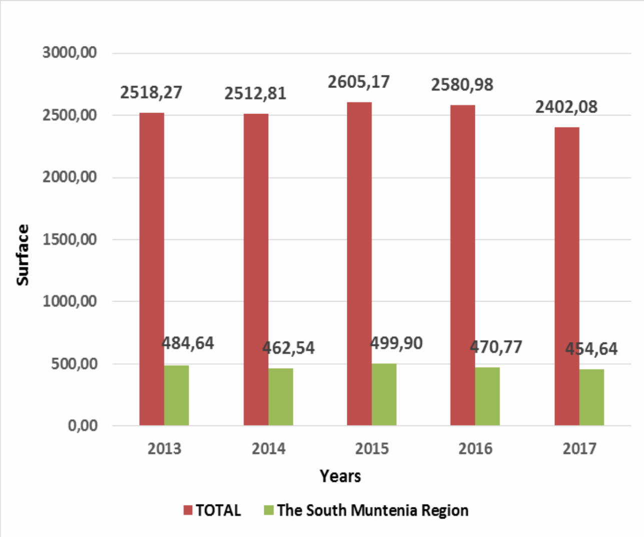
Areas cultivated with maize in the South Muntenia Region account for about 19% of the total national corn surface area.

According to figure 1, it can be noticed that in 2015 the maximum value of the area cultivated with maize in the South-Muntenia Region was 499.90 thousand hectares, 9.95% higher than the last year of analysis, 2017 (454.64 thousand hectares).

As regards to the total production of maize at the national level and South–Muntenia Region, they are inversely proportional to the areas under maize.

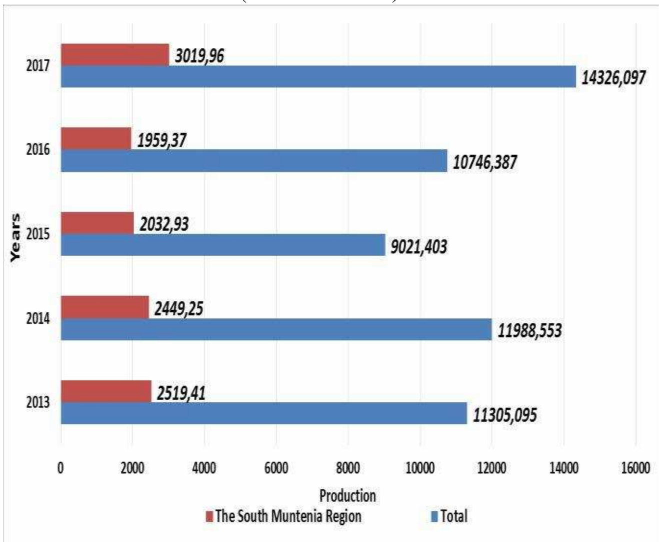
A determinant factor of this situation is the climatic factors, the temperature and the rainfall recorded during the growing period of corn, respectively, from May to August.

Figure no.1 The evolution of the areas cultivated with corn at the national level and by the South-Muntenia Region (thousands of hectares)



Source: INNSE

Figure no.2 Evolution of Total Corn Productions at National Level and South-Muntenia Region (thousand tons)



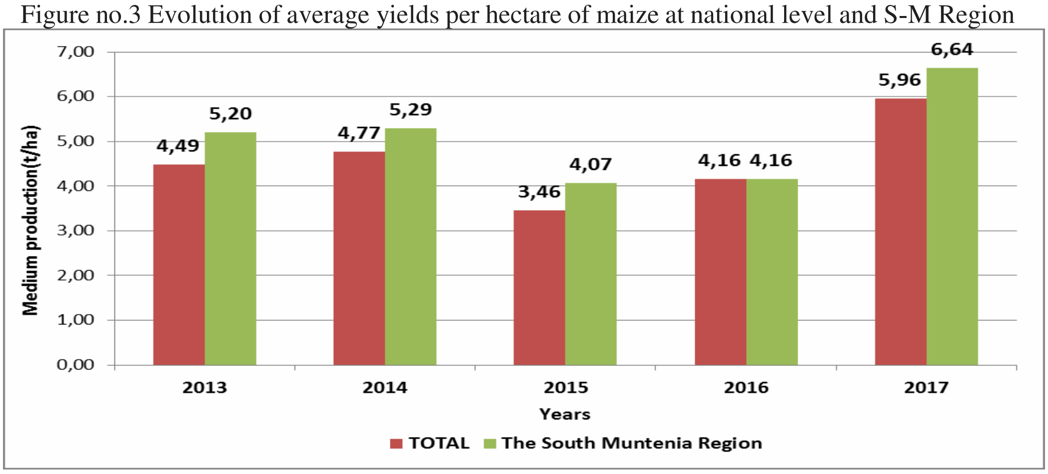
Source: INNSE

The largest national maize production was recorded in 2017, of 14326.1 thousand tons, which is by 37.02% higher than the minimum value recorded during the analyzed period, 2015 (9021.4 thousand tons).

At the South-Muntenia Region, maize production showed an oscillating trend, achieving a minimum production of 1959.37 thousand tons in 2016, which was 35.11% lower than in the last reference year 2017.

The average level of maize production at South-Muntenia region over the analyzed period was 2396.18 thousand tons with an annual growth rate of 4.63%.

Figure no.3 Evolution of average yields per hectare of maize at national level and S-M Region



Source: INNSE

The South-Muntenia Region consists of 7 counties. According to Table no. 1, the Calarasi and Ialomita counties record the highest production at the South-Muntenia Region, with the highest production values registered in 2017 (711.26 thousand tons, respectively 711.30 thousand tons).

The smallest maize production was registered in Argeş and Dâmbovița counties with values between 161.37 thousand tons and 178.52 thousand tons respectively in 2016.

Table no.1 Total maize production in the counties of Region S-M (thousand tons)

Specifications	2013	2014	2015	2016	2017
The South Muntenia Region	2519,41	2449,25	2032,93	1959,37	3019,96
Arges	247,53	208,20	161,96	161,37	304,32
Calarasi	662,01	616,52	584,34	522,79	711,26
Dambovita	260,86	258,81	184,12	178,52	284,14
Giurgiu	288,59	281,06	213,22	191,25	297,96
Ialomita	537,30	543,09	471,95	432,89	711,30
Prahova	231,19	225,31	185,87	209,23	287,22
Teleorman	291,94	316,26	231,46	263,33	423,77

Souce: INSSE

Table no.2 Annual average maize production in South-Muntenia Region (t / ha)

Specifications	2013	2014	2015	2016	2017
The South Muntenia Region	5,20	5,29	4,07	4,16	6,64
Arges	4,51	3,79	3,00	3,02	5,43
Calarasi	6,27	6,48	5,34	5,19	7,72
Dambovita	4,27	4,32	2,98	2,89	4,82
Giurgiu	5,71	5,65	3,80	3,68	6,68
Ialomita	6,11	6,59	5,27	5,72	8,37
Prahova	4,46	4,37	3,42	3,85	5,81
Teleorman	4,01	4,60	3,10	3,62	6,19

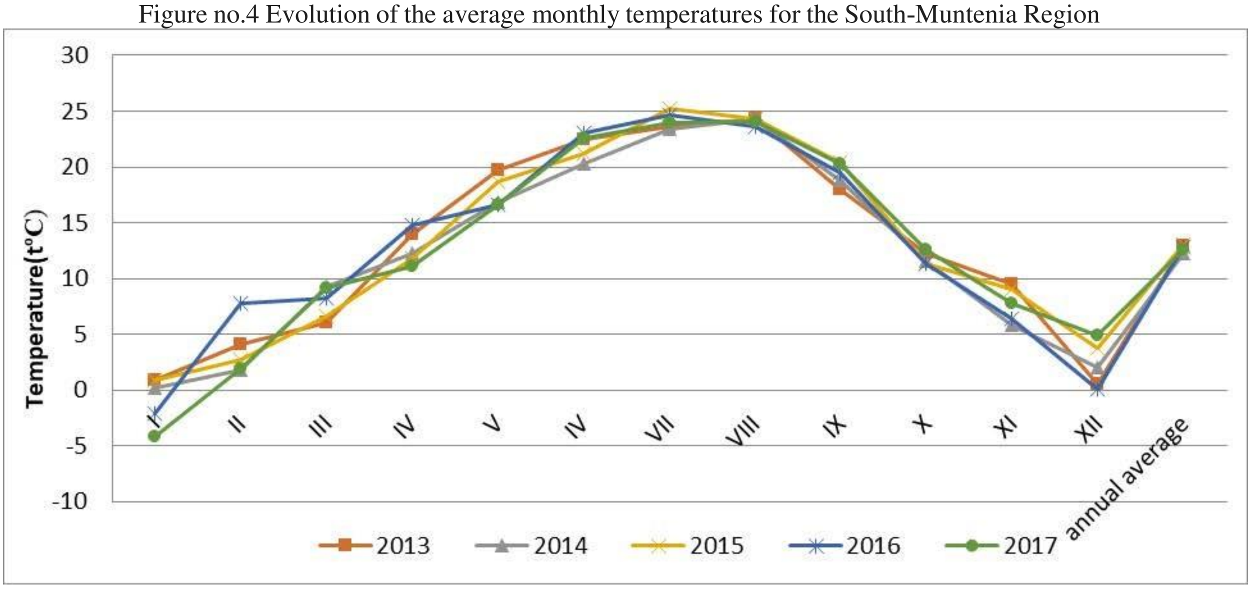
Source: INSSE

Table no.2 shows that at the South-Muntenia Region average annual production of maize followed an oscillating trend in the first two years of the analysis, 2013 and 2014 the production value was 5,20 t / ha respectively 5 , 29 t / ha, then in 2015 it fell sharply by 23.18% over the previous year.

In 2017, the highest annual average production of maize was 6.64 t / ha, 1.5 times the minimum value in 2015. We can say that the climatic factors intervened in the good development of the plant so the final productions were influenced.

From the thermic point of view, in the years 2015 and 2016, from February to September according to Chart no. 4 in the South-Muntenia Region, values were recorded higher than the normal values of these periods. The hottest month of the year was July with the average of monthly temperatures from 23.6 degrees Celsius to 25.7 degrees Celsius; these implicitly affecting the production of maize in this region

Figure no.4 Evolution of the average monthly temperatures for the South-Muntenia Region



Source: own processed data

From the pluviometric point of view, Johannes Humlum has determined that according to the pedo- climatic conditions in Romania, in order for the production per hectare to exceed the average, it is necessary to distribute the amount of rainfall during the entire period of maize vegetation as follows: in May rainfall is greater than 40 mm, in June and July the rainfall is 60 mm and in August it is 80 mm.

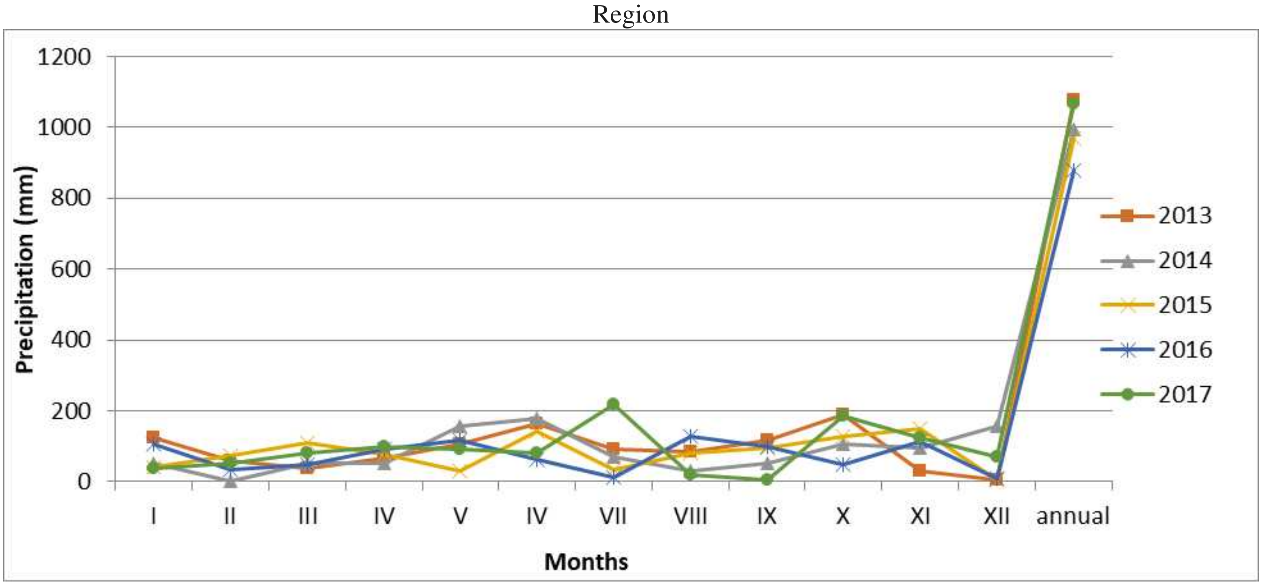
The following precipitation distribution is also considered optimal: May = 60-80 mm; June = 100-120 mm; July = 100-120 mm; August = 20-60 mm.

A fairly logical explanation for the decrease in average and total maize yields for the two owners in the 2015 and 2016 study is the amount of precipitation recorded during the growing season of maize crop.

Analyzing carefully chart no. 5, we can see that:

- In May, the precipitation volume reached two extremes; in 2015 the value of the precipitations was below the optimally admitted level, 32.2 mm, being very drought, and in 2016 the value of precipitation was about 2 times the admitted level (117.8 mm), influencing from the beginning of the corn plant development;
- in June 2015, the precipitation rate was too high in 2015 reaching 140.6 mm being 17% higher than the recommended optimum level, and in 2016 the precipitation level was 62.4 below the optimum level between 100-120 mm;
- In July, in both years there was a very low precipitation level of 33.4 mm and 14 mm, respectively, well below the recommended values, about 78.35 lower than the optimum rainfall;
- In August the precipitation level was above the optimum value, with 2016 more rainfall than the optimum 60 mm.

Figure no. 5 Evolution of the monthly rainfall for the South-Muntenia Region



Source: own processed data

Thus, throughout the vegetation period from sowing to harvest in the years 2015 and 2016 extreme rainfall values have been recorded which have negatively influenced the development of the maize plant and led to a decrease of up to 35.1% of the total production of previous years.

In order to establish a simple linear regression model related to the correlation between the annual rainfall and the total maize production for the South-Muntenia Region, I will analyze the evolution of the two variables for the period 2010-2017, using the data series in Table no.3. Thus, the intensity of the link between the two variables can be estimated.

Table no.3 Variables studied

Year	Annual precipitation (mm) *	Total production (thousand tons)
2010	774,30	1794,86
2011	453,10	2381,53
2012	669,70	1388,69
2013	1078,60	2519,41
2014	994,70	2449,25

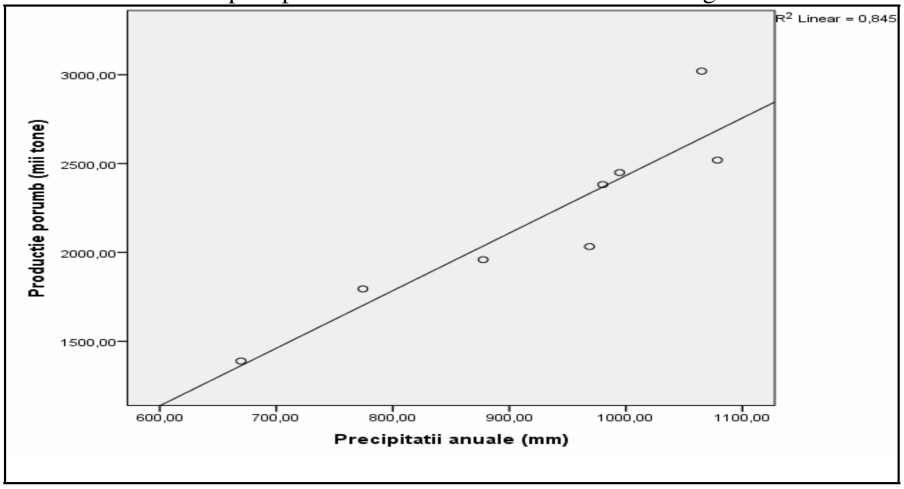
2015	968,80	2032,93
2016	877,50	1959,367
2017	1065,10	3019,96

Source: * according to processed data (NAPP), INSSE

Taking into account the data series in the table above we can see in figure no.6. , that the two indicators under analysis varied in the same sense, so we can state that there is a relationship of dependence between the two variables.

To analyze the typology of the regression model of the two variables, we will proceed to the graphical representation - the Scatter diagram (figure no.6)

Figure no.6. The yield of maize production by annual precipitation variation in South-Muntenia Region



Source: data design (SPSS program)

From the graph above, it can be seen that the graphical representation of the two indicators under study is a straight line. Thus, we can say and appreciate that there is a direct and linear relationship between the two variables, which corresponds to the linear regression model.

Form of simple linear regression: y = a+bx+ε

In the present case, according to the general form of linear linear regression, we obtain the following values of parameters a and b:

a = - 806,024 b = 3,239

The function that characterizes the analysis in the study is:

y = 3,239 x + (-806,024)

To determine the intensity of the link between the two variables, we found the determination coefficient (R^2). The coefficient shows to what extent the dependent variable is explained by an independent variable; in this case the total maize production, respectively the annual rainfall.

The higher the coefficient of determination (R^2) is closer to 1, the stronger the link between the two variables.

In case of analysis, $R^2 = 0{,}845$, this has a very close value of 1, indicating that the independent variable (annual rainfall) is explained in a proportion of 84.5% to the dependent variable (total maize production), resulting in a close connection between the two.

CONCLUSIONS

Currently, climate change is recognized as one of the most important and serious environmental, social and economic challenges facing the world. Agriculture is the most exposed economic sector that can be affected by climate change, being directly dependent on climatic factors.

The South-Muntenia Region holds about 19% of the total cultivated area of maize.

From the data analyzed in the paper it is noted that during the period 2013-2017 the total national maize and South-Muntenia Region are inversely proportional to the areas cultivated with maize.

The largest maize production at national and regional level in the South-Muntenia region was registered in 2017, of 14326.1 thousand tons and 3056.5 thousand tons respectively. In a more detailed analysis at the level of the South-Muntenia region, it is clear that the county counties are Călăraşi and Ialomiţa, 711.26 thousand tons, respectively 711.30 thousand tons in 2017. In the years 2015 and 2016 the smallest values of maize production were registered at both national and regional level.

The volume of corn or other crop production is strictly direct and dependent on climatic factors. After analyzing these factors, it was found that in 2015 and 2016 the average temperatures from February to September were higher than the normal values of these periods, which implicitly affected the production of maize in this region.

In the case of precipitation, during the vegetation period from sowing to harvesting in the years 2015 and 2016, extreme values were recorded, influencing negatively the growth of the maize plant and leading to a decrease of up to 35.1% of the total production compared to previous years.

Using the regression model, the direct and linear relationship of the two surveyed indicators, production and annual precipitation at the South-Muntenia region level was demonstrated. The values of the main coefficients being 1, show the correlation of the two variables, thus showing that the chosen model is a valid one, resulting in the dependence and the strong link between the two variables taken in the study.

By analyzing climatic factors such as temperature and precipitation, it has been demonstrated that they directly influence the production of corn. For the yield to be as high as possible, account must be taken of:

- Soil systems (conventional / unconventional / as well as rationalised, with protective coating, balls or no work), these being chosen according to the concrete conditions of each field, thus creating the culture conditions of harmonious development between the conditions soil and climate in that area;

- the sowing season, this being determined by the evolution of climatic conditions; In the dry springs it is recommended to sow at the beginning of the interval, and in the wet it will be sown later;

- the type of seed used in relation to climatic conditions (for example, drought tolerant hybrids may have a productive potential compared to traditional ones).

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THE DYNAMICS OF THE PRODUCTION IN ROMANIAN SOYA CULTURE IN 2010-2016

BRĂTULESCU ALEXANDRA-MARINA[1]

Abstract: *Soy is one of the most important crops for human, animal and plant feed. The content of soybeans is rich in protein and fat, which gives this crop a very high nutritional value. In this paper we will analyze the surfaces, outputs, prices and value of Romanian imports and exports, soybean culture, thus creating an overview of the study period, 2010-2016. This analysis highlights the evolution or involution of soybean production, using the method of comparative, quantitative and qualitative data analysis to determine their evolution.*

Keywords: *dynamic, soy, evolution, quantitative and qualitative*

JEL Classification: *Q 13, J 11*

INTRODUCTION

The cultivated soy belongs to the Glycine species, the Leguminosales order. Soy is one of the most important crops for human nutrition, animal feed and industry. Soybean seeds contain over 30% protein and 17-25% oil. The world's largest soybean producer is the US, where soybean crops account for 90% of the seed oil. Soy has been grown in Asia for thousands of years and today is one of the world's most important food crops. These vegetables can be classified as leguminous, oleaginous (technical plants), vegetables, or even fuel sources, depending on how they are used. Soy beans are one of the few plants that have a full range of amino acids, being considered complete protein, on an equal footing with meat, dairy products and eggs. As a leguminous plant, which is associated with symbiosis with nitrogen-fixing bacteria, soybean is also of agrofitotechnical importance being a good pre-plant for most agricultural crops, even for autumn cereals, when early varieties are cultivated, leaving large quantities of nitrogen (80-120 kg / ha).

MATERIAL AND METHOD

The present paper is subject to the analysis of the areas, outputs, prices and value of Romania's imports and exports to soybean culture during the period 2010-2016, so this is the main objective of the paper, to show the positive or negative evolution with the data provided by to the National Institute of Statistics (INS) and the Ministry of Agriculture and Rural Development (MADR), using the quantitative and qualitative comparative analysis of data from the analyzed period 2010-2016.

RESULTS AND DISCUSSIONS

In table no. 1, the data on the evolution of the surfaces, productions and prices in Romania, cultivated with soybeans, taking into account the time horizon of 6 years, are analyzed.

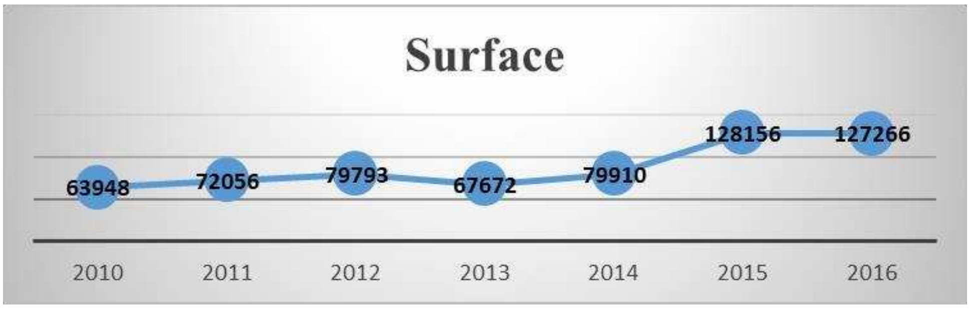
Table no. 1- Data on the evolution of surfaces, outputs and prices in Romania

Specification	U.M	2010	2011	2012	2013	2014	2015	2016	2016/2010 (%)	2016/2015 (%)
Surface	Mii ha	63948	72056	79793	67672	79910	128156	127266	99,01	-0,69
Average production	Kg/ha	2345	1980	1308	2216	2539	2045	2047	-12,71	0,10
Prices	Lei/kg	1,23	1,3	1,71	1,83	1,43	1,33	1,3	5,69	-2,26

Source: www.inse.ro, own calculations

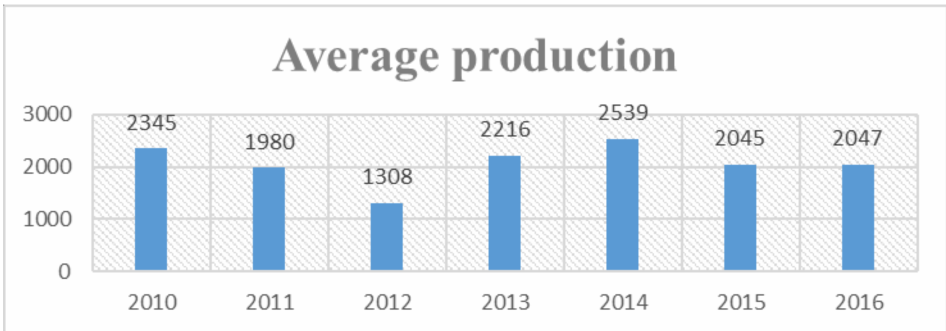
[1]ASC Brătulescu Alexandra Marina, ICEADR București, e-mail: bratulescu.alexandra@iceadr.ro

Chart no. 1 - Soy cultivated area



With regard to the soybean area during the period 2010-2016, we can conclude that the smallest area is recorded here, but does not vary greatly from one year to the next, maintaining a positive trend, comparing the year 2016 we see an increase of 99.01% in the base year, if we report the year 2016 in the previous year, here we see a 0.69% decrease.

Chart no. 2- Average soybean production



In average production, taking the 2010-2016 benchmark, we can say that it varied between 1308 kg / ha in 2012 and the maximum was found in 2014 with (2539 kg / ha). Referring to year 2016, compared to the base year 2010, it results that the average production of this crop has decreased by 12.71%, and if we report the year 2016 the previous year, there is an increase of 0, 10%.

Chart no. 3- Average domestic soybean market price

With regard to the soybean price, we can conclude that there were no major year-to-year changes during the period under review, with only slight fluctuations in growth or declines over the period, remaining relatively constant.

Thus, the following prices were recorded: 2010 (1.23 lei / kg), 2011 (1.30 lei / kg), 2012 (1.71 lei / kg), 2013 (1.83 lei / kg) (1.43 lei / kg), 2015 (1.33 lei / kg), 2016 (1.39 lei / kg). The highest price was registered in 2013 (1.83 lei / kg), and the lowest price was recorded in 2010 with (1.23 lei / kg).

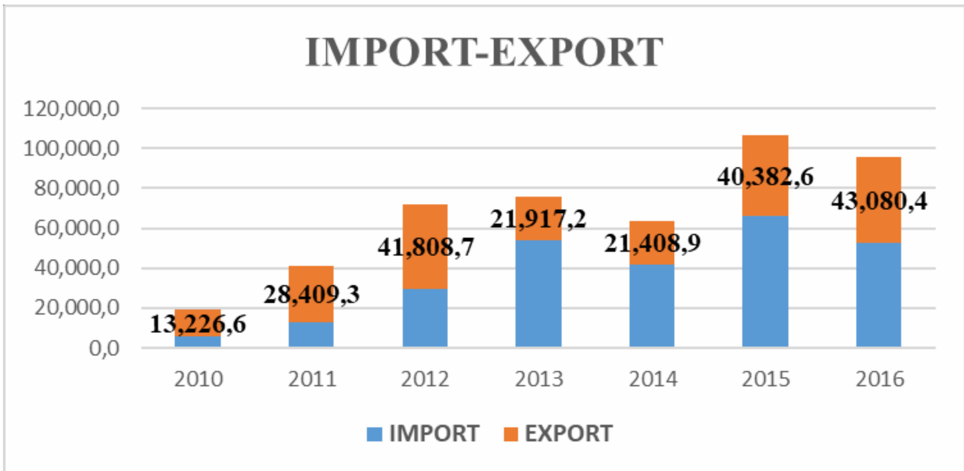
Table no. 2 - The value of imports and exports to soybean crops during 2010-2016

YEAR	IMPORT	EXPORT
	Thousands of euros	
2010	5,988,3	13,226,6
2011	12,951,4	28,409,3
2012	29,831,5	41,808,7
2013	53,716,9	21,917,2
2014	41,889,4	21,408,9
2015	65,875,4	40,382,6
2016	52,511,7	43,080,4

Source: www.madr.ro

In table no. 2, the value of imports and exports to the soybean crop from 2010-2016, the following follows: the trend of export was increasing in 2011 (28,409.30 thousand euros), respectively 2012 (41,808,70 thousand euros), followed by to decrease in 2013 (EUR 21,917.20 thousand) and in 2014 (EUR 21,408.90 thousand), then increase again in the year 2016 (EUR 43,080.38 thousand), while exports of soybeans, registering a declining trend.

Chart no. 4- Value of imports and exports



In the analyzed period 2010-2016, it can easily be noticed that the trade balance was active, the value of exports exceeding the value of the imports.

CONCLUSIONS AND RECOMMENDATIONS

Due to their unique functional properties, soy products have become very attractive ingredients for use in most food systems. The use of soy protein as a feed, supplement or analogous has expanded to most food products. New processing technologies have been created and existing ones have been improved to produce products with a wide range of adaptive properties to different food systems.

In addition to these functional properties, the exceptional nutritional quality of soy protein has been of great importance in recent years. One of the categories of foods in which the use of soy products has expanded is that of bakery products. In conclusion, we export unprocessed products at low prices and import more processed products at high prices.

The analysis of this work for soybean culture for a period of 6 years provides information that can help to increase the efficiency of the use of public funds allocated to this sector, as well as of agricultural producers whose activity is to cultivate soybean culture.

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STUDY OF THE ROMANIAN SUGAR BEET MARKET IN THE PERIOD 2010-2016

BRĂTULESCU ALEXANDRA-MARINA[1], CREȚU DIANA[2]

Abstract: *Sugar beet is of particular importance in the root market, being a biennial plant grown for sugar production, also used in natural medicine, cultivated for its fleshy root used as a vegetable in the human diet and as a fodder plant. This paper analyzes the data on the evolution of sugar beet areas and production in Romania, as well as the sales price of sugar beet. Another aspect considered in this paper is the one related to the consumption of sugar beet in the period 2010-2016.*

Keywords: *sugar beet, food, prices, agri-food market*

JEL Classification: *Q 13, J 11*

INTRODUCTION

Sugar beet is the plant that provides exclusively raw material of good quality and high yield for the sugar industry in our country and throughout Europe. For sugar beet farming, requires special landscaping, crop maintenance and a deep radicular appliance, it is necessary to produce agricultural crops. Sugar beet is grown for roots, from which the main product is sugar, and as a by-product, molasses and borage, used in animal feed and for the production of ethyl alcohol. Sugar beet is a fodder plant of good quality and high yield for the sugar industry in our country and in Europe. Sugar and sugar products form a large group of foods that are characterized by high sugar content (sucrose, glucose), attractive appearance, sweet taste, different shades and pleasant flavor.

MATERIAL AND METHOD

As a method of analysis, the present paper analyzed the areas, yields, prices and sugar consumption in Romania, in the sugar beet culture in 2010-2016, so this is the main objective of this paper, to show the positive or negative evolution with the data provided by the National Institute of Statistics (INS) and the Ministry of Agriculture and Rural Development (MADR) using the quantitative and qualitative comparative analysis of data from the analyzed period 2010-2016.

RESULTS AND DISCUSSIONS

In the table below, we analyze the data on the evolution of Romanian beet cultivated with sugar beet, taking the time horizon of 6 years.

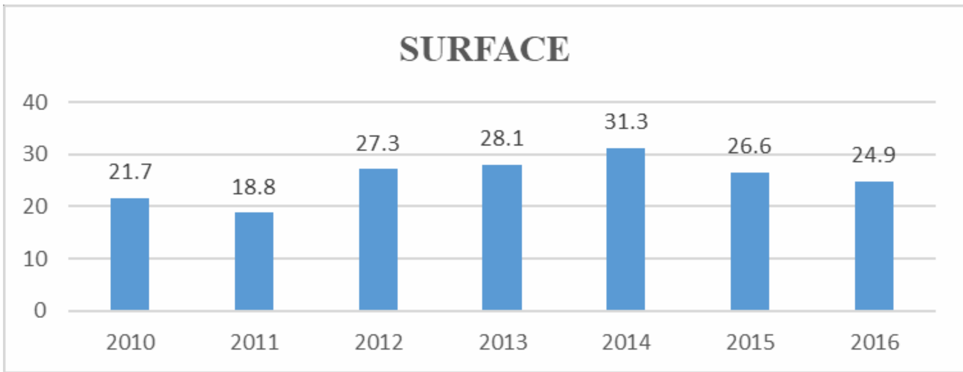
Table no. 1 - Data on surface evolution in Romania

Specification	2010	2011	2012	2013	2014	2015	2016	2016/2010 (%)	2016/2015 (%)
Surface	U.M – thousand hectares								
	21,7	18,8	27,3	28,1	31,3	26,6	24,9	14,75	- 6,39

Source: www.inse.ro, own calculations

Chart no. 1 - The surface cultivated with sugar beet

[1]ASC Brătulescu Alexandra Marina, ICEADR București, e-mail: bratulescu.alexandra@iceadr.ro
[2] ASC Crețu Diana, ICEADR București, e-mail: cretu.diana@iceadr.ro



As regards the area planted with sugar beet in the period 2010-2016, these areas oscillate as a size, from one year to the next, with the minimum value being recorded in 2011 (18816 thousand hectares) and the maximum value is in the year 2014 (31280 thousand hectares), it is also noticed that there is an increase in 2016 as compared to 2010, namely: by comparison between 2016 and 2010, there is an increase of 14.75%

Economic operators in the sugar sector

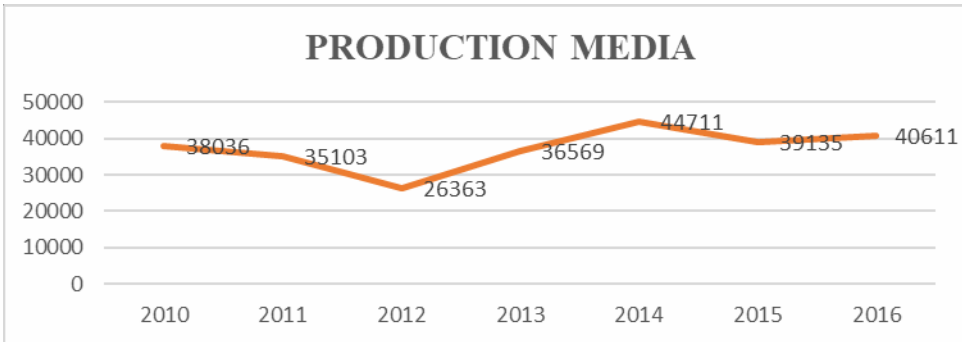
SC Sugar factory Bod S.A. - Process sugar from beet and raw sugar;
SC Tereos Romania S.A. process sugar beet;
SC Sugar Liestis S.A. - Process raw cane sugar;
SC Lemarco Cristal SRL Urziceni - process raw cane sugar;
SC Sugar Corabia S.A. - Process raw cane sugar;
SC Agrana S.A. - Roman Branch - processes raw cane sugar and sugar beet;
SC Agrana Buzău SRL - processes raw cane sugar;
SC Agrana Ţăndărei SRL - processes raw cane sugar;
SC Sugar Oradea S.A. - Process raw cane sugar and beet sugar

Table no. 2 - Average production data with sugar beet

Specification	2010	2011	2012	2013	2014	2015	2016	2016/2010 (%)	2016/2015 (%)
Average production	U.M – kg/ha								
	38036	35103	26363	36569	44711	39135	40611	6,77	3,77

Source: www.inse.ro, own calculations

Chart no. 2 - Medium cultivated with sugar beet



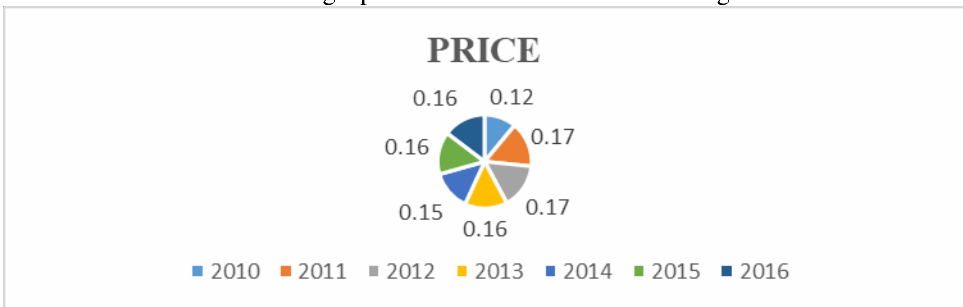
As the average production progresses, it reaches a peak in 2014 (44711 kg / ha) this is due to the high precipitation rate recorded in 2014, the beets being a crop that requires high water intake. In general, the trend of this indicator was increasing, with the minimum registered in 2012 (26363 kg / ha).

Table no. 3 - Average domestic sugar price for sugar beet

Specification	2010	2011	2012	2013	2014	2015	2016	2016/2010 (%)	2016/2015 (%)
	U.M – lei/kg								
Price	0,12	0,17	0,17	0,16	0,15	0,16	0,16	33,3	0

Source: www.madr.ro, own calculations

Chart 3 - Average price in the domestic market to sugar beet



In table no. 3, we note that although production has been characterized by a declining trend, which normally has a price-proportional direct influence, we can see from the data provided by MADR that the average price has increased. However, the variations in price are not significant, they fluctuate between 0.12 lei / kg (2010) and reach 0.16 lei / kg (2016).

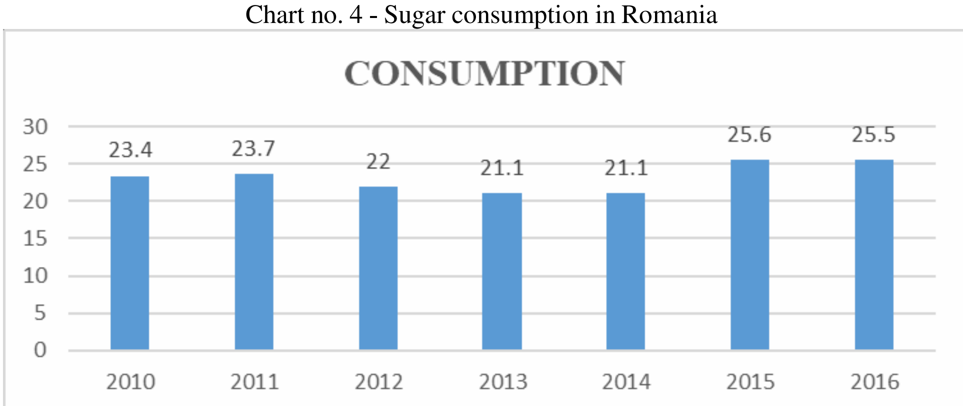
Table no. 4 - Sugar consumption in Romania

Specification	2010	2011	2012	2013	2014	2015	2016	2016/2010 (%)	2016/2015 (%)
	U.M – kg/resident								
Consumption	23,4	23,7	22	21,1	21,1	25,6	25,5	8,97	- 0,4

Source: www.inse.ro, own calculations

Table 4, shows the consumption of sugar / inhabitant registered in Romania in the period 2010-2016, it can be seen that in 2010 the average annual consumption per capita fell from 23.4 kg to 21 , 1 kg in 2013 and 2014 respectively, and then to grow by 25.6 kg in 2015 and 25.5 kg in 2015 respectively.

Chart no. 4 - Sugar consumption in Romania



CONCLUSIONS

In Romania, the main challenge on this market is to ensure that sugar consumption is made from its own resources of raw materials.

Among the main causes according to which this issue is important for Romanian agriculture we mention:

1. the major importance of sugar in the diet of the population, thus conditioning the level and quality of life
2. -deterioration of domestic sugar production
3. the repercussions on the efficiency of sugar production and consumption.

Sugar beet culture is one of the main crops in our country, being the main source of raw material for sugar production, which is the main purpose of beet cultivation. Globally, sugar beet is the second source of sugar production, after sugar cane, providing about 40% of world sugar production.

In conclusion, the sugar beet market is an important sector for the agricultural system in Romania, due to the ratio between supply and demand, which is higher in this market.

This paper analyzes the current situation in our sugar beet market in terms of cultivated area, average production, prices and consumption.

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EGG'S MARKET STUDY IN ROMANIA IN 2011- 2016 PERIOD

CREȚU DIANA[1]

Abstract: *In this paper is presented poultry egg's market in 2011-2016 in Romania, highlighting issues such as: egg's production, price dynamics, annual average consumption, import value but also expert value. At present the production and sale of eggs for consumption in Romania is carried out in compliance with the provisions of Regulation No. 852/2004 on general rules for food hygiene, as subsequently amended and supplemented, Reg. C.E.nr. 111/2008 on the procedure for veterinary registration and food safety of products and for the production and direct or retail sale of animal food or non-animal. The research method used in the study is the statistical processing and economic analysis of the existing data for the period 2011-2016.*

Keywords: *poultry eggs market, price dynamics, consumption*

JEL Classification: *Q11; Q13; L11*

INTRODUCTION

The egg is a particularly valuable product for human nutrition due to its richness in nutrients indispensable to the body and the high degree of assimilation of the nutrients in its composition, the digestibility coefficient being between 80-95%.

The leading position in egg consumption is given by hen eggs, and on narrower scales duck, goose, turkey, quail eggs, differentiated by size and by the nutritional factors and the degree of assimilation of the nutrients in their composition.

The need for fresh eggs for the consumption of the population is ensured by businesses that have conditions for raising poultry meat as well as large eggs producing breeds.

MATERIAL AND METHOD

The research method used in the study is the statistical processing and the economic analysis of the data. The present study analyzed the egg market in the period 2007-2016, namely: production, price dynamics, egg consumption, value of imports and exports by site National Institute of Statistics (NIS) and MARD (Ministry of Agriculture and Rural Development).

RESULTS AND DISCUSSIONS

In Romania, according to NIS (Table 1), eggs production had considerable fluctuations in the period 2011-2016, and we notice that the largest production of egg production was in 2014, namely 6636 million pieces, and the highest small was registered in 2016 by 6182 million pieces most likely due to increased production costs.

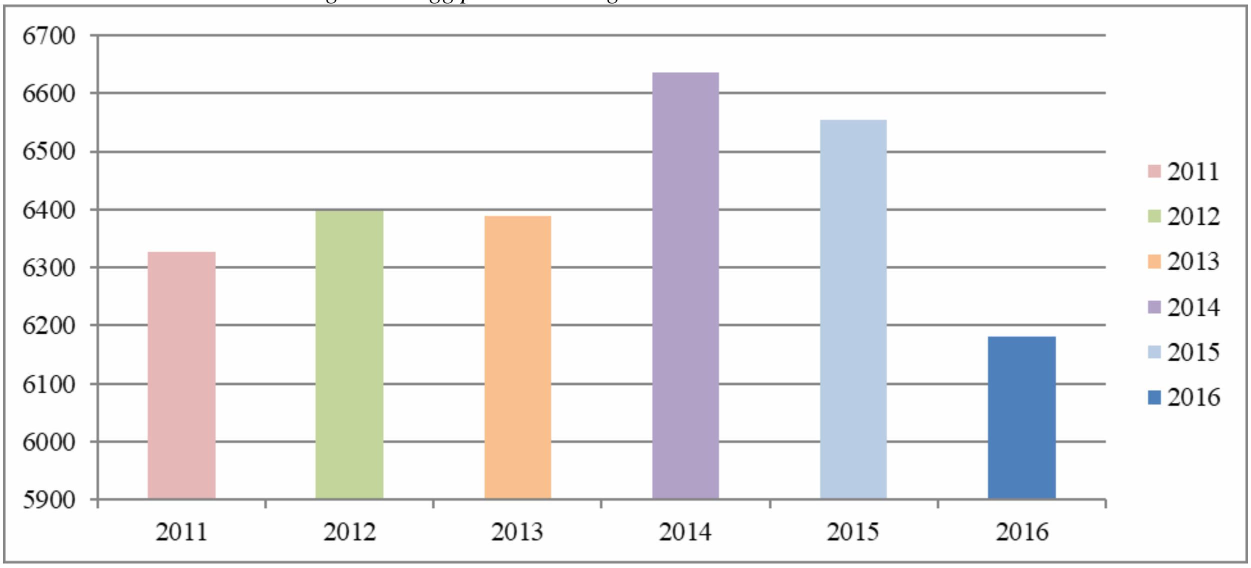
Table 1. Egg production registered in Romania 2011-2016 (mill. pcs.)

Years	2011	2012	2013	2014	2015	2016
Production of eggs	6327	6398	6388	6636	6555	6182

Source:NIS

[1] ASC CRETU DIANA ICEADR Bucharest, e-mail: cretu.diana@iceadr.ro

Figure 1. Egg production registered in Romania 2011-2016



In table no.2 shows the dynamics of prices from 2011 to 2016, showing a constant imbalance, namely in 2011 we have the price of 0.46 lei / piece and in 2016 0.51 lei / pcs highlighting a major increase.

Table 2. Average prices of eggs at farm gate

Agricultural product nomenclature	**Measurement units**	**Periods**					
		2011	2012	2013	2014	2015	2016
Chicken eggs	**Lei/ pcs**	0,46	0,59	0,48	0,48	0,52	0,51

Source: NIS

Figure 2. Price of eggs - 2011-2016

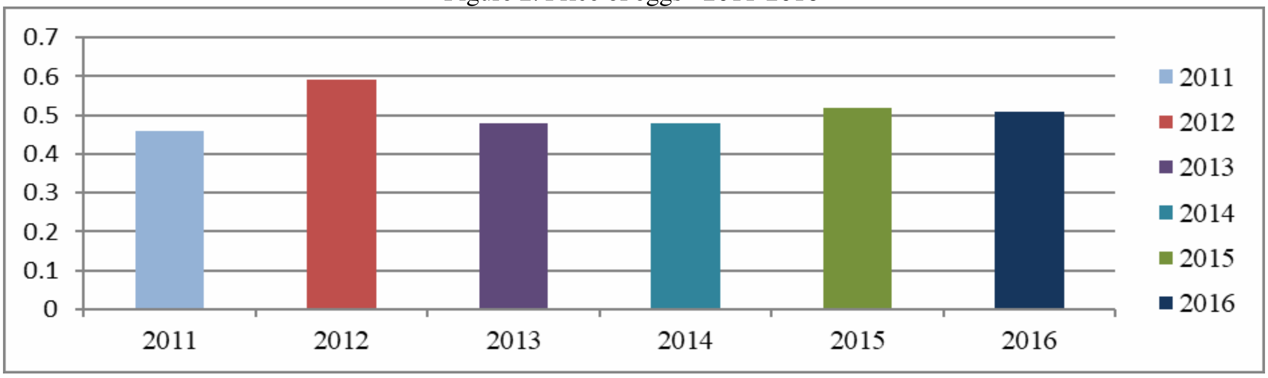


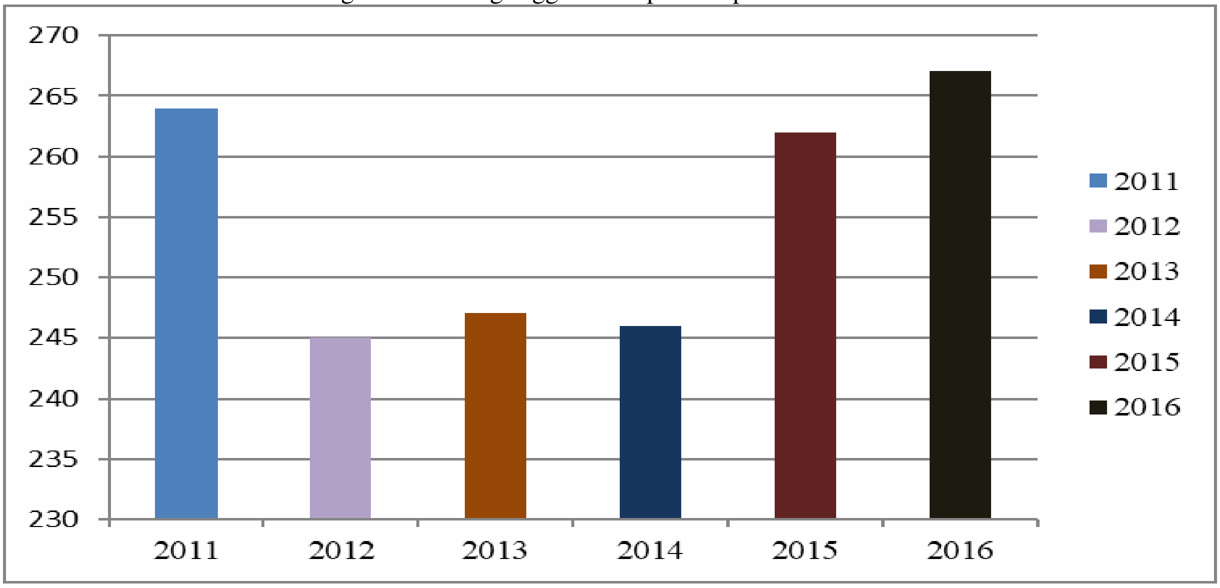
Table no. 3 shows the average annual consumption per capita, which declined in 2015 compared to 2011, which shows the instability of the Romanian market in the production of eggs and the necessity of imports.

Table 3. Annual eggs consumption per capita

Main food and beverages	**Measurement units**	**Periods**					
		2011	2012	2013	2014	2015	2016
Eggs	**Pieces**	264	245	247	246	262	267

Source:NIS

Figure 3. Average egg consumption/capita 2011-2016



The following tables show the significant difference between the value of imports of fresh and preserved eggs and that of exports. The value of imports is much higher than that of exports, this confirming Romania's deficit to ensure its self-consumption.

Table 4. Value of import

Bird eggs in bark, fresh, preserved or cooked	**Periods**					
	2011	**2012**	**2013**	**2014**	**2015**	**2016**
	Th. EURO	Th. EURO	Th. EURO	Th. EURO	Th. EURO	Th. EURO
	24375	18115	19719	21779	26602	24751

Source: NIS

Figure 4. Value of import (th.euro)

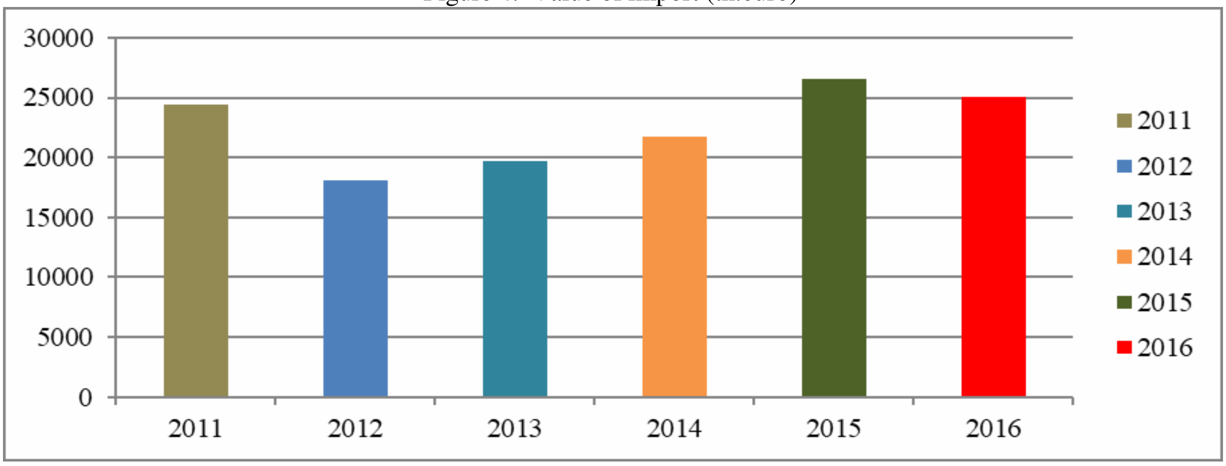
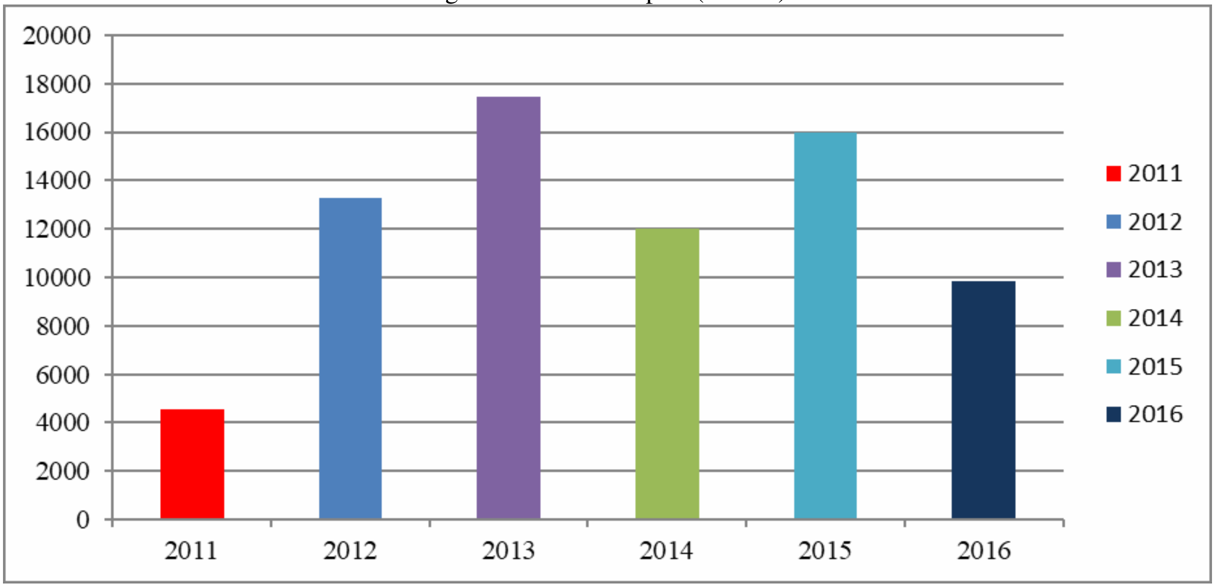


Table 5. Value of export

Poultry eggs in bark, fresh, preserved or cooked	**Years**					
	2011	2012	2013	2014	2015	2016
	Th. EURO	Th. EURO	Th. EURO	Th. EURO	Th. EURO	Th. EURO
	4568	13294	17433	11998	15970	9795

Source: NIS

Figure 5. Value of export (th.euro)



CONCLUSIONS

The egg is a particularly valuable product for human nutrition due to its richness in nutrients indispensable to the body and to the high degree of assimilation of the nutrients in its composition, the digestibility coefficient being between 80-95%.

The largest production of hen eggs in the period (2011-2016) was recorded in 2014, namely 6636 million pieces, and the smallest in 2011, registered 6182 million pieces in 2016.

In the studied report we observed an obvious increase in terms of price dynamics, namely in 2011 the price was 0.46 lei / pc and in 2016 0.51 lei / pc.

Annual average consumption declined in 2015 compared to 2011 due to the high price of eggs.

From the point of view of imports and exports of eggs, the value of imports is much higher than that of exports, which confirms the deficit of Romania to ensure its self-consumption.

The market for fresh eggs in Romania is heavily affected by seasonality, while sales in the retail sector almost doubled in the cold season, compared to the other months of the year, when in rural areas the eggs produced in the peasant farms are consumed.

Among the top five players in terms of volume, besides International Agricola and Toneli Holding, we find local producers such as Aviputna (which produces egg for consumption under the brand "From the yard") and Avicola Bucharest, as well as Fermy Drobiu Wozniak, one of the largest egg producers in Poland. These, together with retailers' own brands, hold 85% of the market.

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SECTION 3

RURAL DEVELOPMENT AND AGRICULTURAL POLICIES

STANDARD COSTS FOR SOWING AND MAINTENANCE WORKS IN VEGETABLE CROPS IN THE PLAIN, HILLY, MOUNTAINS AREA

VLAD MIHAELA CRISTINA[1]

Summary: *the paper presents the partial results obtained on the basis of the scientific researches carried out under the project "Specific cost-specific calculations for different types of agricultural holdings and profiles in the context of accessing the support of the NRDP 2014-2020". The project is financed by contract no. 1313 / 2015-2018, by the ADER research program of the Ministry of Agriculture and Rural Development. The standard costs for sowing, fertilizing, pruning, herbicide, phytosanitary treatments, depending on the crop area, type of farm, tractor power, and aggregate are highlighted.*

Key words: *standard costs, agricultural holdings*

JEL Classification: *O13, O38*

INTRODUCTION

The standard costs of the multi-annual research project, which includes standard cost calculations for different types of farm and profile (plain, hill, mountain), meet the need to diversify agricultural production, improve economic performance, and market orientation, application of public policy facilities at the level of small farms, family farms and their associations.

Small holdings are generally decapitalized, can not provide a high degree of mechanization of technologies, growers resorting to services for certain mechanical works, crop maintenance steps being carried out, in most cases, with simple or even manual mechanical means. The labor force is usually represented by family members and sometimes by staff temporarily employed to meet the need for work during peak periods.

Family associations specialized in certain areas of agricultural production have a much higher level of technical means.

In small agricultural holdings two specific categories of agricultural activities are distinguished:

- activities that occupy about ¼ ha, amounting to a large number of crops (vegetables, fruits, aromatic plants) spread over small areas, which are generally placed around the household and are mainly intended for their own consumption;

- activities that may predominantly target the market, on surfaces of minimum 0,3 ha, with a varied structure of crops (wheat, corn, potatoes, trees, vineyards, perennial crops). Due to the low technical level and the lack of specialized knowledge, efficient use of local resources is not ensured.

MATERIALS AND METHODS

In the context of the objectives of the National Agricultural and Rural Development Strategy for 2014-2020 and of the Code of Good Agricultural Practice, starting from Law 37/2015 and the situation of the tractor and agricultural machinery fleet existing on 31.12.2014, it was estimated costs for sowing and maintenance of different crops by types of holdings (subsistence farms, semi-subsistence farms, small farms, medium holdings, large farms) for the plain, hill and mountain area. These were obtained on the basis of a study on: sowing and maintenance works on the main crops (large crops, fodder crops, vegetable crops), in line with the existing technologies at the forests; Aggregate Production and Consumption Standards; mechanic's tariffs; the cost of fuel and lubricants; wear of aggregates. The production rules and fuel consumption have been calculated according to: tractor power, mechanized work, average work speeds, theoretical working widths,

[1] Ph.D Researcher Research Institute for Agriculture Economy and Rural Development, Mărăşti 61 sctor 1, Bucharest, email: cristina.vlad@iceadr.ro

tractor load, slope. The mechanized tariffs were obtained depending on the degree of difficulty and complexity of the mechanized work.

RESULTS AND DISCUSSIONS

Standard costs for mechanized sowing and crop maintenance work, depending on tractor power, agricultural machinery, type of holding, are highlighted in the following tables:

PLAIN AREA
SOW 2-8 CM IN MEDIUM SOIL

Wide powers tractors (HP)	Tractor power (HP)	Agricultural machine	UM	Working capacity (ha/h)	Diesel consumption (l/ha)	Mechanized costs/work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair costs	Subtotal	Other costs	Total
Subsistence farms												
≤ 45	45	Drill 21 rows	Ha	0,85	5,95	36,47	32,77	3,27	0,30	72,81	3,64	76,45
Semi-subsistence farms												
46 ÷ 80	46	Drill 21 rows	Ha	1,57	5,52	19,75	30,40	3,04	0,28	53,46	2,67	56,13
46 ÷ 80	80	Drill 29 rows	Ha	2,30	7,07	13,48	38,94	3,89	0,35	56,66	2,83	59,49
SMALL holding												
parcel length <250												
81 ÷ 120	81	Drill 29 rows	Ha	2,42	8,26	12,83	45,50	4,54	0,41	63,29	3,16	66,45
81 ÷ 120	120	Drill 48 rows	Ha	5,38	8,79	5,76	48,42	12,13	0,44	66,75	3,34	70,09
MEDIUM farms												
250-500 m long plot												
121 ÷ 200	121	Drill 48 rows	Ha	6,55	9,29	4,73	51,17	12,82	0,46	69,19	3,46	72,64
121 ÷ 200	200	Drill 72 rows	Ha	11,30	10,57	2,74	58,22	16,49	0,53	77,98	3,90	81,88
BIG farms												
parcel length> 800 m												
201 ÷ 360	201	Drill 72 rows	Ha	15,6	12,09	1,99	1,31	66,59	18,86	0,60	88,04	4,40
201 ÷ 360	360	Drill 120rows	Ha	27,41	13,08	1,13	1,41	72,04	24,07	0,65	97,90	4,89

Source: own calculations

SOW 2-8 CM IN MEDIUM SOIL

Wide powers tractors (HP)	Tractor power (HP)	Agricultural machine	UM	Working capacity (ha/h)	Diesel consumption (l/ha)	Mechanized costs/work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair costs	Subtotal	Other costs	Total
Subsistence farms												
≤ 45	45	Drill 4 sections	Ha	1,12	4,51	27,68	24,84	2,30	1,24	56,06	2,80	58,86
Semi-subsistence farms												
46 ÷ 80	46	Drill sections 6	Ha	1,76	2,86	17,61	15,75	1,57	0,79	35,73	1,79	37,51
46÷ 80	80	Drill 8 sections	Ha	3,58	4,54	8,66	25,01	2,72	1,25	37,64	1,88	39,52
SMALL farms												
parcel length <250												
81÷120	81	Drill 9 sections	Ha	4,49	4,91	6,90	27,04	3,14	1,35	38,44	1,92	40,36
81÷120	120	Drill 12 sections	Ha	7,53	6,27	4,12	34,54	4,33	1,73	44,71	2,24	46,94
MEDIUM farms												
250-500 m long plot												
121÷200	121	Drill 12 sections	Ha	9,17	6,63	3,38	36,52	4,57	1,83	46,30	2,31	48,61
121÷200	200	Drill 16 sections	Ha	14,06	8,5	2,20	46,82	4,68	2,34	56,04	2,80	58,84
BIG farms												
parcel length> 800 m												
201÷360	201	Drill 18 sections	Ha	20,63	8,64	1,50	47,59	4,75	2,38	56,22	2,81	59,03
201÷360	360	Drill 24 sections	Ha	30,69	11,68	1,01	64,33	7,48	3,22	76,04	3,80	79,84

Source: own calculations

PHYTOSANITARY TREATMENTS

Wide powers tractors (HP)	Tractor power (HP)	Agricultural machine	UM	Working capacity (ha/h)	Diesel consumption (l/ha)	Mechanized costs/work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair costs	Subtotal	Other costs	Total
Subsistence farms												
≤ 45	45	sprayer 12 nozzles	Ha	1,07	1,7	28,97	9,36	0,82	0,47	39,62	1,98	41,60
Semi-subsistence farms												
46 ÷ 80	46	sprayer 24 nozzles	Ha	3,56	0,9	8,71	4,96	0,58	0,25	14,49	0,72	15,21
46 ÷ 80	80	sprayer 32 nozzles	Ha	5,27	1,22	5,88	6,72	0,74	0,34	13,68	0,68	14,37
SMALL farms												
parcel length <250												
81 ÷ 120	81	sprayer 32 nozzles	Ha	6,65	1,32	4,66	7,27	0,81	0,36	13,10	0,65	13,75
81 ÷ 120	120	sprayer 40 nozzles	Ha	10,35	1,8	3,00	9,91	0,92	0,50	14,32	0,72	15,04
MEDIUM farms												
250-500 m long plot												
121 ÷ 200	121	sprayer 40 nozzles	Ha	13,31	2	2,33	11,02	1,02	0,55	14,92	0,75	15,66
121 ÷ 200	200	sprayer 56 nozzles	Ha	19,76	2,3	1,57	12,67	1,22	0,63	16,09	0,80	16,89
BIG farms												
parcel length> 800 m												
201 ÷ 360	201	sprayer 60 nozzles	Ha	28,93	2,44	1,07	13,44	1,56	0,67	16,74	0,84	17,58
201 ÷ 360	360	sprayer 72 nozzles	Ha	37,62	3,75	0,82	20,66	2,48	1,03	24,99	1,25	26,24

Source: own calculations

FERTILIZED

Theoretical tractor power (HP)	Agricultural machine for transport	Diesel consumption (l/ha)	Productivity (ha/h)	Mechanized costs/work	Cost of fuel and lubricants	Wear aggregate	Repair costs	Subtotal	Other costs	Total
65	Machine run-time amendments <3000 kg/ha	2,5	3,66	8,470	13,77	1,25	0,69	24,18	1,21	25,39
65	Machine run-time amendments 3000-5000 kg/ha	3,4	3,41	9,091	18,73	1,70	0,94	30,45	1,52	31,98
65	Machine run-time amendments 5000-7000 kg/ha	5,5	3,24	9,568	30,29	2,75	1,51	44,13	2,21	46,33
65	Machine run-time amendments crystallized <200 kg/ha	1	11,62	2,668	5,51	0,50	0,28	8,95	0,45	9,40
65	Machine run-time amendments crystallized 200-300 kg/ha	1,3	10,15	3,054	7,16	0,65	0,36	11,22	0,56	11,78
65	Machine run-time amendments crystallized 300-400 kg/ha	1,6	9,64	3,216	8,81	0,80	0,44	13,27	0,66	13,93
65	Machine run-time amendments granulated <200 kg/ha	0,72	16,6	1,867	3,97	0,36	0,20	6,39	0,32	6,71
65	Machine run-time amendments granulated 200-300 kg/ha	0,85	14,35	2,160	4,68	0,43	0,23	7,50	0,38	7,88
65	Machine run-time amendments granulated 300-400 kg/ha	1,1	12,76	2,429	6,06	0,55	0,30	9,34	0,47	9,81

Source: own calculations

CUTTING AND FERTILIZED

Wide powers tractors (HP)	Tractor power (HP)	Agricultural machine	UM	Working capacity (ha/h)	Diesel consumption (l/ha)	Mechanized costs/work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair costs	Subtotal	Other costs	Total
Subsistence farms												
≤ 45	45	Growing 1,6 m	Ha	0,51	5,44	55,39	29,96	2,72	1,50	89,57	4,48	94,05
Semi-subsistence farms												
46 ÷ 80	46	Growing 2,3 m	Ha	0,95	4,01	29,74	22,09	2,05	1,10	54,97	2,75	57,72
46 ÷ 80	80	Growing 4,2 m	Ha	2,04	4,06	13,85	22,36	2,19	1,12	39,52	1,98	41,50
SMALL farms												
parcel length <250												
81÷120	81	Growing 4,2 m	Ha	2,15	4,22	13,14	23,24	2,28	1,16	39,82	1,99	41,82
81÷120	120	Growing 4,5 m	Ha	2,91	6,65	9,71	36,63	3,62	1,83	51,79	2,59	54,37
MEDIUM farms												
250-500 m long plot												
121 ÷ 200	121	Growing 4,5 m	Ha	3,13	6,83	9,03	37,62	3,72	1,88	52,24	2,61	54,85
121 ÷ 200	200	Growing 5,6 m	Ha	4,83	9,80	5,85	53,98	8,13	2,70	70,66	3,53	74,19
BIG farms												
parcel length> 800 m												
201÷360	201	Growing 5,6 m	Ha	5,28	10,41	5,35	57,34	8,64	2,87	74,20	3,71	77,91
201÷360	360	Growing 6,7 m	Ha	6,8	15,86	4,15	87,36	13,48	4,37	109,36	5,47	114,83

Source: own calculations

HILLY AREA
SOW 2-8 CM IN MEDIUM SOIL

Wide powers tractors (HP)	Tractor power (HP)	Agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumption (l/ha)	Mechanized costs/work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair costs	Subtotal	Other costs	Total
Subsistence farms												
<45	45	Drill 17 rows	Ha	0,8	5,49	38,75	30,24	3,02	1,51	73,52	3,68	77,20
Semi-subsistence farms												
46 ÷80	46	Drill 21 rows	Ha	0,97	5,58	31,96	30,73	3,07	1,54	67,30	3,36	70,66
46 ÷ 80	80	Drill 29 rows	Ha	1,38	7,03	22,46	38,72	3,87	1,94	66,99	3,35	70,34
SMALL farms												
parcel length <250												
81 ÷ 120	81	Drill 29 rows	Ha	1,94	8,60	15,98	47,37	4,73	2,37	70,45	3,52	73,97
81 ÷ 120	120	Drill 48 rows	Ha	4,15	8,85	7,47	48,75	12,21	2,44	70,87	3,54	74,41
MEDIUM farms												
250-500 m long plot												
121 ÷ 200	121	Drill 48 rows	Ha	5,47	9,51	5,67	52,38	13,12	2,62	73,79	3,69	77,48
121 ÷ 200	200	Drill 72 rows	Ha	8,66	10,15	3,58	55,91	15,83	2,80	78,12	3,91	82,02
BIG farms												
500-800 m long plot												
201 ÷ 360	201	Drill 72 rows	Ha	10,94	10,37	2,83	57,12	16,18	2,86	78,98	3,95	82,93
201 ÷ 360	360	Drill 120 rows	Ha	18,95	11,07	1,64	60,97	20,37	3,05	86,03	4,30	90,33

Source: own calculations

SOW 2-8 CM IN MEDIUM SOIL

Wide powers tractors (HP)	Tractor power (HP)	Agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumption (l/ha)	Mechanized costs/ work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair	Subtotal	Other costs	Total
Subsistence farms												
<45	45	Drill 4 sections	Ha	0,86	5,15	36,05	28,37	7,78	1,42	73,61	3,68	77,29
Semi-subsistence farms												
46÷80	46	Drill 6 sections	Ha	1,29	5,90	24,03	32,50	3,25	1,62	61,40	3,07	64,47
46÷80	80	Drill 8 sections	Ha	3,49	5,98	8,88	32,94	3,59	1,65	47,06	2,35	49,41
SMALL farms												
parcel length <250												

81÷120	81	Drill 9 sections	Ha	4,85	6,19	6,39	34,09	3,96	1,70	46,15	2,31	48,46
81÷120	120	Drill 12 sections	Ha	6,98	7,15	4,44	39,38	4,93	1,97	50,73	2,54	53,26
MEDIUM farms												
250-500 m long plot												
121÷200	121	Drill 12 sections	Ha	8,36	7,23	3,71	39,82	4,99	1,99	50,51	2,53	53,04
121÷200	200	Drill 16 sections	Ha	11,62	8,61	2,67	47,42	4,74	2,37	57,20	2,86	60,06
BIG farms												
500-800 m long plot												
201÷360	201	Drill 18 sections	Ha	19,15	8,77	1,62	48,31	4,82	2,42	57,16	2,86	60,02
201÷360	360	Drill 24 sections	Ha	26,33	11,65	1,18	64,17	7,46	3,21	76,01	3,80	79,81

FERTILIZED

Theoretical tractor power (hp)	Agricultural machine for transport	Diesel fuel consumption (l/ha)	Productivity (ha/h)	Mechanized costs/work	Cost of fuel and lubricants	Wear	Repair	Subtotal	Other costs	Total
65	amendments to the standard car administered <3000 kg/ha	2,725	3,111	9,96	15,01	1,36	0,75	27,09	1,35	28,44
65	run-time machine amendments 3000-5000 kg/ha	3,706	3,111	9,96	20,41	1,85	1,02	33,25	1,66	34,91
65	run-time machine amendments 5000-7000 kg/ha	5,995	3,111	9,96	33,02	3,00	1,65	47,63	2,38	50,02
65	run-time machine crystallized amendments <200 kg/ha	1,09	9,877	3,14	6,00	0,55	0,30	9,99	0,50	10,49
65	machine run-time amendments crystallized 200-300 kg/ha	1,417	9,877	3,14	7,80	0,71	0,39	12,04	0,60	12,64
65	machine run-time amendments crystallized 300-400 kg/ha	1,744	9,877	3,14	9,61	0,87	0,48	14,10	0,70	14,80
65	run-time machine granular amendments <200 kg/ha	0,7848	14,11	2,20	4,32	0,39	0,22	7,13	0,36	7,48
65	run-time machine granular amendments 200-300 kg/ha	0,9265	14,11	2,20	5,10	0,46	0,26	8,02	0,40	8,42
65	run-time machine granular amendments 300-400 kg/ha	1,199	14,11	2,20	6,60	0,60	0,33	9,73	0,49	10,22

Source: own calculations

HOEING

Range tractors (HP)	Tractor power (HP)	Agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumption (l/ha)	The working capacity (ha/h)	Mechanized costs/work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair	Subtotal	Other costs	Total
Subsistence farms													
<45	45	Growing 2,3 m	Ha	0,56	4,32	1,8	55,36	23,79	2,20	1,19	82,54	4,13	86,67
Semi-subsistence farms													
46 ÷ 80	46	Growing 2,3 m	Ha	0,7	4,48	1,4	44,29	24,68	2,28	1,23	72,48	3,62	76,10
46 ÷ 80	80	Growing 4,2 m	Ha	1,55	4,58	0,6	20,00	25,23	2,34	1,26	48,82	2,44	51,26
SMALL farms													
parcel length <250													
81 ÷ 120	81	Growing 4,2 m	Ha	1,57	4,68	0,6	19, 75	25,78	2,39	1,29	49,20	2,46	51,66
81 ÷ 120	120	Growing 4,5 m	Ha	1,94	6,93	0,5	15, 98	38,17	3,53	1,91	59,59	2,98	62,57
MEDIUM farms													
250-500 m long plot													
121 ÷ 200	121	Growing 4,5 m	Ha	2,39	7,05	0,4	12,97	38,83	3,60	1,94	57,34	2,87	60,21
121 ÷ 200	200	Growing 5,6 m	Ha	3,71	10,12	0,3	8,36	55,74	5,16	2,79	72,05	3,60	75,65
BIG farms													
500-800 m long plot													
201 ÷ 360	201	Growing 5,6 m	Ha	4,68	10,29	0,2	6,62	56,68	5,25	2,83	71,38	3,57	74,95
201 ÷ 360	360	Growing 6,7 m	Ha	6,11	15,83	0,2	5,07	87,19	8,07	4,36	104,70	5,23	109,93

Source: own calculations

HERBICIDE

Range tractors (HP)	Tractor power (HP)	Agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumption (l/ha)	The working capacity (ha/h)	Mechanized costs/work	Cost of fuel and lubricants lei/ha	Wear aggregate	Repair costs	Subtotal	Other costs	Total
Subsistence farms													
<45	45	Sprayer 12 nozzles	Ha	1,01	1,6	0,99	30,69	8,81	0,77	0,44	40,71	2,04	42,75
Semi-subsistence farms													
46 ÷ 80	46	Sprayer 24 nozzles	Ha	3,1	0,93	0,32	10,00	5,12	0,45	0,26	15,82	0,79	16,62
46 ÷ 80	80	Sprayer 32 nozzles	Ha	4,74	1,28	0,21	6,54	7,05	0,61	0,35	14,56	0,73	15,29
SMALL farms													
parcel length <250													
81 ÷ 120	81	Sprayer 32 nozzles	Ha	5,75	1,46	0,17	5,39	8,04	0,70	0,40	14,54	0,73	15,26
81 ÷ 120	120	Sprayer 40 nozzles	Ha	9,31	2,03	0,11	3,33	11,18	0,97	0,56	16,04	0,80	16,85
MEDIUM farms													
250-500 m long plot													
121 ÷ 200	121	Sprayer 40 nozzles	Ha	11,86	2,14	0,08	2,61	11,79	1,03	0,59	16,02	0,80	16,82
121 ÷ 200	200	Sprayer 56 nozzles	Ha	17,89	2,49	0,06	1,73	13,71	1,20	0,69	17,33	0,87	18,20
BIG farms													
500-800 m long plot													
201 ÷ 360	201	Sprayer 60 nozzles	Ha	25,86	2,51	0,04	1,20	13,83	1,20	0,69	16,92	0,85	17,77
201 ÷ 360	360	Sprayer 72 nozzles	Ha	33,29	3,83	0,03	0,93	21,10	1,84	1,05	24,92	1,25	26,17

Source: own calculations

MOUNTAIN AREA
SOW 2-8 CM IN MEDIUM SOIL

Range Tractors (HP)	Tractor power (HP)	Agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumption (l/ha)	Mechanized costs/ work	Cost of fuel and lubricants	Wear aggregate	Repair costs	Sub total	Other costs	Total
Subsistence farms												
<45	45	Drill 4 sections	Ha	0,57	5,15	54,39	28,37	2,83	1,42	87,00	4,35	91,35
Semi-subsistence farms												
46 ÷ 80	46	Drill 6 sections	Ha	0,77	5,90	40,26	32,50	3,25	1,62	77,63	3,88	81,51
46 ÷ 80	80	Drill 8 sections	Ha	2,39	5,98	12,97	32,94	3,59	1,65	51,14	2,56	53,70
Small farms												
parcel length <250												
81 ÷ 120	81	Drill 9 sections	Ha	3,47	6,19	8,93	34,09	3,96	1,70	48,69	2,43	51,13
81 ÷ 120	120	Drill 12 sections	Ha	5,21	7,15	5,95	39,38	4,93	1,97	52,23	2,61	54,85
MEDIUM farms												
250-500 m long plot												
121 ÷ 200	121	Drill 12 sections	Ha	6,52	7,23	4,75	39,82	4,99	1,99	51,56	2,58	54,14
121 ÷ 200	200	Drill 16sections	Ha	9,11	8,61	3,40	47,42	4,74	2,37	57,93	2,90	60,83
BIG farms												
parcel length> 500m												
201 ÷ 360	201	Drill 18sections	Ha	0,07	8,77	2,04	48,31	4,82	2,42	57,59	2,88	60,47
201 ÷ 360	360	Drill 24sections	Ha	0,05	11,65	1,48	64,17	7,46	3,21	76,32	3,82	80,13

Source: own calculations

SOW 2-8 CM IN MEDIUM SOIL

Range Tractors (HP)	Tractor power (HP)	Agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumptionl (l/ha)	Mechanized costs/work	Cost of fuel and lubricants	Wear aggregate	Repair costs	Sub total	Other costs	Total
Subsistence farms												
<45	45	Drill 17 rows	Ha	0,72	5,49	43,06	30,24	2,80	1,51	77,61	3,88	81,49
Semi-subsistence farms												
46 ÷ 80	46	Drill 21 rows	Ha	0,85	5,58	36,47	30,73	3,07	1,54	71,81	3,59	75,40
46 ÷ 80	80	Drill 29 rows	Ha	1,19	7,03	26,05	38,72	3,87	1,94	70,57	3,53	74,10
SMALL farms												
parcel length <250												
81 ÷ 120	81	Drill 29 rows	Ha	1,49	8,60	20,81	47,37	4,73	2,37	75,27	3,76	79,04
81 ÷ 120	120	Drill 48 rows	Ha	3,31	8,85	9,37	48,75	12,21	2,44	72,76	3,64	76,40
MEDIUM farms												
250-500 m long plot												
121 ÷ 200	121	Drill 48 rows	Ha	4,21	9,51	7,36	52,38	13,12	2,62	75,49	3,77	79,26

Range Tractors (HP)	Tractor power (HP)	Agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumptionl (l/ha)	Mechanized costs/work	Cost of fuel and lubricants	Wear aggregate	Repair costs	Sub total	Other costs	Total
121 ÷ 200	200	Drills 72 rows	Ha	6,66	10,15	4,65	55,91	15,83	2,80	79,19	3,96	83,15
BIG farms												
parcel length> 500m												
201 ÷ 360	201	Drill 72 rows	Ha	8,59	10,37	3,61	57,12	16,18	2,86	79,76	3,99	83,75
201 ÷ 360	360	Drill 120 rows	Ha	14,94	11,07	2,07	60,97	20,37	3,05	86,47	4,32	90,79

Source: own calculations

FERTILIZE

Tractor power (hp)	Agricultural machine transport	Diesel fuel consumption (l/ha)	Productivity (ha/h)	Mechanized costs/work	Cost of fuel and lubricants	Wear aggregate	Repair costs	Subtotal	Other costs	Total
65	amendments to the standard car administered <3000 kg / ha	2,975	2,745	11,29	16,39	1,49	0,82	29,99	1,50	31,49
65	run-time machine amendments 3000-5000 kg / ha	4,046	2,745	11,29	22,29	2,02	1,11	36,72	1,84	38,55
65	run-time machine amendments 5000-7000 kg / ha	6,545	2,745	11,29	36,05	3,27	1,80	52,42	2,62	55,04
65	run-time machine crystallized amendments <200 kg / ha	1,19	8,715	3,56	6,55	0,60	0,33	11,03	0,55	11,59
65	machine run-time amendments crystallized 200-300 kg / ha	1,547	8,715	3,56	8,52	0,77	0,43	13,28	0,66	13,94
65	machine run-time amendments crystallized 300-400 kg / ha	1,904	8,715	3,56	10,49	0,95	0,52	15,52	0,78	16,30
65	run-time machine granular amendments <200 kg / ha	0,8568	12,45	2,49	4,72	0,43	0,24	7,87	0,39	8,27
65	run-time machine granular amendments 200-300 kg / ha	1,0115	12,45	2,49	5,57	0,51	0,28	8,85	0,44	9,29
65	run-time machine granular amendments 300-400 kg / ha	1,309	12,45	2,49	7,21	0,65	0,36	10,71	0,54	11,25

Source: own calculations

HERBICIDE

Range Tractors (HP)	Tractor power (HP)	agricultural machine	UM	The working capacity (ha/h)	Diesel fuel consumption (l/ha)	Mechanized costs/ work	Cost of fuel and lubricants	Wear aggregate	Repair costs	Subtotal	Other costs	Total
Subsistence farms												
<45	45	sprayer 12 nozzles	Ha	0,91	1,77	34,07	9,75	0,85	0,49	45,15	2,26	47,41
Semi-subsistence farms												
46 ÷ 80	46	sprayer 24 nozzles	Ha	2,73	1,01	11,36	5,56	0,65	0,28	17,84	0,89	18,74
46 ÷ 80	80	sprayer 32 nozzles	Ha	3,94	1,34	7,87	7,38	0,82	0,37	16,44	0,82	17,26
SMALL farms												
parcel length <250												
81 ÷ 120	81	sprayer 32 nozzles	Ha	4,85	1,55	6,39	8,54	0,95	0,43	16,30	0,82	17,12
81 ÷ 120	120	sprayer 40 nozzles	Ha	7,96	2,17	3,89	11,95	1,11	0,60	17,55	0,88	18,43
MEDIUM farms												
250-500 m long plot												
121 ÷ 200	121	sprayer 40 nozzles	Ha	10,17	2,27	3,05	12,50	1,16	0,63	17,33	0,87	18,20
121 ÷ 200	200	sprayer 56 nozzles	Ha	14,81	2,58	2,09	14,21	1,37	0,71	18,38	0,92	19,30
BIG farms												
parcel length> 500m												
201 ÷ 360	201	sprayer 60 nozzles	Ha	21,91	2,62	1,41	14,43	1,68	0,72	18,24	0,91	19,16
201 ÷ 360	360	sprayer 72 nozzles	Ha	27,93	3,96	1,11	21,81	2,61	1,09	26,63	1,33	27,96

Source: own calculations

CONCLUSIONS

Using the standard costs for sowing and maintenance of vegetable crops by agricultural producers wishing to access public funds in the sessions of the National Rural Development Program 2014-2020, it is aimed at: simplifying the access of support to investment measures in the agricultural field and streamlining the use of public funds; modernizing and increasing the viability of agricultural holdings through their consolidation, openness to the market and processing of agricultural products; Encourage rejuvenation of farmers' generations by supporting the setting up of young farmers.

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ASPECTS OF THE TOURISM MARKET DEVELOPMENT IN THE DOBRUDGEAN RURAL AREA

ELENA SIMA[1]

Abstract. *The rural area from Dobrudgea has an extensive and highly diversified tourism potential. The main tourist attractions are represented by: natural resources – such as spas and balneo-climateric resorts; religious heritage; cultural and historical heritage; ethnographic and gastronomy elements. The tourism infrastructure in these rural areas is well represented by a good rage of accommodation structures such as small budget hotels or B&Bs. However, by comparison, there are very few leisure and service supply structures such as entertainment facilities, bars, restaurants, theatres, cinemas or shopping facilities. In this context, the objective of this paper is to highlight some of the main characteristics or aspects that characterise the rural tourism market development in the Dobrudgean rural area. The methodology used is based on secondary data analyses under the form of a synthesis of information from articles and studies published in specialty journals, in Government documents as well as in other development strategies dedicated to tourism and the rural space. The findings of this scientific research study argues that the successful rural tourism promotion and development very much depends on an efficient and sustainable exploitation of the existing tourism potential, on the development of a viable network of private small and medium-sized enterprises in the tourism sector and also on the involvement of governmental and non-governmental institutions.*

Keywords: *rural space; rural tourism market; tourism activities, Dobrudgea*.

JEL Classification: *R20, L83*.

INTRODUCTION

Essential component of rural development policy, rural tourism is perceived as a priority for the continuous and sustainable development of the rural community, as well as the preservation of the rural landscape and its heritage. It holds great potential in re-launching the economy of rural communities (as occupational alternative for the rural labour force, a way to diversify the economic activities in the rural environment and a way to stabilise and employ long term the rural population). Rural tourism also holds an important place in the overall Romanian tourism development plan. The aspiration is that rural tourism can provide high quality accommodation, comfort, and entertainment. The desire is to develop the rural festivals and events branch of rural tourism, as well as sporting activities and other engaging activities for the tourist. The ideal rural tourism development would encourage the local population to actively engage with these activities and foster a long term, lasting relationship with the tourist (1,2,5).

In Romania, the development and promotion of touristic activities in the rural space was intensified through the implementation of various European Union programmes. These programmes were mainly a source of financing and focused on several aspects:

- to increase, improve and diversify the small-scale tourism accommodation facilities and private investments in the leisure tourism infrastructure;
- to develop the information and promotion tourism centres and to improve and diversify the tourism services connected with the rural tourism through the elaboration of promotion and information materials, orientation, counselling and training in the entrepreneurial and non-agricultural domain granted to the inhabitants in the rural environment;
- to develop the local on-line biking systems for the rural tourism accommodation facilities within the rural area connected at regional and national systems. (4,6,15)

The paper explores how the Dobrugean rural tourism market was approached in tourism policies between 2007-2013; how the rural economy reacted and developed due to the sustained promotion and development of rural tourism; and how it can further develop and help rural communities in the Dobrugean area.

[1] Scientific researcher, PhD, Institute of Agricultural Economics, Romanian Academy, Bucharest, e-mail: elena.sima2008@yahoo.com;

MATERIAL AND METHOD

The methodology adopted for this study consists of secondary data analysis. Secondary data is data that was previously collected and processed and has been reanalysed to satisfy the needs of this study. The analysed information was collected through the documentary study of the works on the approached theme. The statistical data on which the analysis was based were at two counties level: Constanța and Tulcea. They covered the period 2006-2017 and had the following sources: NIS statistical data available online – www.TEMPO-online, other online sources with information from articles and studies published in specialty magazines, as well as the National Rural Development Plan (NRDP) 2007-2013 and non-governmental reports and documents.

The paper contains a brief characterization of the touristic activity in the rural area, in Jurilovca and Murighiol - rural localities in Tulcea county and Costinești and Limanu- rural localities in Constanta county (table 1).

Table 1. List of rural localities statistically monitored from the touristic activity point of view

Crt. no.	Tulcea County	Constanța County
1	Baia	23 August
2	Bestepe	Agigea
3	C.A. Rosetti	Corbu
4	Chilia Veche	Costinești
5	Crișan	Horia
6	Jurilovca	Limanu
7	Mahmudia	Mihail Kogalniceanu
8	Maliuc	Oltina
9	Murighiol	Saligny
10	Nufăru	Seimeni
11	Sfântu Gheorghe	Tuzla
12	Somova	Valu Traian
13	Valea Nucarilor	-

Source: Tempo-online database, 2018, http://www.insse.ro/

The main tourism activity indicators are analysed: the tourism reception structure, the tourism accommodation capacity, arrivals and overnight stays of tourists, both per total county and by rural areas. On the basis of these synthetic indicators the net utilization index of the tourist accommodation capacity in operation was calculated, according to the following formula:

$$I_n = (N / C_f) \times 100,$$

where: I_n is the net utilization index of the tourism accommodation capacity in operation; N is the number of overnight stays in a certain period; C_f is the tourist accommodation capacity in operation. This index was calculated both at county level and by rural localities with touristic activity situated in the Danube Delta and on the Black Sea shore.

RESULTS AND DISCUSSIONS

In the period 2007-2013, the field of *rural tourism* was financially supported within the National Rural Development Plan (NRDP), through Axis 3: Axis 3: “The improvement of life quality in the rural areas and rural economy diversification”, Measure 313 “Encouragement of tourism activities”. The investment supported through the measure 313 of NRDP, was completed by the SOP HRD (POS DRU) 2007-2013 regarding the orientation, counselling and training in the entrepreneurial and non-agricultural sector granted to the inhabitants in the rural area, especially to those coming from an agricultural background (15).

The general objective of the Measure: 313 was the development of touristic activities in rural zones, which could contribute to the increase of jobs' number and to alternative incomes, as well as to the rural space attractivity (11,9).

The financial support granted through this measure had in view investments in:

- the infrastructure of touristic reception and leisure activities (in which there are registered also actions regarding the constructions, modernization, expansion and endowment of the touristic reception structures and private investments in the touristic infrastructure for leisure, independent or dependent on the touristic reception structure),

- the small-scale infrastructure (as well as the centres for touristic information, guide marks arrangements/touristic routes etc.),

- development and/or marketing of touristic services connected to the rural tourism (elaboration of promotional materials, information, etc.).

According to article 55 of the Regulation (EC) 1974/2006 for all the types of actions regarding the elaboration of promotional leaflets for promoting tourist activities such as first publication of leaflets, billposter etc., The general costs related to the project will be supported, such as: purchasing of machinery hard-ware, soft-ware inclusively their purchasing in leasing, the installation work and assemblage, the general costs for drawing up the project such as expenditure representing the architects', engineers' and consultants', fees, feasibility studies/justifying memoir, taxes for issue certificates, clearances and authorisations which are necessary for the project implementation, as stated in the national legislation, purchase of patents and licenses, up to 10% from project eligible value and up to 5% for the project which not includes construction (15).

The activity of rural tourism and agro-tourism is being promoted by the National Association of Rural, Ecological and Cultural Tourism (ANTREC) – Bucharest, which publishes catalogues and booklets, international and national use booklets. The catalogues published are respecting the EUROGÎTES codifications regarding the pictographs for each touristic and agro-touristic boarding house. The promotion of the rural touristic supply is realised through the exhibitions and the National Tourism Fair in Romania, where ANTREC, with its branches participates with local handcrafts and trades. Also, ANTREC is present at all fairs and international tourism stock exchanges (10).

The promoted touristic and agro-tourism boarding houses are situated in the *Danube Delta* - one of the best known touristic destinations of Romania, geographically made of three types of areals: low (Danube Delta and Meadow), lagoons (Razim-Sinoie complex) and coasts (the South-Dobrudgean seashore of the Bloack Sea), on the *Black Sea Shore* - laid on 245 km, between the grind Chituc-the gulf Musura at the border with Ukraine and the locality: Vama Veche at the border with Bulgaria, as well as in the continental zone of Dobrudgea - less known to the tourists, characterized by the specialists by the notion of „structural and stones mosaic", with a specific bio-climate and many protected areas, from North to South (3, 12, 13).

Danube Delta is one of our greatest museums, a morpho-hydrographic and biological laboratory, where all is labile and in search of balance, an open and fragile system, a touristic region of national and international interest, a natural unity, where Man's hand and mind entered in the genesis charm, in his use or detriment, but also Nature's (7).

Before 1990, Danube Delta was an important touristic region of our country, both for the internal circulation, and for the foreign tourism. There used to be a good will for the German tourists (mainly for the Eastern ones). The best appreciated touristic forms were the nautical tourism (the trips by boat and kayak downstream Tulcea) or the stationary tourism (at the touristic base from Lacul Roşu). Besides the main routes (The Danube's arms and some canals) necessary for the link with the human dwellings and economic exploitation of the natural, agricultural, forestry and fishery resources, in the Danube Delta there are other areas for leisure and touristic routes for trips regarded by the Administrative Council of the Reservation.

At present, in the Danube Delta, the touristic forms knowing a real success are: the rural tourism, agro-tourism and eco-tourism with accommodation at the local people. The most frequented localities are: Crişan and Maliuc situated along the Sulina Arm, localities: Nufăru, Mahmudia and Murighiol situated along the Sfântu Gheorghe Arm, as well as the Jurilovca locality situated on the bank of Razim Lake. In touristic purposes it is used for its helio-marine potential of the Sea beaches from Sulina, Sfântu Gheorghe and Gura Portiţei.

The tourism development of the South-Dobrudgean shore region started at the end of the XIX-th century and start of the XX-th, with the balneary climatic stations: Eforie, Techirghiol, Mamaia and Mangalia (8). The housing capacity and touristic arrangements have increased in a considerable way during the interbelic period, but mainly in the decades: 6 and 7 of the XX-th century.

Besides the housing supply in the standard network (hotels, motels, little houses, campings etc.) in the shore localities a real dwelling industry developed under boarding house system, mainly in the rural settlements: Schitu, Costineşti, 2 Mai and Vama Veche. This system perpetuated also after the year 1990, being accompanied by an ample development of the constructions of boarding house type in the private sector. Thus, on localities' list there were added new names as: Corbu, Năvodari, Mamaia-Sat, Lazu, Agigea, Tuzla, 23 August, Limanu.

During the last years, besides the season and balneary tourism, the changes of behavioural type at the level of the customers in tourism have reduced the importance of the mass tourism organized in favour of other forms, as: *the transit tourism, of week-end or professional, scientific, of business, cultural and sports*.

În Tulcea County, five of the rural localities with touristic activity are situated in the Danube Delta (Sfântu Gheorghe, C.A. Rosetti, Chilia Veche, Crişan and Maliuc), and the access is navaly ensured on the three Danube Arms: Chilia, Sulina and Sfântu Gheorghe. The other rural localities with touristic activity are in the limitrophe zone to the Delta and have access on the modernized county roads.

In Constanța County, six of the rural localities with touristic activity are situated on the Black Sea Bank (Corbu, Agigea, Tuzla, Costinești, 23 August and Limanu with the villages 2 Mai and Vama Veche), four are situated on the right bank of the Danube River (Oltina, Saligny, Seimeni, Horia), and two (Valu lui Traian and Mihail Kogălniceanu) are situated at a 16 km distance respectively 27 km from Constanța municipality , the nearest town on the Black Sea Bank.

The Danube Delta was and remains an important touristic objective, both for the internal tourism, and for the foreign one. In the analysed period, most of the housing structures and the most intense touristic circulation were statistically registered in: *Murighiol* situated on the Sfântu Gheorghe Arm and *Jurilovca* situated on the bank of the Razim lake.

Constanța county has inscribed in the statistical database 12 rural localities of which six (Limanu, 23 August, Costinești, Tuzla, Agigea, Corbu) are situated in the zone of the proper touristic shore, near the stations having infrastructure for accommodation, leisure and cure. The housing capacity and the touristic arrangements in the rural localities on the Black Sea shore represent 98% of the total number of the rural touristic structures of Constanta county and is concentrated in the localities: Costinești and Limanu.

The main types of structures with functions of touristic housing, in which it is developing the touristic activity of the rural localities in the Danube Delta and from the Black Sea shore are: the hotels, touristic villas and the agro-touristic boarding houses. The number, the comfort degree and their facilities are fluctuant from year to year and from one locality to other.

From the point of view of the *touristic circulation (arrivals and beds of tourists)*, in the analysed period, the most intense touristic activity was registered in localities: Jurilovca and Murighiol from the Danube Delta and on the shore of the Black Sea in the localities: Costinești and Limanu with the villages 2 Mai and Vama Veche.

Jurilovca commune (with the villages: Jurilovca - commune residence, Sălcioara and Vișina) has lately become the biggest community of fishermen in the Delta, having a Center for fish collection and processing brought here both from the Danube's waters and from the lakes forming the lagoon complex Razim-Sinoe and from those of the Black Sea. The sustained effort of the local communities has transformed the locality also into a point of touristic attraction, the housing capacity and the tourism activity being supported by the presence of the small entrepreneurs who are administrating, starting with the year 2012, a number of 26 touristic villas, a touristic lodge and an agro-touristic boarding house()13.

The number of tourists arrived and bedded in the touristic reception structures in Lipova has increased in the last years (table 2) also due to the fact that from this locality you can reach by the little ship to Gura Portiței, a vacation village situated on the narrow land strip between Golovița lake and the Black Sea, and by car to the ruins, partially restored, of the Greek and Roman fortress: Arganum (centuries: VII bc-VI ac).

Murighiol commune is by its capacity of housing and touristic capacity (table 3) an attraction point accessible to tourists, because, very near to the village a net of canals is opening, through which you can enter the most savage and picturesque from the Danube Delta Biosphere Reservation.

Table 2. The tourism accommodation capacity and the tourism activity of Jurilovca

Years	Structures Number	The tourism accommodation capacity		The tourism accommodation activity		
		existing no. places	in use no. places-days	arrivals no.	overnight stays no. beds	utilization indices
2006	16	348	55320	1327	1368	2,5
2007	27	198	24184	3213	4455	18,4
2008	18	366	26548	9824	21534	81,1
2009	29	345	10400	2566	6776	65,2
2010	29	345	23488	4279	6952	29,6
2011	32	343	33943	4791	10357	30,5
2012	28	345	10950	1762	2992	27,3
2013	29	345	52707	9457	30060	57,0
2014	29	323	15364	7533	13326	86,7
2015	29	323	18967	6104	16731	88,2
2016	29	323	24904	7138	20976	84,3
2017	18	323	27604	5055	16520	59,8

Source: TEMPO-Online statistical database, 2018, http://www.insse.ro/

Table 3. The tourism accommodation capacity and the tourism activity of Murighiol

Years	Structures Number	The tourism accommodation capacity		The tourism accommodation activity		
		existing no. places	in use no. places-days	arrivals no.	overnight stays no. beds	utilization indices
2006	16	556	56045	7891	13618	24,3
2007	13	479	24938	7908	15235	61,1
2008	11	396	67114	9862	16534	24,6
2009	27	469	21257	5984	12432	58,5
2010	25	392	39619	4676	8569	21,6
2011	11	461	42726	3254	6579	15,4
2012	25	565	35466	3985	7763	22,0
2013	24	525	20298	1753	3682	18,2
2014	24	541	14772	3621	8109	54,0
2015	24	456	15380	3586	8388	55,0
2016	24	456	20130	2301	5267	26,2
2017	25	456	61306	8980	13322	21,7

Source: TEMPO-Online statistical data base, 2018, http://www.insse.ro/

In *Costinești locality* , tourism started in the years 1920, but it took off starting the year 1949, together with the inauguration of the first pioneers' camp and continued, ten years later, when they opened the international students' camp (with a few hundreds of blue tents along the sea front), and since the year 1966, the locality was declared as youth station. After the year 1989, Costinești was officially inscribed on the list of touristic stations of national interest, as well as on the list of balneary and climatic stations attested (in the year 2004) by the General Direction of the National Authority for Tourism within the Ministry of Transports, Constructions and Tourism, due to the beneficial climate factors and the conditions for the maintaining and improvement of the health and/or work capacity, as well as rest and relaxation (8).

Limanu commune is a locality full of life and colour, due to villages: 2 Mai, which in summer time, becomes one of the most asked for stations of the Romanian shore and: Vama Veche, which became a touristic brand of national importance with a unique resonance space of freedom and harmony with nature. The main attraction of the two mini-stations is the closeness to nature, the simple free spirited atmosphere, and mainly, the reduced housing tariffs and the convenient prices for the fish dishes, fresh from the Black Sea (12).

Table 4. The tourism accommodation capacity and the tourism activity of Costinești

Years	Structures number	The tourism accommodation capacity		The tourism accommodation activity		
		existing no. places	in use no. places-days	arrivals no.	overnight stays no. beds	utilization indices
2006	192	6500	256819	18937	83414	35,5
2007	191	6468	255572	23190	93677	36,7
2008	191	6468	274623	23926	110812	40,4
2009	193	6429	353807	28625	130773	37,0
2010	198	6882	233106	20507	76078	32,6
2011	131	4910	332700	22848	93399	28,1
2012	157	5268	364929	29069	120260	33,0
2013	154	5282	309640	23532	93446	30,2
2014	146	5021	278416	24745	105796	38,0
2015	154	5949	413619	33386	135548	32,8
2016	154	6011	392618	38402	165022	42,0
2017	152	6109	407653	43090	179587	44,1

Source: TEMPO-Online statistical database, 2018, http://www.insse.ro/

Table 5. The tourism accommodation capacity and the tourism activity of Limanu

Years	Structures number	The tourism accommodation capacity		The tourism accommodation activity		
		existing no. places	in use no. places-days	arrivals no.	overnight stays no. beds	utilization indices
2006	14	822	32746	3059	12866	39,3
2007	15	832	42676	3449	15765	37,0
2008	15	826	44344	3723	18759	42,3
2009	15	832	43210	3017	13712	31,7
2010	16	901	44684	3054	12432	27,8
2011	14	909	88002	8171	22908	26,0
2012	20	1050	97394	10362	29146	30,0
2013	20	1050	92859	9548	29366	31,6
2014	19	986	85390	13468	37351	43,7
2015	21	1124	110370	16622	52909	48,0
2016	20	1122	77080	15108	39944	51,8
2017	18	1054	90242	14800	45332	50,2

Source: Tempo-online database, 2018, http://www.insse.ro/

Also, in the area there are two of the Dobrudgean attractions destined to specialists:

- Limanu cave, very huge (with an area of: 3400 m) and full of ramifications, it used to be inhabited for thousands of years, because the objects found are dated from different historical periods and the chambers had a certain functionality;

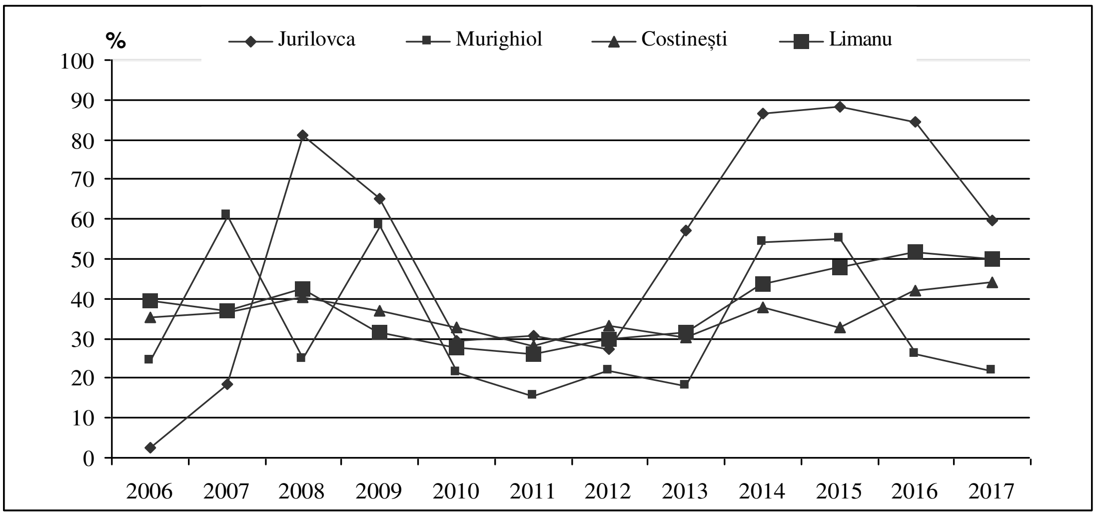
- Hagieni forest, a natural reservation with zoo-botanical profile, spread on 100 ha, with limestone plateaus, with steppe and bushes, a place where anyone can realise the significance of the

Dobrudgean bio-diversity, where there are living three of the most poisonous serpent species (the Dobrudgean horned viper, the ‚bad snake' and Esculap's snake).

Together with Romania's accession to the EU, it increased the competitiveness of the tourism activity of the inhabitants in the four analysed rural localities, situated in the Biosphere Reservation Danube Delta and on the shore of Black Sea. Nevertheless, the statistical data show us that after the year 2006, the number of tourism accommodation structures decreased, but it increased the housing capacity and the comfort degree.

This aspect is sustained through the *net utilization indices of the tourism accommodation capacity in use* (calculated by reporting the number of overnight stays to the tourism accommodation capacity in use in a certain period). For the studied localities, this index evolution (figure 1) is strongly influenced by the following factors of Romanian tourism development: the law framework, the importance granted to the rural tourism at local and national level, the development degree of the general and specific infrastructure etc.

Figure 1. Evolution of the utilization indices of the tourist accommodation capacity in use, in the studied tourism rural localities, in the period 2006-2017



Source: Tempo-online database, 2018, http://www.insse.ro/

Analysing figure 1 we can observe the fact that in locality: Jurilovca the approach and consolidation of a positive attitude towards tourism had a different evolution. Although the period of economic crisis had a word, the leisure tourism grew rapidly, especially made for the sports fishing at Cyprinus carpi, pike, zander, catfish, honey locust etc. In direct relation to the flow of tourists they developed the transport on Golovița lake to the vacation village: Gura Portiței and it grew the number of touristic circuits, organized for the Danube Delta visiting.

The Dobrudgean rural tourism in the Delta or on sea addresses both to Romanian and foreign customers. The segment appealing most to this kind of services is that the second age persons and less to the third age ones. These prefer the quietness of a rural boarding house, more than the noise of the crowdy stations on the shore. We must not neglect the young people, but their share is more reduced, due to the preference for the places full of agitation. The foreign tourists, who appeal most to the supplies of the rural tourism are those interested in the knowledge of history and local traditions, by visiting the picturesque zones, of great beauty, keeping the old habits: houses architecture, folklore clothes, handicrafts, food specialties.

CONCLUSIONS

In Tulcea county, Danube Delta was and remains an important tourism objective, and Măcinului Mountains are not too well known; the tourism accommodation facilities and public food are less developed, which is limiting the tourism number in the zone. The best known tourism rural settlements in Danube Delta are: Crişan, Maliuc, Mahmudia and Murighiol, and locality: Jurilovca situated on bank of lake: Razim, but those in which most of the tourism circulation is registered are: Jurilovca and Murighiol.

In Constanţa county the trends in arrangement of the rural space for tourism have in view the zone of the shore, the localities along Danube and the localities with archaeological sites and religious objectives. The highest variety of tourism reception structures, and most of the season tourism activity is registered in the commune: Costinești with the villages Schitu and Costineşti, and in commune: Limanu with the villages 2 Mai and Vama Veche.

According to data analyse, the in-sufficient promotion of the zone, the limited collaboration between the most important actors, the lack of investments in this sector, tourism policies, the repeated blocking of local authorities' projects and of those in local tourism, the in-coherence and absence of a strategy at central authorities level, the lack of a coherent vision for the development of Romanian tourism, the lack of interest of the State to the development and promotion of the Romanian tourism, the lack of funding of programs and special offers organized by the employers' associations in tourism, represent the reasons for which the Dobrudgean rural tourism in the Delta and Sea is not considered a representative touristic product.

A qualitative estimation of the tourism sector in the Delta shows the fact that the development process was founded on commercialization of products less diversified with a high geographical concentration, configurating a standard supply the commercial actions of which are based mainly on sales of housing places from the main zones (of coast).

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RENTABILITY OF CONSUMED RESOURCES IN CONDITION OF CONVENTIONAL AND ECOLOGICAL OPERATION 2017/2018

ANA URSU[1]

Abstract: *The purpose of the paper is to analyze the profitability of soybean, rice, beet and hemp crops for the production year 2017/2018, given that these crops are subject to reductions in cultivated areas and for their maintenance in crops, in the form of coupled support for conventional crops, and for organic crops - sM 11.2 support for maintaining organic farming practices). The research method used is the qualitative analysis of the absolute and relative indicators of profitability, in the context in which profitability is "an instrument for substantiating the decisions concerning the internal management of economic units, acquiring an essential criterion for assessing the economic efficiency". In principle, the situation of each crop is analyzed analytically on the income and expense indicators, so that the profitability ratios for the analyzed agricultural products are presented in two respects: non-subsidized rate of return and subsidy rate, with an emphasis on highlighting the profitability gaps between the two production systems: conventional and environmentally friendly. It examines the location of each crop in terms of profitability rates and makes some concluding remarks about the two production systems as well as the need to grant subsidies.*

Key words: *profitability, consumed resources, conventional system, ecological system, subsidies*

JEL classification: *O12, P50, Q18, Q57*

INTRODUCTION

In this study, we will refer to the main peculiarities to be taken into account in the analysis of the profitability of agricultural products: soya, rice, sugar beet and hemp, for the production year 2017/2018. One of the main features of the profitability analysis is the use of the indicator "gross income per hectare" and the indicator "net income per hectare, indicators that characterize the rationality of consumption. In the profitability analysis, profitability was also determined by means of some relative indicators of income (rates) with different forms of expression: rate of taxable income (%); rate of net income (%); rate of net income + total subsidy (%); rate of net income + coupled support (%); rate of net income + subMeasure 11.2 (%); rate of net income + direct payments (%), etc.

MATERIAL AND METHOD

The research method used consists of:

- the qualitative analysis of the absolute and relative indicators of profitability, in the context in which profitability is "*an instrument for substantiating the decisions concerning the internal management of economic units, acquiring an essential criterion for assessing the economic efficiency"*. In principle, the situation of each crop on the income and expenditure indicators is analytically analyzed so that the profitability ratios for the analyzed agricultural products are presented in two cases: **case 1** - profitability of agricultural products with subsidies and **case 2** - profitability of agricultural products without subsidies.

- the qualitative analysis of information on agricultural policy measures (Government Emergency Ordinance No. 3/2015 on the approval of payment schemes to be applied in agriculture between 2015-2020 and Order 619/2018 for the approval of the eligibility criteria, the conditions and the implementation of the payment schemes provided for in Article 1 (2) and (3) of Government Emergency Ordinance No 3/2015), i.e direct payment schemes + coupled support;

[1] Research Institute for the Economy of Agriculture and Rural Development (ASAS),
email: ursu.ana@iceadr.ro

RESULTS AND DISCUSSIONS

Soybean

The ***soybean culture*** for the two production levels, 3 t/ha (in the conventional system and 1.5 t / ha (in the organic system), has a gross income rate of 2.6% (conventional system) and -29.1% (organic system) (Table No. 1, line 16). When the support schemes are taken into account, the rate of return on culture changes as follows:

Table no. 1: Profitability of soybean culture - conventional system / ecological system

Nr. crt	INDICATORS	U.M	VALUES	
			Soybean CONV 3,0 t/ha	**Soybean ECO 1,5 t/ha**
1	**A. PRODUCTION VALUE**	lei	4200	2754.0
2	A_1. Of which the main production	lei	3960	2574.0
3	**B (+) SUBSIDIES**	lei	1689.4	2692.1
4	**C (=)THE CRUDE PRODUCT**	lei	5649.4	5266.1
5	**D (-) TOTAL COSTS**	lei	4099.9	3812.0
6	D_1. Of which for the main production	lei	3859.9	3632.0
7	**I. VARIABILE COSTS**	lei	3802.4	3256.3
8	**II. FIXED COSTS**	lei	297.5	555.8
9	**E. (=)** TAXABLE INCOME	lei	100.1	-1058.0
10	(-) Taxes	lei	10.0	-105.8
11	**F. (=) NET INCOME**	lei	90.1	-952.2
12	F.1 (=) NET INCOME + total subsidy	lei	1779.5	1739.9
13	F.2 (=) NET INCOME + coupled support	lei	972.7	-69.6
14	F.3 (=) NET INCOME + subMeasure 11.2		x	50.4
15	F.4 (=) NET INCOME + direct payments	lei	896.9	-145.4
16	**G. RATE OF TAXABLE INCOME (%)**	%	**2.6**	**-29.1**
17	**H. RATE OF NET INCOME (%)**	%	**2.3**	**-26.2**
18	H.1 RATE OF NET INCOME + total subsidy (%)	%	46.1	47.9
19	H.2 RATE OF NET INCOME + coupled support (%)	%	25.2	-1.9
20	H.3 RATE OF NET INCOME + subMeasure 11.2 (%)	%	x	1.5
21	H.4 RATE OF NET INCOME + direct payments (%)		23.2	-4.0
22	**COST OF PRODUCTION**	lei/to	1287	2421
23	**PREDICTABLE PRICE OF INTERNAL MARKET**	lei/to	1320	1716

Source: Own calculations; ADER Project 13.1.2

Soybean - conventional system

Case 1: Profitability of soybean culture: Subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 46.1%, the share of total support (1689.4494 lei/ha/367,328 euro/ha) in net income + total subsidies (1779.5 lei/ha) of 94.9% for the production of 3 t/ha. **Option 1:** Total subsidy = 97,2452 euro/ha (SAPS) + 5 euro/ha redistributive payment (RP) + 57,1745 euro/ha greening payment (GP) + 16,0078 euro/ha transitional national aid (TNA) 1 + 191,9 euro/ha coupled support (CS) = 367,3275 euro/ha).
- *Rate of net income* + coupled support (*SC**):*** it is estimated a rate of return of 25.2%, the share of coupled support SC (882.7 lei/ha/191.9 euro/ha) in net income + total subsidies (1779.5 lei/ha) of 49.6% for the production of 3 t/ha. **Option 2:** coupled support (191,9 euro/ha).
- *Rate of net income + direct payments:* it is estimated a rate of return of 23.2%, the share of direct payments (806.6057 lei/ha/175.4275 euro/ha) in net income + total subsidies (1779.5 lei/ha) of 45.3% for the production of 3 t/ha. **Option 3:** direct payments (175,4275 **euro/ha** = 97,2452 euro/ha SAPS + 5 euro/ha - redistributive payment + 57,1745 euro/ha - greening payment + 16,0078 euro/ha - transitional national aid TNA).

Case 2: Profitability of soybean culture: Option without subsidies

- *Rate of taxable income:* it is estimated taxable income rate of 2.6% (100.1 lei/ha);
- *Rate of net income:* it is estimated net income rate of 2.3% (90.1 lei/ha).

Soybean - ecological system

Case 1: Soybean crop yield - ecological: subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 47.9%, the share of total support (2692.1 lei/ha/585,328 euro/ha) in net income + total subsidies (1739.9 lei/ha) of de 154.7% for the production of 1.5 t/ha; **Option 1:** *Total subsidy* = 97,2452 euro/ha SAPS + 5 euro/ha redistributive payment (RP) + 57,1745 euro/ha greening payment (GP)+ 16,0078 transitional national aid (TNA 1) + 191,9 SC euro/ha coupled support (CS) + 218 euro/ha *subMeasure* (sM 11.2) = 585,3275 euro/ha.
- *Rate of net income + coupled support (SC)**:*** it is estimated a rate of return of -1.9%, the share of coupled support (882.7 lei/ha/191,9 euro/ha) in net income + total subsidies (1739.9 lei/ha) of 50.7% for the production of 1.5 t/ha; **Option 2:** coupled support (191,9 euro/ha);
- *Rate of net income + subMeasure (sM 11.2):* it is estimated a rate of return of 1.5%, the share of *sM 11.2* (1002.6 lei/ha/218 euro/ha) in net income + total subsidies (1739,9 lei/ha) of 57.6% for the production of 1.5 t/ha; **Option 3:** *subMeasure (sM 11.2):* (218 euro/ha);
- *Rate of net income + direct payment:* it is estimated a rate of return of -4.0 %, the share of direct payments (806.6057 lei/ha/175,4275 euro/ha) in net income + total subsidies (1739.9 lei/ha) of 46.4% for the production of 1.5 t/ha; **Option 4:** direct payments (175,4275 euro/ha = 97,2452 euro/ha SAPS + 5 euro/ha payment redistributive + 57,1745 euro/ha payment greening + 16,0078 euro/ha transitional national aid (TNA 1));

Case 2: Profitability of soybean culture - ecological: Option without subsidies

- *Rate of taxable income*: it is estimated taxable income rate of – 29.1% (-1058.0 lei/ha);
- *Rate of net income:* it is estimated net income rate of -26.2% (-952.2 lei/ha)

Rice

The rice crop at the two production levels of 6 t / ha (conventional cultivation) and 4.5 t/ha (organic farming) has gross income rates of -5.7% (in the conventional system) and -10.5% (in the ecological system) (Table 2, line 16). The analysis will be carried out comparatively for the two production levels. In this situation the rates of profitability of the culture are as follows:

Table no. 2: Profitability of rice crop - conventional system/ecological system

Nr. crt	INDICATORS	U.M	VALUES	
			Rice CONV 6,0 t/ha	**Rice ECO 4,5 t/ha**
1	**A. PRODUCTION VALUE**	lei	9400	8550.0
2	A_1. Of which the main production	lei	9000	8550.0
3	**B (+) SUBSIDIES**	lei	3866	4868.6
4	**C (=)THE CRUDE PRODUCT**	lei	12866	13418.6
5	**D (-) TOTAL COSTS**	lei	9942	9552.3
6	D_1. Of which for the main production	lei	9542	9552.3
7	**I. VARIABILE COSTS**	lei	9149	8091.3
8	**II. FIXED COSTS**	lei	793	1461.0
9	**E. (=)** TAXABLE INCOME	lei	-542	-1002.3
10	(-) Taxes	lei	-54	-100.2
11	**F. (=) NET INCOME**	lei	-488	-902.1
12	F.1 (=) NET INCOME + total subsidy	lei	3378	3966.5
13	F.2 (=) NET INCOME + coupled support	lei	2572	2157.0
14	F.3 (=) NET INCOME + subMeasure 11.2	lei	X	100.5
15	F.4 (=) NET INCOME + direct payments	lei	319	-95.3
16	**G. RATE OF TAXABLE INCOME (%)**	%	-5.7	**-10.5**
17	**H. RATE OF NET INCOME (%)**	%	-5.1	**-9.4**
18	H.1 RATE OF NET INCOME + total subsidy (%)	%	35.4	41.5
19	H.2 RATE OF NET INCOME + coupled support (%)	%	27.0	22.6

20	H.3 RATE OF NET INCOME + subMeasure 11.2 (%)	%	X	1.1
21	H.4 RATE OF NET INCOME + direct payments (%)	%	3.3	-1.0
22	**COST OF PRODUCTION**	lei/to	1590	2123
23	**PREDICTABLE PRICE OF INTERNAL MARKET**	lei/to	1500	1900

Source: **Own calculations; ADER Project 13.1.2**

Rice - conventional system

Case 1: Profitability of rice culture: Subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 35.4%, the share of total support (3865.9 lei/ha/840.5513 euro/ha) in net income + total subsidies (3378 lei/ha) of 114.4% for the production of 6 t/ha. **Option 1:** *Total subsidy* = 97,2452 euro/ha SAPS + 5 euro/ha (RP) + 57,1745 euro/ha (GP)+ 16,0078 euro/ha (TNA 1) + 665,1238 euro/ha (CS) = 840,5513 euro/ha.
- *Rate of net income* + coupled support (*CS)****:*** it is estimated a rate of return of 27.0%, the share of coupled support (3059.1 lei/ha/665.1238 euro/ha) in net income + total subsidies (3378 lei/ha) of 90.5% for the production of 6 t/ha. **Option 2:** coupled support (665,1238 euro/ha).
- *Rate of net income + direct payments:* it is estimated a rate of return of 3.3%, the share of direct payments (806.6057 lei/ha/175.4275 euro/ha) in net income + total subsidies (3378 lei/ha) of 23.9% for the production of 6 t/ha. **Option 3:** direct payments (175,4275 **euro/ha** = 97,2452 euro/ha (SAPS) + 5 euro/ha (PR) + 57,1745 euro/ha (GP) + 16,0078 euro/ha - transitional national aid (TNA 1)).

Case 2: Profitability of rice culture: Option without subsidies

- o *Rate of taxable income:* it is estimated taxable income rate of -5.7% (-542 lei/ha);
- o *Rate of net income:* it is estimated net income rate of -5.1% (-488 lei/ha).

Rice - ecological system

Case 1: Soybean crop yield - ecological: subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 41.5%, the share of total support (4868.6 lei/ha/1058.6 euro/ha) in net income + total subsidies totale (3966.5 lei/ha) of 122.7% for the production of 4,5 t/ha. **Option 1:** 97,2452 euro/ha (SAPS) + 5 euro/ha (RP) + 57,1745 euro/ha (GP)+ 16,0078 euro/ha (TNA 1) + 665,1238 euro/ha (CS) + 218 euro/ha *subMeasure (sM 11.2)* = 1058,6 euro/ha.
- *Rate of net income + coupled support (SC)****:*** it is estimated a rate of return of 22.6%, the share of coupled support (3059.1 lei/ha/665.1238 euro/ha) in net income + total subsidies (3966.5 lei/ha) of 77.1% for the production of 4.5 t/ha. **Option 2:** coupled support (665,1238 euro/ha);
- *Rate of net income + subMeasure (sM 11.2):* it is estimated a rate of return of 1.1%, the share of *sM 11.2* (1002.6 lei/ha/218 euro/ha) in net income + total subsidies (3966.5 lei/ha) of 25.3% for the production of 4.5 t/ha; **Option 3:** *sM 11.2* (218 euro/ha).
- *Rate of net income + direct payment:* it is estimated a rate of return of -1.0%, the share of direct payments (806.6057 lei/ha/175.4275 euro/ha) in net income + total subsidies (3966.5 lei/ha) of 20.3% for the production of 4.5 t/ha. **Option 4:** direct payments (175,4275 **euro/ha** = 97,2452 euro/ha SAPS + 5 euro/ha payment redistributive + 57,1745 euro/ha payment greening + 16,0078 euro/ha transitional national aid TNA).

Case 2: Profitability of rice culture - ecological: Option without subsidies

- o *Rate of taxable income*: it is estimated taxable income rate of – 10.5% (-1002.3 lei/ha);
- o *Rate of net income:* it is estimated net income rate of -9.4% (-902.1 lei/ha)

Sugar Beet

The sugar beet culture at the two production levels, 40 t / ha (conventional system) and 30 t / ha (in organic farming) has gross income rates of 19.8% (conventional system) and 20.7 % (in the organic system) (Table 3, line 17). When the support schemes are also taken into account, the rates of profitability of the crop change as follows:

Table no. 3 Profitability of sugar beet culture - conventional system / ecological system

Nr. crt.	INDICATORS	U.M	VALUES	
			Sugar beet CONV 40 t/ha	Sugar beet ECO 30 t/ha
1	**A. PRODUCTION VALUE**	lei	8000	8040
2	A_1. Of which the main production	lei	**8000**	8040
3	**B (+) SUBSIDIES**	lei	4656	5658
4	**C (=)THE CRUDE PRODUCT**	lei	12656	13698
5	**D (-) TOTAL COSTS**	lei	6677	6662
6	D_1. Of which for the main production	lei	**6677**	6662
7	**I. VARIABILE COSTS**	lei	6253	5189
8	**II. FIXED COSTS**	lei	424	1473
9	**E. (=)** TAXABLE INCOME	lei	**1323**	1378
10	(-) Taxes	lei	132	138
11	**F. (=) NET INCOME**	lei	**1191**	1241
12	F.1 (=) NET INCOME + total subsidy	lei	5847	6899
13	F.2 (=) NET INCOME + coupled support	lei	4706	4755
14	F.3 (=) NET INCOME + subMeasure 11.2	lei	X	2243
15	F.4 (=) NET INCOME + direct payments	lei	1998	2047
16	F.5(=) NET INCOME + ANT 6	lei	1525	1575
17	**G. RATE OF TAXABLE INCOME (%)**	%	**19.8**	**20.7**
18	**H. RATE OF NET INCOME (%)**	%	**17.8**	**18.6**
19	H.1 RATE OF NET INCOME + total subsidy (%)	%	87.6	103.6
20	H.2 RATE OF NET INCOME + coupled support (%)	%	70.5	71.4
21	H.3 RATE OF NET INCOME + subMeasure 11.2 (%)	%	X	43.2
23	H.4 RATE OF NET INCOME + direct payments (%)	%	29.9	30.7
24	H.5 RATE OF NET INCOME + ANT 6 (%)	%	22.8	23.6
25	**COST OF PRODUCTION**	lei/to	**167**	**222**
26	**PREDICTABLE PRICE OF INTERNAL MARKET**	lei/to	**200**	**268**

Source: **Own calculations; ADER Project 13.1.2**

Sugar Beet - *conventional system*

Case 1: Profitability of sugar beet culture: Subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 87.6%, ponderea the share of total support (4655.9519 lei/ha/1012.318 euro/ha in net income + total subsidies (5847 lei/ha) of 79.6% for the production of 40 t/ha. **Option 1:** *Total subsidy* = 97,2452 euro/ha (SAPS) + 5 euro/ha (RP) + 57,1745 euro/ha (GP)+ 16,0078 euro/ha (TNA 1) + 764,2 euro/ha (CS) + 72,690 euro/ha (TNA 6) = 1012,318 euro/ha.
- *Rate of net income* + coupled support (*SC**):*** it is estimated a rate of return of 70.5%, the share of coupled support SC (3514.7851 lei/ha/764.2 euro/ha) in net income + total subsidies (5847 lei/ha) of 60.1% for the production of 40 t/ha. **Option 2:** coupled support (764,2 euro/ha);
- *Rate of net income + direct payments:* it is estimated a rate of return of 29.9%, the share of direct payments (806.6057 lei/ha/175.4275 euro/ha) in net income + total subsidies (5847 lei/ha) of 13.8% for the production of 40 t/ha. **Option 3:** direct payments (175,4275 euro/ha = 97,2452 euro/ha SAPS + 5 euro/ha redistributive payment + 57,1745 euro/ha - greening payment + 16,0078 euro/ha - transitional national aid TNA 1);
- *Rate of net income + transitional national aid TNA 6:* it is estimated a rate of return of 22.8%, the share of TNA 6 (334.3231 lei/ha/72,690 euro/ha) in net income + total subsidies (5847 lei/ha) of 5.7% for the production of 40 t/ha. **Option 4:** transitional national aid TNA 6**:** (72,690 euro/ha).

Case 2: Profitability of sugar beet culture: Option without subsidies

- o *Rate of taxable income:* it is estimated taxable income rate of 19.8% (1323 lei/ha/287 euro/ha);
- o *Rate of net income:* it is estimated net income rate of 17.8% (1191 lei/ha/259 euro/ha).

Sugar Beet - ecological system

Case 1: Profitability of sugar beet culture - ecological: Subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 103.6%, the share of total support (5658.486 lei/ha/1230.2929 euro/ha) in net income + total subsidies (6899 lei/ha) of 82.0% for the production of 30 t/ha. **Option 1:** *Total subsidy* = 97,2452 euro/ha (SAPS) + 5 euro/ha (RP) + 57,1745 euro/ha (GP)+ 16,0078 euro/ha (TNA 1) + 764,2 euro/ha (CS) + 72,690 euro/ha (TNA 6) + 218 euro/ha sM 11.2 = 1230,2929 euro/ha.
- *Rate of net income + coupled support (SC)*: it is estimated a rate of return of 71.4%, the share of coupled support SC (3514.7 lei/ha/764.1754 euro/ha) in net income + total subsidies (6899 lei/ha) of 50.9% for the production of 30 t/ha. **Option 2:** coupled support (764,1754 euro/ha).
- *Rate of net income + subMeasure (sM 11.2):* it is estimated a rate of return of 43.2%, the share of *sM 11.2* (1002.6 lei/ha/218 euro/ha) in net income + total subsidies (6899 lei/ha) of 14.5% for the production of 30 t/ha. **Option 3**: *subMeasure (sM 11.2)* - (218 euro/ha).
- *Rate of net income + direct payment:* it is estimated a rate of return of 30.7%, the share of direct payments (806.6057 lei/ha/175.4275 euro/ha) in net income + total subsidies (6899 lei/ha) of 11.7% for the production of 30 t/ha. **Option 4**: direct payments (175,4275 **euro/ha** = 97,2452 euro/ha SAPS + 5 euro/ha payment redistributive + 57,1745 euro/ha payment greening + 16,0078 euro/ha transitional national aid (*TNA* 1);
- *Rate of net income + transitional national aid (TNA 6)*: it is estimated a rate of return of 23.6%, the share of TNA 6 (334.3 lei/ha/72,690 euro/ha) in net income + total subsidies (6899 lei/ha) of 4.8% for the production of 30 t/ha. **Option 5**: TNA 6 (72,690 euro/ha).

Case 2: Profitability of sugar beet culture - ecological: Option without subsidies

- *Rate of taxable income*: it is estimated taxable income rate of 20.7% (1378 lei/ha/299.7 euro/ha).
- *Rate of net income:* it is estimated net income rate of 18.6% (1241 lei/ha/269,7 euro/ha).

Hemp for fiber

The hemp crop at the two production levels, 45 t / ha (conventional system) and 35 t / ha (in the organic system) has a gross income rate of 3.3% (conventional system) and -3.1% (in the ecological system) (Table 3, line 17). When the support schemes are taken into account, the rates of profitability of the culture change as follows:

Table no. 4: Profitability of hemp crop - conventional system / ecological system

Nr. crt	INDICATORS	U.M	VALUES	
			Hemp CONV 45 t/ha	Hemp ECO 35 t/ha
1	**A. PRODUCTION VALUE**	lei	7875	7350
2	A_1. Of which the main production	lei	7875	7350
3	**B (+) SUBSIDIES**	lei	1630	2633
4	**C (=)THE CRUDE PRODUCT**	lei	9505	9983
5	**D (-) TOTAL COSTS**	lei	7624	7582
6	D_1. Of which for the main production	lei	7624	7582
7	**I. VARIABILE COSTS**	lei	7068	5917
8	**II. FIXED COSTS**	lei	556	1664
9	**E. (=)** TAXABLE INCOME	lei	251	-232
10	(-) Taxes	lei	25	-23
11	**F. (=) NET INCOME**	lei	226	-208
12	F.1 (=) NET INCOME + total subsidy	lei	1856	2425
13	F.2 (=) NET INCOME + subMeasure 11.2	lei	x	794
14	F.3 (=) NET INCOME + coupled support	lei	1019	584
15	F.4 (=) NET INCOME + direct payments	lei	1033	598
16	F.5 (=) NET INCOME + ANT 3	lei	257	-178
17	**G. RATE OF TAXABLE INCOME (%)**	%	**3.3**	-3.1
18	**H. RATE OF NET INCOME (%)**	%	**3.0**	-2.7
19	H.1 RATE OF NET INCOME + total subsidy (%)	%	24.3	32.0

20	H.2 RATE OF NET INCOME + subMeasure 11.2 (%)	%	x	13.4
21	H.3 RATE OF NET INCOME + coupled support (%)	%	13.4	7.7
23	H.4 RATE OF NET INCOME + direct payments (%)	%	13.5	7.9
24	H.5 RATE OF NET INCOME + ANT 3 (%)	%	3.4	-2.3
25	**COST OF PRODUCTION**	**lei/to**	**169**	**217**
26	**PREDICTABLE PRICE OF INTERNAL MARKET**	**lei/to**	**175**	**210**

Source: **Own calculations; ADER Project 13.1.2**

Hemp for fiber - *conventional system*

Case 1: Profitability of hemp for fiber culture: Subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 24.3%, the share of total support (1630.394 lei/ha/354.5 euro/ha) in net income + total subsidies (1856 lei/ha) of 87.8% for the production of 45 t/ha. **Option 1:** *Total subsidy* = 97,2452 euro/ha (SAPS) + 5 euro/ha (RP) + 57,1745 euro/ha (GP) + 16,0078 euro/ha (TNA 1) + 172,349 euro/ha (SC) + 6,66 euro/ha (TNA 3) = 354,5 euro/ha.
- *Rate of net income + coupled support (SC):* it is estimated a rate of return of 13.4%, the share of coupled support SC (792.9 lei/ha/172.4 euro/ha) in net income + total subsidies (1856 lei/ha) of 42.7% for the production of 45 t/ha. **Option 2:** coupled support (172,4 euro/ha).
- *Rate of net income + direct payments:* it is estimated a rate of return of 13.5%, the share of direct payments (806.6057 lei/ha/175.4275 euro/ha) in net income + total subsidies (1856 lei/ha) of 43.5% for the production of 45 t/ha. **Option 3:** direct payments (175,4275 euro/ha = 97,2452 euro/ha SAPS + 5 euro/ha redistributive payment + 57,1745 euro/ha - greening payment + 16,0078 euro/ha - transitional national aid TNA 1).
- *Rate of net income + transitional national aid (TNA 3):* it is estimated a rate of return of 3.4%, the share of transitional national aid TNA 3 (30.6 lei/ha/6.66 euro/ha) in net income + total subsidies (1856 lei/ha) of 1.7% for the production of 45 t/ha. **Option 4:** transitional national aid TNA 3 (6,66 euro/ha).

Case 2: Profitability of hemp for fiber culture: Option without subsidies

- *Rate of taxable income:* it is estimated taxable income rate of 3.3% (251 lei/ha/54.6 euro/ha);
- *Rate of net income:* it is estimated net income rate of 3.0% (226 lei/ha/49.1 euro/ha)

Hemp for fiber - ecological system

Case 1: Hemp for fiber crop yield - ecological: Subsidy option

- *Rate of net income + total subsidy:* it is estimated a rate of return of 32.0%, the share of total support (2633 lei/ha/572.5 euro/ha) in net income + total subsidies (2425 lei/ha) of 108.6% for the production of 35 t/ha. **Option 1:** *Total subsidy* = 97,2452 euro/ha (SAPS) + 5 euro/ha (RP) + 57,1745 euro/ha (GP) + 16,0078 euro/ha (TNA 1) + 172,349 euro/ha (CS) + 6,66 euro/ha (TNA 3) + 218 euro/ha *subMeasure (sM 11.2)* = 572,5 euro/ha.
- *Rate of net income + coupled support (SC):* it is estimated a rate of return of 7.7%, the share of coupled support (792.9 lei/ha/172,349 euro/ha) in net income + total subsidies (2425 lei/ha) of 28.6% for the production of 35 t/ha. **Option 2:** coupled support (172,349 euro/ha).
- *Rate of net income + subMeasure (sM 11.2):* it is estimated a rate of return of 13.4%, the share of *sM 11.2* (1002.6 lei/ha/218 euro/ha) in net income + total subsidies (2425 lei/ha) of 41.4% for the production of 35 t/ha. **Option 3:** *subMeasure (sM 11.2):* 218 euro/ha.
- *Rate of net income + direct payment:* it is estimated a rate of return of 7.9%, the share of direct payments (806.6057 lei/ha/175.4275 euro/ha) in net income + total subsidies (2425 lei/ha) of 33.3% for the production of 35 t/ha. **Option 4:** direct payments (175,4275 euro/ha = 97,2452 euro/ha SAPS + 5 euro/ha payment redistributive + 57,1745 euro/ha payment greening + 16,0078 euro/ha transitional national aid (TNA 1)).
- *Rate of net income* + transitional national aid (*TNA 3):* it is estimated a rate of return of -2.3%, the share of *TNA 3* (30.6 lei/ha/6.66 euro/ha) in net income + total subsidies (2425 lei/ha) of 1.3% for the production of 35 t/ha; **Option 5:** *TNA 3* (6.66 euro/ha).

Case 2: Profitability of hemp for fiber culture - ecological: Option without subsidies

- *Rate of taxable income*: it is estimated taxable income rate of -3.1% (-232 lei/ha/-50.4 euro/ha);
- *Rate of net income:* it is estimated net income rate of -2.7% (-208 lei/ha/-45.3 euro/ha)

CONCLUSIONS

The payment schemes applied for the crop year 2017/2018 ensure the profitability of the analyzed crops, contributing to the cultivation of cultivated areas and compensating for income losses for conventional crops (soy, hemp) , as well as crops grown in organic farming (soy, rice, hemp). The results show that sugar beet is profitable both in conventional and organic systems, for both cases of profitability analysis: subsidy option and option without subsidies.

It follows from the above that, in calculating and analyzing the profitability indicators, the particularities that led to changes in income and yield rates of the analyzed crops have to be taken into account.

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ANALYSIS OF THE IMPACT OF COUPLED SUPPORT FOR SOYA ON SURFACES AND PRODUCTIONS

PETRE IONUȚ LAURENȚIU[1]

Abstract: *The present study proposes an analysis of how the changes and trends of soybean surfaces and produced crops have been influenced by the coupled support in the years 2015 and 2016. For this purpose qualitative and quantitative research methods will be used on the data obtained with the statistics, namely the National Institute of Statistics (NIS) and the Agricultural Accountancy Data Network (RICA), data on the total areas cultivated with soybeans and productions, respectively on the areas for which coupled support has been granted. With this data, we will determine the share of areas recorded in APIA in the total area, the dynamics of this indicator and the way in which the minimum compulsory production (for accessing the coupled support) influenced the average yield per hectare.*

Keywords: *soybean culture, coupled support, eligible area, production.*

JEL Classification: *Q15, Q18*

INTRODUCTION

The soybean culture (Glycine max) has a high interest for both the producer and the consumer due to the wide range of uses used for animal feed in human food but also as inputs for certain manufacturing industries.

People's daily diet uses soybeans, but also non-starters to prepare some dishes. Also in soybean meal can be used in human food, up to 15% in certain limits, to get a high protein meal. At the same time, soybean meal can produce vegetable products such as milk, cheese, coffee, biscuits, chocolate.

For animal feed, it is mainly used soybean grains resulting from seed processing to produce oil, so these protein-rich grains are included in feed concentrations used in animal husbandry. Another use of soybean culture in this zoo technical sector may have the plant used as green fodder.

In order to industrialize the soybean culture presents certain opportunities such as obtaining: oil, margarine, lecithin, soap, and colors for painting.

Referring to agriculture, however, the main beneficial feature of this culture is the fact that it leaves behind a high amount of nitrogen in the soil and about 80-120 kg / ha.

As far as the chemical composition of soybeans is concerned, as is well known, protein ranging from 27 to 50 percent, followed by 17-25% fat, and 19-25% carbohydrates, and lecithin of soybeans rises to 2-4%. At the same time, mineral elements such as phosphorus, potassium and calcium magnesium, as well as vitamins, are found in the soybean structure.

All of these aspects mentioned above, which emphasize the importance of soybean culture, lead to a general aspect, namely the importance of continuing cultivation.

Referring to soybean surfaces and yields, they vary annually, either due to the crop rotation, for the first indicator, or according to the agricultural year concerned and the pedoclimatic conditions for the second indicator.

However, there may be some external factors that can influence these indicators (surface, total yield and average yield per hectare), one of these factors may be one of the financial support granted.

Thus, the present research seeks to determine whether such a link exists between soybean surfaces or soybean production and coupled support for this crop.

[1] Scientific Researcher - Research Institute for the Economy of Agriculture and Rural Development, Project ADER 13.1.2, email: petre.ionut@iceadr.ro

MATERIALS AND METHODS

The statistical data from the national databases will present the situation of the soybean surfaces and soybean production in Romania, as well as the average yields per hectare. In the second part of the research we will analyze the data on the coupled support granted and the areas eligible for this support taken from the Agricultural Accountancy Information Network (RICA).

Consequently, connections can be made using the correlation coefficient between the area and output dynamics and the dynamics or value of the coupled support granted during the reference period. These correlations can respond to the question of research, whether the coupled support or its value influences the soybean surface and production. The formula used in calculating the correlation coefficients will be:

$$r_{xy} = \frac{\Sigma(x_i - \overline{X})(y_i - \overline{Y})}{\sqrt{\Sigma(x_i - \overline{X})^2 \Sigma(y_i - \overline{Y})^2}}$$

RESULTS AND DISCUSSIONS

In order to create an overall picture of the soybean crop sector, statistical data were analyzed with reference to the cultivated area, the total yield and implicitly the average yield per hectare on this crop.

Table 1. Dynamics of soybean surfaces and productions in Romania

Specifications	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Surface area (thousand ha)	133234	49857	48833	63948	72056	79793	67672	79910	128156	127266
Total production (thousand t)	136094	90579	84268	149940	142636	104330	149931	202892	262061	263380
Average yield (kg / ha)	1021	1817	1726	2345	1980	1308	2216	2539	2045	2070

Source: National Institute of Statistics

As can be seen from Table 1, the largest area, cultivated with soy since Romania joined the European Union, was recorded in 2007 with 133.2 thousand hectares. It fell sharply in the coming years, more precisely throughout the programming period until 2014, the largest area was almost 80,000 hectares. Things have changed in the new reform, so from 2015, the cultivated area has seen an impressive rise, reaching 128,000 hectares and continuing almost at the same level the following year.

Referring to the average yield per hectare and implicitly to the total yield, they vary from year to year, so even if in the first year the cultivated area was the highest, the yield per hectare was the lowest, so these two indicators, have contracted, resulting in a relatively small total production in relation to the cultivated area of only 136.1 thousand tons of grain soybeans. However, fortunately, yields increased in the next period, reaching double production levels on a single hectare, which implicitly led to an increase in total production. The highest yield was 2045 kg / ha in 2014, but the highest yields were recorded in the last years when the cultivated areas were among the most extensive and the good yield, over 2000 kg / ha, was ensures a total production of over 260 thousand tons of soybeans.

Thus, with the above, we can highlight the increases in the area and implicitly of the soybean production in the last period, which coincides with the current CAP reform. Thus, these statistical data strengthen the fact that certain factors, whether internal or external, have significantly and beneficially influenced soybean culture. For this study attention will be paid to the influence of coupled support.

Since 2015, with the implementation of the new CAP reform 2014-2020, Romania has benefited from a number of additional measures as compared to the previous programming period, ie the granting of new direct aids to Pillar I, including "support coupled ".

As foreseen in the EU Regulation, coupled support can be given to sectors considered important for economic, social and environmental reasons and affected by certain difficulties. This is given to farmers, both in the vegetable and livestock sectors. Among the crops that are included in the vegetable sector are soybeans.

In order to benefit from this support, producers have to meet a number of general conditions but also some particular ones depending on the crop. For soybeans, the specific conditions aim at: achieving a minimum yield per hectare of at least 1300 kilograms of grain; making use of this minimum production on a contractual basis; and the exclusive use of certified seed.

It was further considered that this coupled support to soybean culture had a positive effect on production as financial incentives encouraged more and more producers to apply for this support by cultivating a larger area and implicitly obtaining total direct production proportional.

In order to be able to better analyze how this support influences producers in their decision to cultivate soybeans and to comply with the specific conditions of support (1300 kg of grain per hectare), Table 2 will present the situation with regard to this support from 2015 by 2017, respectively the total budget granted, the number of hectares of the beneficiaries and, implicitly, the average value of the support.

Table 2. Dynamics of coupled quantum rates

Specification	2015	2016	2017
Totalcoupledsupportvalue(euro)	28,996,567.44	29,891,290.95	31,602,000.00
Totaleligiblehectares(ha)	107,769.89	117,391.50	164,718.17
Amount of Support Coupled Support (euro / ha)	269.06	254.63	191.855

Source: Agricultural Accounting Information Network (RICA), Agricultural Payments and Intervention Agency (APIA)

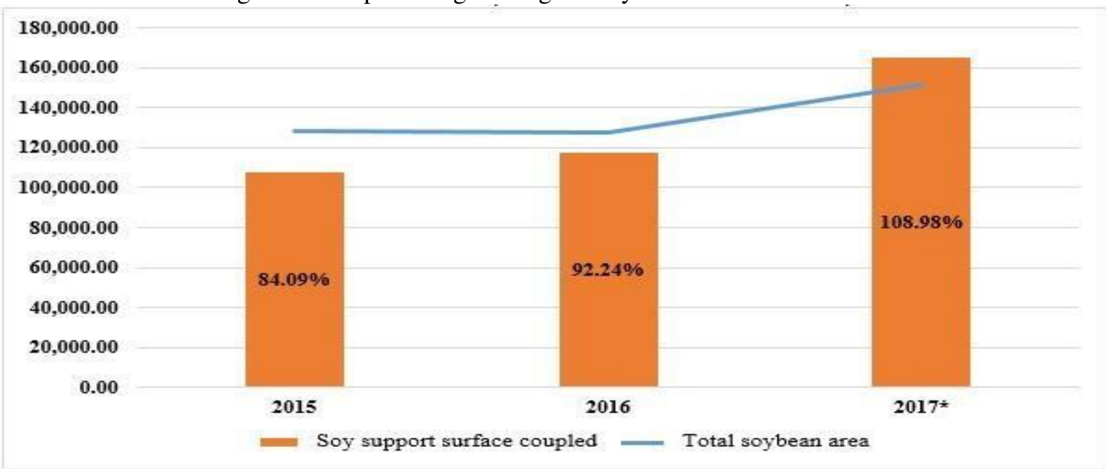
As can be seen in Table 1, the demand for support coupled with soybean culture has been on the rise. The total amount of the allocated budget has been increasing over the whole period under review, starting at around EUR 29 million in 2015, rising by 3.1% in 2016 to around EUR 29.9 million, thereafter (2017) to increase by another 5.7% to 31.6 million euros.

The increase in demand for this support can actually be seen by the number of hectares for which coupled support was requested. Thus, for the year 2015, 107.77 thousand hectares eligible for coupled support were registered at the Agricultural Payments and Intervention Agency. Thus, by reporting the two indicators (the amount of the allocated budget and the number of eligible hectares), the support coupled per hectare was determined, namely 269.06 euro.

In 2016, more hectares were registered, ie 117.4 thousand hectares, representing an increase of 8.9% compared to the previous year. By reporting the total value to the number of hectares, an amount of coupled support for soybean cultivation resulted in 254.63 euro / ha, a decrease of 5.36%. This decrease was recorded as the number of applications increased, as mentioned above.

In the last year the increase in demand for coupled support was even more significant, so the total number of eligible hectares increased to 164.7 thousand, 40.3%, as compared to the previous year. Although the value of the allocated budget has increased, this increase in demand exceeded the first, so when the two indicators were reported, the value of the amount decreased by 24.65%, reaching 191.85 euro per hectare.

Figure 1. The percentage of eligible soya area in total area



Source: own data processing Agricultural Accountancy Data Network (AGIC), Agricultural Payments and Intervention Agency (APIA), INS, Eurostat

In Figure 1, the share of the soybean-cultivated area for which coupled support according to RICA was calculated and the total area taken from the statistical data provided by the National Institute of Statistics. The exception is the year 2017, for which the data were partial, ie the area for which coupled support will be granted has been taken through the interview given by the director of APIA and the total area cultivated with soy was taken from the Euro-state site, this is why it can be seen that in that year the share of the area for which coupled support will be granted exceeds by 8.98% that of the total soybean surface, which can only be scriptic, but not in reality.

However, referring to the years 2015 and 2016, one can observe the following: the soybean area for which coupled support was granted was 84.09% of the total soybean area in Romania in 2015. In 2016, the area for which coupled support increased by 8.15 percentage points over the previous year, so its weight in the total soybean area was 92.24%.

In 2017, even if the data are partial, we can see that the growth trend continues, even increasing, by doubling the difference between the shares of the surface for the coupled support from the total, thus the increase is of 16.74 percentage points.

This growing tendency for the coupled support has definitely influenced the total production of soybeans, these two indicators being in a proportionate relationship.

The influence of coupled support on the average yield per hectare will also be determined by means of the correlation coefficient.

In Table 3, we calculate the correlation coefficients between the amount of direct payments per hectare of soybeans, plus the amounts of coupled support in recent years and the three indicators previously analyzed.

Table 3. Relationship between the amount of subsidies and the area, production and yield

Specifications	Cultivated area	Total production	Average yield per hectare
Direct payment + coupled support	0.6566	0.8210	0.4311

Source: own calculations

CONCLUSIONS

In this paper it was desired to determine the influence of coupled support to soybean culture on indicators such as cultivated area, total yield and average yield per hectare. Thus, by analyzing the current situation of these indicators, there was a concomitant increase with the increase of the coupled support value.

However, in order to clarify this issue, the coefficients of correlation between these variables were calculated, as can be seen in the last table, the situation of soybean culture in

Romania is as follows: Between the amount of direct payments per hectare, cumulated with the value of coupled support and the area cultivated during the period 2007-2017 has a close relationship due to the coefficient of correlation of 0.6566, so when the increased support value increased and the soybean surface. Moving to the second indicator or total output, it can be seen that between this and the value of the support granted is a strong relationship with a coefficient of correlation of 0,821, representing a directly proportional relationship, when the values of the increased support increased and the production total. Last but not least, the average yield per hectare is not influenced by the support given to this crop, given the coefficient below 0.5 and 0.4311, respectively.

In conclusion, in Romania, the area cultivated with soybeans and the total production harvested on this surface are influenced by the values of the financial support granted by the European Union through the first pillar of the Common Agricultural Policy.

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SECTION 4

ADER 13.1.2 PROJECT

”Technical and economic substantiation of production costs and price estimates for wheat, barley, maize, sunflower, rape, soybean, sugar beet, rice, hemp, hops, tobacco, potatoes for conventional agriculture and organic farming”

APPLYING THE MARKETING MIX TO THE ANALYSIS OF THE BARLEY MARKET IN THE EUROPEAN CONTEXT

COFAS ELENA[1]

Abstract: *Barley is a plant cultivated as an herbage plant, which has therapeutic qualities, being relatively well represented in all the Romanian culture areas where it finds appropriate culture conditions. The fact that there are autumn and spring forms may be the reason why this species occupies an important place in the farmer's crop decision, especially when the market offers a price and a guarantee of purchase since the establishment of crops. Occupying almost 5% of the arable land (about 440.4 thousand ha of barley versus 9.3 million hectares of arable land), barley is associated with wheat in cereal-based farms because it does not have any particular fundamental technological requirements. Because of the attractive price, barley can successfully replace wheat. The specific development of marketing activity in agricultural holdings requires changing the way the cereal market is analyzed, from the traditional approach - by analyzing market demand and supply - to a modern approach - by analyzing the marketing mix. This research aimed at analyzing the barley culture market through the mix of marketing, which led to the analysis of all the characteristic elements (product, price, placement, promotion) - practically an analysis both in terms of cultivated surfaces, production and price of culture barley, and marketing tools whose implementation determines the evolution of products and market prices. The results of the research of the marketing mix elements on the barley market and its products have shown positive aspects of the development of this market, as the economic importance of barley crops is lower compared to wheat, corn, rice or rye.*

Keywords: *barley, analyze, market, price, marketing mix*

JEL Classification: *O12, P50, Q18, Q57*

INTRODUCTION

Romania is one of the European countries with the most favorable pedo-climatic conditions for obtaining quality grain crops in significant quantities, which can cover an important segment of the domestic demand for agri-food products. The barley is a plant cultivated both as a fodder and brassica plant, being relatively well represented in all the Romanian culture areas, where they find suitable culture conditions. The fact that there are autumn and spring forms can be the reason why these two species of this type occupy an important place in the farmer's crop decision, especially when the market offers a price and a guarantee of purchase since the establishment of the crops.

Marketing of agricultural products involves identifying the needs of consumers of any kind and age, making a profit by satisfying these needs and maintaining these consumers for a long time. One of the most common definitions of marketing answers 4 questions:

1. What do we sell? - referring to issues related to the subject of the activity of a household / farms - what is the product we produce for sale?

2. How much do we sell? - referring to the calculation of a price we ask our consumer for the product we are destined for;

3. Where and where we sell? - before going to production, we think of who (people, what kind of people are potentially interested in what we produce and where and how we find them, issues related to distribution's logistics or direct sales);

4. How do we sell? - product presentation is perhaps as important as production, being the "first impression" we draw on consumers - including packaging, labeling and certification.

The cumulative responses define "4P" marketing - a concept that has been developed to describe the right combination for a particular set of circumstances, of the four key elements that constitute (Wilmshurst J., Mackay A): product, price level, promotional activity and product distribution.

[1] Scientific researcher, Research Institute for Agriculture and Rural Development, Bucharest, e-mail: cofasela@yahoo.com

MATERIAL AND METHODS

The paper seeks a dual analysis, both in terms of production and areas cultivated with barley, as well as in terms of marketing tools whose implementation determines the evolution of products in the market. As a means, a set of controllable and measurable variables was used, and as a method of study, the marketing mix method (in particular the 4P method) was used to detail marketing strategies and influence the market in order to ensure maximum efficiency at the right time. In fact, they are essential tools of the marketing mix and are used successfully both in theory and in practice.

The elements of the marketing mix - product, price, promotion, placement (distribution or placement of the product) - can be analyzed in different directions for each element.

- The product - it can analyze the assortment, quality, brand, packaging, services, etc.
- The price - you can analyze the price level, the price composition, the commercial additions, discounts, credit conditions, etc.
- Promotion - we can analyze the promotion tools, communication channels with the market, etc.
- Placement - for this, you can analyze distribution channels, pipeline, transport, handling, storage, etc.

The information was supplemented by documents, articles and studies published in specialized magazines and in the analysis of the general situation for production / cultivated surfaces / prices were used the statistical data provided by Eurostat, the National Institute of Statistics of Romania, the Ministry of Agriculture and Rural Development.

RESULTS AND DISCUSSIONS

Barley, like wheat, has a long history, being cultivated by people from ancient times. The barley culture has a wide spread and is due to both varied forms in the crop and to the vegetation period. For the human body, barley offers a wide range of nutrients: vitamins (vitamins E, C, B vitamins B1, B2, B6, B12), minerals (selenium, manganese, calcium, iron, magnesium, molybdenum, copper), food fibers, bioflavonoids, polysaccharides and polypeptides. Barley is used in the human's food in the form of egg and coffee surrogate, even in other areas where wheat is cultivated, respectively as a raw material in the beer industry. It is also used in animal feed, the feed value of barley beans being comparable to that of corn grains, even higher because of the higher protein content. From a chemical point of view, barley grains do not differ too much from grains of other cereals, but contain a higher amount of cellulose, namely a lower amount of fat than corn and oats, and gluten is present in a very small amount, characteristic which determines a poor palatability of the flour (Bîlteanu Gh.). The chemical composition of the bean is influenced by the genetic factors, the form of culture (autumn or spring), the pedoclimatic conditions and the applied technology.

Table 1. Chemical components of barley and barley straw

Specification	Average values (%) la:	
	beans	**straw**
Water	13,92	13,15
Crude protein	10,53	2,87
Crude fat	2,08	1,40
Unassembled extractive substances	66,18	39,94
- of which starch	55,16	-
Cellulose	4,85	38,65
Ash	2,78	4,45

Source: I. Borcean și colab, Tehnologia culturilor de câmp, Ed. Agroprint, Timișoara, 1997

In 2017, Romania ranked as the 1st in the European Union in maize and sunflower production, respectively 4th in wheat and rape and 3rd in soybeans. These cultures led to a faster growth of agriculture in GDP last year, but especially to the increase in the value of agriculture, crucial to the food security of the population. Although the first half of 2018 was one of the most difficult periods in terms of weather, the yields obtained from grain cereals have exceeded expectations. In most counties, the crop of grain cereals has increased since 2017, registering a new historic high in the country. This was primarily due to timely subsidies and respect for modern culture technologies. If, in 2017, the average yield per hectare for barley crops was 4.731 Kg / ha, the average production per hectare was 5.204 kg / ha in the 2018 campaign, with the highest average yield per hectare being obtained in the counties: Constanta, Ialomita, Bihor, Braila, Arad, Timis, Calarasi, Mehedinti, Dolj and Ilfov. These 10 counties made 860,000 tons of barley crop, accounting for 61% of country production.

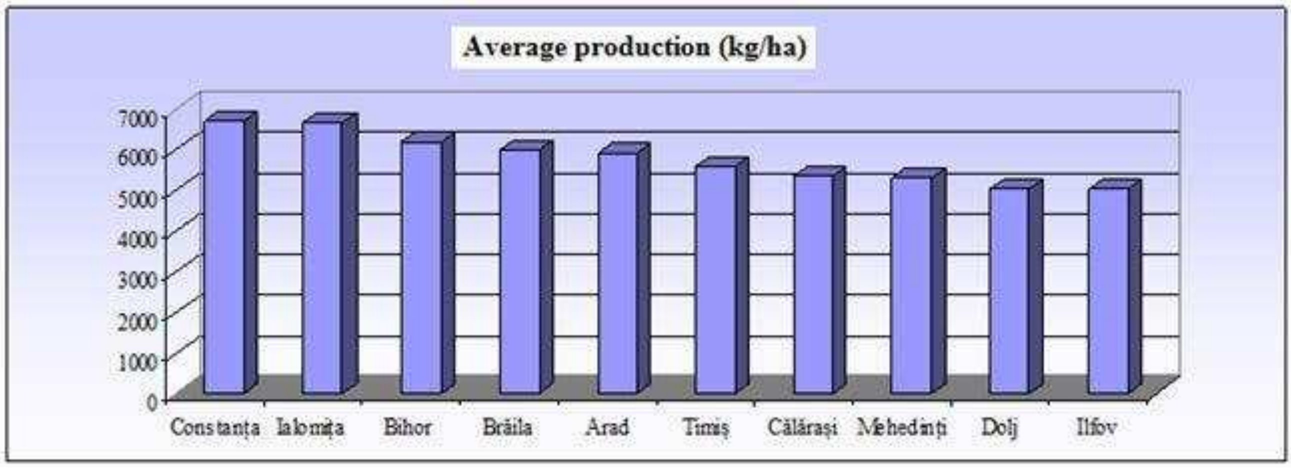

Fig. 1. Average barley crop production in 2018 (source: www.gazetadeagricultura.info)

Even before the harvest campaign was launched, agricultural producers were interested in the evolution of the price so that they would know what the barley production would be: in the storage areas or immediately sold out of the cereal purchasers. Thus, this paper proposed to approach the criteria for the development of the grain-producing holdings through the analysis of the activity from the point of view of the marketing mix, respectively the implementation of the specific marketing tools. 11 years after the European integration of Romania, this paper also comes as an analysis of the impact of this on the different agricultural and agri-food products.

The development of the concept of "marketing mix" can be considered one of the dominant ideas in the practice and theory of modern marketing. To build an appropriate and efficient marketing mix, companies need to consider the following (Iuhos I. C., Bal C.):

- Never act on the market and on the environment by means of a single way or instrument, but with a multitude of means and tools that, in fact, constitute the components or elements of the marketing mix;
- The degree of integration of the means, methods and tools that have been used must be high. Using them in an isolated way, without a relationship of interdependence, reduces the efficiency of the mix;
- The allocation of resources and investments will take into account the specificity, size and power of the firm and will focus on the fair and judicious distribution of all marketing mix elements. Only with a judicious allocation of resources (material, financial and human) on each element of the marketing mix, firms can avoid excessive consumption of resources.

In general, the term "marketing mix" refers to the four main elements or dimensions around which marketing activity focuses, namely (Kotler P.): product, price, promotion, placement. The marketing mix defines a set of tactical and strategically controllable tools, grouped or focused around at least 4 important aspects of marketing (the 4P), which they combine in a specific dosage depending on the conditions specific markets, with a view to producing a positive reaction on the markets for the demand for its products.

In the following, we will analyze the elements of the mix-marketing complex for the barley crop market and the development trends of this market, an analysis that can be useful in developing a strategy for the efficient development of marketing activity on agricultural holdings, in forecasting prices and in making the right decisions for having profit.

1. The product

Generally, a product is anything that can be offered on a market to meet a need or desire. To this end, we studied and evaluated the products of the barley market, the problems of the products on the market and the trends of product development on the market and we analyzed the variation of the official statistical data for the barley culture between 2000-2015 separately, on two intervals: 2000-2006 (pre-accession period in the EU) and 2007-2015 (post-accession period in the EU), comparing statistically the significance of recorded average values. Occupying almost 5% of the arable land (about 440.4 thousand ha of barley versus 9.3 million hectares of arable land), barley is associated with wheat in cereal-based farms because it does not have any particular fundamental technological requirements.

Also because of the attractive price, barley can successfully replace wheat, especially in the spring, when wheat and barley crops are compromised.

Table 2. Dynamics of barley surfaces and productions in Romania - pre-accession EU

Specifications	2001	2002	2003	2004	2005	2006
Surface (thousand ha)	528,80	549,73	317,23	412,00	471,63	326,41
Average production (kg/ ha)	2.988	2.111	1.705	3.413	2.288	2.215
Total production (thousand to)	1580,04	1160,38	540,80	1405,99	1079,14	722,92

Source: Statistical data F.A.O.

Table 3. Dynamics of barley areas and productions in Romania - post-accession EU

Specifications	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Surface (thousand ha)	363,8	394,0	517,5	515,8	419,5	424,2	495,7	516	462,0	487
Average production (kg/ ha)	1461	3069	2284	2542	3170	2325	3250,5	3319	3424	3726
Total production (thousand to)	531,4	1209,4	1182,1	1311,0	1329,7	986,4	1542,2	1712,5	1582	1815

Source: 2007 - 2015 - INS data - Romanian Statistical Yearbook, 2016 - INS data - Plant production

- *Evolution of cultivated areas*

In 2000-2006 (pre-adhesion), barley was grown on average on 440-450 thousand hectares, with a multiannual variation of about 22%, which is statistically considered to be a large variation to very high. The tendency of the crop system expressed by the difference between the average value and the median value of the variation function indicates that the areas occupied with barley tended to decrease. In 2007-2015 (post-accession), the average occupied area was 443.6 thousand ha, without the recorded decrease (2.288 thousand ha) being statistically significant. However, it is worth noting the annual variation of the areas, which decreased relatively significantly, the 12% / for 2007-2015 qualifying as average variations.

This suggests that after accession a system of agricultural farms specialized in barley culture has crystallized, which, on a yearly basis, establishes culture on the same surfaces. It can be appreciated that the barley market has evolved towards a constant multiannual demand, which implies the conclusion that, with regard to the areas occupied, EU accession has given some predictability. As we can see, the tendency manifested in the last years of the interval is the decrease of the occupied areas (about 5%).

- *Evolution of total barley production*

Total production increased from 1101.7 million t / 2000-2006 to 1209.9 million t / 2007-2015, but the difference of about 108.2 thousand tons could be remembered as significant. Because the surface variability was relatively large, we can assume that at least part of the annual variability of total output (32.6%) is due to environmental factors. The growth trend of total production recorded in the pre-accession period was maintained after post-accession.

The relationship between the decrease of the cultivated area and the increase of the total production determined in 2000-2007 has also been maintained in insignificant limits, suggesting an increase in the efficiency of the crop amid the increase of the production at the surface unit, in other words, the barley culture has a slight tendency of intensification. Analyzing the degree of intensification of barley culture through the relationship between the surface and the total production, we find that in the period 2000-2007 the relationship is positive, of an extensive type, while in the period 2007-2015 the increase of the total production is in a reverse relation proportionality, suggesting that there has been a turnaround of the production system towards the relatively intensive nature, with the not very significant differences.

- *Evolution of the average barley production*

Average production increased by 186 kg / ha (2,505 kg / 2000-2006 and 2,691 kg / 2007-2015). This increase is insufficient to be statistically ensured because of the large multiannual variability of 26.1% (over a quarter of the average), which supports the extensive nature of the culture system, despite intensification tendencies. The decline in multiannual variability after adherence is insignificant (0.5%), suggesting that the variation in average yields could be due, in particular, to variations in environmental conditions. Concerning the farmer's decision expressed through the relationship between the sown area and the average production achieved, the post-accession system’s mutations are relatively discreet. Relationships are small, of inverse proportionality, suggesting the same intensification trend, with an insignificant annual rate, the difference being in the probability range below 10%.

2. The price

In the broad sense, the price is the sum of all the values that consumers offer in return for the benefit of having or using the product / service in question. Pricing a product is a strategic decision that must be consistent with the choice of other marketing mix variables (Dubois P.L., Jolibert A.). The profit margin, demand and supply, marketing costs and many other factors must be taken into account when deciding the price. In order to elaborate the strategy for the development of the marketing activity on the agricultural holdings it is necessary to identify the tendencies of price evolution, as well as solutions to the problems that arise on the grain market in general. Prices for cereal products are usually established in correlation with: demand for and supply of agricultural products, competitors on the cereals market, grain competitiveness and state regulation of procurement policy, respectively to grant subsidies and endowments.

Table 4. Data on the average purchase price on the domestic market (lei / kg) for barley

2007	2008	2009	2010	2011	2012	2013	2014	2015
0,59	0,67	0,44	0,41	0,73	0,86	0,79	0,62	0,66

Source: 2007 - 2015 - INS data - Romanian Statistical Yearbook

Barley price dynamics suggests a constant oscillation in the period under review, but prices have also oscillated in the pre-accession period. The reasons for this decrease or increase are many and varied. Factors that affect one degree or another may be the following:

a. Production: the more accurate are the forecasts of the harvest, the more stable are the prices. The most impact on the grain prices has the performance indicators: the results obtained at the last harvest and the expected ones, the size of the cultivated areas, the harvest forecasts, the carry-over stocks and the harvesting terms. Reaching out of the sown areas, farmers count on a particular crop. On the basis of estimates, the state makes forecasts for internal and external consumption, but farmers correct their forecasts depending on weather, soil and other conditions - for example, if the size of cultivated areas is below the level of the previous year then the offer will be weaker, prices will rise and vice versa. While farmers are waiting for a new harvest, the grain remains in the warehouses of the last crop, and the reserve's volume leads to lower prices. Otherwise, prices may also be increased if farmers harvest later than the set deadline.

b. Climatic factors. Climate instability is one of the main causes of unstable crops and presents an inherent risk to agriculture. Frequent natural disasters such as droughts, late spring frosts, hail and floods have a devastating impact on crops. In addition, soil can lose its natural fertility and needs rehabilitation.

c. Economic factors - each country influences prices in its own way. The economic factors include: the volume of cereal exports and imports, the balance between supply and demand, the market situation and the economic situation in the importing countries. It is important to know in what economic phase the cereal market is. Depending on the phase - soar, peak or recession - future price increases or decreases can be predicted. In addition, account must be taken of the economic phase in the importing and exporting countries, which determines the volume of production and purchasing power.

d. Situation in adjacent markets: the financial crisis stimulates the cereal market.- There is a close link between the financial and the commodity markets. If the financial market shakes, investors opt for goods and in this case, grain prices are rising. The reverse situation leads to lower prices.

e. Policy - The tense situation inside the country negatively influences the purchasing power

f. Speculation - there are investors who decide to invest in the markets, speculating with prices. When they sell financial instruments for agricultural crops, prices fall, and when they buy them price grow. The volume of exchanges on stock exchanges has long exceeded the real volume of grain sales and purchases in the physical markets.

Table 5. Situation of intra- and extra-Community trade in barley

	Cant_ IMP (to)	**Val_IMP (mii euro)**	**Cant_EXP (to)**	**Val_EXP (mii euro)**
2007	46.104,7	10.176,2	139.808,1	26.507,4
2008	187.448,9	32.804,4	645.056,3	110.263,5
2009	47.209,9	5.199,3	543.310,9	60.176,8
2010	90.878,3	14.312,5	771.877,6	94.920,8
2011	186.770,1	34.530,6	763.540,5	145.411,2
2012	138.004,3	32.137,3	688.074,6	154.026,3
2013	222.758,0	44.438,3	1.132.937,1	223.593,6
2014	110.090,9	17.181,0	1.374.770,7	228.017,8
2015	533.792,2	83.097,2	1.763.164,3	299.095,3
2016	480.421,0	70.305,2	1.310.986,4	191.836,6
2017*	58.168,4	8.441,2	129.808,0	21.684,6

Data source: INS - EUROSTAT (* January - April)

The general mechanism for the functioning of the agricultural markets in the European Union is based on a complex system of regulating the prices of products. Thus, three price levels are established annually for products covered by the CAP:

 Indicative price - is the price at which agricultural products are marketed on the domestic market. Its level is considered appropriate to ensure a "reasonable" standard of farmer income.

 The intervention price - is the guaranteed minimum price that can be obtained for domestically marketed production. When the cereal's prices reach the minimum level (when the supply is in excess of demand), the Community intervenes by purchasing and storing the product concerned, not allowing the fall in market price below the intervention price and ensuring that farmers receive minimum incomes. In the case of cereals, and therefore of barley, the level of the intervention price is increased each month to cover the costs caused by the storage of production by farmers in the harvest and marketing period. The monthly increase in the intervention price is designed to avoid placing the entire harvest on the market, and farmers are thus encouraged to gradually market their production in smaller installments.

 The price threshold - is the price below which imports of agricultural products can not enter the EU. The reason is that, after adding specific transport and marketing costs throughout the Community, the consumer price of the imported products will be higher than domestic product prices. The threshold price level is obtained by applying customs duties at the world price level.

3. Promotion

Promotion refers to the ways we can find to bring our product to the target audience and to differentiate it from competition. Promotion takes place in two main directions:

- *Product promotion* - through all the means and methods used in the orientation and information of the potential customers about new or improved products, starting with the idea of a new product and its launch on the market, to develop a positive attitude towards the product.
- *Sales promotion* - through all the actions and means of capturing the attention of potential buyers, by sales outlets, in order to boost sales.

It is made by several types of actions, called promotional means or forms, such as: advertising, direct promotion, public relations, merchandising, sales promotion, other actions. Promoting is not, however, a stand-alone tool, but rather a combination of such elements - a promotion mix. The aim and objectives of promoting agri-food products are:

- ✓ increasing sales and persuading consumers,
- ✓ increase market position,
- ✓ creating a positive image of the product,
- ✓ creating a favorable climate for future sales,
- ✓ educating and informing the market.

The advertising campaign is designed to increase sales volume and attract customers by: advertising message (press, radio, TV etc.), brochure, catalog, flyer, banner, etc. The essence of advertising is to offer the right product to the customer with the right argument. Selling through personal effort consists of: choosing customers; in approaching customers; attracting attention; awakening interest; presenting and demonstrating the use of the product, overcoming objections; concluding the transaction and assuring the client about the fairness of its decision and choice.

Public relations creates a climate of trust among potential customers, using internal and external communications, the Internet, lobbying, and marketing consulting. The special promotional methods that are aimed at the immediate increase of sales are: participation in fairs and exhibitions, visits to customers, sales with offers, etc.

4. The placement (Distribution)

Placement is the component of the marketing mix that refers to the places where customers can find the product, but also how they come into contact with it. The manufacturer, intermediaries (if any) and the consumer make up a distribution channel (Coughlin A., Anderson E., Stern L., Ek-Ansary A.). A key role in setting the price fulfills the company's supply chain. Stages of the complex chain of final food products or product groups are:

- production of agricultural raw materials in different forms and types of agricultural, family or associative units;
- purchases of raw materials, transport, storage, inventory formation system;
- product processing;
- internal trade: en gross and in detail;
- foreign trade.

Distribution is interposed between production and consumption by: act of selling, buying, transporting, storing, conditioning and delivering products. Channels of distribution include all companies that participate in sales-purchase acts when transferring a product from the manufacturer to the destination. Classification of distribution channels:

- ✓ short channel (producer-consumer);
- ✓ medium channel (producer-intermediate-consumer);

- ✓ long channel (producer - wholesaler - retailer - consumer).

Intermediaries are wholesalers and retailers who interfere between the consumers and the manufactures. As types of intermediaries on the grain market we meet those who work in the name and on behalf of others (brokers, agents, agents), those who work on their behalf and on the account of others (commissioners) and those who work on their behalf, and on their own (wholesale companies, en-detail companies, specialized firms, cooperative organizations).

CONCLUSIONS

From the analysis of the barley market, it can be said that during the ten years of Community agricultural policy applied in Romania, the barley production system did not undergo significant mutations, the reductions of the cultivated areas and the production increases being statistically uninsured, which makes the detected tendency to intensify uncertain, repetitive and reproducible. Serious aggravations (especially in the area of trade in agricultural products) produced by the transition to a market economy had a negative impact on barley crop production and grain crops in general. Although plant productivity has declined, the production volume has, however, been maintained, at least at the outset, by the substantial expansion of cultivated areas. This is explained by the fact that cereals have remained an attractive alternative for larger producers with limited access to credit resources. One possible explanation would be that the producers in question do not require large amounts of cash until harvest, and the cereal crops can be grown on large areas, which provide sufficient income and provide the opportunity to cover the actual investment.

Marketing of agricultural products involves identifying the needs of consumers of any kind and age, making a profit by satisfying these needs and maintaining these consumers for a long time. Marketing includes all the activities and services involved in the transfer of a product from the point of production (farm or farm administration) to the consumer. This is a valuable sector linking the consumer's agricultural producer. Specifically, marketing activities refer to the selection of the distribution channel, business decisions (investments, purchases, etc.), how and how it will be produced (such as conventional, organic, bio-dynamic or a combination of these) and business, advertising, promotions, price strategy etc.

In order to achieve profit, the marketing activity must begin even before sowing the harvest. Farmers must provide:

- ✓ products that consumers want,
- ✓ in the right form (fresh, dried, processed etc.)
- ✓ at the right time of the year,
- ✓ in the right quantities,
- ✓ to the quality and packaging required,
- ✓ in the right place,
- ✓ at the price that consumers are willing to pay.

Practically, the 4 P - product, price, promotion and placement - helps focus on the 4 most important aspects of selling a product and prove to be useful in several circumstances such as:
- in marketing strategy planning: when we make our marketing strategy and business plan, the 4 P help us structure ourselves so that we can identify the risks and opportunities.
- in market monitoring: once we have chosen our product and marketing strategy, we can monitor market changes by checking how the product, price, promotion, or sales position changes over time.

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THE DYNAMICS OF MAIZE PRODUCTION IN THE CLIMATE FACTORS VARIABILITY CONDITIONS

COFAS ELENA[1]

Abstract: *Corn has always been the basic culture of the Romanian peasant. It has extensive uses in human nutrition, in animal feed, in industry, and as a product for export activities. For these reasons, maize occupies more than one third of the country's arable land. Maize is a cereal crop with multiple and distinctive phyto-techical and biological peculiarities, of which we mention: it resists well drought and heat; has few diseases and few pests; can be grown on very different lands and under different climatic conditions; supports monoculture; being a sowing plant, leaves the weeds clean; is a good precursor for many plants; makes good use of organic and mineral fertilizers; reacts very strongly to the application of irrigation; can be sown for fodder and even for the second crop; has a very high multiplication factor; allows convenient production of highly productive hybrids and adapts to cultivation areas, etc. The research aims to analyze the evolution of the production of corn crops during 2007-2017 in correlation with the multi-annual fluctuation of the average air temperature, as well as the annual average rainfall, which reveals significant variability from one year to the next, the trend of evolution evoking an ascending trend from the point of view of the thermal resources compared to the hydric ones. It results that, at the level of the agricultural territory of our country, the natural thermal potential is richer than the water one, the limiting factor with negative effects on the field crop productivity being rainfall water. Productivity of crops shows fluctuations from one year to another, being significantly influenced by the variability of climatic conditions and, in particular, the production of extreme climatic events.*

Keywords: *corn, temperature, precipitation, production, surface*

JEL Classification: *O12, P50, Q18, Q57*

INTRODUCTION

Climate variability influences all sectors of the economy, but farming remains the most vulnerable. Productivity of crops shows fluctuations from one year to another, being significantly influenced by the variability of climatic conditions and, in particular, the production of extreme climatic events. Thus, in Romania, on about 64% of the arable land, the soils are affected, to a greater or lesser degree, by frequent droughts, over long and even consecutive years, respectively by an excess of humidity in rainy years more than 6 million ha). The impact of climatic variability on the growth, development and formation of agricultural crops is quantified by the potential of meteorological parameters to ensure optimal vegetation conditions or produce unfavorable effects depending on the degree of intensity of the disturbing factor, the mode and duration of action, the probability of production and return in time and space, as well as the vulnerability of plant species to the production of extreme events. Each physical, chemical and biological process that determines the growth and development of agricultural crops is regulated by specific climatic requirements, and any deviation from these requirements implicitly determines the variability of agricultural produce.

Corn is one of the most important crops on our planet. Corn has expanded into crops due to particular plant and biological features (Bîlteanu Gh., Bîrnaure V.). Among other things, corn is well tolerant to drought and heat, is characterized by few diseases and few pests, can be cultivated on different reliefs and under different climatic conditions, bears the monoculture, it is a pruning crop, leaving the weeds clean, is an excellent precursor to wheat, makes good use of organic and mineral fertilizers, makes it easy to obtain very productive hybrids and adapts to cultivation areas, reacts strongly to irrigation, etc.

[1] Scientific researcher, Research Institute for Agriculture and Rural Development, Bucharest, e-mail: cofasela@yahoo.com

MATERIAL AND METHODS

In order to obtain a definite situation regarding the influence of climatic factors on the production of corn in Romanian agriculture, particular analyzes were made for the areas Calarasi, Buzau and Fundulea both for the period 2007-2017 and for the 2020-2050 perspective, several climatic scenarios for some of the most important climatic elements that can be correlated with agricultural production in the case of maize crop, namely: percentage of soil water, actual rainfall, percentage of corn production decrease, water requirement and efficiency of use of water.

Estimating the impact of foreseeable climate change on the growth, development and training of agricultural crops is based on the use of crop simulation models (CERES-Maize for maize) (National Meteorological Administration) in combination with climate predictions of global / regional climate models at various future resolutions and stairs (e.g., 2020-2050, 2070-2100). The magnitude of the effects of the various climate scenario projections is determined by the interaction between the existing local climatic conditions, the severity of climatic parameters predicted by climate scenarios, the effect of CO_2 growth on photosynthesis and the genetic type of the plant.

In order to identify the changes in the observed climate regime in Romania, the series of annual and annual values (certain parameters) were analyzed at the stations in the areas Calarasi, Buzau and Fundulea with complete observations for the period 2007-2017 for the average air temperature and the rainfall quantities, as well the ranges of indices referring to extreme events (maximum amount of time with rain / without rain, maximum rainfall in 24 hours, daily precipitation over certain thresholds). The analysis of changes in the mid-time of the aforementioned time series is made with regard to the identification of the long-term linear trend or the average jump (which indicates the regime change), the statistical significance of these is calculated using non-parametric tests Mann-Kendall (Busuioc A., H. von Storch) and Pettitt (Boroneant C., Rimbu, N.). These tests use calculation methods, of which the most well-known are: a) the dynamic method represented by the regional climatic models, which are coupled with the global climatic models; and b) the statistical method based on certain statistical relations established on the basis of observation data between climate variables at local / regional scale and large scale atmospheric variables. The results of this analysis are summarized below in the climatic scenarios presented, namely the projections of changes in the Romanian climate regime (air temperature and atmospheric precipitation) for the period 2020-2050 compared to the current period 2007-2017.

RESULTS AND DISCUSSIONS

Maize is a plant that has a good adaptability to intense lighting conditions and high daytime temperatures with low photoresponsiveness. The main climatic factor of corn crop is temperature. The thermal requirements of the plant are relatively high throughout the vegetation period, although they are quite different from one vegetation stage to another. The optimum maize growth temperature is 28-30ºC, but it also uses moderate temperatures. It is believed that in the growth, blooming and filling phases of the grain, temperatures of 10°C cause plant growth to cease, yellowing or whitening of the plant. Very high temperatures above 32°C are considered as critical temperatures for corn. Through the sweat process, the plant loses a very large amount of water, dehydrating, even if the plant has a reservoir of water in the soil. At higher temperatures (48°C for 6 hours) and under relatively low humidity conditions (below 30%) the maize plant is irreversibly dry. As it advances in vegetation, the requirements of maize are rising as against temperature. To ensure a good growth rate, average temperatures should not fall below 13ºC in May and below 18ºC in June, July and August. When the temperature is high during the day and low during the night, the growth rate of maize plants is reduced, the growing season is prolonged and the production decreases.

Of the country's agricultural territory, on 76% of the area the heat factor is favorable and very favorable to maize crops, which can ensure high yields. The amount of heat, however, varies greatly in agricultural areas, very distant averages of annual average temperatures from less than

7ºC to more than 11ºC give a high degree of temperature variation in the period of growth and development of maize plants in different areas.

The main climatic factors that determine the level of vegetal production, including corn production, are: heat (temperature), light and water (precipitation). Of the climatic factors involved in plant growth and the formation of agricultural production, light and natural heat are inseparable elements, the values of which generally follow the same curve. Therefore, temperature and precipitation were used in calculations and determinations. In order to determine which production levels these climatic factors can provide in different areas, a synthetic unit of these factors, called the hydrothermal index, is given by the formula:

$$I.ht = (Pmm \times T) : 1000,$$

where I.ht = hydrothermal index,
Pmm = annual average precipitation of the area (in mm/season),
T = average annual temperature (in ° C - degrees Celsius).

At the same time, experimentally and statistically, it has been determined that in the case of the application of appropriate technologies, an I.ht. it corresponds to a production quantity of 1-1.5 tonnes of corn.

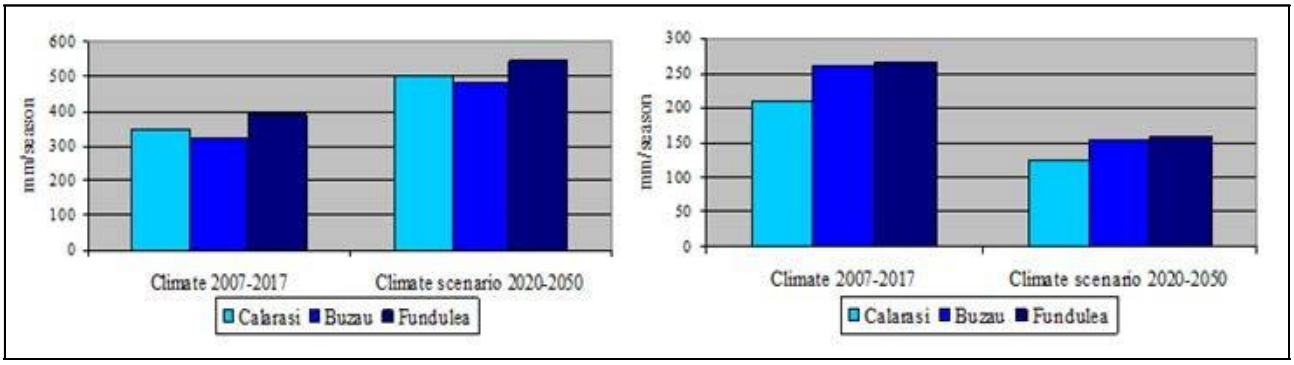

Fig. 1. Water deficiency in soil and the amount of precipitation

Using climatic factors, the "climatic polygon" (C. Chirita, C. Paunescu, D. Teaci) of Romania was drawn up. Research and practice have established that corn can be cultivated with good results in areas where the annual average temperature is above 7ºC, in which the sum of the useful temperature degrees during the growing season of the respective crops is achieved. Of course, there is a wide variation of areas from this point of view and proper of the right varieties and hybrids. Romania's large agricultural areas in Dobrogea, Bărăgan, South Plain, Western Plain, Transylvania and Moldova have an average annual temperature of between 8.2 and 11.2 ° C and average precipitation between 359 and 631 mm. From a thermal point of view, all large agricultural areas are therefore favorable to corn crops. Under the "climatic polygon" hydrothermal indexes were calculated and their isolates were drawn up. It is noted that in the maize areas (with an average annual temperature above 7ºC and with annual average precipitation 359-631 millimeters), hydrothermal index values are between 4 and 7 under natural, non-irrigated conditions.

It follows that climatic factors could provide unmanned production of 4,000-10,500 kilograms/ha of corn grains, of course if these climatic conditions are agreed with edifices (corrected), varieties and hybrids used and applied technologies. In areas with an average annual temperature of 9° C, evapotranspiration during vegetation is increasingly intense. For corn, in order to get the best out of the heat and light from these areas and to obtain large productions, it is necessary to fill the water from precipitation up to the limits of 800-900 mm. In the case of the addition of precipitation with irrigation water, hydrothermal index values in the respective zones amount to 9-11.5 for maize. Thus, improved climatic factors allow production to reach: 9,000-18,000 kilograms/ha.

It is clear that the climatic factors - heat and, implicitly, light - best meet the needs of the plants, the limiting factor being water, which, if completed, can double the crop compared to that achieved by the natural condition of the climatic factors. The concrete situation of the agricultural land and agricultural land in terms of favoring climatic factors is the following: almost 11.5 million hectares of agricultural land are in areas with an average annual temperature above 8ºC; about 8 million hectares in areas with an average annual temperature of 9° C; about 2 million in areas with average temperatures between 7 and 8° C and the rest (1.2-1.5 million hectares of mountain meadows) in areas with less than 7° C annual average - about 6.5 million agricultural land, of which: 5.5-6 million arable hectares are in areas with less than 500-550 mm annual rainfall; 4.5-4.9 million hectares in 500-600 mm precipitation areas and about 3.5-3.9 million hectares in areas with annual rainfall of over 600 mm (Marinica I., Constantin (Oprea) D.M., Marinica A., Vătămanu V).

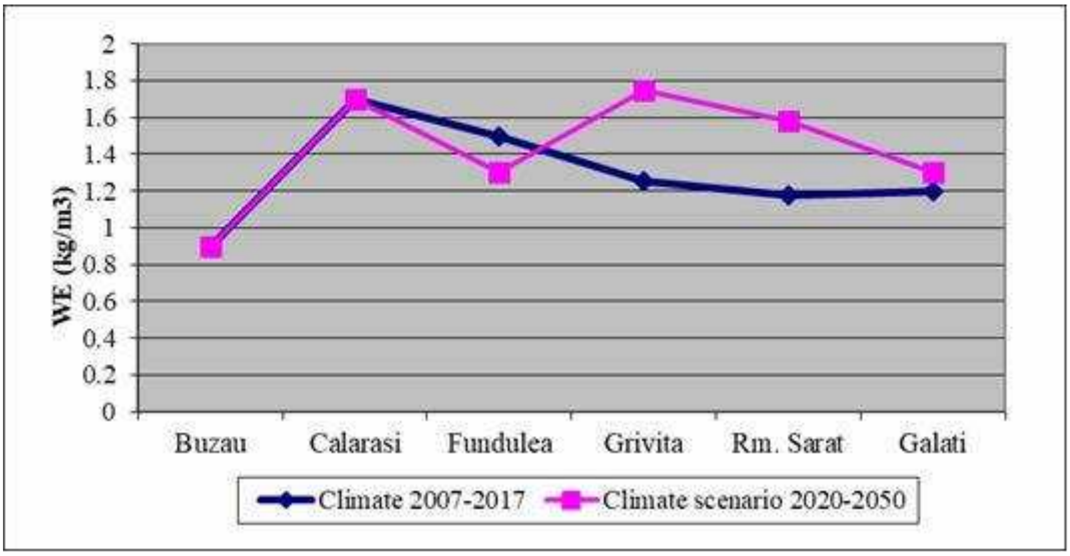

Fig. 2. Water efficiency - corn crop

We can easily deduce that the heat factor (implicitly light) is favorable and very favorable to corn crops on 76% of the agricultural territory of the country, as it can ensure high yields. The amount of heat varies greatly in agricultural areas, very distant averages of annual average temperature from less than 7ºC to over 11ºC offer high temperature variations in the growth and development period of plants in different areas. In some of these, heat is a limiting factor for corn production. Although natural precipitations along with the temperature (hydrothermal index) in our agricultural areas generally provide conditions for potentially high yields, we still have large areas and large agricultural areas where water is a limiting factor for corn production. Filling water through irrigation in precipitation areas between 350 and 600 mm leads to a substantial improvement in hydrothermal indices and to the possibility of double or triple corn harvest.

The heat factor and, implicitly, the light can be modified to a lesser degree, but their degree of recovery can be greatly improved by the measures we can apply, such as zoning corn crops, allocating it to the territory taking into account the heat required to reach maturity and ensure great productions. The location on areas and micro zones must be avoided with abundant heat and light of hybrids requiring a lower amount of temperature and not making good use of the heat and light available in the area; creating and using hybrids with a larger foliar surface with rapid vegetative growth; selecting a proper density of plants per unit area and line orientation so that all plants receive the maximum possible heat and light and the assimilated organic mass production is maximum per unit area.

We can conclude that, on more than 75% of Romania's agricultural territory, climatic factors are favorable to corn crops, and by correcting the water factor in large agricultural areas they become very favorable, ensuring very high potential outputs. However, climatic factors (through the hydrothermal index) can only determine or measure the favorable climate for agricultural crops and the level of possible productions. These are largely related to edifying factors and their interaction with climatic factors.

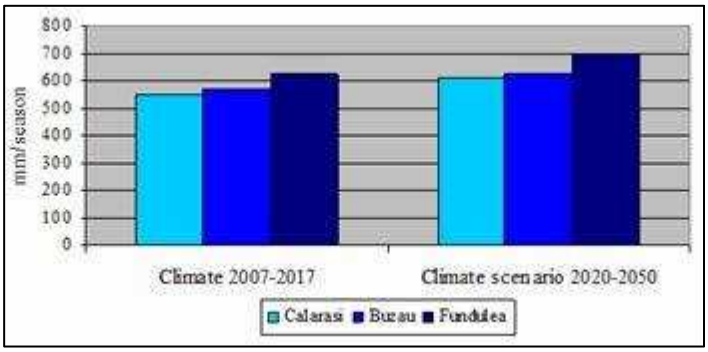

Fig. 3. Water requirement of corn crop

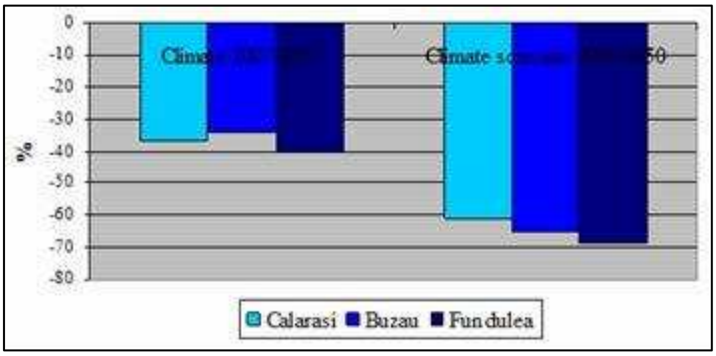

Fig. 4. The percentage of corn production

From the point of view of the interactions between climatic and climatic factors, the following situations can be encountered in Romania:

 Areas with a corresponding natural hydrothermal index and favorable edifying factors. Example: Calarasi area - 560 mm precipitation + 250 mm groundwater intake; 10.5ºC average annual temperature; wet groundwater chernozem with favorable physical and chemical properties; soil with favorable attributes; I.ht = (810 mm x 10.5): 1000 = 8.5, which means a potential maize production of 12,700 kg/ha.

 Areas with a corresponding natural hydrothermal index, but with unfavorable edifying factors. Example: Buzau area - 850 mm annual rainfall; 10.3ºC average annual temperature; podzolic soil with unfavorable features; soil with unfavorable features; I.ht. = (850 mm x 10,3): 1000 = 8.7, ie 3 tonnes of maize, production actually achieved without soil improvement work. Although the hydrothermal index is practically the same for Calarasi and Buzau (8.5 and 8.7), the production at Buzau was three times smaller than in Calarasi due to unfavorable edifices of the podzolic soil.

 Areas with inappropriate natural hydrothermal index, but with favorable edema factors. This area covers most of the areas of Dobrogea, Bărăgan, South Plain and other areas not yet equipped for irrigation, except for land with a good groundwater intake. Example: Fundulea area with 300 mm annual precipitation; 11.2°C average annual temperature; chernozem soils with favorable properties; soil with favorable attributes; I.ht. = (300 x 11.2): 1000 = 4.7 (4,500-7,000 kg/ha of corn, possible production under natural conditions). If irrigation improves the water factor by adding up to 800 mm, I.ht. becomes (800 x 11.2): 1000 = 8.9 and production can grow to over 13,000-14,000 kg/ha.

 Areas, micro-zones or plots with inadequate natural hydrothermal index and unfavorable edifying factors.

These situations can occur in all regions of the country - in large areas, in low-temperature areas (below 6-7°C average annual) and with abundant rainfall (over 750-800 mm), where the hydrothermal index is quite high due to large amounts of rainfall, but corn and other crops do not produce grains or mature because of the lack of the amount of temperature required (Marinica I., Constantin (Oprea) D.M., Marinica A., Vătămanu V.). In these areas there are also cold, compact, impermeable soils with low aera, acidified pH, poor in nutrients. To increase production, you can act by completing the soil nutrition reserve, eliminating excess water, correcting acidity, improving the composition of natural flora or herb mixtures.

Table 1. Data on the evolution of maize areas and maize production in Romania

Specification	**UM**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Surface	mii ha	2524.7	2441.5	2338.8	2098.4	2589.7	2730.2	2518.3	2512.8	2528	2497	2640
Average production	Kg/ha	1526	3215	3409	4309	4525	2180	4488	4770	3509	4014	5800
Total production	mii to	3853.9	7849.1	7973.3	9042.0	11717.6	5953.4	11305.1	11988.6	8871	10024	14500

Source: INS Data - Plant productions of main crops (2007 – 2017)

In Romania, over the period 2007-2017, the multi-annual fluctuation of the average air temperature and the annual average rainfall rates reveal significant variability from one year to the next, the trend of evolution evoking an upward trend in terms of thermal resources compared to those of water (Baciu, M., Busuioc, A., Breza, T). It results that, at the level of the agricultural territory of our country, the natural thermal potential is richer than the water one, the limiting factor with negative effects on the field crop productivity being rainfall water. A peculiarity is presented in 2017, according to the data presented by the Ministry of Agriculture. In this respect it should be mentioned that the total production of grain maize registered in 2017 in our country was 45% higher than that of the previous year 2016 (Soare E., Dobre I.). Thus, with an average production per hectare of nearly 6000 (5800) kg/ha, Romania managed to record a record production of more than 14.5 million tonnes in 2017. The production recorded in 2017 was the highest ever obtained, given that in 2016 maize production was about 10 million tons, with 4 tons harvested per hectare. Another record production was recorded in 2014, when 11.3 million tons of corn was harvested in Romania, with an average production of 4480 kg/ha.

CONCLUSIONS

In the coming decades, the implications of global warming in the industrial economy, water supply, agriculture, biodiversity will be very obvious. Globally, heating thus has the effect of increasing the frequency and intensity of extreme events, especially drought and floods. The causes that lead to the occurrence of these phenomena are obviously related both to the climate and to the human interventions, namely irrational use of land and water resources, improper agricultural practices, deforestation, overburdening and, last but not least, air and soil pollution. Climate data from the last century highlights a progressive warming of the atmosphere and a significant reduction in rainfall, which is considered to be limiting to the development and productivity of agricultural crops, as well as the use of water resources. These changes may have significant consequences on the growth and development of crops during the vegetation period, depending on the degree of intensity of the disturbing factor, the mode and duration of action, and the vulnerability of the plant species to the occurrence of extreme weather events.

In the long run, measures to prevent and mitigate the effects of climate change include reforestation programs, pollution reduction, restoration and modernization of anti-erosion works, as well as the expansion of sandy soil improvement and improvement, etc. At the same time, educating the population and raising awareness about environmental protection are major requirements in developing climate change adaptation strategies. The solutions and recommendations for the development of actions and procedures to prevent and mitigate the effects of climate variability in agriculture must fully embrace the whole set of known measures (agrotechnical, cultural, irrigation, etc.) and rapid intervention actions to locate and limit the spread of extreme phenomena in order to avoid accentuating the consequences.

However, addressing climate change impacts requires specialized scientific data and analysis, risk management in agriculture, including mainly actions on the management and conservation of environmental resources, as well as taking correct decisions in the future. The foundation and development of agricultural management options for adapting and reducing the negative impacts of possible climate change on crop systems may recommend specific technological measures: modification of the sowing date, use of genotypes with high resistance to high temperatures / drought, modification of land use practices, the change of crop rotation and, last but not least, the application of irrigation.

From the above it can be seen that in the agricultural areas of Romania it is possible to produce large quantities of corn. However, the conclusion is that in some areas large production is achieved only if the hydrothermal index - ie the water element - is corrected by arranging the respective lands for irrigation. In other areas, interventions are needed to improve edema factors in order to obtain high yields of corn. In many cases, on large surfaces, measures are needed both to improve the hydrothermal index and edema factors.

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RESEARCH ON THE VALIDATE OF WHEAT PRODUCTION IN THE CONTEXT OF MEASURES ENTREPRISED FOR THE EXTENSION OF MARKET MECHANISMS

COFAS ELENA[1]

Abstract: *Wheat occupies an important place in the food security strategy as it is characterized by its long-lasting consistency and by its suitability for a wide range of bakery products. The role of wheat in the food security strategy is also determined by low maintenance costs compared to other foods, with no need for refrigerated chains or costly installations. Being the main raw material in bakery products, wheat is the most important crop in grain production. The bearers of wheat supply are, on the one hand, agricultural producers, irrespective of their organization and, on the other hand, the wheat traders, the latter having recovered as carriers of the offer, because they are generic, a primary market for the marketing of wheat (when it goes from producers to traders or directly to processors) and subsequently at least a second stage of marketing between different traders or between traders and processors. The Common Agricultural Policy is mainly integrationist, to a greater extent than the internal market, where the harmonized standards have replaced them by only about 10% national ones. With regard to the CAP, national agricultural policies have been replaced, for the vast majority of agricultural production, by common rules for the functioning of markets and the marketing of products. For the implementation of common market regulation measures, the following instruments are used: prices, market intervention, financial aid, production quotas, common customs protection.*

Keywords: *wheat, market, mechanisms, production, analyze*

JEL Classification: *O12, P50, Q18, Q57*

INTRODUCTION

The structure of crops in Romania and, respectively, of crop production is dominated by cereal production. Of these cereal crops, wheat - which is a traditional culture for the Romanian farmer, regardless of the size of the household or farms - holds a significant percentage of 39.2% of the total cultivated area (in 2016) and 65% of the area cultivated with cereals (in 2016). Although wheat production has a sale-purchase advantage far beyond that of maize production (and because of the use of maize as feed), wheat market trading is well below the level recorded in other European countries.

The extent to which the Romanian agriculture evolves from the traditional economy to the market economy can be appreciated by the way in which the production of the crop is capitalized, respectively by the dynamics of the quantities of wheat that is consumed by buying from the producer. In fact, market capitalization of cereals is a requirement of economic modernization. The bearers of wheat supply are, on the one hand, agricultural producers, irrespective of their organization and, on the other hand, wheat traders, the latter being also found to be carriers of the offer. It can be said that there is a primary market for the marketing of wheat when the distribution process is made from producers to traders or directly to processors), respectively a secondary market, trading between different traders or between traders and processors.

MATERIAL AND METHODS

As a research method, the quantitative analysis of the European / Romanian statistical data was used in the elaboration of the paper, as well as the information on the agricultural policy measures in Romania, for the wheat culture. Also, for the study of the circulation of agricultural products obtained from wheat - both common wheat and durum wheat - the supply balances were used, which, although a relevant statistical tool, is not very used in the macroeconomic analysis. These balances are carried out by the National Institute of Statistics and are a synthesis of statistical

[1] Scientific researcher, Research Institute for Agriculture and Rural Development, Bucharest, e-mail: cofasela@yahoo.com

indicators, coming from different statistical domains, being drawn up on the basis of a harmonized methodology at EU level. These indicators give the possibility to evaluate the structure of resources (production and import) as well as their destination in a self-consumption or sale-purchase system. The reference period is the calendar year (www.insse.ro).

Within the supply balances the following correlations are established:

resources = uses

resources = usable production + imports + initial stock

uses = internal use + exports + final stock

internal use = human consumption + industrial use + feed + seed + losses

Supply balances are classified as follows:

- after the transformation stage: balances of primary products (products in the original state, which have not undergone any change) and transformed balances (products obtained by processing a primary product);
- after the marketing stage: the farm balance or the producer (made for products that are used in high proportion directly in agriculture), the market balance and the total balance sheet (refers to all stages of marketing and is made up of the balance sheet of the producer and market balance);
- after aggregation: simple balance sheet (balance sheet of a single primary product: ex-balance sheet of durum wheat pasta) and aggregate balance sheet (the balance of a primary product plus the products derived from it, transformed into primary product by means of transformation coefficients: eg the wheat balance comprises both grains and derived products transformed into grains).

The information has been supplemented by documents specific to Community / national legislation, agreements, directives, regulations, decisions on the common organization of markets - which stipulate the rules for the organization of markets and trade in EU agricultural products - and articles and studies published in journals specialty, etc. As regards the CAP, for the vast majority of agricultural production, national agricultural policies have been replaced by common rules for the functioning of markets and the marketing of products, the implementation of which uses instruments such as: prices, market intervention, financial aid, production, common customs protection, etc.

RESULTS AND DISCUSSIONS

Wheat is one of the oldest crop plants and the most important food plant. With high ecological plasticity, wheat grows on all continents and occupies the largest areas of the world of all crop plants. Wheat grains are the raw material for the production of flour and derived products - pasta, especially durum wheat, biscuits, grain, confectionery - and, to a lesser extent, for the extraction of starch, glucose, dextrin, alcohol, etc. The bran resulting from the grinding of wheat grains is a particularly valuable concentrated fodder, especially for dairy cows, young and breeding animals, rich in proteins (exceeding corn), fats, carbohydrates, mineral substances (phosphorus salts) , B vitamins, etc., and wheat straw is used in the pulp and paper industry, as feed for animals, as litter, for fire, for different weaves, etc.

Qualitative qualities of wheat depend on the chemical composition of the grain, which varies between wide limits, depending on the variety and the vegetation conditions, the main components being between the following average values: water 13-14%; carbohydrate 63-69%; protein substances 12-16%; about 2% fatty substances; cellulose 1.8-2.2%; mineral substances 1.6-1.8%. The most important wheat species are Triticum aestivum (common wheat), hexaploid species and Triticum durum (tetraploid). It is estimated that of the total wheat production, about 65% is used in human nutrition, 21% as animal feed, 8% as seed material and 6% for different industrial products.

The European Union is the main actor on the wheat market, the world's largest wheat producer and producer, with higher yields than the world average. However, wheat production is constant in many EU Member States, and the lack of improvement in this area may endanger the consumption of wheat in the future. One of the main challenges facing agriculture over the last 20 years is the increase in wheat production due to the dramatic increase in wheat demand as a result of world population growth and the way the diet of the population changes. At the level of 2016, Romania ranks 5th on the cultivated surface, after France, Germany, Poland and Spain, the same place and the production produced after France, Germany, the United Kingdom and Poland.

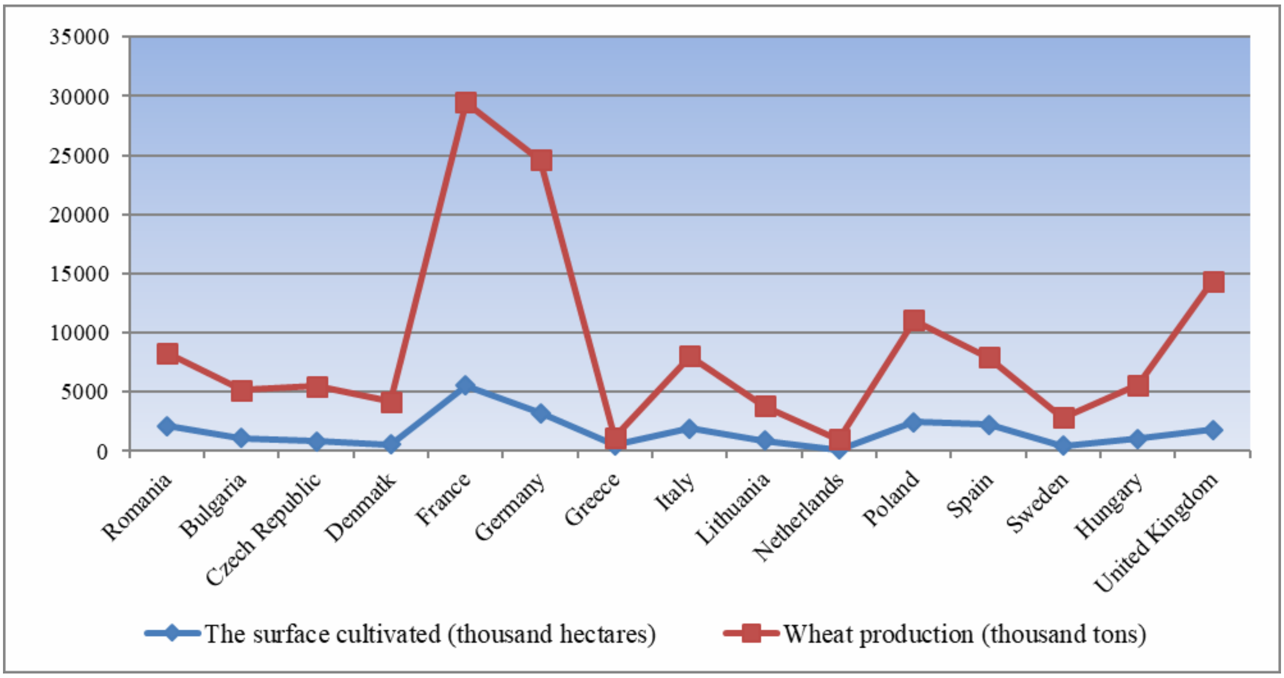

Fig.1. Grown areas and wheat production in 2016 (source: EUROSTAT)

The productivity of wheat crops is influenced by a number of factors, which are important both in terms of inputs and crop biology, environmental conditions and agricultural market characteristics and agricultural policies. Such a classification can induce the determinants of productivity at farm level: farmers and farm features, management and innovation practices, climate change, political reforms, market fluctuations, farmers' risks, macroeconomic technology factors etc.

The wheat supply presents some important features, among which:

- Seasonality, which is due to the fact that the volume of the offer is at the beginning of the agricultural year, the relatively constant consumption naturally decreasing the supply during the year, the minimum being reached at the end of the year. As a result, the price of wheat follows a growing natural trend during the agricultural year.
- Dependence on climatic conditions. In economically developed countries, the degree of dependence on climatic conditions has been reduced, especially through the introduction of irrigation systems. However, due to extreme weather phenomena, a low level of production shows that this dependence still has a major influence on the yields of the producers.

a. The evolution of resources and uses of wheat and wheat products

In 2016 both wheat and wheat commodities with its components, usable production, imports and initial stock as well as exports and end stocks reached the maximum level of the analyzed period, as outlined below:

- the wheat resources and wheat products in 2016 were 54.0% higher than wheat and wheat resources in 2012 (minimum level).

- the level of imports and exports in 2016 increased by 3.4 times and 3.0 times respectively compared to 2012 when the lowest level was reached. Both the share of imports and exports in resources, respectively the uses of 2016, was 16.6% and 50.1% respectively. These were 9.2 and 19.5 percentage points higher than in the previous year

- the internal use of wheat and wheat products in 2016 decreased by 27.2% over the previous year (maximum level of the analyzed period) and increased by 12.9% compared to the minimum level

achieved in 2013. Human consumption has the largest share of domestic use, with a 58.0% share in 2016.

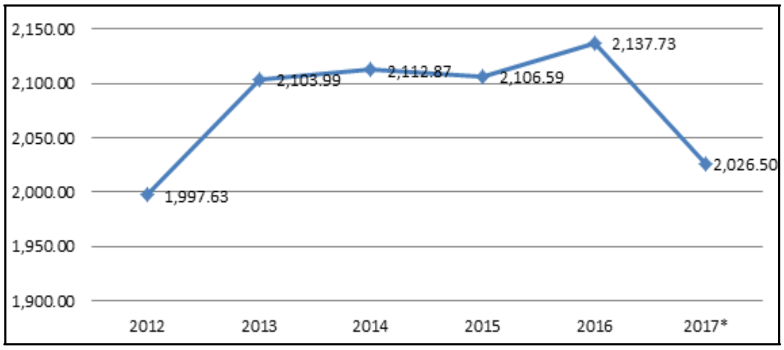

Fig.2. Evolution of wheat fields (thousand ha) in Romania
(source: 2012-2016 - INS, 2017 - EUROSTAT)

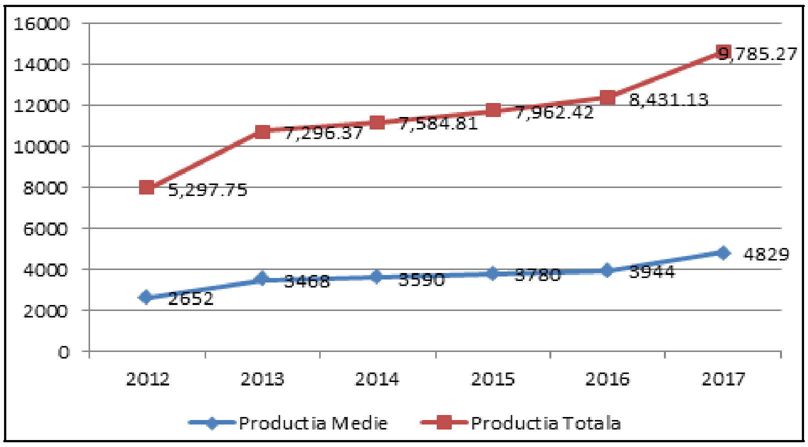

Figure 3. Evolution of average and total wheat production (thousand tons) in Romania
(source: 2012-2016 - INS, 2017 - EUROSTAT)

Table**.** 1. Situation of intra- and extra-Community trade in wheat (2012-2017)

	Quantity imported (to)	**Import value (thousand euros)**	**Quantity exported (to)**	**Export value (thousand euros)**
2012	531.827,00	118.663,40	2.314.888,20	544.095,90
2013	679.827,70	122.897,10	4.773.293,80	977.679,50
2014	670.919,40	116.079,90	4.965.442,70	959.356,80
2015	652.266,90	115.549,30	3.555.280,70	692.534,90
2016	2.155.962,60	330.860,50	6.993.999,20	1.141.908,40
2017*	476.861,60	79.082,50	1.839.168,90	325.688,70

Source: www.madr.ro,* January - April

b. Supply balances for common wheat and durum wheat

From the mere observation of the data in Table 2, it is clear that the quantitative value of exports exceeds that of imports over the entire study period, the maximum value was recorded in 2016, ie the minimum value in 2012. The supply balances for the main agro-food products are an important tool for studying the agri-food product market. They represent a synthesis of statistical indicators, coming from different statistical domains, and they do not have their own legislation.

The supply balances are based on a harmonized methodology at EU level and are transmitted to Eurostat according to a timetable set by Eurostat.

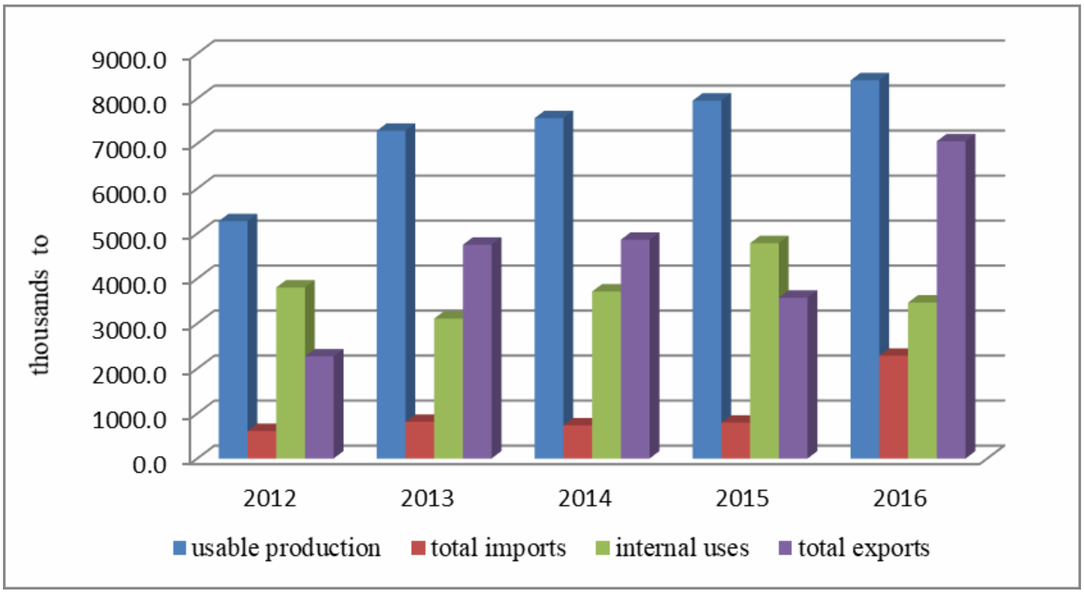

Fig.4. Supply balance - common wheat (source: www.insse.ro)

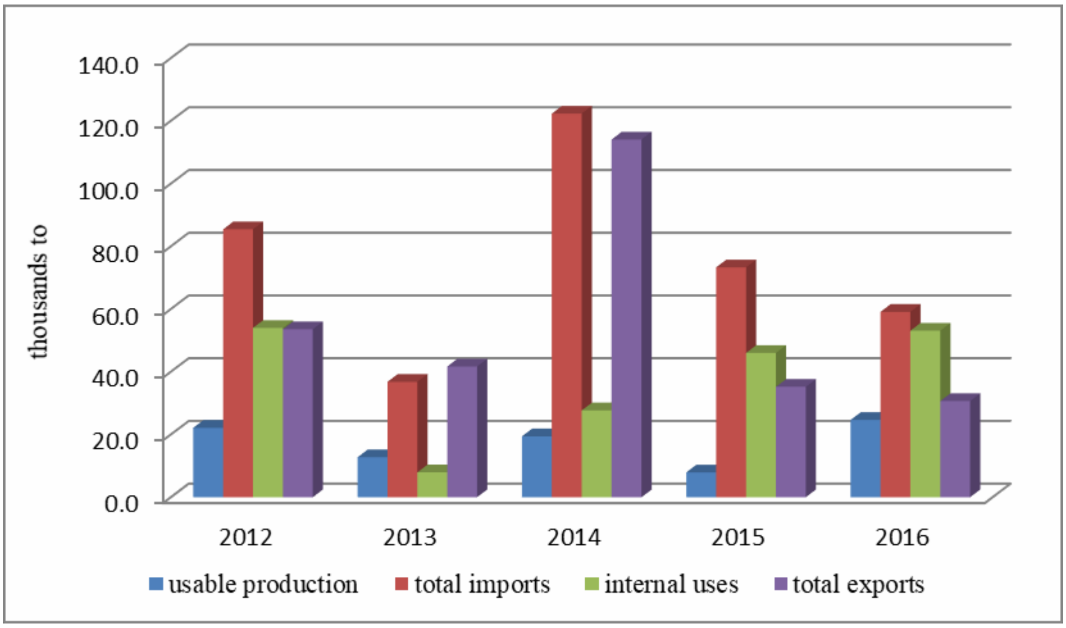

Fig.5. Supply balance - tough wheat (source: www.insse.ro)

c. Grain market and market mechanisms - wheat culture

The Romanian grain market comprises a wide range of products, similar to those found on the European grain market, but with some peculiarities, of which we can specify the following:

- in comparison with other marketing subsystems, the cereals market is distinguished, first of all, by the dynamic supply and demand ratio, being a means of balancing the market because it has as its object products which are an appreciable economic sphere for the population as a whole;

- the cereals market is an indicator of the market's pulse, which can anticipate changes and directions for action for businesses in its sphere of influence but also on the commercial environment in general;

- the buyer's behavior is little influenced by emotional or impulsive factors, as buyers are scattered and consumption is relatively constant, regardless of the size of the revenue or the price, if consumption has been set at a rational level;

- Cereal marketing chains are long, with an increasing number of specialized intermediaries for whom promotional activity has a low share, and international trade is dominated by large specialized commercial enterprises.

A phenomenon that has negatively influenced the cereals market, especially those of breadmaking, has been and is still represented in recent years by the increase in stocks to agricultural producers. Clearly, this phenomenon is also a consequence of market prices. Another sensitive issue facing the cereals market in Romania is that of the territorial distribution of cereal crops. The dispersion of the supply generates problems of collection, transportation, distribution etc., given that the demand is spread evenly throughout the country.

Romanian farmers are also dependent on firms that have the monopoly of the main raw materials and materials necessary for the production process and which they sell at very high prices, with a pay-as-you-go payment. Producers are also dependent on storage facilities for agricultural products, where they are often deceived when receiving, conditioning and laboratory analyzes of harvested products. Manufacturers are also dependent on insurance companies that make fabulous profits, but they invent all sorts of reasons for not paying them damages. When manufacturers have to sell their products they appear on the market all kinds of merchants who, acting on behalf of non-existent firms, uncontrolled by anyone and not bound by any law, offer manufacturers low sales prices compared to the cost price per ton of product. Of the proceeds earned, most of the producers do not even recover their production costs, ie the profit does not even exist.

The cereal price has been liberalized, but it remains under the direct influence of processors who are better organized and have the interest that this price is to their advantage and as a result be reduced. Farmers are numerous and with a very low economic power, making them vulnerable on the market. Poor organization of wheat and cereal producers in the associative plane and the few non-governmental bodies that represent them determines that their interests are insufficiently represented and defended and that the legislative proposals in their interest are very rare and inconsistent. The cereal price increased each year, but each time the increase was below the annual inflation rate, which made the wheat producers' economic power have a decreasing trend.

With all these problems, it can be said that 2007 - the year Romania joined the European Union - marked a new age in the agricultural and rural development economy of our country. Against this background, the agricultural economy has had to adapt quickly to be able to integrate into the EU's internal market and to adopt the Common Agricultural Policy in its entirety. On the other hand, in a context of market opening and globalization, the principles of the common commercial policy applicable to trade in agricultural products have been established. The specific objectives of the CAP are:

- increasing agricultural productivity by promoting technical progress and ensuring optimal use of production factors, especially labor;
- ensuring a fair standard of living for the agricultural population;
- market stabilization;
- guaranteeing security of supply and ensuring reasonable prices for consumers.

The European model of agriculture is based on a competitive market-oriented sector, while fulfilling other public functions, such as protecting the environment, as well as integrating agriculture with the environment and forestry. In order to include agricultural products in the free movement of goods while maintaining State intervention in the agricultural sector, it was necessary to eliminate the national intervention mechanisms incompatible with the common market and, in order to be transposed at Community level, it was necessary to draw up the CAP. It moves its focus from direct subsidies to agriculture (Pillar I of the CAP) towards the integrated development of the rural economy and the protection of the environment (Pillar II of the CAP).

EU accession had a positive and stimulating effect on the production and recovery of wheat: in Figure 6 it can be seen that after the accession, the wheat price had a positive tendency to grow, with slight inflections due to the production obtained in the respective years. It is remarkable that after 2007, the wheat sales price never fell below the prices recorded between 1998 and 2006. The same trend is also noted in Figure 7 for wheat exports, which have seen spectacular increases after Romania's accession to EU.

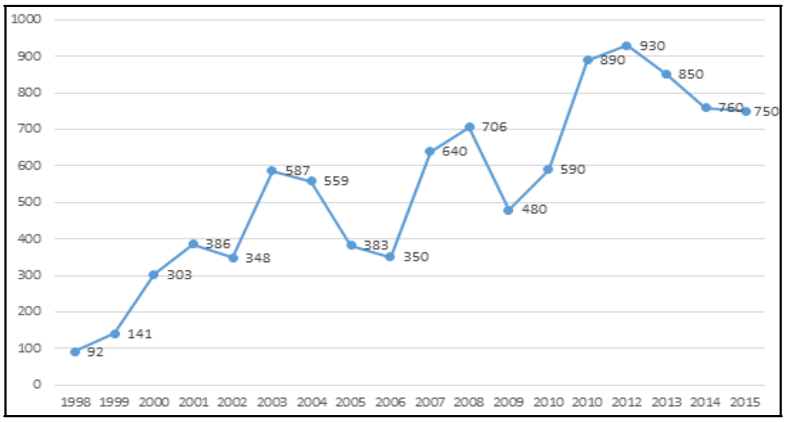

Fig.6. The evolution of the wheat price (1998 - 2015) (source: www.insse.ro)

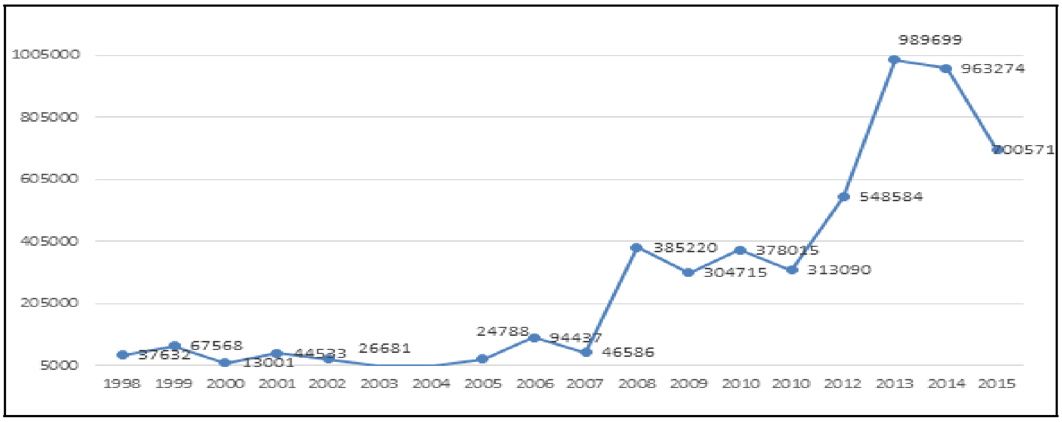

Fig.7. Evolution of wheat exports (1998 - 2015) (source: www.insse.ro)

Food demand is not elastic, ie it reacts to a small extent to price variations. In addition, given the length of production cycles and the fact that production factors are clear, the world supply of agricultural products is very rigid. Against this background, an abundant offer leads to lower prices, while, on the contrary, a reduced offer causes a strong price increase. All of these elements contribute to the permanent instability of the markets. In such a situation, public authorities have always had a clear tendency to regulate agricultural markets and to support producers' incomes, a trend the CAP has taken over. Supporting public goods, known as non-commercial functions of agricultural activity (ie unpaid), has therefore become a key element of more recent agricultural and rural policies, including the Common Agricultural Policy. CAP funding is currently provided by the EAGF and the EAFRD.

Table 2. CAP expenditure broken down by Member State

	Direct aid / markets and other measures for 2016 / rural development 2016 (EUR million)				**Percentage of farms benefiting from direct aids from the EAGF (2016)**		
	a. EU-28 direct aid (Pillar I - EAGF)	**b. Total pillar I - EAGF EU-28 [including (a.)]**	**c. Total EAFRD EU-27 (Pillar II)**	**(b + c)% of total EU**	**With help ≤ 5 000 EUR**	**With help ≤ 20 000 EUR**	**With help ≥ 50 000 EUR**
RO	1 521,3	1 568,4	1 140,9	4,8	95.78	98.77	0.47
UE-28	40 984,1	44 221,1	12 305,7	100,0	76.80	92.73	1.81

Sources: European Commission - EAGF and EAFRD financial reports, 2016

Romania's accession to the European Union and integration into a common market has given manufacturers and consumers greater flexibility in accessing those outlets / outlets (beyond the native market) that could provide them with more convenient prices and higher sales volumes.

CONCLUSIONS

Although accession to the EU has induced constancy and predictability in the farmers' culture decision, the Romanian rural economy - mostly dominated by agriculture - is still poorly integrated into the market economy. In the current context, some key issues can be identified:

1. *Low market integration and inefficiency of agrifood chains*

The existence of long distribution chains places captive farmers between their suppliers and customers and strives for their prosperity. The solution would be the development of short supply chains, namely the creation and development of producer groups, actions that will help holdings to better integrate into national and European markets. It is important for producers to plan their supply and better adapt to market demand (quantity, quality, rhythm and short delivery times, compliance with traceability principles etc.).

2. *Poor promotion of Romanian agro-food products*

The problem of poor promotion of Romanian agro-food products is due to a number of reasons, such as: the variable quality of products over longer periods of time, the difficulty of honoring large and constant volumes, the poor presence of domestic distributors on the international market, poor branding or non-existence of products.

3. *Insufficient storage capacity*

The solution would be to support the construction and upgrading of warehouses, in order to strengthen value chains and create added value by taking measures to improve storage capacity. The existence of storage facilities will allow additional gains for farmers who will no longer have to sell their produce immediately after harvesting, when prices are usually declining. Also, the concentration of production will facilitate the process of negotiating prices with traders / large chain stores.

The extent to which the Romanian agriculture evolves from the traditional economy to the market economy can be appreciated by the way the production of these crops is exploited, respectively by the dynamics of the quantities of wheat that are consumed by buying from the producer. Although the state measures to expand market mechanisms have begun to produce positive effects, in the absence of a rapid dynamics of agricultural property concentration, progress in harvesting grain production through sale-purchase will not be significant.

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ANALYSIS OF THE RENTABILITY OF THE SUNFLOWER PRODUCTION SYSTEM – NON IRRIGATED OR IRRIGATED

PETRE IONUȚ LAURENȚIU[1]

Summary: *Although it is still argued that crop irrigation brings higher yields and higher incomes, it does not always take into account the costs of these additional works. Thus, there may be some cases where the level of these expenditures exceeds the productivity gain, and therefore there is a disadvantage (loss). The question that arises from this context is the following: is it worth to irrigate the sunflower culture in order to increase yield? In order to determine the efficiency (profitability) of the two crop systems (irrigated and non-irrigated) data from ADER 13.1.2 will be used to calculate the economic indicators in order to determine the level of profitability between the two systems. These data will refer to crop technology and the income and expenditure budget for setting up and operating a hectare of sunflower.*

Keywords: *irrigation, non-irrigation, sunflower, profitability*

JEL Classification: *Q12, Q15*.

INTRODUCTION

Sunflower culture is one of the most common oleaginous crops in our country. Its importance is given by the finished product resulting from the processing, namely the sunflower oil with a high demand on the market, being the most widespread and used product of this kind.

From 2013 to the present, according to Eurostat, Romania holds the first place in the European Union in total sunflower production; at the same time, Romania, is one of the world's leading and leading venues. In the last year, 2017, Romania's total production exceeded the 2 million tons threshold.

Sunflower crop is widespread because it has a wide degree of use in both human and fodder nutrition, and this culture contributes to economic development through its industrial and energy uses.

The main geographic areas where sunflower is grown in Romania are: the Dobrogea, the Romanian Plain and the West, with the most suitable conditions for the development of this plant.

By processing sunflower seeds, in addition to the aforementioned oil, the by-product is the feed used to feed the animals, and sunflower cakes can also be used.

Another feature of the importance of culture is the fact that sunflower is a melliferous plant, so it is also used to produce honey.

Hulls of sunflower seeds can be harvested by processing to obtain: fibro-wood, pellets, ethyl alcohol, carbon dioxide, fodder yeast.

These aspects of the role of sunflower culture in the Romanian agricultural sector lead to the fact that this culture has a wide use framework, it is very well acclimated in our country, which leads to the high level of production, according to the statistics; at the same time, there is a decent value pricing that ensures the profitability of the culture.

Reaching the profitability term, this paper seeks to analyse this profitability between two irrigated and non-irrigated crop systems. In the literature it is stated that the sunflower will have a high production if properly maintained. Also in the specialized works, the technical ones, indicate that although this crop is resistant to drought conditions, 1-4 watering of 400-800 cubic meters per hectare can be applied.

All these additional works to ensure production under more unfriendly conditions with the plant record a series of specific expenses when the culture budget is being implemented, so the study wishes to examine whether these costs are justified to be met to meet the culture maintenance requirements.

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[1] Scientific Researcher - Research Institute for Agriculture Economy and Rural Development, Project ADER 13.1.2, email: petre.ionut@iceadr.ro

MATERIAL AND METHOD

In order to achieve the research, the data on sunflower crop technology and its income and expenditure budget will be analysed. These data will be taken from research project ADER 13.1.2, coordinated by the Research Institute for Agriculture Economy and Rural Development.

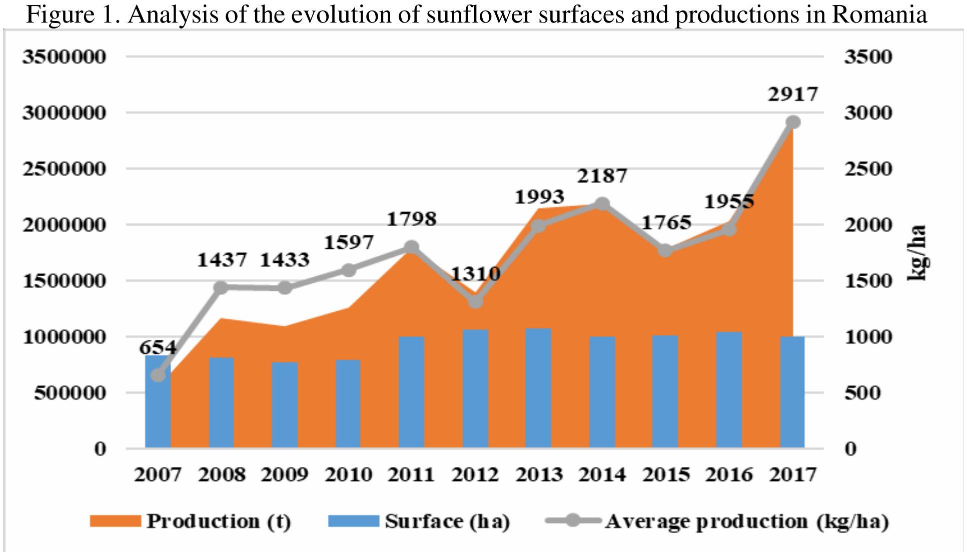
These data are structured on two levels of production, depending on the system, irrigated and non-irrigated, thus a comparative analysis will be carried out and a series of economic indicators will be calculated on the profitability of each system and the differences between them will be assessed .

RESULTS AND DISCUSSIONS

Although there is no statistical evidence on the irrigated area in Romania, structured on agricultural crops, in order to evaluate it for sunflower, one can analyse from the point of view of evolution the total irrigated agricultural area. Analysing from the moment Romania joined the European Union, it can be noticed that this area (actually irrigated with watering) recorded a decrease from year to year on average of 4.06%. During this period, on average, an agricultural area of 190,000 hectares was irrigated each year, of which 188.7 thousand hectares are arable land, respectively 99,3%.

Considering the tendency of irrigated areas to evolve in the same crop irrespective of culture, the evolution of sunflower surfaces and crops will be analysed.

Figure 1. Analysis of the evolution of sunflower surfaces and productions in Romania



Source: Data processed on www.insse.ro

As can be seen in Figure 1, the sunflower area in Romania oscillated in the analyzed period, having a downward trend in the first part of this period, reaching a peak in the middle of the period, and again declining. The total area recorded an increase, with an average annual growth rate of 1.79%, with an average of 945 thousand hectares each year.

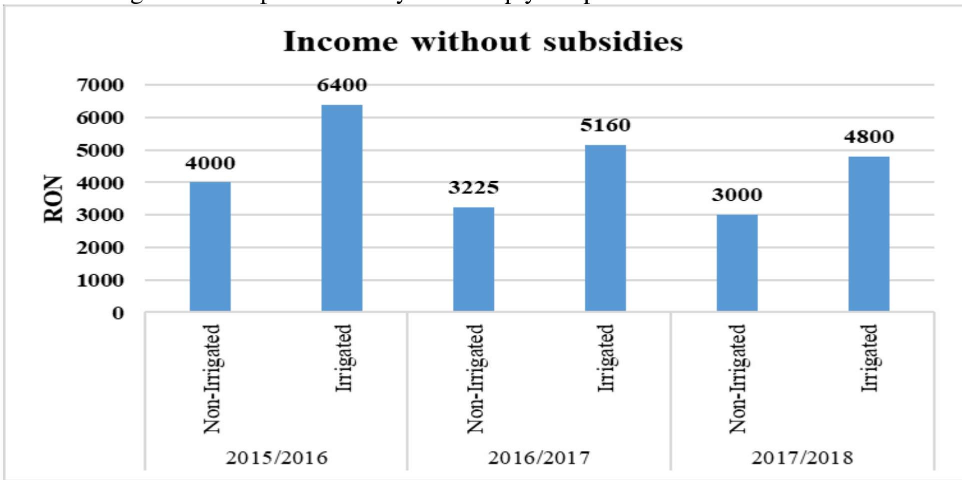
Regarding the total sunflower production, we can see a more pronounced increase from the surface, decreasing in the first period and in 2012, when it was the worst agricultural year of the last period. On average, there is an average annual growth rate of 18.2% and a total annual average production of 1.666 million tonnes.

In terms of average yield per hectare, it can be seen that it retains the trend of total production. The average yield level has grown quite a lot, considering that in 2007 it was 654 kilograms per hectare, and in 2017 it reached 2917 kilograms per hectare, reflecting an intensive increase in sunflower crops. The annual growth rate was quite high, respectively, of 16.12%, and on average the yield per hectare for the whole period was 1763 kilograms.

These considerations show the importance of sunflower crops and the importance of increasing average productivity per hectare. Next, we will analyse the economic efficiency in terms of increasing the yield per hectare by changing the irrigated crop and irrigation system respectively.

According to the technical reports developed by the Research Institute for the Economy of Agriculture and Rural Development, ADER 13.1.2 has determined the level of the following indicators for the sunflower crop for both systems: income per hectare, cost and profit. These indicators were set for three agricultural years, namely 2016, 2017 and estimates for 2018, and the average yields of the irrigated and irrigated crop system were 2500 and 4000 kilograms of sunflower per hectare, respectively.

Figure 2. Comparative analysis of crop yield per hectare for sunflower

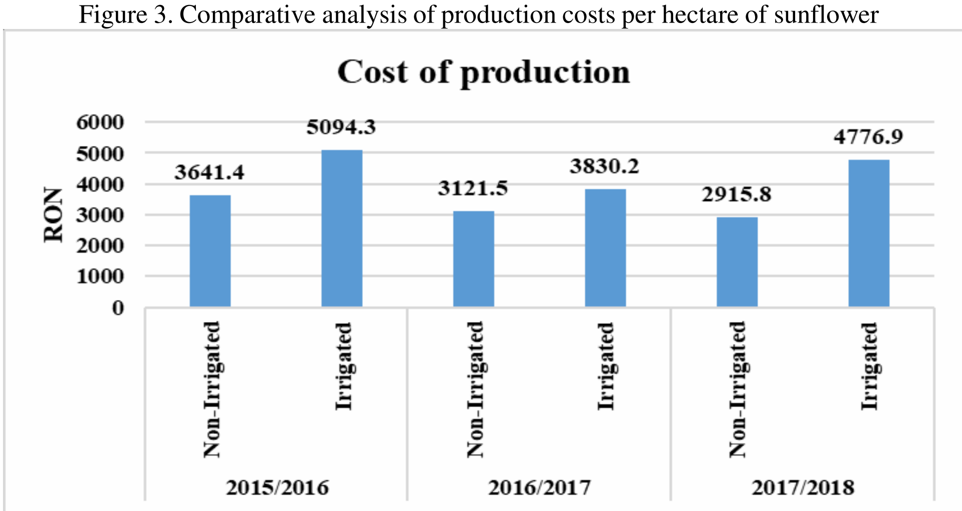


Source: Data processed on ADER project 13.1.2

Although the sunflower seed yield price varies from year to year, it remains constant for a safe year irrespective of the system used (irrigated or irrigated), so the relative difference between irrigated and non-irrigated is the same every year respectively 60%. However, the absolute difference between the income obtained from the cultivation of one hectare of irrigated sunflower and another non-irrigated is different depending on the price of recovery.

In the agricultural year 2015-2016 there was a difference in income between the two irrigated and non-irrigated systems of 2400 lei. In the next agricultural year, the farmers' income gap between the two crop systems was lower and 1935 lei, being 19.38% lower than in the previous year. In the last agricultural year, an income difference between the irrigated and the non-irrigated system is estimated at 1,800 lei, this difference decreasing from one year to the next, being less than the previous year by about 7%.

Figure 3. Comparative analysis of production costs per hectare of sunflower



Source: Data processed on ADER project 13.1.2

As regards the hectare expenditure for sunflower crops, their levels were shown in Figure 3, compared to each of the two crop systems analysed, over the reference period.

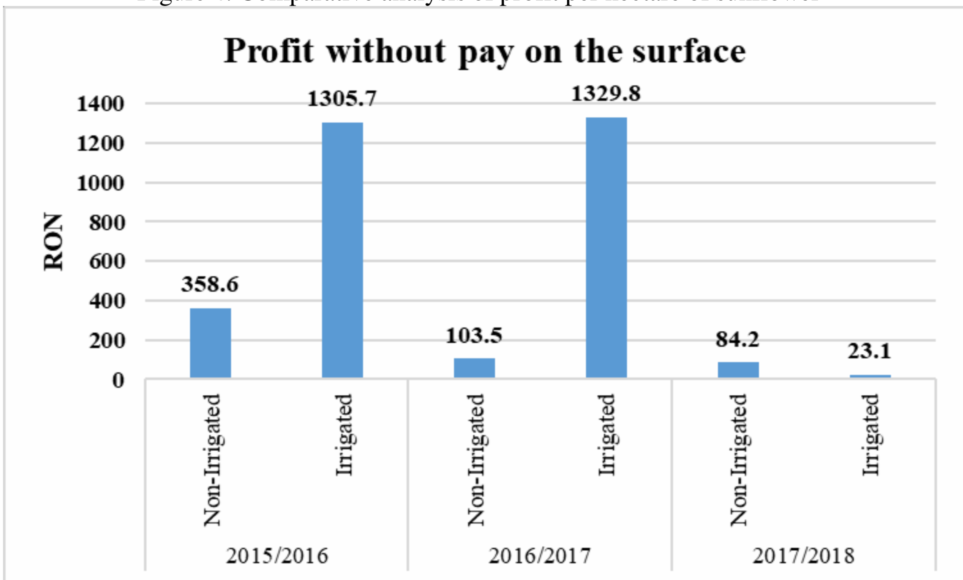
In the first agricultural year, the difference in expenditures in order to increase productivity was of 1453.2 lei, respectively the level of expenditures for the irrigated system was higher by 39.9%. Thus, the difference in expenditures this year is less than the income gap, which was previously analysed by approximately 950 lei.

In the agricultural year 2016-2017, there was the smallest difference in terms of expenditure per hectare of sunflower, between the irrigated and non-irrigated system, respectively of 708.7 lei, or by 22.7% higher. It can be seen that the difference in spending for this year is less than the income gap.

However, in the last year it is estimated that the level of the irrigation expenditure and the increase of the productivity of the sunflower crop will be higher than the non-irrigated system, by 1861.1 lei, ie 63,8%, a very high threshold exceeding the benefit earned, as measured by the revenue earned.

In order to be able to analyse the most relevant profitability level, the level of gross profit was determined and analysed in a similar manner in Figure 4:

Figure 4. Comparative analysis of profit per hectare of sunflower



Source: Data processed on ADER project 13.1.2

It can be seen in Figure 4 that in the first two years of agriculture considered, the profit level for the irrigated system of the sunflower crop is higher than the non-irrigated, with 947.1 lei and 1226.3 lei per hectare respectively. In the second year, the difference in profitability is a significant one given the fact that the profit level for the non-irrigated sunflower crop is only 103.5 lei per hectare.

In the last year we can see that the profit level is very small, below the threshold of 100 lei per hectare for the non-irrigated system, and for the irrigated one it is observed that it is lower, 3.6 times, respectively 23.1 lei. Thus, we can say that in the agricultural year 2017-2018 it is not economically justified to increase the average productivity per hectare by irrigating the land, because the benefit is lower than the lack of application of the intensive development works of culture.

CONCLUSIONS

In the present study, it was desired to analyse the economic efficiency of increasing average productivity per hectare of sunflower by irrigating the crop, and to analyse whether the variable costs specific to intensive crop growth do not exceed incomes.

In the comparative analysis between the two irrigated and non-irrigated systems, the income gap has been shown to have a decreasing trend due to the ever lower prices of consumption, and the expenditure gap is fluctuating from year to year in very large lines, with differences between 708 lei per hectare and 1861 lei per hectare. This can be a risk when deciding to irrigate the crop in order to increase the average yield per hectare.

Of these expenditures mentioned and analysed in the study, those specific to the production increase, the irrigation expenditures represent weights between 20.9% and 50.8%. Thus, the specific expenditures specific to crop growth are not only composed of irrigation expenditure but also of variable ones that increase with the level of production.

Depending on the situation, it may be appreciated that the irrigation of sunflower crops is not always profitable, given that for the year 2017-2018, the rate of return for non-irrigated crops was 2.89%, and for the irrigated was more respectively, of 0.48%.

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ANALYSIS OF THE RAPE CULTURE RENTABILITY FOR NON-IRRIGATED AND UNIRRIGATED PRODUCTION SYSTEMS

PETRE IONUȚ LAURENȚIU[1]

Summary: *This paper proposes the analysis of economic indicators referring to the feasibility and efficiency of rapeseed cultivation in two different irrigated and non-irrigated systems, in order to determine the eventual higher profitability of the increase in production. The question of the research is the following: is it more efficient to ensure that the rapeseed is irrigated in order to obtain higher yields? In order to answer this question, we will use data taken from ADER 13.1.2, coordinated by the Research Institute for the Economy of Agriculture and Rural Development, referring to the technological data and the budget for the income and expenditure of the rapeseed. With the help of these, certain technical and economic indicators will be determined by means of which the final conclusion of this study can be established.*

Keywords: *rapeseed culture, profitability, irrigation, non-irrigation*

JEL Classification: *Q12, Q15*.

INTRODUCTION

As is well known, rapeseed occupies an important place in world agriculture and, implicitly, in the global economy, through the processed product and the oil, being used in both human and industrial food.

Like any oilseed rape, rape has a high lipid content, but besides, rape seed contains high protein, sugar and water. The quantitative ratio between the core of rapeseed and their shell varies between 4 and 6 percent.

Rape culture (Brassica napus) has a beneficial effect on crop rotation to optimize it, this crop being a good precursor to many crops, also helps to clean the weed soil, optimize it, and demand on the market is ensured, sometimes even before sowing.

These issues have led to a universally valid claim, namely that intensive rape productivity is needed given the importance of this crop.

In order to obtain the highest yields in terms of average yield per hectare, ie intensive growth, an optimal technology should be considered. In order to increase productivity, specialists argue that the following features have to be taken into account in other technologies: the sowing season and the control of pests.

Going beyond these considerations, in this paper we will deal with two different systems of cultivation, namely rape cultivation in a non-irrigated system and irrigated system. By default, the latter records a yield per hectare higher than the first, thanks to the irrigation of the land. However, these additional work to be done for watering the land are additional costs when we make a small record of expenditure.

Although it is necessary to increase the average yield per hectare, and a possible solution would be to irrigate the areas planted with rape, there is a problem that coincides with the question of research, namely, it is cost effective to irrigate the rapeseed culture in order to increase productivity?

MATERIAL AND METHOD

For this study quantitative and qualitative data will be analysed from the ADER project 13.1.2 „Technical and economic cost-orientation of production costs and estimates of harvest prices for wheat, barley, maize, sunflower, rape, soybean, sugar beet, rice, hemp, hops, tobacco, conventional agriculture and organic farming", coordinated by Research Institute for Agriculture

[1] Scientific Researcher - Research Institute for Agriculture Economy and Rural Development, Project ADER 13.1.2, email: petre.ionut@iceadr.ro

Economy and Rural Development, these data referring to rape crop technology and to its revenue and expenditure budget.

This data, one set for each crop (irrigated and non-irrigated) crop system, will be analyzed comparatively in order to observe income and expenditure differences and calculate the rate of return.

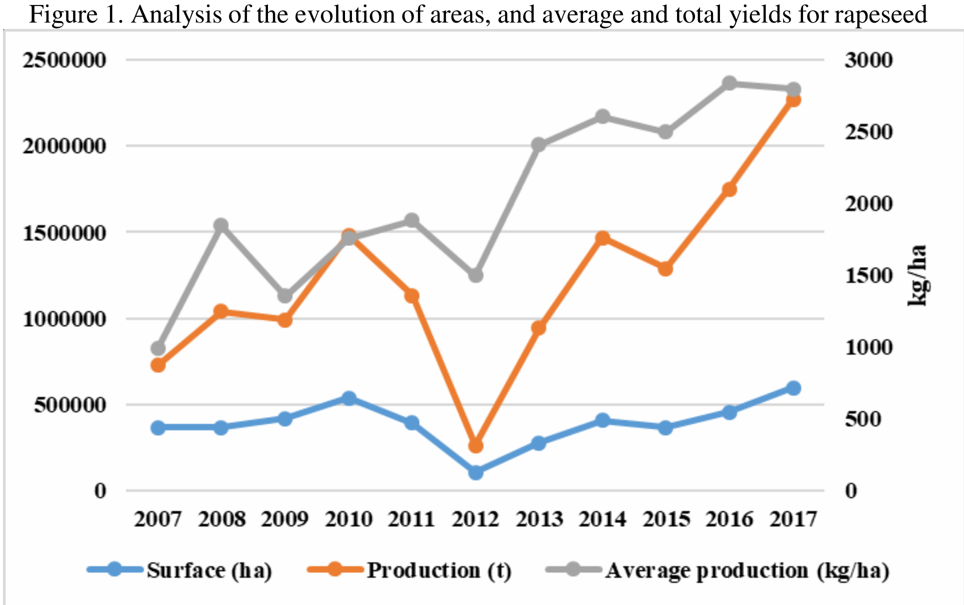
RESULTS AND DISCUSSIONS

First, it will start from the irrigated agricultural area in Romania, as specified by official national statistics, with at least one watering. On average, over 2007-2017, the irrigated agricultural area was 190,000 hectares, with a maximum in the first part of the analysed periods of more than 320,000 hectares, and in the last year the irrigated agricultural area was over 211 hectares. Out of this area, on average, about 99.3% is the area actually irrigated by at least arid watering. On average, over the whole period, 2007-2017, the irrigated land actually with at least one watering registered a decreasing trend, with an average annual negative rate of 4.06%.

The fact that the irrigated area has decreased in Romania is a direct consequence of the management of irrigation systems and its infrastructure, but the question may arise as to why these areas do not increase if they increase the profitability of crops, ie why large-scale farming companies do not invest in such systems.

Regarding the rapeseed surface, these irrigated crop areas are not allocated in Romania's national statistics, but we can analyse the total area and yields at national level to further analyse the average yield per hectare in order to determine its tendency and the degree of development, if this case exists.

Figure 1. Analysis of the evolution of areas, and average and total yields for rapeseed



Source: own processing based on www.insse.ro data

On average, during the reference period, the area planted with rapeseed recorded an increasing trend, with an average annual growth rate of 5.06%, resulting in an average over the whole period of about 390 thousand hectares. As can be seen in Figure 1, in the first part of the period the area increased year-on-year, and in 2010, it registered a decreasing trend, reaching the lower limit in 2012, when it was cultivated only a little over 100,000 hectares (105.3 thousand hectares), but in the following period the area planted with rape began to grow almost constantly until 2017, when the total cultivated area was about 600 thousand hectares (598 thousand ha).

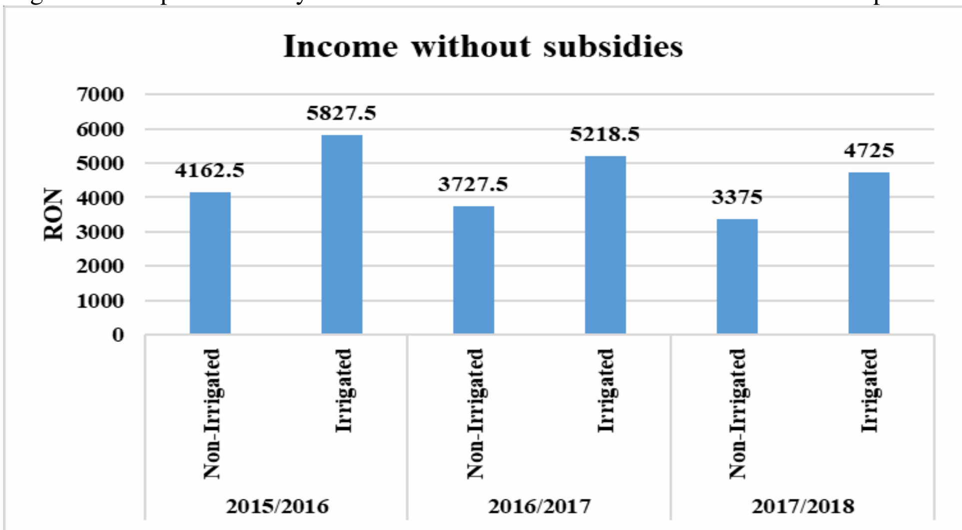
Also in Figure 1 is the evolution of total rapeseed production in Romania, so it can be seen that it maintains the tendency of the cultivated areas, but it shows a more amplified growth. For this indicator, the average annual growth rate was 16.56% during the analysed period, and in this area of time, the average total production was 823 thousand tons of rapeseed.

Regarding the average yield per hectare, it oscillated according to the two indicators presented above. Starting from a very low yield in the first period, ie 990 kilograms of rapeseed per hectare, this indicator has been quite significant, with an average annual growth rate of 10.94%, reaching 2017, at a crop yield per hectare of 2798 kilograms of rapeseed. This is due to the fact that this cultivation has intensified, ie the total production has increased considerably more than the growth of cultivated areas. On average, for 2007-2017, the average yield per hectare for rapeseed was 2110 kilograms per hectare.

Therefore, it can be established that the importance given to this culture is significant given its intensive growth and the fact that the production obtained is demanded by the market. Next, the economic indicators of rape crop for the two non-irrigated and irrigated production systems will be analysed in order to determine the irrigation efficiency of the crop to increase the average yield per hectare.

According to the data and technical reports submitted to the Ministry of Agriculture and Rural Development by the Research Institute for Agriculture Economy and Rural Development concerning ADER 13.1.2, these data were calculated and estimated between 2015-2018, cultivating one hectare of rapeseed.

Figure 2. Comparative analysis of income from the cultivation of one hectare of rapeseed



Source: Data processed according to the ADER project 13.1.2

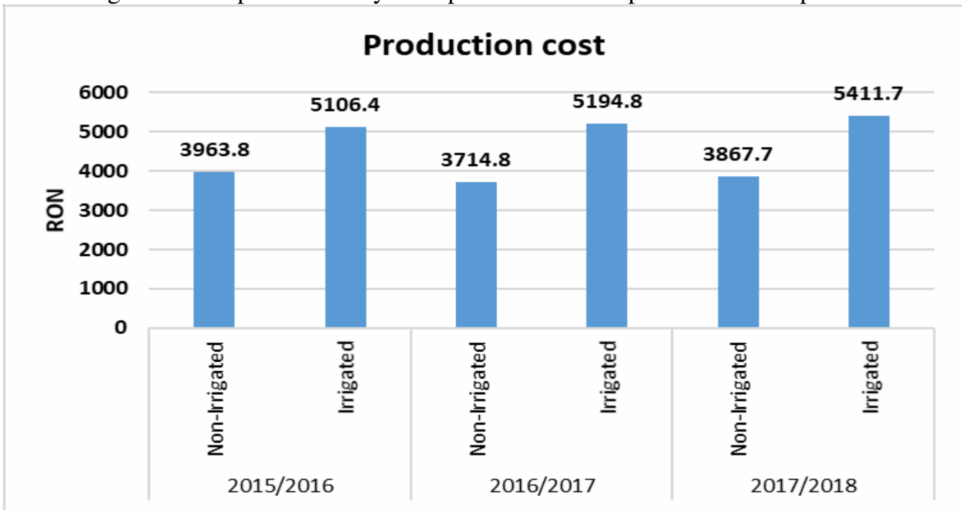
Figure 2 compares the income obtained without subsidies after the cultivation of one hectare of rapeseed for three agricultural years, depending on the crop, irrigated and irrigated system respectively.

Analysing comparatively, it can be noticed that for the crop year 2015-2016, the income obtained in the irrigated system is higher than that obtained in the non-irrigated system by 1665 lei / ha and 40% respectively.

In the agricultural year 2016-2017, in the irrigated system a higher income is earned, compared to the non-irrigated system, by 1491 lei per hectare, respectively by 40%, but the income is lower than the previous agricultural year due to the price of capitalization rape that directly influences the income per hectare.

In the current agricultural year, the yield per hectare of irrigated rapeseed, higher by 1350 lei, was estimated by the project, compared to the non-irrigated one, the relative growth remaining at the same level, being strictly linked to the increase in production; an average yield of 2500 kilograms per hectare for non-irrigated crops and 3500 kilograms of rapeseed per hectare was taken into account for what irrigation, hence the level of revenue by 40%, given the constant sales price between systems.

Figure 3. Comparative analysis of production costs per hectare of rapeseed



Source: Data processed according to the ADER project 13.1.2

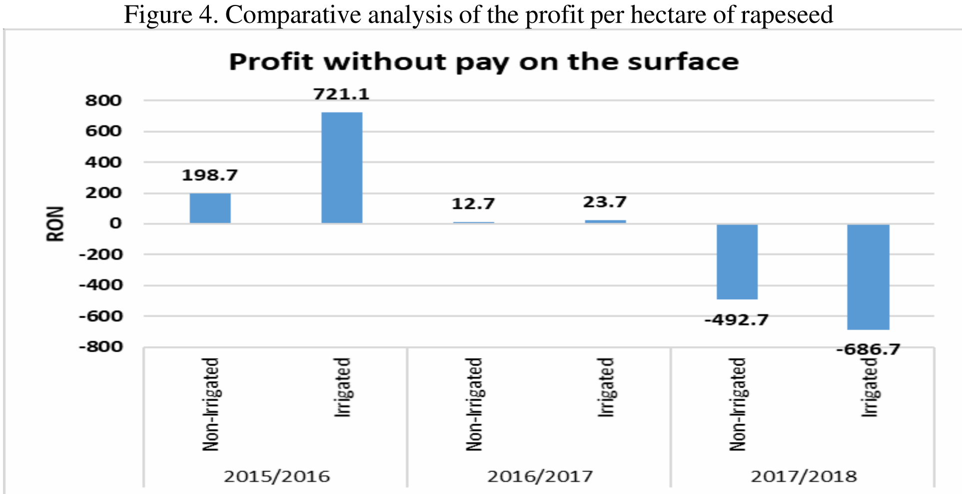
In Figure 3, the level of expenditure for one hectare of rapeseed is similarly high, so in the first agricultural year, 2015-2015, the difference between the irrigated and non-irrigated system in terms of the production cost is 1196.6 lei per hectare, being 28.83% higher. Thus, it can be seen that the absolute difference between systems of expenditure is less than the income gap previously analysed for the same year.

In the following year, the irrigated culture cost, on the surface unit, more than the non-irrigated with 1480 lei, being higher by 39.84%. There is an increase compared to the previous year of the difference between the two crop systems, by 11 percentage points, respectively by 283.4 lei per hectare.

In the current agricultural year, there is an even greater discrepancy between the two systems in terms of the cost of rape cultivation, so it is estimated that the irrigated system recorded a higher cost of 1544 lei per hectare, respectively 39.92 %, an increase of only 64 lei (0.08 percentage points) compared to the previous year, but this increase is sufficient to exceed the level of the expenditures in the previous figure by 194 lei, given the downward trend in revenue and rising costs.

In order to better observe the profitability level, the level of profit obtained from a hectare of rapeseed will similarly be compared.

Figure 4. Comparative analysis of the profit per hectare of rapeseed



Source: Data processed according to the ADER project 13.1.2

Regarding the profit per unit area, in Figure 4 it can be noticed that for the first agricultural year, the difference between the two irrigated and non-irrigated crop systems was 522.4 lei per hectare, respectively in the irrigated system the profit was higher than 3.63 times.

In the second year there is a significant decrease in the profitability of the crop, thus registering a gross profit of 12.7 lei for the non-irrigated system and of 23.7 lei for the irrigated one, even if the relative difference is almost double, it is obtained profit margin of only 11 lei per hectare.

This year, a loss for rape crop is expected for both crop systems, respectively 492.7 lei for non-irrigated and 686.7 lei for irrigation. Therefore, the increase in production by irrigation works this year is economically ineffective, with a higher loss of 194 lei and 39.37% respectively.

By analysing gross profits, it can be seen that it is more influenced by the level of spending that "pulls down" the level of profit per hectare of rapeseed, and the increase in production level in the last year is economically unjustified, the expenses that come with the increase in production are higher than the level of income generated by this increase.

CONCLUSIONS

The paper sought to analyse economically the efficiency of productivity growth on the surface unit by using the irrigation system for rapeseed crops.

It is appreciated that, in the last period, the level of incomes obtained for the irrigated system compared to the irrigated system is higher, given the average yield per hectare, but it shows a decreasing trend. Besides this, the level of spending is higher for this system, and the difference between the two systems has a diametrically opposed trend towards revenue and an increase. Therefore, analysing the evolution of these two economic indicators will intersect and will change the profitability of the culture as it can be seen in the last analysed year, when the profit level for the irrigated system was lower than the irrigated system.

It can be appreciated that the intensive development of the crop by increasing the yield per hectare by irrigation can be economically inefficient, in certain situations, when the price of capitalizing on the crop is reduced and the increase of the costs directly proportional to the level of the increase of the production is too high.

This situation can also be explained by the fact that the share of irrigation expenditure actually decreased over the analysed period, influencing more the other variable expenses that increase with the increase of the production. In the first agricultural year, irrigation expenditures accounted for 41.15% of the difference in expenditure between the two systems, and with the increase of this difference and the decrease of the irrigation expenditures it reached 20.3% and 19, respectively, 43%.

It should be noted that in the last year legislative measures have been made with regard to the cost of irrigation and settlement or their de-commitment for farmers in the country. This would reduce the loss recorded in the last year, but due to the low share of irrigation costs in the cost gap, the situation will not improve significantly.

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COMPARATIVE LABOR FORCE ANALYSIS IN CONVENTIONAL AND ECOLOGICAL AGRICULTURE – OLEAGINOUS PLANTS

PETRE IONUȚ LAURENȚIU[1]

Summary: *This paper seeks to analyse from a comparative point of view the efficiency of the use of manual labour as well as the mechanized works in the cultivation of oil plants in order to obtain profit and the profitability of this activity from the point of view of conventional and ecological crops. The main source of data to be analysed in this paper was the technical reports submitted by the Research Institute for Agriculture Economy and Rural Development through the ADER 13.1.2 project to the Ministry of Agriculture and Rural Development, data referring to the technological value of the three crops (sunflower, rape, soybean) but also with reference to the income and expenditure budget. These data are calculated per unit area and one hectare respectively. Finally, the efficiency of the use of resources, namely labour and mechanized works, will be analysed according to the crop system to see whether the transition to sustainable agriculture is economically viable.*

Keywords: *labour productivity, oil plants, conventional, ecological*

JEL Classification: *Q12*

INTRODUCTION

It is more and more common to say that the labour force in agriculture is getting smaller and aging because of the exodus of young people in the country, but not only. Thus, it can be considered that this resource is becoming more and more valuable but also more expensive.

Regarding the two systems of agriculture, namely the conventional and the ecological ones, one can discuss very many themes on these systems, regarding the advantages and disadvantages. Among the technological differences between the two types of agriculture can be mentioned the degree of utilization of the labour force. This is at a higher level in organic farming than in the conventional one, since not all mechanized works in the conventional way can be done in an environmentally friendly way, and thus the manual labour force intervenes.

By presenting these two issues, is a question of research being developed, ie economically efficient as a farmer, going to organic farming, taking into account the high level of labour force and the related costs?

For this, the level of labour force required and the related costs, as well as the total expenditure and income of oil crops, both in conventional and ecological systems, will be presented.

The importance of oil crops can be revealed in many aspects, both technically and economically, some examples may be: From the total area cultivated in the agricultural sector, it is estimated according to the National Institute of Statistics that almost 85% is cultivated with two large product groups, cereals, and oily plants. On average, over the past 10 years, a little over 65% of the area cultivated with the main crops is owned by the cereal group, and about 18% is owned by the oil plants. However, for oleaginous plants there is an increasing trend, in 2007 their area had a weight of 17.23%, and in 2017 this weight was 21.26%. In addition to this finding, it is also important to specify the usefulness of the product, both the first and the processed, but also their positive characteristics for animals, humans and the environment. From the other point of view, the economic one can analyse the value of agricultural production for the two product groups, namely grains and oily plants. According to the NIS, the value of cereal production at the producer price has increased since its accession to the European Union, about 3 times in the last year worth about 15.5 billion lei. In the case of oil products, the value of production at producer price increased much more in 2016, it was 6.3 times higher than in the reference year 2007, but the value retains the proportion of cultivated areas of 5, 5 billion less than grain. In 2007, of the total value of the vegetal

[1] Scientific Researcher - Research Institute for Agriculture Economy and Rural Development, Project ADER 13.1.2, email: petre.ionut@iceadr.ro

production, about 19% was owned by the cereal group and only 3% of the oil crops in the last analysed year both increased, but not by the same trend, so the group of cereals represented 34, 3% and oilseeds 12.1%.

MATERIAL AND METHOD

The main data analysed in this study refers to the technology of oilseed crops (sunflower, rapeseed and soybean) as well as the income and expenditure budgets related to these technological devotes for the agricultural year 2016-2017. These data were taken from the technical reports of the ADER 13.1.2 project contracted by the Research Institute for Agriculture Economy and Rural Development.

In order to highlight the differences, advantages and disadvantages between the two systems of agriculture, respectively conventional and ecological, regarding the allocated resources, the labour force and the obtained income, a comparative analysis of both technical and economic indicators was made.

RESULTS AND DISCUSSIONS

As described above, we used indicators from the income and expenditure budget, but also from the technological value of the three large types of oil plants cultivated in Romania. Thus, for both conventional agriculture and organic farming, we have analysed comparatively indicators such as: production, production value, production costs, manual and mechanized labour costs, labour consumption, labour productivity, profit and rate of return.

Taking into account the agricultural year 2016-2017, a comparative analysis of the previously presented indicators for oily crops was carried out in a conventional and ecological system.

Table 1. Comparative analysis of the economic efficiency of oilseeds

Specifications	UM	Sunflower		Rape		Soy	
		CONV	ECO	CONV	ECO	CONV	ECO
Production	kg/ha	2500	2000	2500	1700	3000	1500
Value of production	RON/ha	3225	2720	3727.5	2920.6	4005.0	2547.0
Production Expenses	RON /ha	3121.5	2652.1	3714.8	3021.5	4625.3	3543.7
Labour costs	RON /ha	51.5	199.6	70.2	355.8	115.2	195.4
Expenditure on mechanized works	RON /ha	1478.8	1274.8	1585.2	1189.5	1734.0	1408.3
Labour consumption	ore-om/ha	18.1	35	21.9	56.5	28.8	37.1
Labour consumption	ZO/ha	2.3	4.4	2.7	7.1	3.6	4.6
Labour productivity (physics)	ore-om/tonă	7.2	17.5	8.8	33.2	9.6	24.7
Labour productivity (of value)	RON/ore-om	178.2	77.7	170.2	51.7	139.1	68.7
Gross profit	RON /ha	103.5	67.9	12.7	-100.9	-620.3	-996.7
Rate of return	%	3.3	2.6	0.3	-3.3	-13.4	-28.1

Source: Project ADER 13.1.2

Comparativeanalysisofsunflowercrop

Analysing from the point of view of the differences between conventional agriculture and organic farming, we can determine the absolute differences for sunflower crops. The yield from cultivating one hectare of sunflower was higher by 500 kilograms per hectare for conventional agriculture, as it is well known that organic farming has lower yields. Regarding the value of production, this is higher in the conventional system with 505 lei per hectare. As you can see, the expenses are lower than the value of production in both cases, but those in the conventional system are higher by about 470 lei.

By reaching the labour costs one can notice significant differences between the two systems of culture, so the ones recorded in the ecological system are higher by 148 lei per hectare than the conventional one, given that, as will be possible see later, the need for manual labour is higher.

Expenditure on mechanized works is higher in the conventional system than in the organic one, by 204 lei per hectare. Labour consumption is almost double in the ecological system than conventional, ie a difference of 16.9 hours per person per hectare or 2.1 days.

As far as labour productivity is concerned, both physical and value, it is noted that the physical one is larger in the ecological system, which means that for a ton of sunflower it takes several hours-man and the productivity value is more large in conventional system, with about 100 lei per hour.

The gross profit obtained from one hectare of sunflower was higher for the conventional one by 35.6 lei per hectare. Both rates of return are positive, but they are higher for the conventional system.

Comparativeanalysisofrapecrop

Conventional rapeseed production increased by 800 kg per hectare compared to the organic one, so even if the recovery price is higher for the organic product, there is a constant difference of about 807 lei between the values of the production in conventional to organic.

The expenditure gap is of 693.3 lei, between the conventional and the ecological cultures, but it should be noted that the level of the ecological expenses exceeds that of the revenues. As expected, labour costs are higher for the organic system, with respectively 285 lei per hectare, given that the level of labour consumption is significantly higher, with 34.6 hours per person per hectare or respectively 4.3 days. It can be appreciated that the differences in the manual labour force are compensated by the reduction of the expenditures for the mechanized works, which are higher for the conventional system by 396 lei per hectare.

As far as labour productivity is concerned, there is an absolute difference for the physical one, of 24.5 hours per person per ton, given the high consumption of manual labour, and for the value of the difference is in favour of the conventional system with 1185.5 lei per hour.

It can be noticed that the gross profit is low in conventional system (13 lei per hectare), and in the ecological system there is a loss of 100 lei, for a production of 1.7 tons per hectare. Thus, the rate of return on the conventional system is very low by only 0.3% and the one for the ecological system is negative, ie -3.3%.

Comparative analysis of soybean culture

As regards the third oleaginous crop and soybean, there can be noticed a difference between the yields of 1,500 kg / ha, the organic one being half that of the conventional one, and this difference is estimated to be a difference in income of 1458 lei per hectare, and in terms of total expenditures they are above the income level for both crop systems, with a difference of 1082 lei per hectare.

The labour costs are higher in the ecological system with 80.2 lei per hectare and the ones for mechanized works are higher in the conventional system with 325.7 lei per hectare. Thus the labour consumption is higher in the ecological system with 8.3 hours-man, ie a little over a day.

The productivity of soybean work is similar to the others, meaning that there are more man-hours per ton of organic soybean, and higher labour productivity for the conventional system.

For both crops, a loss for soybean culture was estimated for 2017, respectively 620 lei for the conventional system and 997 lei per hectare for the ecological system. Profitability rates were negative, ie -13.4% and -28.1%.

For a complete comparative analysis, the relative differences between the two crop systems, respectively conventional and ecological, were determined for oil plants, in order to determine the labour and resource requirements and the influence on the economic efficiency.

Figure 1. Comparative analysis of relative differences between oil plant culture systems

Source: data processed on project ADER 13.1.2

Analysing the relative differences between the two systems of olive plant culture, the main technical-economic indicators, in the crop year 2016-2017, the following can be appreciated.

For sunflower, organic production is 20% less than conventional and 15.66% less, so you can see from the start a different price for the two outputs. The difference in expenditure is similar to income, so spending on organic production is lower by 15.04%. Labour costs are higher in the organic system of 3.87 times those in the conventional system, but the physical labour consumption is only 93.37% higher in ecological (ie approximately 2 times). Expenditure on mechanized works is lower in the organic system by 13.79% compared to the conventional one. Productivity of work expressed in physical units is considered to be weaker in the organic system, requiring 2.4 times more hours per person per ton of product and the value is also weaker because the value a man produces in one hour it is 56% less in the ecological system. The relative difference between gross registered profits showed that in the organic system a profit was achieved 34.4% lower than in a conventional system and the rate of profitability was 22.78% lower.

For rape crops, the production obtained in the organic regime was lower by 32%, for which the value was lower by 21.65%. Total spending was lower for the eco-system by 18.6%. But those with the labour force were higher in this culture system 5 times, for a 2.6 times higher physical labour consumption. Those with mechanized work were smaller by only 25%. In terms of labour productivity, it took about 3.8 times more hours of work to get a ton of rapeseed for the eco-system, and 69.6% less lei obtained by providing a man-hour for work. Given that for the conventional system the gross profit is slightly above zero, and for the ecological system this is negative, the relative difference is high, the profit in the ecological system being less than about 10 times, and there is a similar difference for the rate of profitability.

For the last analysed oily crop, ie soybeans, there is a difference of 50% in production compared to the ecological system, with a difference of 36.4% in this production. Total spending on organic farming is 23.4% lower than for the conventional system, but labour-related expenditure is 69.6% higher, with 28.8% physical labour consumption higher, and those related to mechanized works are lower in the ecological system by 18.8%. Labour productivity is negatively affected by this higher consumption of organic workforce, so one tonne of soy is obtained with a man-hours contribution greater than 2.5 times, and the value is 50% higher little by hour. For the gross profit indicator, there is actually a loss for both production systems, but the one recorded for the eco system is 60% higher and the rate of profitability is 2.1 times lower.

CONCLUSIONS

In this paper, a comparative analysis of the conventional and organic farming systems for oil plants (sunflower, rape, soybean) was approached in the agricultural year 2016-2017, based on the results of the ADRE 13.1.2 project related to the estimate technologically and the income and expenditure budget for each of the listed crops.

It was desirable to analyse from the point of view of economic efficiency the opportunity to move from conventional agriculture to organic farming, given the additional consumption of certain resources which are increasingly difficult to find in rural areas, or in the agricultural sector, with reference in particular to manual labour.

It can be seen that the production obtained for organic oil plants is less, by 20% to 50%. The revenue and expenditure on these productions maintains the trend of the latter. Although the relative differences between the two labour cost systems are quite large, looking at the absolute differences, the situation changes, in the sense that, assuming that there is this resource, the extra difference that the farmer has to pay organic farming, the difference in the cost of mechanized works that are lower in this system is offset. Thus, if the reduction of the labour force was not a social problem, from an economic point of view, the shift from conventional agriculture to organic farming would not negatively influence the activity of the farm with regard to labour costs.

We can conclude that the economic efficiency of organic crops is lower than that for conventional oil crops in the crop year 2016-2017, given the level of production, which is quite different between these two systems, and the level of the pricing price that does not have much influence value of production between these two systems.

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COMPARATIVE STUDY ON THE ECONOMIC EFFICIENCY OF HEMP CULTURE IN A CONVENTIONAL AND ECOLOGICAL SYSTEM

ȘURCĂ DANIELA-ELENA[1]

Abstract: *In order to analyze the degree of development of economic systems for the two agriculture types, conventional and ecological, as well as the "survival" capacity and the direction of their development, it is necessary to take into account the correct definition and measurement of the economic efficiency for the culture analyzed. Economic efficiency is most often defined as the close link between the resources allocated to the production process and what follows from the process, which leads to consuming the resources available in a rational way. Thus, economic efficiency can be determined by comparing the effects of an action with the efforts required to produce it. The present study aims to highlighting the two economical agricultural systems for hemp culture by analyzing and comparing the set of technical and economic indicators present in the income and expenditure budget. The revenue and expenditure budget highlights issues such as: the value of production, the costs incurred with this crop, the resulting income and the rate of return. The main objective of the study is to bring to light the agricultural system that is most economically efficient for the culture in the analysis.*

Key words: *economic efficiency, ecological / conventional hemp, profit*

JEL Classification: *Q 12, Q57*

INTRODUCTION

Industrial hemp *(Cannabis sativa L.)* is a herbaceous annual plant of the family Cannabaceae with a class average of 2-3 meters, but it is conceivable to reach up to a height of 5 meters in some exceptional cases [12]. It is cultivated for industrial properties and derived products [8]. It is considered to be one of the plants with a fast growing cycle [6] and is one of the first plants to be transformed and used as fiber about 10 000 years ago [9]. Hemp is probably one of the oldest plants cultivated by man, according to archaeologists was used since the time of the Neolithic in countries like China and the islands that are nearby Japan (islands oki), archaeologists found prints of fiber ceramics which dates back to 5000 BC. [7]. Textile expert Elizabeth Wayland Barber has over time synthesized all historical evidence of this culture and has shown to the general public that this plant was known and used not only in the above mentioned countries but also in all the northern regions of Europe Germany, Switzerland, Austria, Romania, Ukraine) [3]. The widespread use of these plants makes it a plant of the future, making it a multiplicity of commercial products such as paper, textile fibers, biodegradable materials (biodegradable plastics), paints and biofuels [4]. This plant can also be used in the livestock sector, according to a study carried out in 2003, that more than 95% of hemp seeds were sold in the European Union and used in feed and poultry. [5]

At present (2017), according to the study "Hemp as an Agricultural Commodity" by Renee Johmson (agricultural policy specialist), more than 30 countries worldwide cultivate industrial hemp and use it as agricultural commodities on the global market. Thus, for the year 2016, the total area of 44 388 hectares of industrial hemp is recorded, it is worth mentioning that the areas increased by 7.22% compared to 2012 but decreased by -3.45% compared to production in 2016 at the modal level was 71 475 tonnes, 27.5% higher than in 2012 and -9.32% lower than in 2015.

The main hemp producers worldwide for the year 2016 were: Europe, China, South Korea and Russia. The European Union has an active hemp market with production in most member countries but with production centered in France, the Netherlands, Lithuania and Romania.

According to data provided by the Ministry of Agriculture and Rural Development of Romania, in 2016, that country held an area of 904.83 hectares in a conventional system, representing 2.04% of the total area of the world with this crop, with a share in production 4,5% representing 3 200 tonnes. In an ecological system, Romania had an area of only 53.39 hectares for 2016, but 20.6% more than in 2012, representing about 8.61 hectares.

[1] Scientific researcher ICEADR- surcă.elena@iceadr.ro

Before analyzing the economic efficiency of hemp production in a conventional and organic system, it is necessary to briefly describe them.

As defined by the European Council "Organic farming is farming practices which are designed to minimize human impact on the environment, while ensuring a more natural functioning of the agricultural system." [10] While classical or conventional farming is the opposite of what it means to organic farming and is represented by the use of pesticides that have a negative effect on natural balances.

In view of the above-mentioned importance of this culture at global and national level in both industrial and zootechnical fields, I propose to compare the two hemp cultivation systems in order to determine the economic efficiency of this plant in both systems, conventional and environmentally friendly.

MATERIALS AND METHODS

The paper is structured in two parts, so in the first part of the paper a qualitative and quantitative analysis of statistical data will be carried out. For greater accuracy as data will be analyzed statistical yearbooks released by specialized institutions in the field of statistics: Eurostat, FiBL, FAOSTAT, the National Statistics Institute. Therefore, in the first part of the paper, an overview of current and past state of hemp culture in the two systems is to be carried out, analyzing the surfaces and the total yields obtained.

In the second part of the paper we will use the income and expenditure budget of the hemp crop, it is an instrument containing economic data related to the value of the production, the production expenses and their structure, plus the net income as well as rate of return.

The revenue and expenditure budget will be taken over from the ADER project 13.1.2 "Technical and economic fundamentals of production costs and estimates of the prices for wheat, corn, sunflower, rapeseed, soybean, sugar beet, rice, hemp, hops, tobacco, potatoes for conventional farming and organic farming "[1] phase / stage eight, which has as its general objective the management of costs in conventional and organic agriculture. The specific objectives of the phase have led to the simulation of as many scenarios as possible in determining the profitability threshold, so that the research carried out aims to provide the best information on the economic efficiency indicators for the two agricultural systems.

The objective of the paper is to calculate economic indicators describing the yield and feasibility of hemp crop according to the agricultural system (conventional or organic).

The paper has a synthetic methodological character, highlighting the theories, concepts and models of technical and economic analysis, the presentation of the indicators used in assessing the economic efficiency of the production activity, the profitability threshold, as well as the effect of average output and price on the gross margin. Optimal solutions have a specific character and research has been based on descriptive research (ADER 13.1.2, Phase 4, MADR).

RESULTS AND DISCUSSIONS

In Romania, an area of approximately 904.83 hectares of hemp in a conventional system was grown in 2016, according to statistics, it was more than 10 times in 2012, representing an area of 830 hectares with a 43.4% over the previous year (2011). For the period under review, increases are recorded from one year to the next, except for the year 2015 where there is a decrease in areas of -17.6%.

Table 1. Evolution of hemp surfaces and production

Specifications	2012	2013	2014	2015	2016	2012
Surface area (thousand ha)	74.04	184.27	765.72	630.74	904.83	74.04
Total production (thousand t)	33.06	284.67	678.11	2617.82	3200.09	33.06
Average yield (kg / ha)	446.5	1544.9	885.6	4150.4	3536.7	446.5

Source: FAOSTAT; INS

If we refer to total hemp production, we see in Table 1 that it is gradually increasing from one year to the next, thus the largest production is recorded in 2016 by 22.3% higher than in 2015 and by approximately 10 times higher than the base year 2012.

Thus, according to the two indices, average yields per hectare of hemp cultivation were calculated, it varied in the analyzed period (2012-2016) between 446.5 kg per hectare (year 2012) and 4 150.4 kg per hectare (2015). *It is worth mentioning that these productions are taken into account after the production is dried up, otherwise, as production is still green it weighs more.*

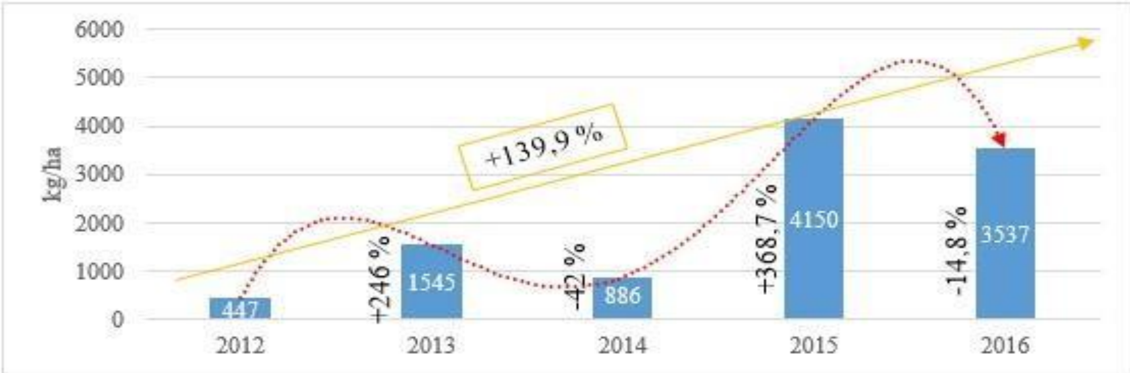

Figure 1. The average yield of dried hemp in conventional system
Source: data processing FAOSTAT, INS

As can be seen in Figure 1, average hemp production increased by 139.9% on average, reaching peak in 2015, while 2016 is ranked second from this point of view, with average yield per hectare being of 3537 kg, with -14.8% less compared to the maximum year 2015.

Regard to organic farming data have been taken from the Eurostat European Statistical Site and FiBL, the organic farming area for the years included in the study, from 2012 to 2016. As shown in Table 2, areas for this organic crop have reached and a maximum of 54.1 hectares in 2014, with 20.7% more than the surface in the year 2012 and with 4.4% more compare to the year 2013, recording a minimum of 44.8 hectares in the year 2012.

Table 2. Situation of organic hemp- surfaces and production

Specifications	2012	2013	2014	2015	2016
Ecological Surface (hectares)	44,8	51,8	54,1	52,8	53,3
Organic production (tonnes)	47,2	47,13	88,46	83,04	81,74
Average organic production. (Kg / ha)	1054	910	1635	1573	1534

Source: FAOSTAT; INS

If we refer to total dry hemp production in an ecological system, we can see from table no. 2 that they record a maximum of 88.46 tons in 2014, 87.7% more than in the previous year, which is expected to decrease by -6.13% in 2015. In 2016, the total production of dried hemp for fiber is 81.74 tonnes with -1.57% less than in 2015 but 73.2% higher than the base year of 2012.

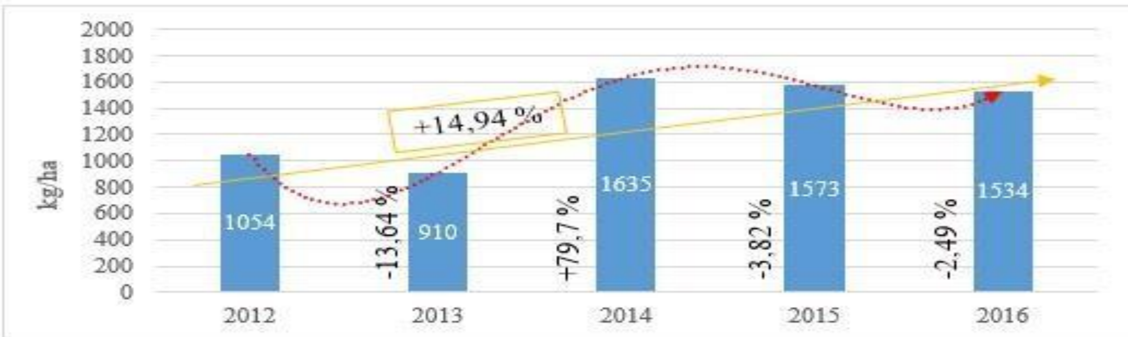

Figure 2. Average production of organic hemp dried hemp
Source: data processing Eurostat; FiBL

According to figure 2, average hemp production increased by an average of 14.9%, reaching a peak in 2014, similar to total production, while in 2016 they fell by 2.49% as compared to 2015, 6.21% compared to 2014, but they are higher compared to 2012 by 45.6%.

Average production for this crop change from year to year, the most significant change being in 2014 compared to the previous year, when average production increases by 79.7%.

In order to get closer to the study we need to be able to determine the economic efficiency of hemp crop in the two agricultural systems, so we will analyze the income and expenditure budget of this crop for the two types of systems farm. Indicators presented in the Income and Expenditure budget were calculations on a hectare area, in a medium-sized plains area for 2015-2016, on the still green production of this crop.

Table 3. Income and Expense budget of conventional and organic hemp cultures

INDICATORS	U.M	Culture System	
		Conventional	Organic
Average production	kg/ha	45000	35000
A. VALUE OF PRODUCTION	lei	5107.5	5141.5
A1. Of which the main production	lei	5107.5	5141.5
B (+) SUBVENTIES	lei	2142.1	2142.1
C (=) GROSS PRODUCT	lei	6516.0	7283.6
D (-) TOTAL EXPENSES	lei	5820.9	4418.0
D1. Of which for the main production	lei	5820.9	4418.0
I. VARIABLE CHARGES	lei	5536.5	4195.3
1.Expenditure on raw materials and materials	lei	4049.2	2812.5
- Seed and planting material	lei	1440.0	1440.0
-Chemical / organic fertilizers	lei	1388.4	1019.2
- Pesticides / Organic pesticides	lei	1220.6	353.3
- Other materials	lei	0.1	0.0
2. Expenditure on mechanized works	lei	1230.4	1195.7
3. Spending on irrigation	lei	x	x
4. Supply costs	lei	121.5	84.4
5. Temporary labor costs *	lei	x	x
6. Insurance	lei	135.5	102.7
II. FIXED EXPENSES	lei	284.3	222.7
- Expenditure on permanent labor	lei	17.1	17.1
- General and management expenses	lei	108.4	82.2
- Loan interest	lei	115.9	80.5
- Lease	lei	x	x
-Entertainment for buildings and utilities	lei	43.0	43.0
E. (=) IMPORTANT INCOME	lei	-713.4	723.5
(-) Taxes and fees	lei	-114.1	115.8
(-) Rental	lei	x	x
F. (=) NET INCOME + subsidies	lei	1542.8	607.7
G. TAX INCOME TAX (%)	%	-12.3	16.4
H. NET INCOME RATE + Subsidies (%)	%	26.5	62.2
COST OF PRODUCTION	lei/to	129.4	126.2
PREVIOUS PRICE MARKET PRICE	lei/to	113.5	146.9

Source: ADER Project 13.1.2

As can be seen from the hemp crop budget (Table 3), average yield of green hemp was set at 45,000 kg in the conventional system and at 35,000 kilograms in the organic system by 22,2% lower. Analyzing the value of total production, it can be seen that the differences are relatively small, from 5107.5 in the conventional system to 5141.5 in the ecological system, representing a difference of 0.67% (-34 lei).

Although there is a fairly large difference between the two productions, their value does not differ greatly, the reason why the values of the two productions do not differ significantly is given by the price, which are relatively close.

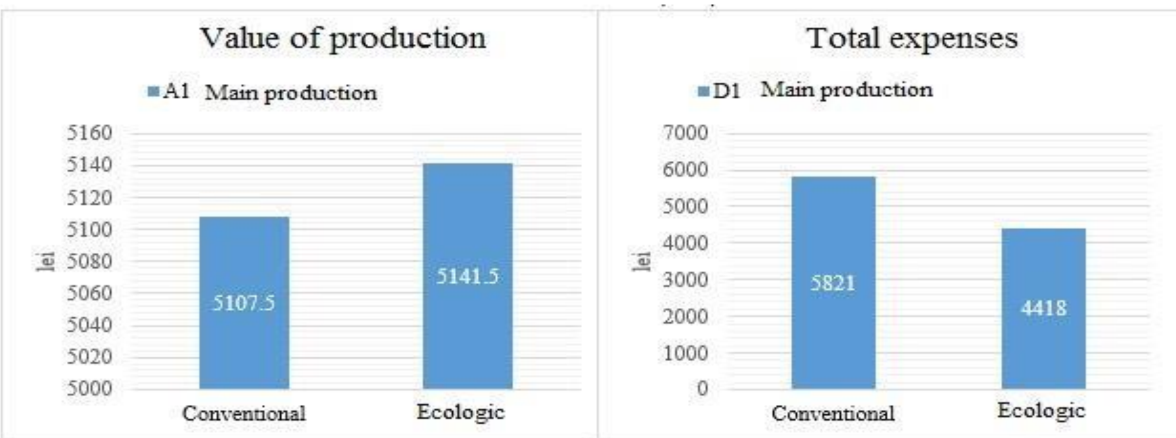

Figure 3. Structure of production value and expenditure
Source: own processing based on Income and Expense Budget data ADER Project 13.1.2

Concerning hemp crop expenditure for the two agricultural systems, it is noted that in the case of organic hemp crops, total expenditure is lower than that found in the conventional system. In other words, the economic effort is lower by -24.1% compared to conventional production expenditure.

This is due to the fact that certain expenses with raw materials and materials found in this system are lower than those found in the conventional system, the same is true for general and management expenses. The total costs amount to 4481 lei, in an ecological system and are used in the main production, with no secondary production, as is the case with the conventional system.

On the other hand, the conventional production is done with an effort amounting to 5821 lei, of which 95.11% represents the variable expenses presented in the income and expenditure budget of crops (Table 3), while the remaining 4.89% represents the expenses fixed, namely 284.3 lei.

Analyzing all these costs compared to the value of the production, it can be observed that for hemp grown in ecological system, the expenditures reach a fairly high level of profitability, so for this production there was a taxable income of 723.5 lei; while the value of the amount of taxable income in the conventional system is negative -713.4 applying the tax index means that no profit is achieved if no subsidies are granted.

With the addition of subsidies granted to this culture in an ecological and conventional system, we can see that the net income + subsidies is positive for both systems, so for the conventional system we get a value of 1542,8 lei, and in ecological system we get the value of 607,7 lei .

Profitability rates establish economic efficiency, so for conventional hemp crops, we notice that the taxable income is -12.3%, while in the organic system this is 16.4%, which shows that the income is higher than expenses, resulting profit.

Going forward and analyzing the cost per unit of product, in our case per ton, we can see (Table 3) that it does not differ significantly from one system to another, the difference being very low of only 3.2 lei /tonne, respectively to 129.4 lei / ton in a conventional system at 126.2 lei / ton in ecological system.

In order to better determine the feasibility and economic efficiency of this culture presented in two systems, were calculated the following indicators.

Table 4. Indicators on the economic efficiency of hemp culture in a conventional and ecological system

INDICATORS	U.M	Culture System	
		Conventional	Organic
Gross margin	lei	-429	946,2
Expenses for 1000 lei production pp.	lei	1139,7	859,3
Consumption of working time	man-hours / ha	13,2	13,2
Labor productivity (value)	lei / hour-man	385,9	389,7
Work productivity (physical)	Kg / h-man	0,3	0,4
Profit or loss (gross)	lei / ha	-713,37	723,5
Profit threshold (physical)	kg	48780	28560

Source: ADER Project 13.1.2; Ana Ursu, et. al (2017)

The gross margin in table 4 was determined by calculating the difference between the value of the main production and the variable costs of the hemp culture for both systems, conventional and ecological (environmentally friendly). As can be seen from the above table (table no. 4), the gross margin of conventional hemp crop is negative, justifying that variable costs with this conventional crop culture exceed the value of the main production by about 8.39% . However, at the other pole there is the gross margin for the same crop but in ecological system, where it can be seen as positive, with a value of 946,2 lei, being higher than that of hemp culture obtained in a traditional system. One of the main reasons why the gross margin is positive in an organic system compared to a conventional system is that some variable costs are lower, such as material expenses.

The second indicator presented in table 4 "expenses per 1000 lei of main production" determines the level of distribution of the factors of production, in order to obtain the finished product, in this case dried fiber for hemp. So, for a simple observation, the effect of this indicator on the economic efficiency of this culture will be plotted.

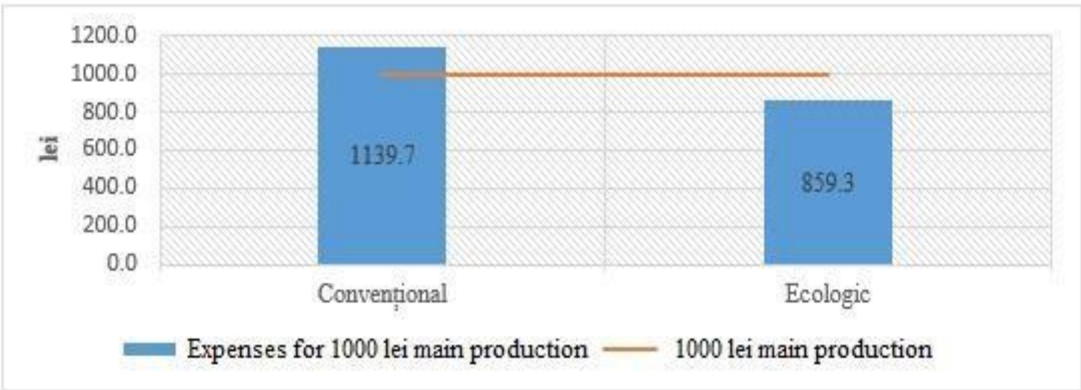

Figure 4. Costs per 1000 lei of main production
Source: own data processing ADER Project 13.1.2

As can be seen in figure 4, there are differences between the two agricultural systems used in the hemp crop. Thus, the expenses per 1000 lei of the main production exceed the value of 1000 lei, thus exceeding the conventional profitability threshold, for a production of 1000 lei were spent 1139.7 lei with a difference of 280.4 lei compared to hemp in an ecological system, where to produce hemp in the amount of 1000 lei is spent 859,3 lei which falls within the profitability threshold. The above mentioned shows that the chosen agricultural system may have an impact on the profitability of the hemp crop.

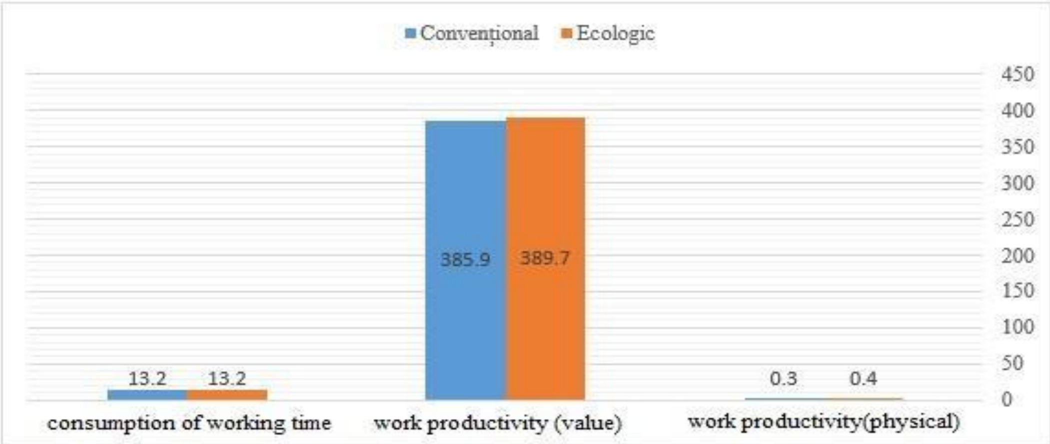

Figure 5. Consumption of working time and labor productivity
Source: own data processing ADER Project 13.1.2

In figure 5, one can observe not only the difference from one agricultural system to another that is relatively small, but also the differences between the indicators analyzed. Thus, according to figure no.5, labor consumption for hemp cultivation was 13.2 hours for both agricultural systems for a hectare area.

Depending on the output obtained and its value, it can explain the two labor productivity. Therefore, the productivity of the physically expressed work is higher in the ecological system with 0.1 kg / h in the ecological system, a small difference from one system to another, a sign that the agricultural system used (conventional or organic) does not greatly influence, in this culture, the productivity of work physically expressed.

In the case of labor productivity from a value point of view, there can be noticed a difference of 3.8 lei / hour-man, so in an ecological system for hemp culture the labor productivity expressed in terms of value is marginal by 0.98% conventional system.

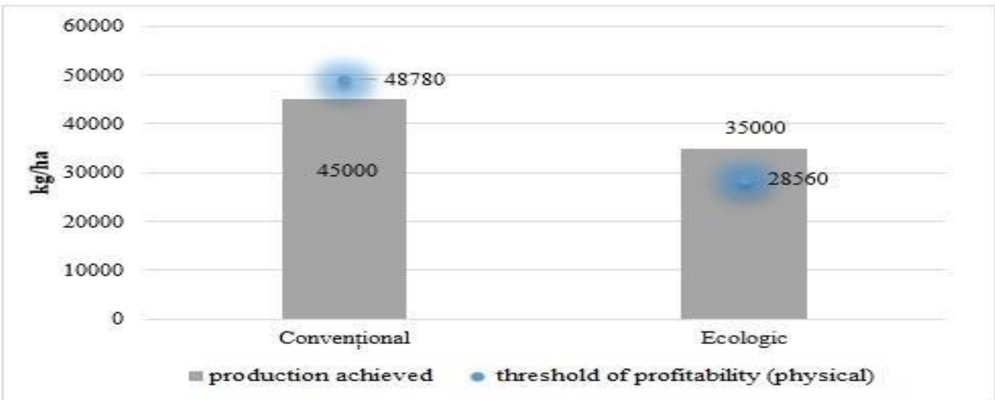

Figure 6. The physical profitability threshold
Source: own data processing ADER Project 13.1.2

In figure 6, it can be seen that the profitability threshold for each hemp farming system. Thus, in order to grow hemp in a conventional system with a minimum profitability, a production level of 48.78 tonnes / ha has to be attained, which shows in this case that the production of 45 tonnes / ha is not profitable. In the organic system, due to the higher domestic market price for this product, the profitability threshold in the physical unit is lower at a level of 28.56 tons per hectare. Thus, the level of cost-effective production in the organic system has been exceeded in the present case by approximately 22.6%, which shows that organic hemp production is profitable with a production of 35 tons / ha, yielding a profit physically 6.44 tons / ha.

CONCLUSIONS

The first part of this paper presents a brief description of the hemp culture as well as the main growers of this plant continuing with the surfaces cultivated with this culture, both in conventional and ecological systems, highlighting the evolution of surfaces, total and average productions, observing that they were on average increasing for each system (139.9% conventional, 14.94% ecological).

Regarding economic efficiency, it can be argued that only an agricultural system for hemp cultivation for the analyzed productions (35000 kg / ha in the organic system and 45000 kg / ha in conventional system respectively) brings a profit to the farmer, namely hemp cultivation in an ecological system. From the revenue and expenditure budget it can be seen that the amount of taxable income is negative for the conventional agricultural system.

Due to the higher recovery price for organic hemp, it can be seen that for a lower production by 22.2% compared to the conventional one, production value is 0.66% higher. In terms of total expenditure, given the same production gap, the level of organic production is lower by about 24.1% compared to conventional production.

By addressing all aspects listed above for the purpose of determining economic efficiency, the subject of this paper, we can say that this culture is cost-effective in an ecological system (with or without subsidies) and less cost-effective in a conventional system (if not granted subsidies this crop records losses in a conventional system). Thus, the rates of return without subsidies differ from one system to another, in the case of traditional agriculture, hemp cultivation obtained a negative rate of -12.3% while in the ecological system a rate of 16.4 %; subsidy rate rates are 26.5% conventional and 62.2% organic, ecologically used can be an advantageous income-enhancing solution for the Romanian farmer.

In conclusion, I believe we have pointed out that the economic risk culture and the farmer who chooses this plant must take into account all the cost economics of both organic and conventional. The production level must be taken into account as it determines the physical profitability threshold that can make the difference between gain and loss.

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COMPARATIVE STUDY ON THE ECONOMIC EFFICIENCY OF RICE CULTURE IN A CONVENTIONAL AND ORGANIC SYSTEM

ȘURCĂ DANIELA-ELENA[1]

Abstract: *Economic efficiency is defined by the obtaining of useful economic effects, provided that material, human and financial resources are used rationally. Thus, in general terms, economic efficiency can be defined as the connection between the useful effects obtained from a certain economic activity and the efforts made in the respective activity represented by the expenses related to the production process. The main objective of the study is to highlight the economic efficiency of two system conventional and organic for rice crops. In the context of the achievement of the main objective of the paper, it will be analyze the technical and economic indicators referring to: the dynamics of the surfaces, the average outputs, the budget of revenues and expenditures. The revenue and expenditure budget will highlight certain economic issues, such as the value of production, the costs incurred with this crop, the resulting income and the rate of return. In conclusion, this paper seeks to highlight the best agricultural system in terms of economic efficiency, for rice crops, using the comparative method on the set of indicators analyzed.*

Key words: *economic efficiency, organic / conventional rice, profit*

JEL Classification: *Q12, Q57*

INTRODUCTION

Rice culture is considered to be one of the most important crops in the world due to the high global consumption, but also because it fits well with the demands of industrialization and processing. After the rice is processed, various oils are used in the cosmetic and pharmaceutical industry, as well as various flours and cakes used in the livestock sector.

According to the FAO Biennial Global Food Markets Report, global rice use has fallen by 1.3% in 2016/2017. [6]

Of the total quantity of cereals consumed globally, rice has a share of 21%, the largest consumer and rice producers being China, India and Indonesia. Thus, rice crops (Oryza sativa) around the world have a wider coverage. In the crop year 2016-2017, this crop occupies approximately 161.1 million hectares [12], representing 14% of the world's agricultural land with a production of 483.9 million tonnes, accounting for 19% of the total grain yield of the world.

Although global surface area and rice production is growing, at a national level (Romania), the situation is the opposite, the areas recorded with this crop gradually declining for the last years 2014-2016 / 2017, from 12 719 (year 2014) hectares at 8 360 hectares (year 2017) in conventional system and from 4 466 hectares (year 2014) to 3 164 hectares (year 2016) in the organic system. [13]. Before analyzing the economic efficiency of rice production in both conventional and organic systems, it is necessary to know and describe them.

Organic farming is presented by INFOAM (National Federation of Organic Farming Movements) as "*a production system that supports the health of soils, ecosystems and humans. It is based on ecological systems, biodiversity and life cycles adapted to local conditions instead of using input materials with adverse or negative effects on the environment.* "[5] Organic farming is also defined by Regulation (EC) No. 834/2017 as *"a global system for agricultural management and food production that combines best environmental practices, high biodiversity, natural resource conservation, high animal welfare standards and a production method that respects the preferences of certain consumers for products obtained using natural substances and processes. "*[9]

[1] * Corresponding author, e-mail: surca.elena@iceadr.ro

In short, organic farming is presented as a system that avoids the use of chemical fertilizers, pesticides and growth regulators, through organic farming systems in pursuit of natural balance. [10]

While conventional or classical agriculture is at the opposite end, and is represented by intensive mechanized agriculture based on maximizing productivity and profitability, it can be said that this type of agriculture is the opposite of organic farming, using inputs that can have a a negative effect on the environment and with time it can create natural imbalances.

In view of the above considerations, but also the worldwide demand for this product for both the industrial and the food sectors, I believe that the two system (conventional and organic) should be compared in order to determine their economic efficiency.

MATERIALS AND METHODS

In the first part of the paper there will be a qualitative and quantitative research on the statistical data. For the highest accuracy of the data, we will consult the websites of specialized institutions in this field, such as: National Institute of Statistics, Eurostat, Faostat and FiBL. Thus, it is desired to create an overview of the past and current situation regarding the areas and the yields obtained in the two rice crop systems.

In the second part, the income and expenditure budget of the crop is used, the tool is used to assess the value of the production (both main and secondary) and the structure of the production expenses, to which are added the net income and the rate of profitability. This budget was taken over from the ADER project 13.1.2 "Technical and economic costing of production costs and estimates of the prices for wheat, maize, sunflower, rape, soybean, sugar beet, rice, hemp, hop , Tobacco, Potato for Conventional Agriculture and Organic Farming "[1] managed by the Research Institute for the Economy of Agriculture and Rural Development, the project runs between 2015-2018, takes place in stages and the results of the stages are presented to the public on the official website of the institute. The budgetary data presented in this article were processed from the above-mentioned ADER project from the number eighth phase (Analyzing the economic efficiency of plant production for conventional and organic agriculture) the main objective being the comparative analysis of the economic efficiency of the vegetal production for conventional agriculture and organic farming. The specific objectives of the phase have led to as many simulations of possible scenarios as possible in determining the profitability threshold, so the research carried out aims to provide the best information regarding the economic efficiency indicators for the two agricultural systems. [11]

The paper has a methodological, synthetic character, emphasizing the theories, concepts and models of technical and economic analysis, the presentation of the indicators used in the appreciation of the economic efficiency of the production activity (indicators reflecting the economic effort - the consumption of working time, production indicators, indicators reflecting the economic effect - average production, total incomes, average price on the farm, indicators reflecting the actual economic efficiency - labor productivity, production cost, gross profit, profit rate, production costs per 1000 lei income material expenses per 1000 lei of income, etc.), the profitability threshold as well as the effect of the average production and the price of capitalization on the gross margin. [3]. Optimal solutions have a specific character. Through studies and analyzes we are pursuing the ways of increasing the economic efficiency and determining this efficient. The research was based on descriptive research (web report of ADER 13.1.2, Phase 8, MADR) [11].

RESULTS AND DISCUSSIONS

In Romania, approximately 9 435 hectares of conventional rice were grown in 2016, less by -14.74% compared to the previous year, but there are also increases in the area for 2013 compared to the previous year 2.43% and in 2014 compared to 2013 by 9.84% and 12.52% as compared to 2012. (Table 1)

Table 1. Evolution of rice surfaces and yields

Specifications	2012	2013	2014	2015	2016	2012
Surface area (thousand ha)	11 304	11 579	12 719	11 067	9 435	11 304
Total production (thousand t)	50 862	54 646	45 159	49 773	43 635	50 862
Average yield (kg / ha)	4 499	4 719	3 505	4 497	4 624	4 499

Source: INS

If we refer to total rice production, we can see from Table 1 that it decreases for the year 2014 compared to 2013 by -17.36%, respectively 9 487 tonnes. The same situation is also noted in 2016 as compared to the previous year, when the total production drops by -12,33% that means with 6 138 tonnes.

Thus, on the basis of these two indicators the production averages per hectare were calculated, it varied between 4 719 kg / ha (year 2013) and 3 505 kg / ha for the analyzed period (2012-2016).

Figure 1. The average yield of rice in the conventional system
Source: INS data processing

As can be seen in Figure 1, the average yield of rice increased on average by +2.57%, reaching the maximum in 2013, while in 2016 the average yield was 4 624 kg/ha, with -2,01% less compared to the maximum year, ranking the second place.

According to the same figure it is observed that average production per hectare is changing from one year to the next, the largest decrease being in 2014 compared to 2013 by -25.7%, while the highest increase is in 2015 compared to the previous year being + 28.3%.

In terms of organic farming data were taken from the European site Eurostat organic farming section and FiBL Statistical, for 2012-2016 period. It can be seen in table no. 2 that the areas for this ecological crop have reached a maximum of 4 466 hectares in 2014, representing an increase of 160.8% compared to year 2012 (+2 754 hectares) and +70,6% compared to year 2013 (+1 848 hectares). Surfaces begin to decline over 2014 by -30.9% in 2015 and by -29.15% in 2016. The year at the opposite end, with the smallest area, is 2012 with an area of organic rice of only 1 712 hectares.

Table 2. Situation of organic rice areas and production

Specifications	2012	2013	2014	2015	2016	2012
Surface area (thousand ha)	1 712	2 618	4 466	3 085	3 164	1 712
Total production (thousand t)	5 314	6 158	12 521	15 473	9 743	5 314
Average yield (kg / ha)	3 103	2 352	2 804	5 016	3 079	3 103

Source: Eurostat; FiBL

If we refer to the total production of organic rice we see a very high increase in 2015, reaching a maximum of 15 473 tons, this being higher by + 23.6% compared to the previous year, followed by it will decrease in 2016 with -37.03% representing a number of 5 730 hectares. It is worth mentioning that for the period 2012-2016 the total production increases by +26.43%.

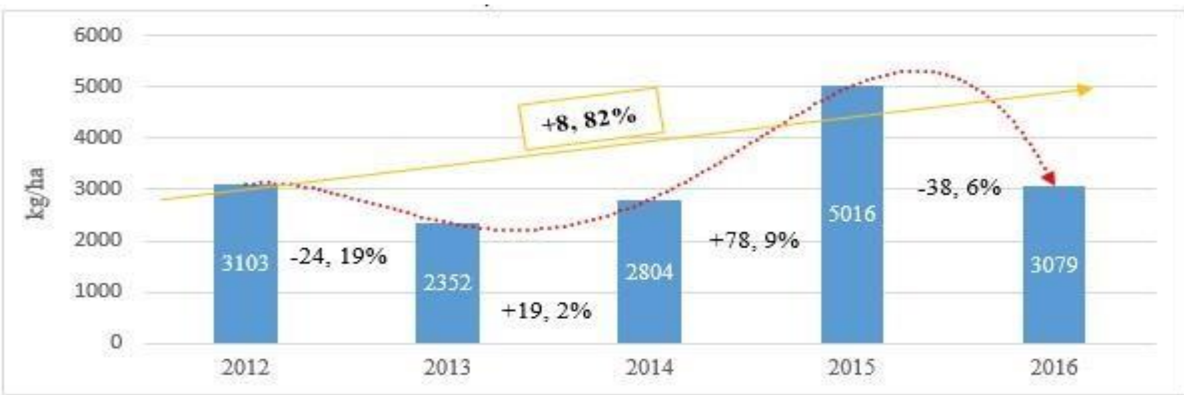

Figure 2. The average yield of rice in organic system
Source: data processing Eurostat; FiBL

As can be seen in figure 2, the average yield of rice increased on average by + 8.82%, reaching the maximum in 2015, while in 2016 the average yield was 3 079 kg / ha, with - 38.6% less than the full year, ranking third, after 2012 with an average production of 3,103 kg / ha.

According to the same figure, average production per hectare is changing from one year to the next, the highest increase being recorded in 2015 compared to 2014 by + 78.9%.

Thus, in order to establish the economic efficiency of rice crops in the two types of agricultural systems, I will submit to the analysis, the income and expenditure budget for rice crops in both organic and conventional systems. It is worth mentioning that the indicators to be presented have been calculated for a hectare cultivated with rice in a medium-sized plain area for 2015-2016.

Table 3. Income and Expense Budget of Conventional and Organic Rice Cultures

INDICATORS	U.M	Culture System	
		Conventional	Organic
Average production	kg/ha	3500	3000
A. VALUE OF PRODUCTION	lei	3740	9000
A1. Of which the main production	lei	3500	9000
B (+) SUBVENTIES	lei	3654.1	3654.1
C (=) GROSS PRODUCT	lei	7394.1	12654.1
D (-) TOTAL EXPENSES	lei	5227.1	9443.4
D1. Of which for the main production	lei	4987.1	9443.4
I. VARIABLE CHARGES	lei	4923.0	8512.3
1.Expenditure on raw materials and materials	lei	2502.4	5577.5
- Seed and planting material	lei	487.5	462.5
-Chemical / organic fertilizers	lei	1466.5	4508.1
- Pesticides / Organic pesticides	lei	548.0	606.9
- Other materials	lei	0.36	0.0
2. Expenditure on mechanized works	lei	1516.4	1823.1
3. Spending on irrigation	lei	725	725.0
4. Supply costs	lei	75.1	167.3
5. Temporary labor costs *	lei	x	X
6. Insurance	lei	104.1	219.4
II. FIXED EXPENSES	lei	304.1	931.1
- Expenditure on permanent labor	lei	71.4	483.2
- General and management expenses	lei	83.3	175.5
- Loan interest	lei	106.4	165.2
- Lease	lei	x	x
-Entertainment for buildings and utilities	lei	43	107.2
E. (=) IMPORTANT INCOME	lei	-1487.1	-443.4
(-) Taxes and fees	lei	-237.9	-70.9
(-) Rental	lei	x	x
F. (=) NET INCOME + subsidies	lei	2250.8	3281.6
G. TAX INCOME TAX (%)	%	-29.8	-4.7
H. NET INCOME RATE + Subsidies (%)	%	45.1	34.8

COST OF PRODUCTION	lei/to	1425	3147.8
PREVIOUS PRICE MARKET PRICE	lei/to	1000	3000

Source: ADER Project 13.1.2

As can be seen from the rice crop budget (Table 3), average rice production in a conventional system was set at 3 500 kilograms, while in an organic system at 3 000 kilograms per hectare, with -14.28% lower. Analyzing the value of total production, it can be noticed that the differences are significant from 3 740 lei in the conventional system to 9 000 in the ecological system, which is higher by 5 260 lei (140%).

Although the production gap is not very high from one system to another, production value differs significantly, the reason for this difference is given by the price of production capitalization; according to Table 3 (income and expenditure budget) organic production of rice has a higher market price compared to the conventional one, which is three times higher.

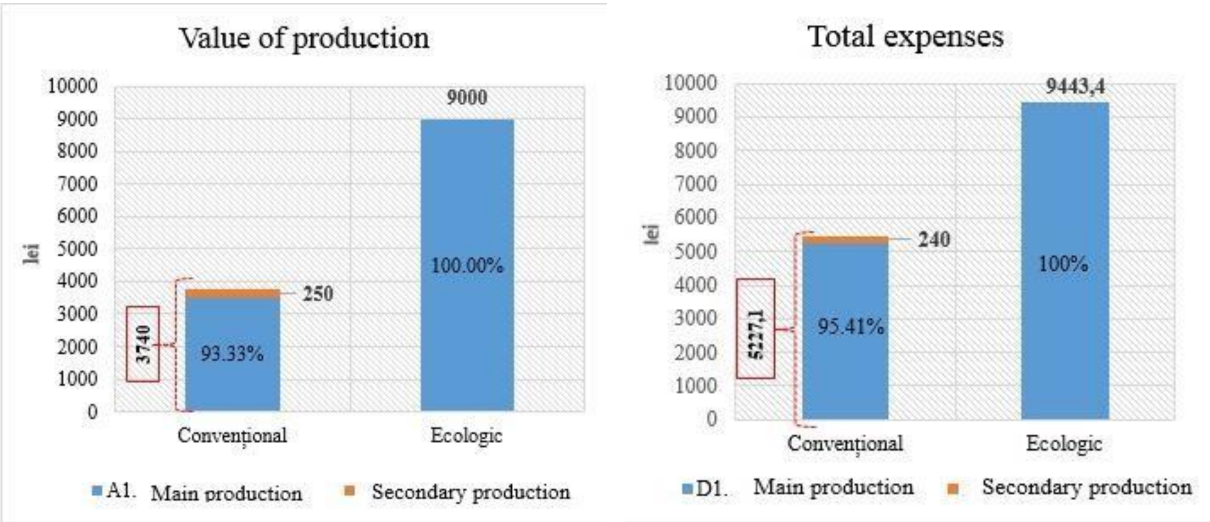

Figure 3. Structure of production value and expenditure
Source: own processing based on BVC data ADER Project 13.1.2

Concerning the rice crop costs for the two agricultural systems, it is noted that in the case of organic rice crops, the total expenditure is higher than the one found in the conventional system, due to the raw material and material expenses and the permanent workforce. The total expenses amount to 9,443.4 lei and are used in the production of seeds, with no secondary production, this effort is higher with + 122.9% compared to the conventional production costs.

On the other hand, conventional production is made with an effort amounting to 5,227.1 lei, of which 95.41% (4987.1 lei), for the main production, the balance of 240 is the value of the expenditures with the secondary production.

Analyzing the structure of expenditures it can be noticed that for conventional rice crops to obtain 3,500 kilograms production, a value of 5,227.1 lei is spent, out of which 94.18% (4 923 lei) variable expenses while 5,82% (304.1 lei) are fixed costs. In the case of organic production, 90.14% of the total expenditure incurred with this crop for the production of 3 000 kilograms per hectare represents the variable costs (8512.3 lei) while the fixed expenses represent 9.86% (931.1 lei).

Analyzing these in comparison with the value of the production, it can be observed that for the rice cultivated in a conventional system, the expenses reach the minimum profitability, thus for this production there was a taxable income of -1487,1 lei; and even if the ecological production value is higher, the taxable income is still negative -443.4 lei. At these income levels, the tax rate was applied, which means that there is no profit if there is no subsidy.

With the addition of the subsidies granted to this culture in a conventional and ecological system, we note that the net income + subsidies is positive, so in a conventional system we get a value of 2,250.8 lei, while in ecological system we get a value of 3,281.6 sign that there are larger subsidies here.

Rates of return help to establish economic efficiency, so for conventional rice crops, we notice that the taxable income rate was -29.8% and in the ecological system -4.7%, thus demonstrating that the incomes achieved with this culture in the two systems are lower than the costs incurred. After the addition of the subsidies, the rates of return become positive, so in a conventional system it is 45.1% while in the organic system it is 34.8%, which shows that the incomes are higher than the expenses that make profit.

Analyzing the cost per unit of product, in this case per ton, we can see that it differs significantly from one system to another, from 1,425 lei / ton in a conventional system to 3,147.8 lei / ton in ecological system, the difference being 1,722.8 lei, but as shown in Table 3, the price of recovery is higher in the case of organic rice.

In order to better determine the feasibility and economic efficiency of this culture in the two systems, the following indicators were calculated.

Table 4. Indicators on the economic efficiency of rice culture in a conventional and organic system

INDICATORS	U.M	Culture System	
		Conventional	Organic
Gross margin	lei	-1423	488
Expenses for 1000 lei production pp.	lei	1424,9	1049,3
Consumption of working time	man-hours / ha	22.9	78.5
Labor productivity (value)	lei / hour-man	152.9	114,6
Work productivity (physical)	Kg / h-man	0,152	0,038
Profit or loss (gross)	lei / ha	-1487.1	-443.4
Profit threshold (physical)	kg	4920	2840

Source: ADER Project 13.1.2; Ana Ursu, et. al (2017)

The first indicator analyzed in Table 4, is gross margin, and was determined by calculating the difference between the value of the main production and the variable costs of the rice crop, both in the conventional and organic systems. As can be seen from the above table (no. 4), the gross margin of conventional rice crops is negative and quite large, which justifies the fact that the variable costs of this crop in this system exceed the value of the main production. On the opposite side, the gross margin of the same culture is in an ecological system, where it is observed that it is positive with a value of 488 lei, being higher than that of the rice obtained in the classic system. One of the main reasons why the gross margin in the ecological system is positive over the gross margin in a conventional system is due to the fact that the raw materials and materials are less expensive.

The second indicator presented in table 4 "expenses per 1000 lei of the main production" determines the level of distribution of the factors of production, in order to obtain the finished product, in this case the rice grains. So, for a simple observation, the effect of this indicator on the economic efficiency of this culture will be plotted.

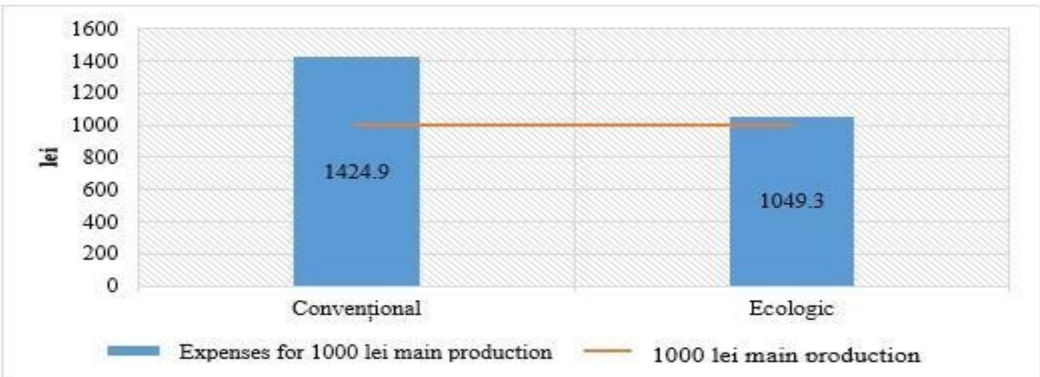

Figure 4. Costs per 1000 lei of main production
Source: own data processing ADER Project 13.1.2

As can also be seen in figure 4, irrespective of the system used for rice crops, the expenses per 1000 lei of the main production exceed the value of 1000 lei, thus exceeding the profitability, but not at the same level. In the case of classic / conventional rice, for a production of 1000 lei, 1424.9 lei was spent with a difference of 375.6 lei compared to the ecological system where to produce ecological rice worth 1000 lei is spent 1049.3 lei. The above mentioned shows that irrespective of the chosen system, rice crops are not profitable without subsidies.

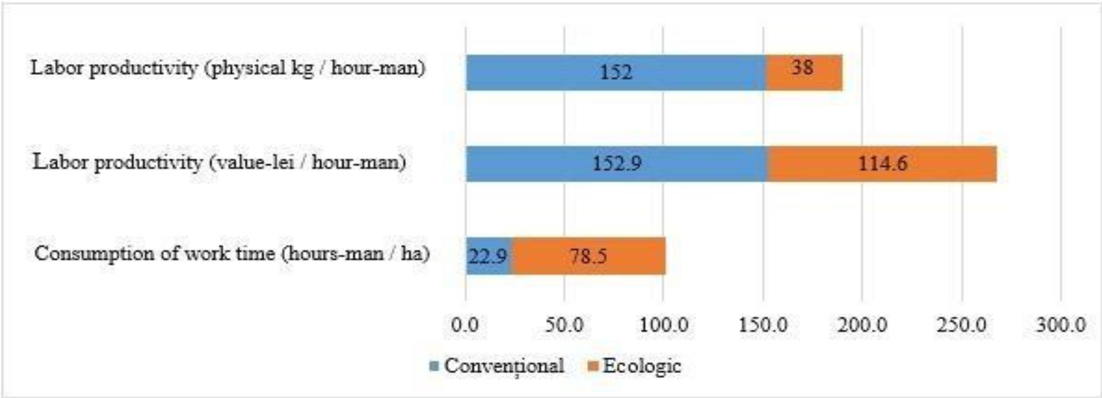

Figure 5. Consumption of working time and labor productivity
Source: own data processing ADER Project 13.1.

Figure 5 shows the difference in working time consumption, so for conventional rice crops, this consumption was 22.9 hours per person, while the consumption of work per hectare of rice in the ecological system it was more than about 3 times, respectively 78.5 hours-man.

Thus, depending on the output obtained and its value, the two labor productivity can be explained. The productivity of work physically expressed is higher in the conventional system (152 kg / hour-man) than in the ecological system (38 kg / hour-man) 4 times. In the case of labor productivity in terms of value, one can observe a situation similar to the above mentioned, so that for the rice crop in a conventional system the labor productivity is 152.9 lei / hour-man, and in ecological system is 114, 6 lei / man-hour, this being lower by about 25.05%.

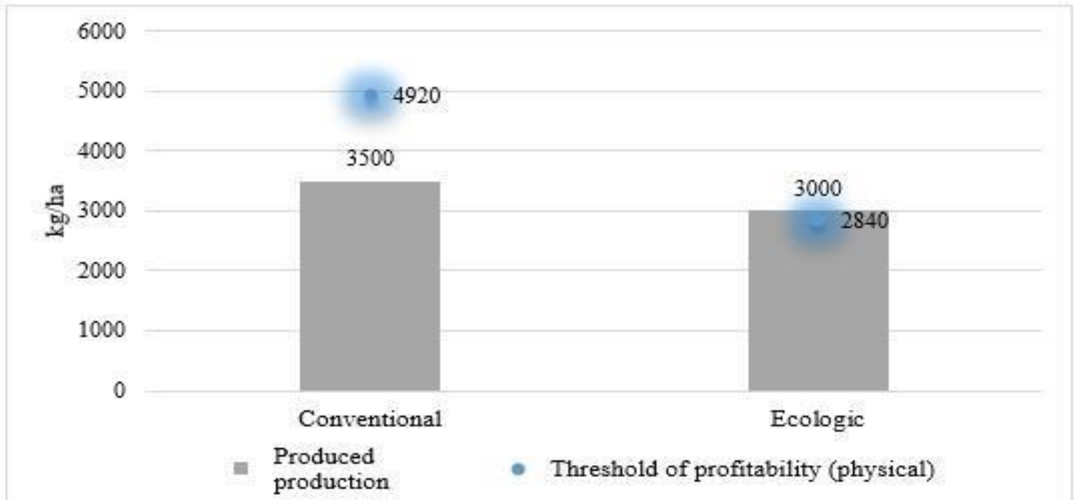

Figure 6. The physical profitability threshold
Source: own data processing ADER Project 13.1.2

In figure 6, you can see the profitability threshold for each rice growing system. Thus, in order to grow conventional rice with a minimum profitability, a production level of 4920 kilograms per hectare must be attained, which demonstrates in this case that conventional rice production is not profitable for production 3500 kg / ha; in the ecological system, due to the higher pricing price, a lower profitability threshold (physical units) was set, ie 2840 kilograms per hectare. Therefore, this level of cost-effective production in the organic system was slightly exceeded by the calculated production, which in the present case demonstrates that the production of organic rice is profitable with a production of 3000 kg / ha, thus obtaining a profit physically 160 kg / ha.

CONCLUSIONS

The first part of this paper presents the areas cultivated with rice, both in conventional and organic systems, showing the evolution of surfaces, of total and average production, observing that they (average outputs) were on average increasing for each system (2,57 Conventional, 8.82% organic).

As regards economic efficiency, it can be argued that only an agricultural system of rice cultivation for the analyzed productions (3500 kg / ha in the conventional system and 3000 kg / ha in the ecological system) brings a profit to the farmer, namely growing rice in an ecological system. From the revenue and expenditure budget, it can be seen that the amount of taxable income (that determines the profit or loss) is negative.

Due to the better pricing price for organic rice, it can be seen that for a smaller production of 14.2% compared to the conventional one, production value is 157.14% higher. In terms of total expenditure, given the same production gap, the level of organic production costs is higher than the yield differential, total organic rice expenditure is 80% higher than conventional production.

Using all aspects addressed in order to determine economic efficiency, we can say that both systems bring profit as long as subsidies are given to this culture, without subsidies the rates of profitability are negative, so losses are recorded. Rates of return on subsidies differ from one system to another, in the case of classical agriculture, rice crops obtained a rate of 45.1% while in the organic system a rate of 34.8% was obtained, which we leads to the idea that this culture, practiced in a conventional system, is an optimal solution for increasing the income of the Romanian farmer.

In conclusion, in order to attract the attention of Romanian farmers, I believe that it must be emphasized that this crop presents certain economic risks and that all the cost elements of rice crops must be taken into account, both in a conventional and ecological system. It should also be mentioned that farmers willing to cultivate this plant must have a level of production as this determines the physical profitability threshold, so an imbalance of 160 kg / ha in an ecological system can make the difference between gain and loss.

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PAC SUBSTITUTIONS IMPACT ON THE TOBACCO MARKET IN ROMANIA

POP RUXANDRA-EUGENIA[1]

Abstract: *The tobacco market in Romania has seen a significant increase regarding the size of the areas covered by this industrial crop and production. One of the key factors underpinning this statement is the volume of forms of financial support under the PAC 2014-2020 for this crop. It is well known that among the National Transitional Aid for the Vegetable Sector, the tobacco subsidy (ANT 4) provides the highest amounts per hectare cultivated. In this paper we will evaluate the relationship between production variables, existing surfaces on the tobacco market and, on the other hand, the volume of subsidies granted to us in the country using statistical analysis methods using SPSS and Microsoft Excel.*

Key words: *tabacco market, PAC 2014-2020, linear regression, statistical analysis*

JEL Classification: *Q15, Q52, Q27*

INTRODUCTION

At European level, but also in its neighborhood in 2016, the largest tobacco producers were countries like Turkey, Greece, Macedonia, Italy, Poland, Bulgaria. In Europe, Romania ranks 11th in terms of tobacco-growing area but also recorded production. At national level, tobacco production in recent years is about 1700 tons, the most productive regions being the South Muntenia Region and the South West Oltenia Region. The processing part of the production is characterized by monopoly competition, with high demand but a single prime processor eligible to conclude contracts with tobacco producers and two other establishments authorized in other member states of the European Union. Due to this, the trade balance on the tobacco market registered a deficit of 8,594 tons, the equivalent of 69,565 thousand EUR. Regarding the situation of the imports on the tobacco market, we observe, analyzing the data provided by INSSE, that the largest share of tobacco imports and its substitutes come from the European Union (on average 60%), the rest of the imports coming from outside it.

At the tobacco market level we encounter a number of factors that influence the level of tobacco production and the size of the areas cultivated with this crop, such as climatic and pedological factors, socio-demographic factors of farmers, economic and financial factors, legislative factors. In this paper, we will mainly address the last category, legislative factors, and their impact on the level of tobacco production. More specifically, we will refer to European directives and policies that set the level of financial support for tobacco farmers. During the implementation of the 2014-2020 CAP policies, it has been pursued to achieve objectives such as: reliable food production, sustainable management of natural resources and climate policies, sustainable territorial development. We will analyze the level of financial support provided under the Common Agricultural Policy and whether the amount granted had a significant impact on the level of tobacco production or the area cultivated with it.

MATERIALS AND METHODS

In order to accomplish this paper, three main working methods will be used, such as:

- Dissemination of existing information in the specialized, local and international literature of interest;

[1] PhD Student, Scientific researcher, Research Institute for Agriculture Economy and Rural Development, e-mail: pop.ruxandra@iceadr.ro

- Quantitative and comparative analysis of the statistical data provided by the National Institute of Statistics on: the size of the areas cultivated with tobacco, the production of tobacco produced on the territory of our country;
- Analyzing and interpreting data using the SPSS statistical program by producing the following outputs:

  - the value of the Chi-square test and the contingency coefficient: (Analyze - Descriptive Statistics - Crosstabs - Statistics - Chi-square / Contingency coefficient);

RESULTS AND DISCUSSIONS

At tobacco cultivation level as agricultural production, it is clear that there is a decrease in the level of its production, primarily due to the lack of processing plants. At this moment there is only one manufacture that makes purchases from farmers, representing a prime -process. However, tobacco culture remains profitable due to the undeniable market demand. In Table 1, we present the areas and production recorded on tobacco in the territory of our country:

Table 1 –Tabacco surfaces and productions 2007 – 2017

Surfaces and production tabacco 2007 - 2017											
Year	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Surfaces (ha)	1101	1235	850	1532	1681	1258	941	855	745	926	801
Production (to)	1128	2366	1566	2971	2562	1341	1357	1405	1079	1656	1219
Production/ ha (to)	1,02	1,92	1,84	1,94	1,52	1,07	1,44	1,64	1,45	1,79	1,52
Medium Production (kg/ha)	1025	1916	1842	1939	1524	1066	1442	1643	1448	1741	1522

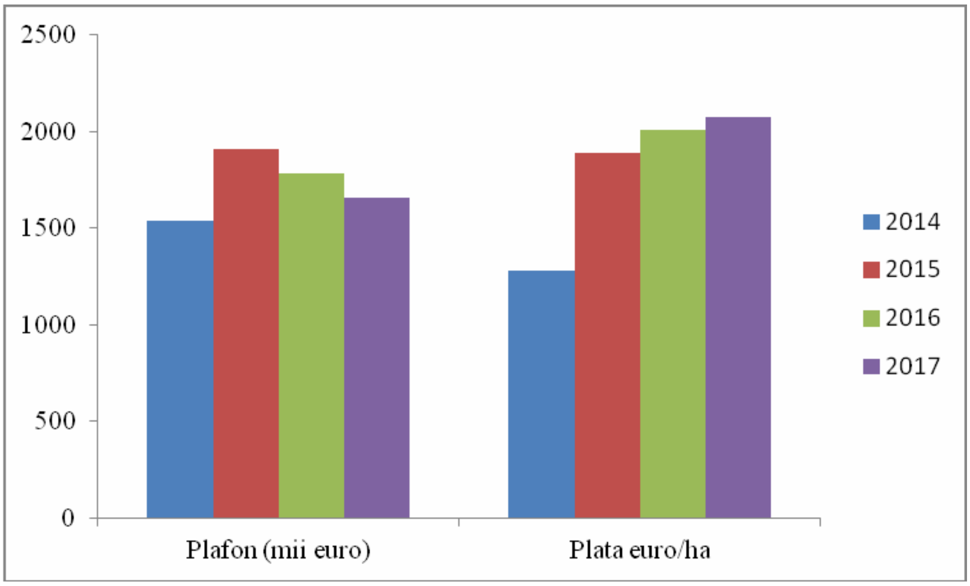
Source: Tempo-INSSE- Statistical databases

Thus, we notice that the maximum production of tobacco and the areas cultivated with it was achieved in the years 2010, 2008 and 2009 and the minimum in 2007, 2012 and 2015. In 2017 both the production and the tobacco growing areas were lower compared with the previous year and also lower than the average recorded during the analyzed period. From counties with the smallest and the largest recorded tobacco production the point of view, analyzing the statistical data, we mention the following:

- the main counties in the territory of which high tobacco production was obtained in 2016 are Dolj (681 tonnes) and Teleorman (614 tonnes);
- higher productions, but much smaller than these two counties, were recorded in counties such as: Mureş (174 tons), Argeş (67 tons), Olt (20 tons), Iaşi (16 tons) and Ialomiţa 13 tons).

We have mentioned previously that, according to the hypothesis of the present study, the level of support offered by the state to farmers dealing with tobacco cultivation influences the level of production and of the areas cultivated with tobacco. Thus, we present below the amounts granted as National Transitional Aid 4 (ANT 4) and the financial ceilings for 2014-2017:

Figure 1: amounts awarded ANT 4 - tobacco crop



Source: www.madr.ro

We note that although the amounts granted to the hectare have risen steadily, ranging between € 1280.19 per hectare to € 20178 per hectare, the ceilings for National Transitional Aid 4 are characterized by a predominantly downward trend. For example, the amount of the ceiling granted in 2018 is slightly above the amount granted in the 2014 application year. Thus, the value of the amounts granted per hectare cultivated with tobacco increased, the value of the financial ceilings decreased.

Once presented with these variables, two hypotheses that the present research may wish to confirm or refute:

1. Hypothesis 1: The level of caps granted under ANT 4 significantly influences the production of tobacco and the areas cultivated with it;
2. Hypothesis 2: The level of the amounts per hectare granted under ANT 4 significantly influences tobacco production and the areas cultivated with it.

To validate these assumptions, we will use the SPSS program to calculate the chi-square test and the contingency coefficient values.

For the first calculated correlation, the existing one between the existing ceiling and the size of the areas cultivated with tobacco, we present Figure 2:

Figure 2 – correlation between the ANT 4 ceiling level and the size of the cultivated areas

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Contingency Coefficient	.307	.032
N of Valid Cases		4	

Sursă: rezultate program SPSS
Source: SPSS results

The value of the chi-square test is 0.032 (<0.050), meaning that there is a significant link between the two variables. The value of the resulting contingency coefficient is 0.307, which means that the intensity of this link is poor.

Figure 3 – correlation between the level of ANT 4 ceiling and output level

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Contingency Coefficient	.745	.287
N of Valid Cases		4	

Source: SPSS results

The value of the chi-square test is 0.287 (> 0.050), meaning there is no significant link between the two variables (Figure 3).

Figure 4 – correlation between the level of the amounts granted under ANT 4 and the size of the cultivated areas

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Contingency Coefficient	.500	.043
N of Valid Cases		4	

Source: SPSS results

The value of the chi-square test is 0.043 (<0.050), meaning that there is a significant link between the two variables. The value of the resulting contingency coefficient is 0.500, which means that the intensity of this relationship is average.

Figure 5 shows the correlation between the level of tobacco production achieved and the amounts granted per hectare cultivated with tobacco:

Figure 5 – correlation between the level of the amounts granted under ANT 4 and the size of the cultivated areas

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Contingency Coefficient	.745	.287
N of Valid Cases		4	

Source: SPSS results

The value of the chi-square test is 0.287 (> 0.050), meaning that there is no significant link between the two variables.

CONCLUSIONS

In the present paper, we analyzed, in the first part, the areas and the tobacco production, as well as the level of the financial ceilings and the amounts granted per hectare to those who are involved in the cultivation of tobacco. We have noticed that the trend of the areas and the production recorded during the period 2007 - 2017 was oscillating, with a peak reached in the middle of the analyzed interval. Tobacco production has started to increase slightly lately, but has not reached its 2010 or 2011 levels, but rather halved by reappraising to these milestones.In the second part of the paper we analyzed the links between the variables presented in the first part, using the SPSS program, thus elaborating four hypotheses:

1. Hypothesis 1: The level of ceilings granted under ANT 4 significantly influences tobacco production; - validated hypothesis

2. Hypothesis 2: The level of ceilings granted under ANT 4 significantly influences areas under tobacco; - null hypothesis

3. Hypothesis 3: The level of the amounts per hectare granted under ANT 4 significantly influences tobacco production; - validated hypothesis

4. Hypothesis 4: The amount of the hectare amounts granted under ANT 4 significantly influences the areas under cultivation with tobacco. - null hypothesis

This shows that financial support under the PAC 2014-2020, in the form of ANT 4, has a greater impact on tobacco-growing areas than tobacco production. This is also explained by the fact that farmers can take the decision to cultivate tobacco under the influence of different economic, financial factors, but the level of production also depends heavily on climatic or pedological factors. We also notice that tobacco yields per hectare oscillate quite well over the period under review, starting from 1 tonne tobacco / ha and reaching about 2 to tobacco / hectare.

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SUGAR BEET AND SUGAR MARKET IN EUROPEAN AND NATIONAL CONTEXT

RUXANDRA – EUGENIA POP[1]

Abstract: *This paper aims to present the sugar beet and sugar market from a marketing perspective, both at national and european level, taking into account the main elements of the custom marketing mix on the sugar beet and sugar market (product, price, promotion, distribution) as well as the characteristics of demand and supply on the market of interest, represented by the consumption registered respectively by the number of economic agents and beet production at national level. We also want to show where we situated in Europe, in terms of the value of beet production at producer price. Once these issues have been analyzed statistically and interpreting the data gathered, the paper aims to highlight the strengths and weaknesses identified at market level by conducting a SWOT analysis.*

Key words: *sugar beet market, swot analyze, demand, supply*

JEL Classification*: Q15, Q52, Q27*

INTRODUCTION

The Root Market in Romania is one of the most productive markets of this kind in Europe, ranked fourth on the continent, after France, the Netherlands and Germany. Sugar beet is grown for roots, from which the sugar is produced as a main product, and molasses used as animal by-products for animal feed and for obtaining alcohol. Romania is a country with a tradition in the cultivation of sugar beet, especially if we refer to the period before the 1989 Revolution. As can be seen from the data analyzed in this paper, one can notice an involution of Romania's sugar beet areas and production, primarily due to factors such as market shares or liberalization of prices on the analyzed market. Liberalization refers to the production of white sugar obtained from the processing and processing of beet throughout Europe and its unrestricted marketing on the European and world market. The sugar beet culture is one of the main crops in our country, being the main source of raw material for sugar production, which is the main purpose of beet cultivation. Worldwide, sugar beet is the second source of sugar, after sugar cane, providing about 40% of world sugar production. Along with food, sugar also serves as a raw material for glycerol production, ethyl alcohol production, lactic and citric acid production, special fuels, lactoprene and dextran as a culture medium for penicillin production. In 2015, the area cultivated with beet was 26,596 hectares, according to the National Institute of Statistics, a smaller area than in 2014. In 2016, the area cultivated with beet reached 24,924 hectares, which shows a decrease compared to 2015. Analyzing the statistical data on the production of sugar beet recorded on the territory of our country, we affirm that the counties with high production are Covasna, Braşov, Satu Mare and Neamţ. Reduced sugar beet production was recorded in Bacau, Hunedoara, Galati and Vaslui. Thus, it is noticed that, in general, in the counties where large sunflower and maize production is registered, lower beet production is recorded because it is not cultivated after these crops. Sugar beet can be cultivated, however, after grain cereals, such as wheat and barley. We also notice that the production of sugar beet is higher on the territory of the counties where precipitation has been high, and vice versa.

[1] CS Pop Ruxandra – Eugenia, ICEADR, Bucureşti, pop.ruxandra@iceadr.ro

MATERIALS AND METHODS

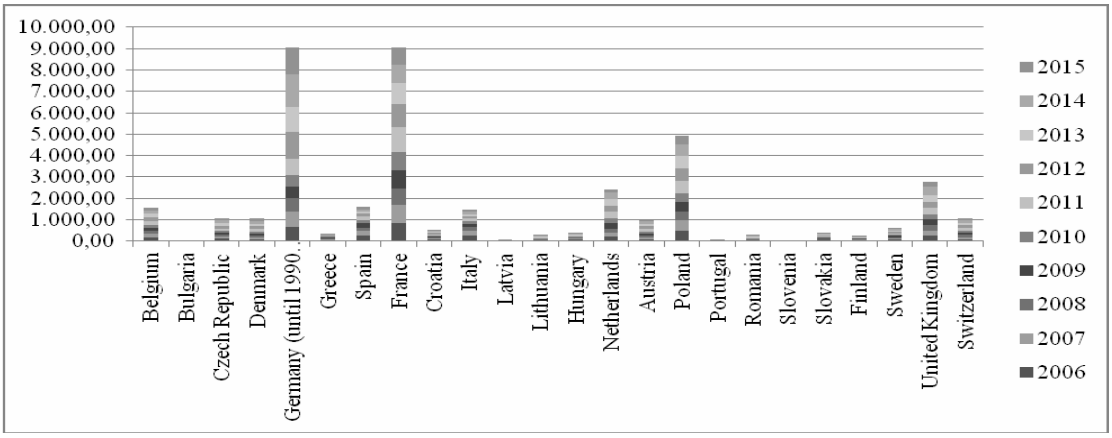
In order to accomplish the present work, the following will be used as main methods:

- Collection, interpretation and capitalization of existing statistical data in state databases, such as INSSE (national level) or EUROSTAT (European level), on the particularities of supply and demand on the sugar beet market as well as other components of analyzed market;
- Dissemination of information from national and / or international literature;
- Making a SWOT analysis at the sugar beet market at the level of an agricultural enterprise.

RESULTS AND DISCUTIONS

Ateuropeanlevel, Romania ranks 18th in terms of the value of beet production at producer price, before countries such as Lithuania, Finland, Portugal and Latvia. Unfortunately, in the southeastern area of Central Europe, Romania has the lowest value on this market.

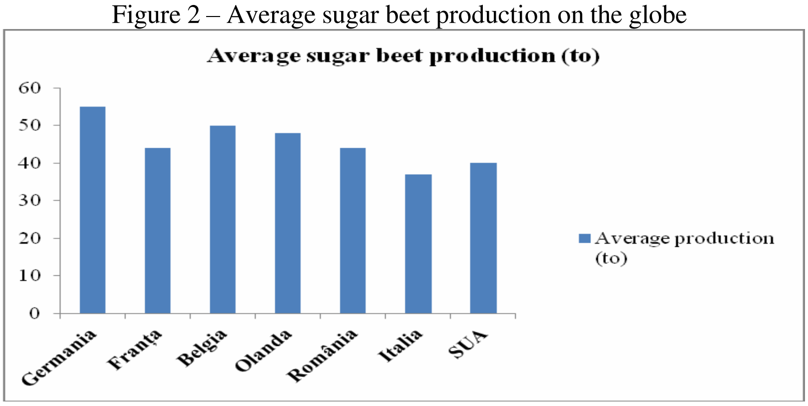
Figure 1: The value of sugar beet production at the producer price



Source: www.eurostat.com

Attheeuropeanlevel, sugar market and implicitly sugar market, leaders are represented by countries such as Germany, France, Poland and England. In relation to arable land, large beet-growing areas are found in countries such as the Netherlands, Denmark and Sweden. However, average yields per hectare are quite small, not exceeding 50 tonnes (Figure 2)

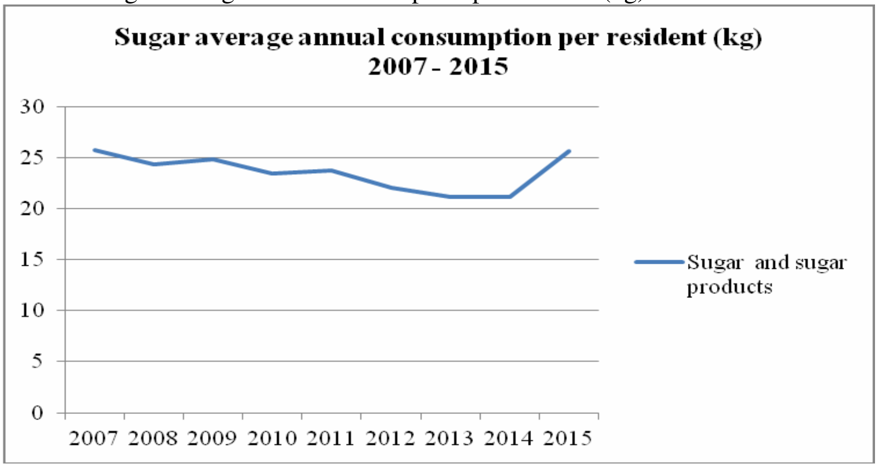
Figure 2 – Average sugar beet production on the globe



Source: www.faostat.com ; www.madr.ro

At national level, demand on the sugar beet market materializes primarily through the recorded annual average consumption. Because we cannot quantify the consumption of sugar beet because the latter is cultivated for processing, we will analyze consumption on the sugar market. In Figure 3, we will present average annual per capita consumption over the period 2007-2015 for sugar and sugar products in sugar equivalent.

Figure 3:
Sugar average annual consumption per resident (kg) 2007 - 2015



Source: www.insse.ro

Thus, from the data analyzed regarding the average annual consumption per capita (2007 - 2015), it is noticed that in Romania, from 2007, the average annual per capita consumption decreased from 25.7 kg to 21, 1 kg in 2014, then rising and reaching the 2007 level in 2015 (25.6 kg). This is directly proportional to beet production, in the sense that, in the years when small productions were recorded, consumption decreased and in the years when production increased, there were also changes in sugar consumption.

Also, looking at the data on sugar consumption, depending on the social categories in which consumers belong, but also by the environment, it is noted that the highest average monthly consumption in the sugar market is recorded in pensioners, this being normal, especially if we take into account the fact that older people are deficient in minerals such as chromium, magnesium and zinc. The lack of these minerals in the body triggers that "sweet lust". It is also noticed that a small amount is consumed in rural areas than in urban areas. This can be explained by the fact that in the countryside, sweet products made in their own household, such as jams or jams, are consumed.

Economic agents that have as their object sugar production are basically those who shape the national supply on the sugar market. By consulting the specialized sites on the number of entities according to the CAEN code, we can see that the segment of interest has to do with oligopolistic competition, with a high demand on the market, but with a low bid, activating in this field 23 companies, most of them based in Alba County. Other counties on the territory of which such enterprises are located are: Timiş, Bucharest, Bihor, Buzău, Ialomiţa, Mureş. In the beet and sugar market, the competition is dynamic and segmented, both from the point of view of their branches and from the point of view of the counties on the territory of which the economic agents operate.

Thus, briefly, the main components of the sugar beet and sugar market, we can make a SWOT analysis at its level (Table 1).

Table 1 –SWOT Analysis sugar beet market

SWOT ANALYSIS ON THE SUGAR BEET MARKET AT AGRICULTURAL FACTORY			
Strenghts	**Weaknesses**	**Opportunities**	**Threats**
Climate change in Romania is favorable to the cultivation of beet, which requires, first of all, a large amount of water;	The location of the sugar beet culture is of paramount importance; it can not be cultivated in any way after the following crops: corn, sunflower, oats, rape, mustard, sorghum and after successive crops herbicidated with triazine substances; however it can be cultivated after the cereal grains, especially after the wheat and the barley and legumes;	At the level of political and governmental factors: the elimination of sugar quotas on the sugar market in the European Union;	Declining labor force in agriculture and its migration from rural to rural areas;
The sugar beet market is dynamic, demand in this market is rising;	The imperative necessity, especially in beet culture, the creation of irrigation conditions or land with groundwater intake;	Granting of grants (direct payment schemes and coupled support 733.6 lei / ha);	Climate change, extreme meteorological phenomena (drought, hail);
Innovative tools, treatments, and practices in the field of beet crop harvesting and efficiency (eg pest or other treatments, different types of fertilization)	Sugar beet is a crop that requires many soil nutrients (for example: for one tonne, a consumption of 4-5 kg of nitrogen, 1.5-2 kg of phosphorus, 5.5-6 kg of potassium, 2.5 kg of calcium and 1.5 kg of manganese)	Facilitating access to new technologies;	Decrease in the number of investors in the field;
Use of high quality seed	Need for elaborate maintenance work, even from the tenth day of sowing;	Technological improvements in the sugar beet market;	Changes occurring at the level of political and governmental factors that directly or indirectly affect the agricultural market, implicitly beet;
The beet market is one of the most integrated and regulated at European level	Lack of funding	The oligopolistic competition: high demand and low supply on the sugar market	Competition, mainly economic agents dealing with the production of sugar substitutes: reed
Taking important landmarks from us in the country, sugar	Reduced promotion of the agricultural enterprise on the beet or	Modernization of treatments against diseases and pests in the	At the level of the economic factors: the

production costs are much lower than in other crops (around 0.160 lei / kg.)	sugar market;	tuberculosis market;	increase in the interest on agricultural loans and the fees charged by the bank;
National experience in beet cultivation, dating back to the communist period;	Equipment wear;	Drop in interest on agricultural loans;	Rising input prices without which the farmer can not effectively carry out his work;
Application to funding sources to support the business.	Labor instability in the agricultural market, or lack of necessary skills.	Major financial allocations at national level by the PAC	Implement poor management to improve productivity and efficiency.

Source: Pop R., Piața culturilor de cereale, oleaginoase, tuberculifere și rădăcinoase, Ed. ASE, 2017

Determinants that influence beet production can be assessed through the SWOT analysis so that farmers can form an overview of their crop conditions, harness their strengths, improve the weaknesses and know the threats with which they can face their work. The most important aspect is that they are aware of the opportunities existing on the market and make use of them in the work they carry out.

CONCLUSIONS

The sugar beet market is an important sector for the agricultural system in Romania due to the ratio between the demand and the over-supply offered on this market. This paper attempted a funnel-based approach, from general to specific, starting from an overall analysis of the sugar beet market at European level and continuing with a national analysis.

At European level, we have established Romania's position in terms of value for production at producer price, but also from the point of view of the average international sugar beet yields. Analyzing the ranking of countries with the highest value of beet production at producer price, we highlighted countries such as France, Germany, Poland and England. As for the lowest values registered in Europe, we mention countries such as Bulgaria, Slovenia, Latvia, Portugal and Finland. Romania ranks 18th in the ranking.

At national level, we have briefly traced data on the counties with the largest recorded beet production (Covasna, Brasov, Satu Mare and Neamt). The counties on the territory of which small productions were registered are Bacau, Hunedoara, Vaslui and Galati. Generally, in the counties where large sunflower and maize crops are recorded, lower beet yields are recorded because they are not cultivated after these crops. Sugar beet can be cultivated, however, after grain cereals, such as wheat and barley. We also notice that the production of sugar beet is higher on the territory of the counties where precipitation has been high, and vice versa. Concerning sugar consumption on the sugar beet market, we can analyze it from the perspective of the processing industry to the consumption of sugar. It remained relatively constant during 2007 - 2015, reaching the peak at the end of the range. We note that pensioners are the social category consuming a higher amount of sugar, which is to be expected, given that they need a higher amount of sugar than young people. Analyzing the competition in the sugar production sector, I noticed that it is oligopolistic, with a small number of bidders, but a high demand. The paper ends with a SWOT analysis conducted at the level of an agricultural enterprise operating on the sugar beet market, presenting the strengths, weaknesses, opportunities and threats that could characterize the internal and external environment of such an enterprise.

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SECTION 5

ADER 16.1.2 PROJECT

”Models of development of short chains of capitalization on the pathway primary production – services – warehousing – processing – marketing”

THE INFLUENCE OF PEOPLE INCOME ON VEGETABLES CONSUMPTION IN ROMANIA

RALUCA ANDREEA ION[1]

Abstract: *The article analysis the people income influence of vegetables' consumption, assuming that the consumption of vegetables increases along with income growth. The paper tries to answer the question what are the direction and the intensity of income influence on vegetables' consumption? In pursuing this question, data related to income and vegetables consumption have been analysed using the regression models. The results show that 1-unit change in the level of income leads to 0.720 units change in the level of vegetables' consumption. The consumption of vegetables reacts evident to changes in the level of income, as compared to the consumption of fruits. The topic of research and the findings are relevant, because of vegetables' importance for human health, due to their content in micro and macro nutrients. Is also rises awareness on the determinants of vegetables' consumption, and on the extent to which people income plays a role in food choices.*

Keywords: *vegetables, market, self-consumption, people income*

JEL Classification: *Q13*

INTRODUCTION

The objective of the paper is to identify the direction and the intensity of the relationship between vegetables consumption and people income. For identifying this relationships, data from the National Institute of Statistic of Romania have been analysed using the regression models. The hypothesis tested in this paper is that the level of vegetables consumption increases along with people income growth (Ion, 2015).

The topic is important because vegetables are required in human nutrition as a result of their content of vitamins and minerals. Vegetables become, as such, significant for health, and interesting subject of research. Worldwide, the role of vegetables' consumption is well recognized. The World Health Organization has undertaken research on nutritional status and their relationship to health. As such, vegetables are recommended in the daily diet, because they have very favourable effects on the human body: hydrating the body because of the high water content, fresh vegetables have 72 -95 per cent water, increasing the body's immunity capacity, fat reduction. Vegetables contain vitamins important in the prevention of diseases and maintaining the human body's metabolic balance. They ensure large amounts of vitamin A, found in carrots, tomatoes, lettuce, spinach, pepper, beetroot and meet in a proportion of 60-80 per cent the body needs for carotene (Ion and Dobre 2015).

Vegetables market has a specific behaviour different from other agro-food markets, as a result of its numerous features (Preda, 2001, Turek et al.2008). The most important of them refer to atomicity of demand and supply, vegetables homogeneity, seasonality, zoning, and perishability. Poorly developed collection systems also characterises the vegetables' market, which lead to a high level of self-consumption. As a consequence, only small parts of total production is put on markets. These generate either quantitative surpluses or deficits, which create strong market distortions (Manole et al., 2005, Marin et al., 2017). Besides these, it should be mentioned that the demand for vegetables is continuous, while the supply is seasonal. In order to satisfy the demand, the whole year, imports are needed.

Findings will help farmers, processors and retailers in their efforts of invest money in certain branches and to better understand the factors that changed consumption and production of vegetables.

[1] Associate Professor, PhD, Bucharest University of Economic Studies, Department of Agro-food and Environmental Economy, email: raluca.ion@eam.ase.ro

1. MATERIALS AND METHODS

The information used for market research is collected from databases and publications of the National Institute of Statistics of Romania. The data related to the income and the consumption of vegetables are centralized in Table 1 and Figure 1. The income is expressed in lei per person per month. It refers to the period 2001-2016 and its values have been updated to 2016 using the prices indices. The income increased over the period under analysis from 472 lei per inhabitant per month to 1112 lei per inhabitant per month.

The consumption of vegetables refers to all fresh vegetables and products obtained from vegetables and expressed as fresh vegetables. The data have been retrieved from the National Institute of Statistics database and they are gathered for the period 2001-2016. The consumption of vegetables increased in the period under analysis, up to 125%, from 125 kilograms per person per year to 158 kilograms per person per year. The average annual vegetable consumption was 151 kg / capita in 2012, and 152 kg / capita in 2013 (Ion and Dobre, 2015).

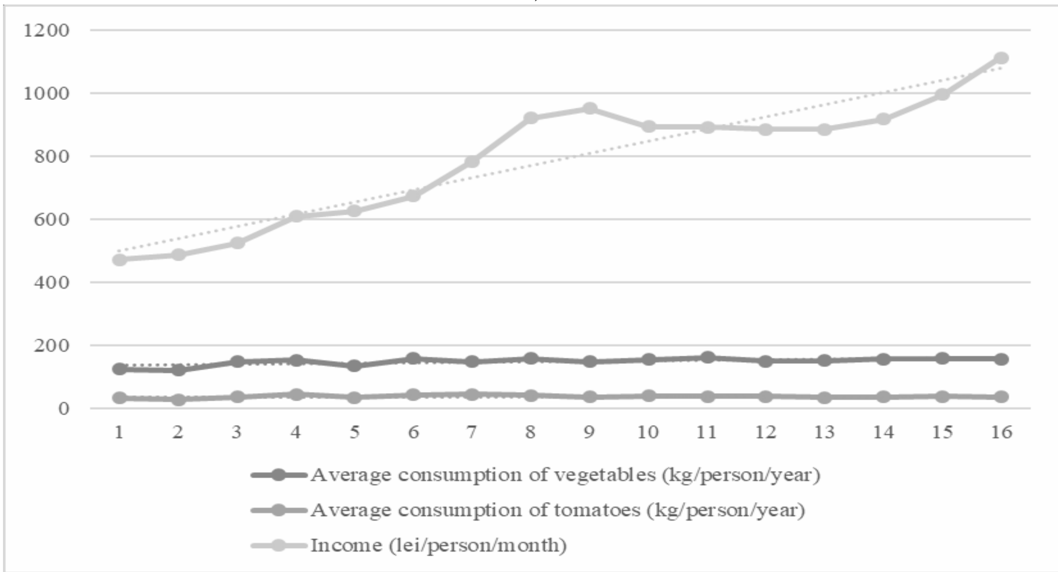
Data in Figure 1 and Table 1 show that the consumption of tomatoes slightly increased to 109% over the period under analysis, from 34 kilograms per person per year in 2001, to 38 kilograms per person per year in 2016.

Table 1. The average consumption of vegetables, the average consumption of tomatoes, and the average population income, in Romania, 2001-2016

Year	Average consumption of vegetables (kg/person/year)	Average consumption of tomatoes (kg/person/year)	Income (lei/person/month)
2001	125.6	34.6	472.81
2002	122.4	28.6	488.09
2003	148.9	37.4	525.45
2004	154.8	45.6	608.83
2005	136.1	35	626.09
2006	158.6	44.6	674.01
2007	149.9	46.4	784.76
2008	158.9	42.6	921.36
2009	148.7	37.4	951.05
2010	155.7	40	894.25
2011	162.9	38.6	892.34
2012	151.4	38.4	885.78
2013	152	35.4	886.17
2014	158	38.1	917.68
2015	158.5	38.6	995.00
2016	158	38	1112.22

Source: National Institute of Statistics of Romania

Figure 1. Dynamics of vegetables' consumption, tomatoes' consumption, and population income, in Romania, 2001-2016



Source: National Institute of Statistics of Romania

2. FINDINGS

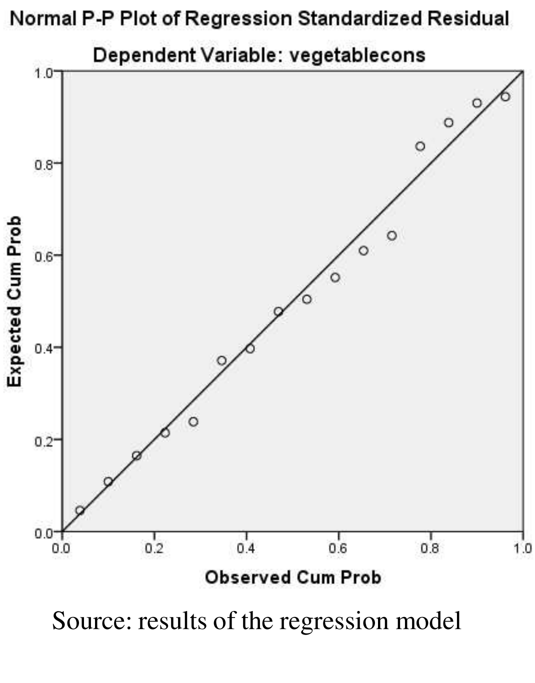
The results of the regression models are presented in Table 2 and Figures 2 and 3. The regression model showing the relationship between income and vegetable consumption is statistically significant since the values of Sig. are below 0.05. Medium correlations have been found between income and the average consumption of vegetables, since the value of R Square is 0.518. The regression model showing the relationship between income and tomatoes' consumption is not statistically significant, since the values of Sig. are higher than 0.05.

Table 2. The influence of people income on consumption of vegetables

Variable	R Square	Coefficients of regression function	Standard error	Sig.
Average consumption of vegetables	0.518	0.720	0.011	0.002

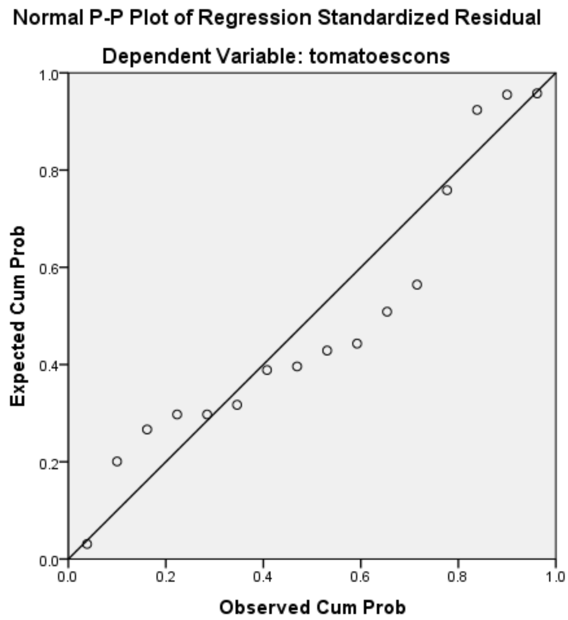
Source: results of the regression model

Figure 2. Relationships between people income on consumption of vegetables



Source: results of the regression model

Figure 3. Relationships between people income on consumption of tomatoes



Source: results of the regression model

The results of the regression model show that 1-unit change in the level of income leads to 0.720 units change in the level of the average consumption of vegetables. If income increases by one leu per month, or 12 lei per year, the consumption of vegetables grow with 0.720 kilograms per year. Small reactions in the level of tomatoes consumption have been identified, showing that tomatoes' consumption do not depend on the market and people income, as long as they are more or less acquired from the peoples own households. Farmers' self-consumption from their own production reached 75 per cent of vegetable products for fresh consumption or to conserve (Ion and Dobre, 2015). There are situations where self-consumption fully covers requirements for certain vegetable species, as previous research (Preda, 2001) showed.

CONCLUSIONS

The paper investigated the relationship between people income and vegetables' consumption in Romania, over the period 2001-2016. Analysing the data using the regression model, the results show that the hypothesis aimed to be tested in this article, namely that the level of vegetables' consumption increases along with people income growth, is validated. Moreover, weak correlations have been found between tomatoes consumption and people income, arguing, anew, that tomatoes consumption do not depend on market conditions, but on individuals own sources of acquiring the tomatoes for family needs.

Due to vegetables' significance for human health, further research should investigate the other determinants of vegetables' consumption, besides people income, to see to what extent they influence people food choices.

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THE MAIN INDICATORS EVOLUTION FROM THE FRUITS AND VEGETABLES SECTOR

NECULA RALUCA ALEXANDRA[1], NECULA (ILIE) DIANA MARIA[2], DRĂGHICI MANEA[3], TUDOR VALENTINA[4]

Summary: *Romania is a country with a high* production *potential for the vegetables and fruits, due in particular to the high natural fertility of soils and to the climate diversity. Besides the favorable conditions for the production of fruits and vegetables, it should be mentioned that Romania is a country which is concerned with agriculture, to meet the economic and technical requirements characteristic of the market economy. In this paper we analyze, by comparison, the areas, the average and total production, the purchase and sales price, the incomes obtained from the sale and the trade balance on the main vegetable and fruit crops, in order to determine the evolution of these indicators and to determine the situation of this agricultural sector in Romania. By using specific indicators, the trend followed by the fruit and vegetable sector can be determined, which can be used to assess the actual real situation of Romanian horticulture and to determine the next steps to improve future results.*

Keywords: *surfaces, production, consumption, trade, evolution.*

JEL Classification: *E29, E30, F10*

INTRODUCTION

2007 was the year when the Common Market Organization for Fruit and Vegetables was implemented in Romania with the European sector reform.

This effort and EU financial support for producer groups and organizations has now reached 24 recognized producer organizations under EU law[5].

In Romania, according to Eurostat publications, there is a high share of farms with no legal personality, with areas of between 2 and 5 hectares, thus justifying the low degree of farm technology, professional training of farmers, organization of production, as well as significant quantities of fruits and vegetables marketed at the farm gate or on street trading networks.

Also, in the MADR publications it is stated that the area with field vegetables has been decreasing continuously over the last years with the area covered with greenhouses in Romania (from 5000 ha in 1989 to 431 ha at the end of 2016).

The area of orchards and nurseries, in the 1980s, represented 2% of the country's agricultural area, and in the year 2016 it fell to 1%. Most of the fruit plantations are aged, older than 25 years, with low productive potential, declining or abandoned. According to the culture system, more than half of them are exploited in an extensive system (classic) [6].

The degradation of the horticultural system has led to the entry of imported vegetables and fruits on the market due to substitution of demand, not to do something that does not grow in our country.

Consumption is increasing but the quantity of vegetables consumed is influenced by several tendencies that are present on the Romanian market (diet, European influences, taste, quality, health).

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[1] Lecturer PhD, USAMV Bucharest; PhD Student at Academy of Economic Studies Bucharest, raluca_nec@yahoo.com
[2] Scientific researcher II, Bucharest, necula.diana@iceadr.ro
[3] Professor PhD., USAMV Bucharest, dmprofesor@hotmail.com
[4] Professor PhD., USAMV Bucharest, valentina_tudor@yahoo.com
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MATERIAL AND METHOD

The research was carried out by analyzing the available statistical data from the fruit and vegetables sector in the Eurostat and INS database.

The calculation formulas to calculate the indicators are as follows[7] :

Annual Growth Ratio =

r2007-2016 = $\sqrt[9]{\pi\left(\frac{p1}{p0}\right)-1}$; where:

r2007-2016 = average growth rate ; ∏p1/po = indices with a base chain

Standard deviation = $\partial = \sqrt{\frac{\sum(\bar{x}-xi)^{\wedge}2}{n-1}}$; where :

∂ = standard deviation ; xi = Average over a number of years

n = number of years analyzed

Coefficient of variation = $C = \frac{\delta}{\bar{X}} x100$, where :

C - coefficient of variation - expressed as a percentage and may be small (0-10%, medium (10.1-20%) or high (greater than 20.1%).

RESULTS AND DISCUSSIONS

1. Cultivated surfaces and realized productions

Romania is an important producer of vegetables and fruit, ranking fifth in the EU after the cultivated area[8].

According to the most recent study on the agricultural structure (2013), nearly 920,000 farms deal with fresh vegetables, which represents 12.4% of all European farms with arable land. Almost half (49.4%) of these holdings were in only three countries: Romania (22.1%), Poland (15.4%) and Spain (11.9%). However, 15 countries have shares of less than 1% each.

In 2015, nearly 2.2 million hectares of land in the EU were used to produce vegetables for fresh consumption and for processing. This represents 1.9% of all EU arable land. Almost half (47.2%) of the surface area of the vegetables was located in only three Member States. These were Italy (19.5%), Spain (16.6%) and Poland (11.1%). This first group was followed by a second group consisting of France (10.9%) and Romania (7.1%).

Vegetable production reached 3.3 million tons last year, down 8.1% year-on-year, according to the latest data submitted by the National Institute of Statistics (INS) (2017).

In 2016, grape production declined by 7.8% to 737,000 tonnes, due to a 8.3% decrease in yield per hectare.

Instead, orchard fruit production increased last year by 0.4% to 675,000 tons, even if the area fell by 0.7%.

Table 1. Comparative evolution of the areas cultivated on the main vegetable crops, at the country level, for the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									Dates 2007-2016 vs 1990	
		2007	2010	2013	2016	Mediate	STDEV	Coefficient of variation		Growth rhythm		
	thousands ha	thousands ha	thousands ha	thousands ha	thousands ha	thousands ha	thousands ha	%	signif.	%	thousands ha	%
Tomatoes	50.6	46.0	49.8	48.4	41.0	47.5	3.58	7.53	small	-1.28	-3.1	94.0
Eggplants	5.6	5.5	10.3	9.4	8.8	9.2	1.44	15.53	Mid	5.41	3.6	164.6
Dry onions	27.2	34.1	33.8	32.2	30.3	32.8	1.79	5.45	small	-1.31	5.6	120.6
Dry garlic	9.7	11.5	12.8	10.6	10.2	11.7	1.21	10.38	Mid	-1.27	2.0	120.4

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White cabbage	27.2	46.1	47.0	54.9	46.2	48.4	2.52	5.20	small	0.03	21.3	178.2
Pepper	23.0	18.6	21.0	19.5	18.0	19.4	1.01	5.19	small	-0.38	-3.6	84.2
Edible roots	15.2	18.2	18.2	18.0	16.5	18.0	1.14	6.35	small	1.06	2.8	118.3

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR108A

It is highlighted in the table above an analysis of the areas cultivated with the main vegetable crops during the period 2007-2016 compared to 1990.

It can be noticed that most of the areas diminished during the period 2007-2016, with a rate ranging from -0,375 in the case of pepper culture and -1,31% in the case of dried onions.

Significant increases were recorded in eggplant culture at a rate of 5.41% over the period under review.

Comparing this period with the year 1990 there are observed increases over this year in most crops, especially in white cabbage crop where the areas grow by 21.3 thousand ha (78.2%) and the eggplant with 3.6 thousand ha representing an increase of 64.6%.

The only crops where the cultivated area decreases in this period compared to 1990 are tomato and pepper crops with respectively -3.1 thousand ha and -3.6 thousand ha. Surface variations are in most small crops, except for areas planted with eggplants and dried garlic, where increases or decreases are more pronounced.

Among individual crops, tomatoes have occupied the largest area, accounting for 11.7% of the total vegetal area.

The areas used for tomato cultivation were predominant in Italy (41.9%) and Spain (22.8%), followed by Romania (9.5%), Portugal (7.3%) and Greece %).

Table 2. Evolution of the areas' share occupied by family gardens at country level over the period 2004-2016

Indicator	UM	2004	2007	2010	2013	2014	2015	2016
Total vegetables	thousands ha	308.2	253.4	262.7	259.0	239.5	239.5	228.1
Family gardens	thousands ha	110.9	83.0	92.4	93.2	90.0	88.3	86.0
	%	*35.98*	*32.76*	*35.17*	*35.97*	*37.59*	*36.88*	*37.71*
	%		*91.04*	*97.74*	*99.97*	*104.47*	*102.49*	*104.80*

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR108A

Of the total area planted with vegetables, the family gardens represented 35.98% in 2004, decreasing in the next year by approx. 9% but towards the end of the period it increases by 4.8%, representing 37.71% of the total area cultivated with vegetables.

Table 3. The comparative evolution of the average yields of the main vegetable crops at the country level for the period 2007-2016 as compared to 1990

Product, Years, UM	1990	2007-2016									2007-2016 vs 1990	
		2007	2010	2013	2016	Averages	STDEV	Coefficient of variation		Rhythm of growth		
	t / ha	t / ha	t / ha	t / ha	t / ha	t / ha	t / ha	%	signif.	%	t / ha	%
Early, semi early and summer potatoes.	8.0	12.3	13.2	14.2	14.1	13.6	1.01	7.40	small	1.55	5.6044	169.7
Autumn Potatoes	11.5	13.9	13.4	16.2	14.6	14.7	2.08	14.14	Mid	0.60	3.2	128.1
Vegetables - total	10.9	12.3	14.7	15.3	14.7	14.7	1.08	7.39	small	2.02	3.7	134.3
Tomatoes	14.4	13.9	15.4	15.5	15.3	15.5	1.08	7.01	small	1.06	1.0	107.1
Dry onions	8.3	9.5	10.9	12.2	10.7	11.2	0.94	8.36	small	1.33	2.9	135.3
Dry garlic	3.1	4.4	5.3	5.9	5.3	5.3	0.50	9.28	small	2.25	2.2	169.5
White cabbage	15.9	19.4	20.9	21.1	21.5	21.1	1.23	5.82	small	1.15	5.2	132.4
Pepper	7.9	9.9	11.6	11.7	11.2	11.6	0.91	7.80	small	1.37	3.8	147.6
Green and yellow melons	11.2	13.2	21.1	20.9	19.3	19.1	2.36	12.32	Mid	4.37	7.9	170.3

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR110A

Regarding the average yields on the main crops cultivated in Romania, increases are observed for all these crops, with a growth rate of 0.6% for autumn potato crops and 4.37% for melon culture. The highest increases in average yields over the period 2007-2016 compared to 1990 recorded the melon cultures with 70.3%, early, semi-early and summer potatoes with 69.7%, dry garlic culture with 69.5% % and pepper culture by 47.6%.

Table 4. The comparative evolution of total yields on main vegetable crops, at country level, for the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									Dates 2007-2016 vs 1990	
		2007	2010	2013	2016	Mediate	STDEV	Coefficient of variation		Rhythm of growth		
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	%	Signif.	%	Th. tons	%
Vegetables - total	2,357.5	3,116.8	3,863.6	3,961.0	3,358.4	3,720.9	310.49	8.34	small	0.83	1363.455	157.8
Tomatoes	813.6	640.8	768.5	749.1	627.2	735.8	84.41	11.47	Mid	-0.24	-77.8	90.4
Eggplants	52.0	63.7	144.4	123.3	116.2	131.2	29.43	22.43	high	6.91	79.2	252.5
Dry onions	225.4	325.0	369.1	391.8	325.1	367.2	27.36	7.45	small	0.00	141.8	162.9
Dry garlic	30.6	49.9	67.2	62.2	54.4	62.2	6.43	10.33	Mid	0.95	31.6	203.3
White cabbage	551.9	893.2	981.2	1,156.4	992.4	1,020.4	78.47	7.69	small	1.18	468.5	184.9
Pepper	182.0	184.9	243.5	227.7	201.9	225.8	21.72	9.62	small	0.98	43.7	124.0
Edible roots	158.6	209.0	241.6	242.3	219.2	238.8	21.74	9.10	small	0.53	80.3	150.6

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR113A

The total production of the main vegetable crops cultivated in Romania increased during the analyzed period, with the exception of the tomato crop where the yields dropped by -0.24% and is lower by 9.6% in this period compared to 1990. The highest increases is recorded in the eggplant culture at a rate of 6.91% and in the white cabbage crop at a rate of 1.18%.

Cultures that recorded the highest increases in the period 2007-2016 compared to 1990 are: eggplant growing with 152.5%, dry garlic cultures by 103.3% , white cabbage crop by 84.9%, culture of onions with 62.9% and edible vegetable and root crops by 57.8% and 50.6%, respectively.

According to the survey on the structure of agriculture, about 1.55 million farms manage annual fruit groves at European level. This figure represents 14.6% of all European farms with "used agricultural area". Almost half (47.9%) of these holdings were in only three countries: Romania (18.7%), Spain (16.5%) and Poland (12.7%). In contrast, 15 countries accounted for less than 1% each (2013).

Table 5. The comparative evolution of the total yields of the main crops at the country level for the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									2007-2016 vs 1990	
		2007	2010	2013	2016	Mediate	STDEV	Coefficient of variation		Rhythm of growth		
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	%	Signif.	%	Th. tons	%
Total	1,453	1,086	1,420	1,300	1,242	1,268.4	123.00	9.70	small	1.50	- 184.6	87.3
Plums	450	373	625	512	513	502.1	70.76	14.09	Mid	3.62	52.6	111.7
Apples	683	475	553	514	467	505.8	50.46	9.98	small	-0.19	- 177.3	74.0
Pears	74	63	60	67	53	59.0	7.30	12.37	Mid	-1.93	14.8	79.9
Peaches	53	17	11	18	2. 3	18.5	3.87	20.93	Mid	3.45	-34.5	34.9
Cherries and sour cherries	68	65	70	80	74	73.6	6.35	8.63	small	1.40	5.9	108.7
Apricots	48	28	24	28	31	31.2	5.21	16.66	Mid	1.21	-16.7	65.2
Nuts	26	26	34	32	34	32.7	3.35	10.26	Mid	3.27	6.7	125.6
Strawberries	18	16	21	2. 3	2. 3	20.6	2.60	12.66	Mid	3.76	2.4	113.0
Other fruits	31	2. 3	20	24	2. 3	24.3	2.34	9.64	small	0.06	-6.9	77.9

INS, 2018, TEMPO, HOME, AGRICULTURE , AGR115A

In the analyzed period, 2007-2016, total yields on main fruit crops increased except for apple and pear crops, where yields declined at -0.19% and -1.93%, respectively.

Significant increases in this period are recorded in strawberries with a growth rate of 3.76%, plums at a rate of 3.62%, peach crops by 3.45%, and walnut cultivation with a growth rate of 3.27%.

Comparing the level of production in the period 2007-2016 with 1990, we notice very high decreases in peach crops by about 65%, in apricot and 34.8% in crops, in apple production by 26%. The production of nuts, strawberries, plums and cherries and sour cherries rose by 25.6%, 13%, 11.7% and 8.7%, respectively.

In order to restore the fruit sector, a farm sub-program "Sub-measure 4.1a - Investments in fruit holdings", which aims at the establishment of plantations of fruit trees and shrubs, replacing aging and declining fruit plantations, with viable orchards to ensure quality productions. The competitiveness of a fruit farm depends to a large extent on the ratio between fresh production and processing[9].

Table 6. Evol take take productions of fruits and vegetables per capita per day, at the country level for the period 2004-2016 compared to 1990

Indicator	UM	2004	2007	2010	2013	2014	2015	2016	2017	2016	2017
Vegetables production	kg / day / person	0.577	0.378	0.471	0.485	0.467	0.452	0.414	0.449	0.414	0.449
	%		*65.6*	*81.5*	*84.1*	*80.9*	*78.3*	*71.7*	*77.8*	*71.7*	*77.8*
Fruits production	kg / day / person	.211	0.132	0,173	0.159	0,160	0.151	0.153	0.131	0.153	0.131
	%		*62.5*	*82.0*	*75.5*	*75.8*	*71.5*	*72.5*	*61.9*	*72.5*	*61.9*

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR113A

From the analysis of the evolution of the fruit and vegetable output per capita per day during the period 2004-2017, presented in table no. 6, the following is observed:

- at country level, vegetable production declined by 34.4% in 2007 compared to 2004, in the coming years it has experienced significant increases and decreases from year to year by 2017 to reach 22.2% lower compared to 2004, but 8.4% higher than in the previous year and 18.7% higher than in 2007.

- in terms of fruit production, it decreases in 2007 compared to 2004 by 37.5%, slightly increases in the next years, and towards the end of the period it decreases by 38.1% as compared to 2004, by 14.4% compared to the previous year, reaching almost the same level as in 2007.

Table 7. Evolution Average monthly income and vegetable consumption on a person, at t Miss the period 2004-2016

Indicator	UM	2007	2008	2010	2013	2014	2015	2016
Average Monthly Income	lei / month	577.71	731.53	795.31	895.85	937.65	1,010.67	1,112.22
	%		*126.63*	*137.67*	*155.07*	*162.30*	*174.94*	*192.52*
Average monthly consumption	kg / month, / pers.	18.3	19.1	18.6	18.8	19.9	20.5	21.0
	%		*104.05*	*101.32*	*102.68*	*108.37*	*112.06*	*114.60*

INS, 2018 , TEMPO - HOME, CLV104A; BUF105I

Analyzing average monthly earnings per person, Table 7 shows that it increased significantly over the period 2007-2016, so that in 2008 it were 26.63% higher than the reference year, increasing progressively each year until 2016 where the income registered in the first year of the period by 92.52% is exceeded.

There is also an increase in average monthly consumption per person, where in 2008 it grew by 4% compared to the reference year 2007, and by the end of the period there are increases of 12% and 14.6% respectively in the year 2015, 2016 compared to the same year.

Daily consumption of fruit and vegetables varies greatly between EU Member States, with those aged 15 or over not eating fruits and vegetables daily, from almost two thirds of the Romanian population (65.1%) to slightly above 15% in Belgium (16.5%).

[9] MADR, Strategia națională pentru programele operaționale în sectorul de fructe și legume, 2018-2020, http://www.madr.ro/docs/agricultura/legume-fructe/strategie-legume-fructe-2018-2020.pdf

On the other hand, the proportion of those who eat at least 5 servings daily ranged from one-third in the United Kingdom (33.1%) to less than 5% in both Romania (3.5%) and Bulgaria (4.4%).

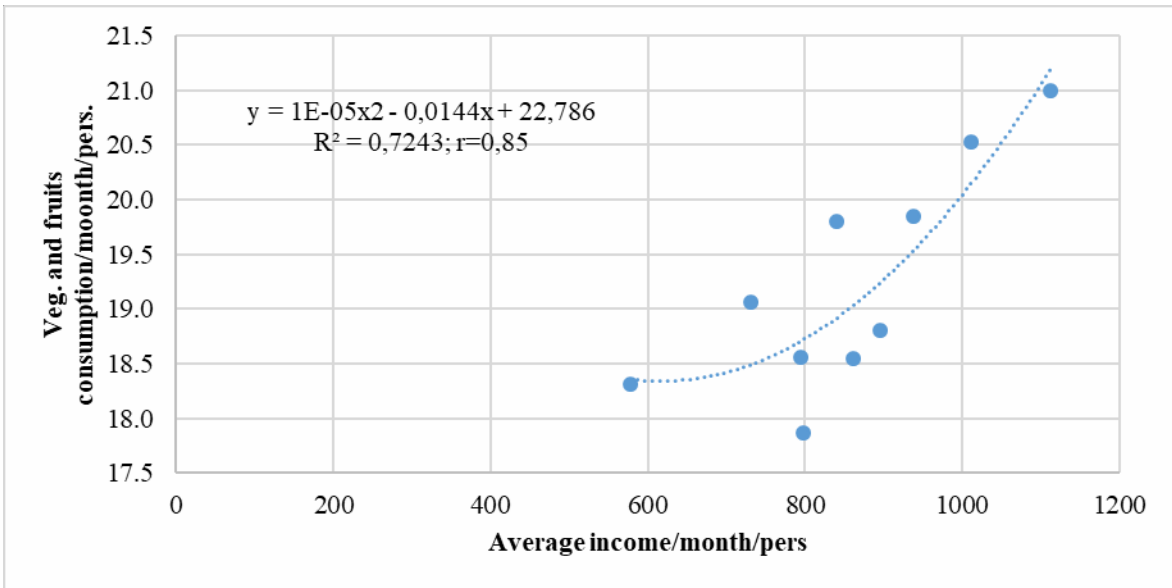

Fig1. The correlation between average monthly income per person and average monthly consumption of fruit and vegetables at country level over 2007-2016

The correlation between average monthly incomes and per capita consumption (Figure 1) shows that with the increase in average income, the consumption of vegetables and fruits is also increasing, contributing also their lower price compared to EU countries.

2. Marketing of fruit and vegetable productions

Prices for vegetables and fruits in Romania are at half of the EU average and also the smaller in the community, shows an analysis of the European statistical office Eurostat that considers 2016 data.

At the end of the ranking, Romania is alongside other countries in the region, namely Poland (62%), Bulgaria (66%), Czech Republic (75%) and Hungary[10].

Table 8. The evolution of the purchase price for some agricultural products

Crop	2004	2007	2010	2013	2017	Average	St. dev.	Coeff. variation		Annual Rhythm
	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	%	signif.	%
Field tomatoes	0.57	0.82	1.80	0.98	1.88	1.32	0.63	47.99	high	9.69
Field Cucumbers	1.02	1.53	1.22	1.34	1.58	1.36	0.32	23.47	high	3.44
Bean pods	0.77	0.65	0.67	0.89	2.34	1.02	0.51	50.38	high	8.91
Long pepper - red type	0.90	0.90	1.12	1.49	2.17	1.31	0.43	32,80	high	7.00
Bell Pepper	1.11	1.00	2.14	1.26	1.81	1.29	0.37	28.39	high	3.85
Fibber	1.59	1.23	1.54	1.87	2.42	1.65	0.36	21.81	high	3.30
Grapes for wine	0.84	0.89	1.54	1.07	1.67	1.33	0.33	24.85	high	5.44

INS, 2018, TEMPO-HOME, PRICES, PPA102C

During the period 2004-2017, the purchase price of the agricultural products analyzed in table no. 8 increased, as follows:

[10] Eurostat Statistics explained, 2018, Comparative price levels for food, beverages and tobacco, https://ec.europa.eu/eurostat/statistics-explained/index.php/Comparative_price_levels_for_food,_beverages_and_tobacco#Oils_and_fats.2C_fruits.2C_vegetables.2C_potatoes_and_other_food_products, accesat iulie 2018

- for field tomatoes, the purchase price in 2007 increased by 43.85% compared to the first year of the period, by 2017 it increased by 229% compared to 2004 and by 129% compared to 2007
- The purchase price of one kilogram of bean pods has been maintained until 2013 around 0.7-0.8 lei / kg that by 2017 it will reach three times higher than in 2004.
- in the same way, the pepper crops are presented, of which the highest increase in the purchase price of the red pepper culture, which was 24% higher in 2010, then increased by 141% in the year 2017 of 2004.
- and the purchase price of one gram of grape for wine increased during this period, from 0.84 lei / kg in 2004 to 2017 to 1.67lei, kg which means an increase of 98%.

Table 9. Evolution of the selling price of some agricultural products

Crop	2004	2007	2010	2013	2017	Average	St.dev.	Coeff. Var.		Annual Rhythm
	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	%	signif.	%
Field tomatoes	1.70	2.30	3.40	2.39	3.43	2.57	0.65	25.31	high	5.54
Early and summer potatoes	1.15	1.47	1.36	1.50	1.26	1.27	0.13	10.12	medium	0.72
Autumn potatoes	1.01	1.10	1.36	1.77	1.50	1.31	0.27	20.81	high	3.11
Cauliflower	1.88	2.89	3.77	3.73	4.13	3.23	0.73	22.67	high	6.26
Early and summer white cabbage	0.70	1.68	1.49	1.43	1.53	1.36	0.34	25.12	high	6.22
Autumn cabbage	0.52	1.42	1.40	1.00	1.57	1.22	0.37	30,74	high	8.87
Lettuce	3.22	4.16	4.56	6.67	6.56	5.38	1.18	22.00	high	5.62

INS, 2018, TEMPO-HOME, PRICES, PPA102C

As the purchase price increased during the period 2004-2017, the sales price also increased. A faster pace was suffered by the autumn cabbage crop, where the sales price grew at an annual rate of 8.87%, with the average selling price in this period being 1.22lei / kg.

And the selling price of one kilogram of cauliflower and early white and summer cabbage grew at a rate of 6.26% and 6.22%, respectively. On the opposite side, the selling price of one kilogram of early and summer potatoes had a slower annual growth rate of only 0.72%, with an average of 1.26 lei / kg.

Table 10. Comparative evolution of purchase price, sale price and commercial addition to field tomatoes

Price type	2004	2007	2010	2013	2017	Mediate	St dev	Coeff. Var.		Annual Rhythm
	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	%	signif.	%
Acquisition	0.57	0.82	1.80	0.98	1.88	1.32	0.63	47.99	high	9.69
Sale	1.70	2.30	3.40	2.39	3.43	2.57	0.65	25.31	high	5.54
Marketing	1.14	1.48	1.60	1.41	1.55	1.25	0.62	49.41	high	2.42

INS, 2018, TEMPO-HOME, PRICES, PPA102C

For field tomatoes, the purchase price and implicitly the sales price increased during this period with an annual growth rate of 9.69% and 5.54% respectively, the average of the period being 1.32 lei / kg and 2.57 lei / kg.

The capitalization of fruits and vegetables has proven to be the most difficult issue because there are no foundations for specific markets for the use of vegetables production. Those who produce vegetables in small quantities lower the price very much, which disadvantages those who practice vegetable growing as their main activity and live from the marketing of production.

The sale is done either directly from the farm gate or directly on the market or through intermediaries. Vegetables and fruit growers are threatened by large hypermarkets and by massive imports. On the one hand, large chain stores refuse to buy the merchandise at a fair price, and on the other hand, imports compete for domestic production.

Approximately 50-60% of the Romanian fruit and vegetable production is marketed in peasant markets organized in urban centers and at the gate of the farm. Although prices have an increasing trend, even when farmers have entered into commercial contracts, the beneficiaries do not come to pick up the merchandise until the prices fall. [11]

3. Consumption of vegetables and fruit per person for 2007, 2013, 2017

Table 11. The comparative evolution of the average annual consumption of vegetables at the country level of the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									2007-2016 vs 1990	
		2007	2010	2013	2016	Average	STDEV	Coefficient of variation		Rhythm of growth		
	kg	kg	kg	kg	kg	kg	kg	%	signif.	%	kg	%
Vegetables and vegetable products in fresh vegetables equivalent	110.8	149.9	155.7	152	155.9	155.2	4.56	2.94	small	0.44	44.39	140.1
Tomatoes	44.1	46.4	40	35.4	38.4	39.4	3.07	7.78	small	-2.08	-4.71	89.3
Dry onions	12.2	18	19.7	20.6	20.4	20.0	0.97	4.82	small	1.40	7.84	164.3
Cabbage	22	40.8	42.5	44.7	41.1	42.4	1.60	3.77	small	0.08	20.43	192.9
Edible roots	7.4	11.6	12.7	12.4	13.5	13.1	1.33	10.12	Mid	1.70	5.7	177.0
Pepper	7.5	9.2	12.4	11.5	11.3	11.6	1.02	8.85	small	2.31	4.06	154.1
Peas green	4	1.2	1.3	1	1.6	1.3	0.25	19.49	Mid	3.25	2.71	32.3
Green beans	1.3	2.3	2.3	2.8	3.2	2.8	0.29	10.43	Mid	3.74	1.48	213,8
Cucumbers	3.3	5.9	7.9	7.2	9.5	8.0	1.06	13,14	Mid	5.44	4.74	243.6
Other vegetables	9	14.5	16.9	16.4	16.9	16.6	1.28	7.71	small	1.72	7.56	184.0

INS, 2018, TEMPO - HOME, CLV104A

The average annual consumption of vegetables and vegetable products in fresh vegetable equivalents at country level analyzed during 2007-2016 increased at a year-on-year rate of 0, 44% and compared to 1990, increased significantly, with 44.39 kg representing an increase of 40.1%.

In the period 2007-2016, the consumption of most vegetables increased, but especially the consumption of cucumbers at a rate of 5.44%, green beans at 3.74% and, compared to 1990, the consumption of cucumbers and beans have doubled.

And the consumption of green peas grew at an annual rate of 3.25% in the analyzed period but compared to 1990 it decreased by 67.7%. Table 11 shows that at the country level the consumption of tomatoes decreased in the period 2007-2016 with an annual rate of -2.08% and compared to 1990 it is 10.7% lower.

Concerning the consumption of fruit and fruit products in fresh fruit equivalents, there is an increase in the analyzed period 2007-2016, from 69.9 kg annually in 2007 to 96 kg annually in 2016, representing an increase of 37.3 % at an annual rate of 3.59%. Comparing the total consumption of fruits in this period with that of 1990, there is an increase of 16.09 kg, representing 27%. In the analyzed period, the consumption increases for most fruits, except for the consumption of cherries - the ones that fall during this period at a rate of -1.11%, so in 2016 it is 9.5% lower than in 2007, but increased in this period compared to 1990 by 27%.

Table 12. Comparative evolution of the average annual fruit consumption at country level for the period 2007-2016 compared to 1990

Product, Years, UM	1990	2007-2016									Dates 2007-2016 vs 1990	
		2007	2010	2013	2016	Average	STDEV	Coefficient of variation		Growth rhythm		
	kg	kg	kg	kg	kg	kg	kg	%	signif.	%	kg	%
Fruit and fruit products in fresh fruit equivalent	59.5	69.9	67	73.7	96	75.6	9.71	12.85	Mid	3.59	16.09	127.0
Apples	27	23.6	22.5	23.5	28.4	23.8	3.07	12.92	Mid	2.08	-3.24	88.0
Plums	5.8	3.1	5.1	4.5	5	4.5	0.60	13.28	Mid	5.46	-1.29	77.8
Apricots	2	1.5	1.3	1.6	1.8	1.7	0.25	14.61	Mid	2.05	-0.31	84.5
Cherries - Sour cherries	3	4.2	3.5	4	3.8	3.7	0.36	9.85	small	-1.11	0.69	123.0
Peaches - Nectarines	3	2.3	1.6	3.1	6.2	3.4	1.64	47.61	high	11.65	0.44	114.7

[11] MADR, Strategia naţională pentru programele operaţionale în sectorul de fructe şi legume, 2018-2020, http://www.madr.ro/docs/agricultura/legume-fructe/strategie-legume-fructe-2018-2020.pdf

Grapes	7.4	5.5	5.4	6.7	6.9	6.5	0.71	10.86	Mid	2.55	-0.86	88.4
Meridional and exotic fruits	4.9	22.8	20.9	23.1	34.4	24.2	4.90	20.26	high	4.68	19.3	493.9
Other fruits	6.4	6.9	6.7	7.2	9.5	7.8	0.92	11.81	Mid	3.62	1.36	121.3

INS, 2018, TEMPO - HOME, CLV104A

Although in the analyzed period the consumption of fruits increases compared to 1990, there are decreases in plums consumption by 22.2%, apricots by 15.5%, apples by 12% and grapes with 11.6%, and the consumption of meridional and the increase of exotic fruits was impressive by 393.9%.

4. Import and export of vegetables and fruits in Romania

Table 13. Monthly and annual evolution of the import of vegetables , plants, roots and tubers at country level for 2011-2017

Year, UM	Month												*Total year*
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€	mil.€
2011	12.8	17.6	28.8	23.0	19.5	10.2	4.7	5.2	5.0	6.1	8.8	10.6	152.2
2012	10.3	12.8	22.6	17.7	18.1	9.8	5.8	8.3	8.7	11.7	16.1	16.6	158.6
2013	20.5	20.7	25.7	27.1	20.8	8.4	5.4	5.7	7.3	10.8	15.0	18.7	186.1
2014	21.1	26.5	34.9	30.9	25.4	12.7	8.0	7.6	10.8	12.5	16.3	20.9	227.5
2015	21.6	28.1	37.0	34.3	27.4	16.0	8.2	10.6	13.7	17.5	26.3	34.2	274.7
2016	31.8	43.8	52.4	54.1	37.1	19.1	11.9	13.4	14.7	20.8	29.1	36.9	365.0
2017	37.1	47.8	65.0	53.4	45.8	22.1	16.9	14.1	18.5	23.3	30.4	36.1	410.6
Monthly Average (Mil. €)	22.2	28.2	38.1	34.3	27.7	14.1	8.7	9.3	11.3	14.7	20.3	24.8	253.5
St dev (mil €)	9.6	13.1	15.4	14.3	10.2	5.2	4.4	3.6	4.7	6.1	8.2	10.7	101.7
Coeff. Var.(%)	43.1	46.5	40.4	41.6	36.9	36.9	50.3	38.5	41.7	41.5	40.6	43.0	40.1
Signif.	High	High	High	High	High	High	High	High	High	High	High	High	High
Annual Rhythm (%)	19.5	18.1	14.5	15.1	15.3	13.8	24.0	18.2	24.3	25.1	22.8	22.7	18.0

INS, 2018, TEMPO - HOME, FOREIGN TRADE, EXP102J

Imports of vegetables, plants, roots and tubers increased over the period 2011-2017, from € 152.2 million in 2011 to € 410.6 million in 2017.

It can be seen from the data of the table that the value of the import is the highest in February - May 2011 with a maximum in March of 28.8 million €, as in 2013 the period of import is higher from December to May with a maximum of 27.1 million € in April, and in 2017 we import vegetables, plants, roots and tubers in February, March, April, amounting to € 47.8 million, € 65 million and € 53.4 million respectively , representing an increase of 171%, 125% and 132%, respectively, compared to the same months of 2011.

Table 14. Evolution of monthly and annual imports of fruit at the country level for the period 2011-2017

Year, UM	Month												*Total year*
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €	mill. €
2011	16.4	16.6	23.4	15.9	16.1	16.5	12.7	10.6	8.5	12.6	15.5	20.5	185.4
2012	12.8	15.3	17.7	17.5	19.6	20.5	19.2	18.5	16.0	18.8	25.4	33.6	235.1
2013	30.4	24.2	26.6	27.6	24.7	22.2	18.4	18.1	16.4	18.0	28.2	39.3	294.2
2014	31.6	29.6	28.3	29.9	30.1	25.8	21.3	21.8	22.3	25.8	32.5	43.2	342.2
2015	39.8	35.4	42.1	36.3	36.2	41.6	33.2	35.8	33.7	37.8	44.5	60.7	477.1
2016	47.3	45.8	51.0	51.7	47.3	45.7	40.8	41.3	36.9	41.5	52.1	62.5	563.7
2017	55.9	48.3	56.9	51.1	68.6	53.2	41.8	45.0	38.7	51.1	60.4	67.4	638.4
Monthly Average (Mil. €)	33.4	30.7	35.1	32.9	34.7	32.2	26.8	27.3	24.7	29.4	36.9	46.8	390.9
St dev (mil €)	15.6	13.2	14.9	14.5	18.3	14.3	11.7	13.2	11.8	14.3	16.0	17.3	171.7
Coeff. Var. (%)	46.7	42.8	42.5	44.1	52.7	44.5	43.5	48.5	48.0	48.7	43.2	37.0	43.9
Signif.	high	high	high	high	high	high	high	high	high	high	high	high	high
Annual rhythm (%)	22.7	19.4	16.0	21.5	27.3	21.5	21.9	27.3	28.7	26.3	25.5	21.9	22.9

INS, 2018, TEMPO - HOME, FOREIGN TRADE, EXP102J

The situation of the import of fruit during the period 2011-2017 is the same as described in table 13, with significant increases for the analyzed period from 185.4 million € in 2011 to 638.4 million € in 2017, representing an increase of 244%. If in 2011 the import value reaches maximum rates in March of € 23.4 million and December of € 20.5 million, in 2012 in December it reached € 33.6 million, € 25.4 million in November, and in June € 20.5 million. In the last years of the analyzed period throughout the year, the value of fruits imports is high, in 2017 it reaches very high values during the 5th month of 68.6 mil. €, and December 67.4 mil. € representing a growth of 45% and respectively 8.8% versus the previous month and 326%, respectively 228.7% compared to the same months of 2011.

Table 15. Monthly and annual evolution of exports of vegetables, plants, roots and tubers at country level for the period 2011-2017

An, UM	Month												*Total year*
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €
2011	2.1	2.1	3.0	2.4	4.9	5.4	6.5	8.2	8.2	4.4	3.9	1.9	53.1
2012	2.1	2.1	2.1	2.0	3.6	5.5	4.8	7.4	5.8	8.7	5.3	2.7	52.1
2013	2.6	2.5	2.7	4.2	4.9	8.7	10.2	6.7	14.9	10.2	8.1	4.3	80.0
2014	2.9	2.5	2.2	2.4	4.7	7.1	13.1	15.6	16.1	11.6	5.7	4.4	88.3
2015	3.2	3.3	2.6	2.8	4.7	7.8	8.9	9.9	18.3	16.7	8.5	3.6	90.3
2016	2.4	2.3	2.0	1.9	4.3	6.5	17.9	16.1	12.7	9.6	7.2	3.5	86.4
2017	2.2	2.1	2.1	1.9	3.9	6.4	39.9	27.4	19.2	21.4	10.2	4.0	140.6
Monthly Average (Mio €)	2.5	2.4	2.4	2.5	4.4	6.8	14.5	13.0	13.6	11.8	7.0	3.5	84.4
St dev (mil €)	0.4	0.4	0.4	0.8	0.5	1.2	12.0	7.4	5.0	5.6	2.2	0.9	29.6
Coeff. Var.)%)	17.7	17.8	15.8	32.6	11.5	17.5	82.9	56.7	37.1	47.3	30.9	25.4	35.1
Signif.	Mid	Mid	Mid	high	Mid	Mid	high	high	high	high	high	high	high
Rate annually (%)	0.8	-0.3	-5.5	-3.8	-3.8	3.0	35.1	22.2	15.3	30.0	17.4	13.1	17.6

INS, 2018, TEMPO - HOME, EXTERIOR TRADE, EXP102J

As regards the export of vegetables, significant increases are observed on months, starting in May and culminating in September and October, where the highest values are recorded, these being the months in which most vegetables, plants and tubers are harvested. An export detriment in Romania is that there are few warehouses and greenhouses for crops in protected areas to benefit from a better-valued export also in November-April. Exports in 2011 recorded € 53.1 million, with successive increases until 2017 when € 140.6 million was recorded. In July of 2017, the export capitalized to € 39.9 million euros, with 33.4 million € more than in July 2011.

Table 16. Monthly and annual evolution of exports of edible fruit, plants, roots and tubers at country level for 2011-2017

Year, UM	Month												*Total year*
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €
2011	3.1	2.5	2.6	2.2	3.7	4.2	5.4	9.6	9.9	9.3	10.2	7.6	70.2
2012	3.5	3.7	4.4	3.1	3.9	4.4	9.1	9.8	5.8	8.5	10.6	8.0	74.9
2013	3.2	3.7	3.8	2.6	3.2	3.9	6.0	8.0	7.4	13.2	13.9	10.4	79.4
2014	5.5	7.8	7.4	4.7	5.5	4.7	6.7	10.7	5.7	10.1	15.0	11.7	95.5
2015	6.6	8.0	7.1	4.7	3.6	4.5	5.6	6.1	6.0	12.3	10.7	6.6	81.9
2016	4.0	3.1	3.2	2.9	2.0	4.3	5.7	5.9	5.7	5.9	6.5	4.8	54.0
2017	3.4	2.9	4.9	3.3	3.4	4.9	7.5	6.5	8.4	8.1	7.4	4.3	64.9
Monthly Average (Mill. €)	4.2	4.5	4.8	3.4	3.6	4.4	6.6	8.1	7.0	9.6	10.6	7.7	74.4
St dev (mil €)	1.3	2.4	1.8	1.0	1.1	0.3	1.3	2.0	1.7	2.5	3.1	2.7	13.2
Coeff. var)%)	31.8	52.2	38.6	28.8	29.2	7.4	20.1	24.5	23.7	26.1	29.1	35.5	17.8
Signif.	high	high	high	high	high	small	Mid	high	high	high	high	high	Mid
Annual growth rhythm (%)	1.7	2.7	11.3	6.6	-1.6	2.5	5.6	-6.3	-2.7	-2.3	-5.1	-9.0	-1.3

INS, 2018, TEMPO - HOME, EXTERIOR TRADE, EXP102J

Regarding the export of fruits, plants, roots and tubers, there are large oscillations of values over the analyzed period. If at the level of year 2011 Romania exports fruits worth 70.2 million Euro, maximum in August-November, approx. 9.9 million / month euro, reaches a maximum of 95.5 million euro in 2014, with the largest exports in October-December. At the end of the period, exports fell to 54 million euro in 2016 and 64.9 million euro in 2017, with higher values in September and October. As with vegetables, more spaces with a controlled atmosphere for storage are needed to benefit from a better-valued and balanced export over months and years.

Table 17. Monthly and annual average balance of foreign trade in fruit and vegetables for the period 2011-2017 of Romania

Year, UM	Month												*Total year*
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €
2011	-24	-30	-47	-34	-27	-17	-5	2	5	-5	-10	-22	-214
2012	-18	-22	-34	-30	-30	-20	-11	-10	-13	-13	-26	-39	-267
2013	-45	-39	-46	-48	-37	-18	-8	-9	-1	-5	-21	-43	-321
2014	-44	-46	-54	-54	-45	-27	-9	-3	-11	-17	-28	-48	-386
2015	-52	-52	-69	-63	-55	-45	-27	-30	-2. 3	-26	-52	-85	-580
2016	-73	-84	-98	-101	-78	-54	-29	-33	-33	-47	-67	-91	-788
2017	-87	-91	-115	-99	-107	-64	-11	-25	-30	-45	-73	-95	-843

INS, 2018, TEMPO - HOME, EXTERIOR TRADE, EXP102J

Thus, if the balance shows a difference of -214 million euros in 2011, it reaches -843 million in 2017, representing an increase of almost 4 times, the differences between months being even 30 times higher (November 2013 compared to November 2017).

5. Performance indicators of the production and marketing of vegetables and fruits

Table 18. The main indicators that characterize the enterprises that grow vegetables and fruits in 2015 and 2016

Indicator		UM	2015	2016	2016 vs 2015	
					UM	%
Enterprises		No	1,264	1,577	313	124.8
Average number of employees		No	4,430	4,484	54	101.2
Fiscal value	Total	million lei	783.5	904.2	120.68	115.40
	On the enterprise	mil / lei	0.62	0.57	-0.05	92.50
	per employee	thousand lei / employee	17.69	20,16	2.48	114.01

INS, 2018 TEMPO - HOME, Statistical Yearbook IN -enterprises, RSI101A

The number of enterprises for growing vegetables and fruits in the year 2016 increased by 313 enterprises compared to 2015, representing an increase of 24.8%. Also, the total turnover and the one per employee increased by 15.4% and 14.01% respectively, but the turnover on enterprises decreased by 0.05 million lei in 2016 compared to 2015, representing a decrease of 7.5%.

Table 19. Main indicators characterizing wholesalers of vegetables and fruits for 2015 and 2016

Indicator		UM	2015	2016	2016 vs 2015	
					UM	%
enterprises		No	1,514	1,475	-39	97.4
Average number of employees		No	5,214	5,123	-91	98.3
Fiscal value	Total	million lei	4,806	5,478	671.79	113.98
	On the enterprise	mil / lei	3.17	3.71	0.54	116.99
	per employee	thousand lei / employee	92.18	106.93	14.75	116.00

INS, 2018 TEMPO - HOME, Statistical Yearbook IN -enterprises, RSI101A

In the case of the number of wholesalers of vegetables and fruits, the situation is different from those that produce them, which is down by year 2016 compared to 2015, with 39 enterprises, which represents a decrease of 2.6%. The number of employees decreased by 1.7% in 2016 as compared to 2015, but the total turnover increased by 13.98%, the one on the company by 16.99% and the one on the employee by 16%.

Table 20. The main indicators characterizing the retailers for vegetables and fruits in the years 2015 and 2016

Indicator		UM	2015	2016	2016 vs 2015	
					UM	%
Enterprises		No	1,170	1,179	9	100.8
Average number of employees		No	2,131	2,097	-34	98.4
Fiscal value	Total	million lei	423	482	59.28	114.02
	On the enterprise	mil / lei	0.36	0.41	0.05	113.15
	per employee	thousand lei / employee	19.84	22.98	3.15	115.87

INS, 2018 TEMPO - HOME, Statistical Yearbook BUSINESS, RSI101A

An increase in the number of enterprises is seen in 2016 compared to 2015 in the case of fruit and vegetable retail trade with 9 enterprises, but the number of employees decreases by 1.6%. Total turnover increases by 14.02%, per employee by 15.87% and by enterprise by 13.15%.

CONCLUSIONS

The demand for vegetables / fruits is continuous, while the offer is seasonal. For this purpose it is necessary to produce the vegetables throughout the whole year. For this purpose, it is possible to resort to realize the production of vegetable products in a protected system, in greenhouses and solariums, or by storage in spaces with natural or forced ventilation, equipped with boxes, chambers and equipment for monitoring the environmental conditions (temperature, humidity, dioxide carbon). Vegetables can also be stored in silos from the ground, after the harvest, to be used the following year (carrot, parsley, celery, potatoes, red beet, cabbage, radishes etc.).

The analysis made in the fruit and vegetable sector in Romania highlighted the following issues, which continuously affect the production potential of the sector:

• There are a large number of small and very small farms; a plus being, however, that there are numerous holdings with a large assortment of fruit and vegetable species and varieties;

• These farms have in a great extent a low degree of modern technical means of production and harvesting;

• Vegetable and fruit trees have a high degree of fragmentation, thus highlighting the lack of a coherent land consolidation strategy;

• Areas cultivated with some vegetables and fruits are decreasing during the analyzed period, thus affecting the production and the consumption from own production, being necessary to import; there is also an increase in areas cultivated with competitive varieties of vegetables;

• Romania has favorable pedo-climatic conditions for the cultivation of vegetables, trees and fruit trees, and the increase in yields can be made using modern technologies, the results of the last years being at most of species encouraging.

• The reduction of imports could be done by diversifying domestic production, increasing the number and modernizing the processing units.

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WHY POLISH APPLES ARE PRESENT ON THE ROMANIAN MARKETS?

MICU MARIUS MIHAI, TUDOR VALENTINA CONSTANȚA, SMEDESCU DRAGOȘ ION[1], CARBARĂU COSMINA ANDREEA

Abstract: *With millions of tons harvested annually, the apple is the third fruit consumed in the world, after oranges and bananas. In 1989, Romania had 79,000 ha of apple trees, but in 2017 the situation was different, with about 55,000 ha planted, occupying the second place in the EU after Poland, the leader of the apple cultivated area and production. The speed of rejuvenation of plantations is low in Romania. Of the total area cultivated with apple trees, 70% of plantations are old, and it is obviously that production is both quantitative and qualitative low. The present study aims to analyze the apple market at the European Union level and, implicitly, at the level of Romania. To achieve this, the 2013-2017 period was was taken as the basis of study and indicators such as total production, cultivated area and average yield per hectare were taken into account. Thus, at the level of the European Union, Poland is the undisputed leader in apple production, together with Italy and France, providing about 60% of the total production recorded in the 28 countries. At the same time, the analysis also focuses on price developments in the first five apple-producing countries, and the lowest price is recorded in Poland in 2013 of only 20 cents / kg, which explains to a certain extent the presence on the Romanian market of Polish apples.*

Keywords: *apples, apple production, producers, cultivated areas*

JEL Classification: *Q13, Q17*

INTRODUCTION

Over the last 20 years, the Common Agricultural Policy, has reduced the regulation of agricultural markets, allowing market forces to guide the production [7].

Romania has a long tradition of growing fruit trees, which also have an important role in agriculture. Apples and plums are by far the first place in terms of surface and production [5].

It is important to know that 37.5% of apple-producing countries belong to Europe. The main producers in the European Union are: Poland, France, Italy, Germany, Spain, Hungary, Romania.

With regard to Romania, the main favorable factors that lead to a remarkable production of apples are given by the favorable climate, the quality of the soils, the qualities of apple, the apple tree experts and, last but not least, the cultivation tradition. From this point of view, we need to keep in mind that global warming creates great worries among specialists and population, regarding the climate future of the planet [3].

At the same time, the high nutritional value of fruits, especially apples, and the long period of time that they can cover, cause high consumption among the population [2].

According to the data of the European Institute of Statistics, Romania had an area cultivated with 55.5 thousand hectares (almost 10% of the total area cultivated in the EU) in 2016, being the second EU cultivator after Poland, which , had a triple surface.

In production, however, the situation is almost dramatic: while Poland obtained 3.6 million tons in 2016, about a quarter of total EU28 production, Romania achieved almost half a million, standing at the seven in the top.

Worldwide, according to the FAO, Asian countries are the largest apple growers (42.42% of total production), followed by Europe with 22.89% of world production, and North America by 9.42% .

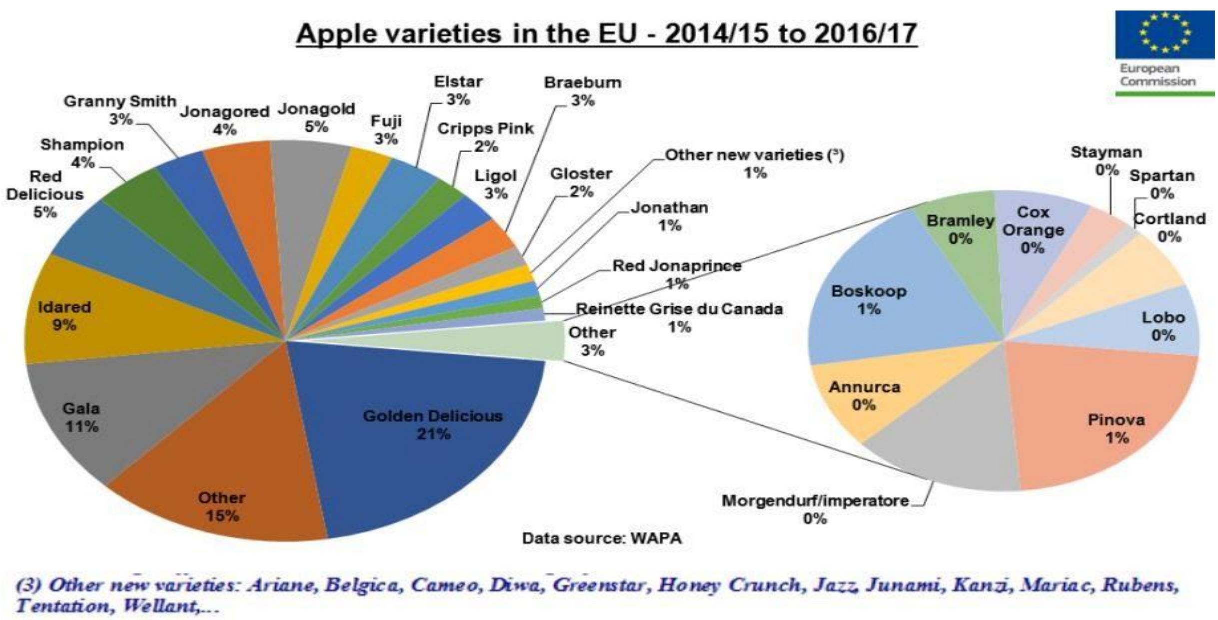
Apples are ranked first in the fruit, with a production of 12.5 million tons harvested in 2016, equivalent to almost 25 kilograms per capita in the EU. Poland again ranked first, accounting

[1] Universitatea de Științe Agronomice și Medicină Veterinară București, 59 Mărăști, sector 1, 011464, București, Romania, Phone: +40 21 318 25 64/232, E-mail: smedescudragos@yahoo.com

for 28.7% of total production, followed by Italy with 19.6% and France with 14.5% of total production [16].

European Union countries are constantly producing over 14 million tons of apples. Outside the EU, significant areas are grown in Moldova, Ukraine, Russia and Turkey. As for the main varieties of apple cultivated in Europe, the most popular is Golden Delicious with a grown in a proportion of 21%, followed by the Gala variety grown at 11%, Idared 9%, Red Delicious 5% and Jonagold 5%

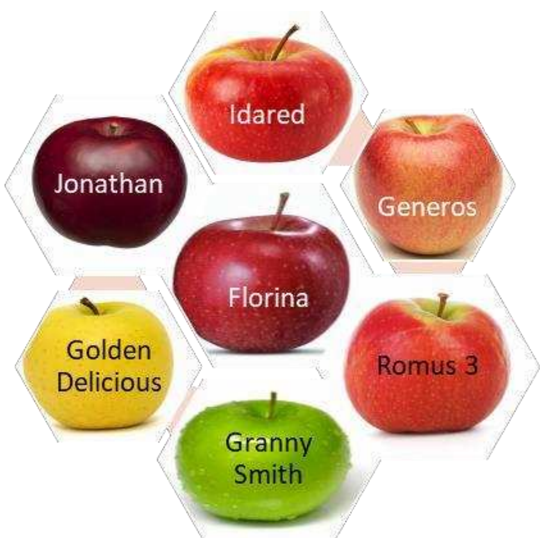
Figura 1. Apples varieties harvested in Europe between 2014-2017



Sursa: European Comission, (2018) [12].

Regarding Romania, there are around 60 varieties of apples, comprising both varieties created within the research units in the country as well as varieties imported from abroad which have been tested and proved to be adapted to pedoclimatic conditions, and depending on the baking and preserving season, they may be summer, winter or autumn. Among the Romanian apple varieties, we distinguish the old, traditional varieties and the newly created varieties obtained from the hybridizations.

Figure 2. The main apple varieties harvested in Romania



Sursa: ***http://www.gradinamea.ro/Marul_3295_548_1.html

- **Jonathan** is an winter variety originary from United States, with red and juicy pulp, appreciated for flavor, sweeteness, but slightly acidic taste.
- **Idared** is also an American winter variety very productive, with large yellowish-green fruits, which keep their fresh state for a long time.
- **Generos** is a Romanian variety of winter, with large and aromatic fruits, yellowish-green, with a reddish tinge.
- **Florina** is a Romanian autumn-winter variety, productive, with large fruits, appreciated for the its purple color and its pleasent taste.
- **Romus 3** is a summer autochthonous variety with red fruits and sweet and juicy pulp. It produces abundant fruit from one year to another.
- **Granny Smith** is an Austrian variety, large-fruited, with a very intense green colour, andfirm, succulent and acidified pulp.
- **Golden Delicious** is a winter variety originary from the Unites States,medium sidez, yellowish-green fruit, with white, juicy, slightly sweet and slightly acidized pulp [8].

MATERIAL AND METHOD

Documentation, analysis and data processing are the main research methods used. These methods are based on synthesis, analogy and comparative analysis. Once the information has been identified, known and interpreted, the next step was the detailed documentation of the field of interest.

The data used in this study were provided by Faostat, the European Institute of Statistics, the Ministry of Agriculture and Rural Development, and the National Institute of Statistics of Romania.

Documentation and study, as part of the analysis activity, are key research methods, enabling analysis to identify the first knowledge and information. Documentation also involves analyzing legislation, but also comparing the different sources studied.

RESULTS AND DISCUSSIONS

The apple culture is so widespread, on the one hand, because of the food value and therapeutic value of the fruit, and on the other hand, for the high economic value. Apples have special biological features, being among the few fruits that keep their freshness for a long time and can be transported over long distances and consumed at any time of the year.

The undeniable leader in apple production is Poland, along with Italy and France, providing about 60% of total production, a fairly high percentage compared to the other 25 states in the European Union.

Although Romania ranks second after Poland, in terms of the cultivated area, when it comes to production, our country is not so good, holding only 349,000 tons of apples in 2017 compared to 2870,000 tons owned by Poland. It should be noted that at the European level the production of apples fell during the period 2013-2017, the lowest being recorded in Romania, where the decrease was about 32% and in Poland about 10%.

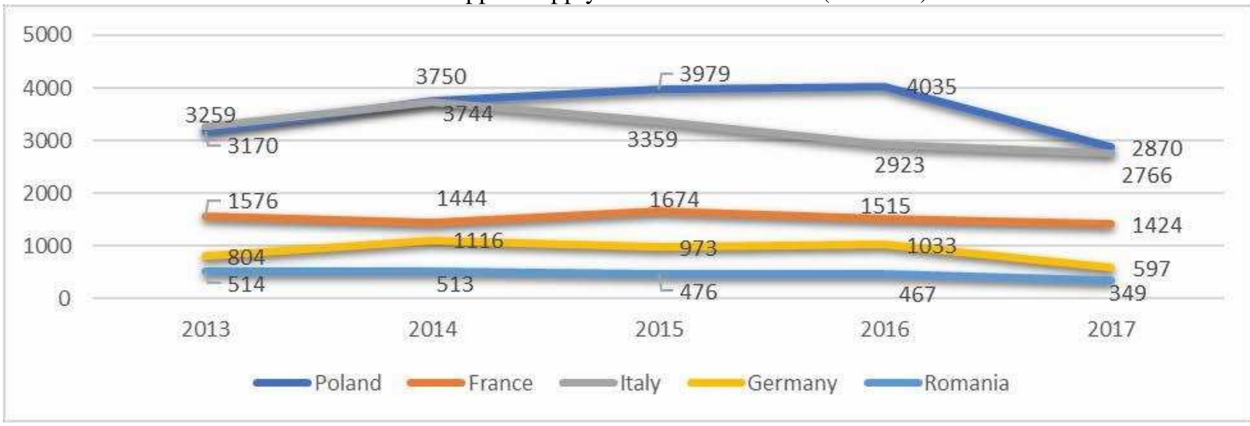
Table 1. EU28 apples supply between 2013-2017

Country	2013	2014	2015	2016	2017	2017/2013
Other EU28 states	10748	11548	11461	11274	9013	83.86%
Poland	3170	3750	3979	4035	2870	90.54%
France	1576	1444	1674	1515	1424	90.36%
Italy	3259	3744	3359	2923	2766	84.87%

Germany	804	1116	973	1033	597	74.25%
Romania	514	513	476	467	349	67.90%

Source: Processed data provided by Eurostat (2018).

Chart 1. EU apples supply between 2013-2017 (000 tons)



Source: Projection according to data provided by Eurostat, (2018).

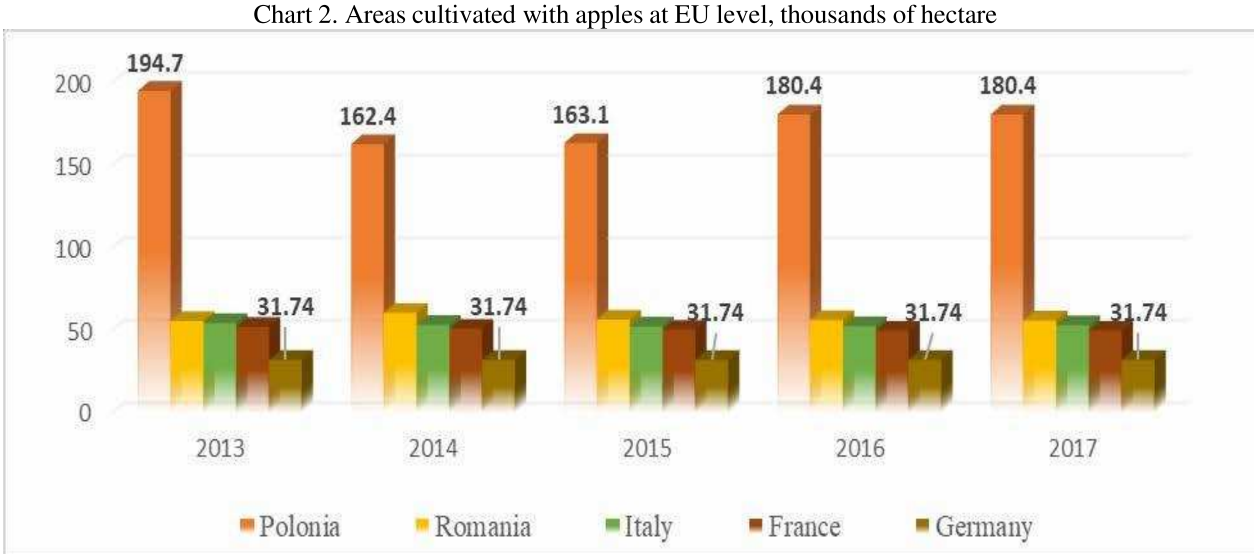
At EU28 level, Poland, Romania, Italy, France and Germany are the first countries with the largest area cultivated by apple trees. The country with the largest cultivated area is Poland, with 180.4 thousand hectares, followed by Romania with an area of 55.68 thousand hectares, Italy with 52.78 thousand hectares, France with 49.62 thousand hectares, the last of the five being Germany, with 31.74 thousand hectares cultivated. Between 2013 and 2017, Romania and Germany maintained their grown-up areas, unlike Poland, which recorded the largest decline of 7%. For Italy and France, the decrease was 2.5% and respectively 4%.

Table 2. Areas cultivated with apples at EU level28 between 2013-2017, thousands of hectares

	Country	2013	2014	2015	2016	2017	2017/2013
1	**Polonia**	194.7	162.4	163.1	180.4	180.4	92.66%
2	**Romania**	55.37	60.28	56.13	55.88	55.68	100.56%
3	**Italy**	54.13	53.01	52	52.16	52.78	97.51%
4	**France**	51.79	50.68	50.17	49.65	49.62	95.81%
5	**Germany**	31.74	31.74	31.74	31.74	31.74	100

Source: Processed data provided by Eurostat (2018)

Chart 2. Areas cultivated with apples at EU level, thousands of hectare



Source: Projection according to data provided by Eurostat, (2018).

Regarding the ratio between the production and the cultivated area, it is noted that in 2017 Italy ranks the top, producing 52.41 tons of apples per cultivated hectare, followed by France with 28.70 tons/ha and Germany with a production of 18.81 tons/ha.

In 2013, the average yield per hectare was much higher in all five countries analyzed, Italy had a production of 60 tons, France of 30 and Germany of 25 tons. At the same time, Romania, the country with the second crop cultivated with apples, produced in 2013 an average of 9.3 tons per hectare, and in 2017 it only produces 6.3 tons. The reason for this discrepancy is due to the fact that 70% of the plantations are old, thus automatically producing a low production (Table 3).

Table 3. Evolution of average apple production per hectare in the EU28

Country	2013	2014	2015	2016	2017	2017/2013
Italy	60.21	70.63	64.60	56.04	52.41	87.04%
France	30.43	28.49	33.37	30.51	28.70	94.31%
Germany	25.33	35.16	30.66	32.55	18.81	74.25%
Polonia	16.28	23.09	24.40	22.37	15.91	97.71%
Romania	9.28	8.51	8.48	8.36	6.27	67.52%

Source: Processed data provided by Eurostat (2018).

In Romania, apple culture is specific to hilly areas, where there are many fruit trees. Among the counties recognized for the cultivation of the apple are Argeş, Dâmboviţa, Valcea, Prahova, Buzău, Suceava, Iaşi, Maramureş, Bistriţa, Sălaj and Mureş.

Of the total area of Romanian orchards, one-third is occupied by apple orchards, thus ranked second, after the plum orchards.

Both of the world varieties and Romanian varieties are grown, divided into three groups: summer, autumn and winter varieties.

Among the varieties grown on the territory of Romania, we find the varieties of Romus, Generos, Delia, Cardinal, Idared, Jonathan, Golden Delicious, Florina, Starkrimson, Pionier, Foyos de Voineşti, Jonagold, Fuji [9].

EU production is estimated at the lowest level in 2007, down 20% to 10.0 million tons. At the level of Romania, apple production has declined in the last decade due to the reduction of the area covered with apple orchards and the number of trees grown [1].

For this reason, the production of apples is not enough to cover the needs of consumers, which justifies the import of apples [4].

July high temperatures, severe freezing in April 2017, and the flowering of trees in early March have significantly affected production throughout the European Union, especially the top producers in Poland and Italy.

Reduced consumption is expected to cause significant trade shifts as exports will drop by 45% to 820 million tons and imports are expected to fall by nearly 20% to 500,000 tons [11].

If we analyze prices, the accusa changes from year to year, depending on the country's production, depending on imports and exports, and last but not least, depending on the salaries in each country.

Table 4. Apple prices €/100kg on September 2013 versus September 2017

EU	• 2013 -> 66 euro/100kg • 2017 -> 55 euro/100kg
Germany	• 2013 -> 47 euro/100kg • 2017 -> 45 euro/100kg
France	• 2013 -> 103 euro/100kg • 2017 -> 74 euro/100kg
Italy	• 2013 -> 81 euro/100kg • 2017 -> 65 euro/100kg
Poland	• 2013 -> 20 euro/100kg • 2017 -> 39 euro/100kg
Romania	• 2013 -> 52 euro/100kg • 2017 -> 40 euro/100kg

Source: European Comission, (2018). [13]

Thus, we note that Germany is the only country that has not recorded a notable price difference over the two years as a basis for analysis.

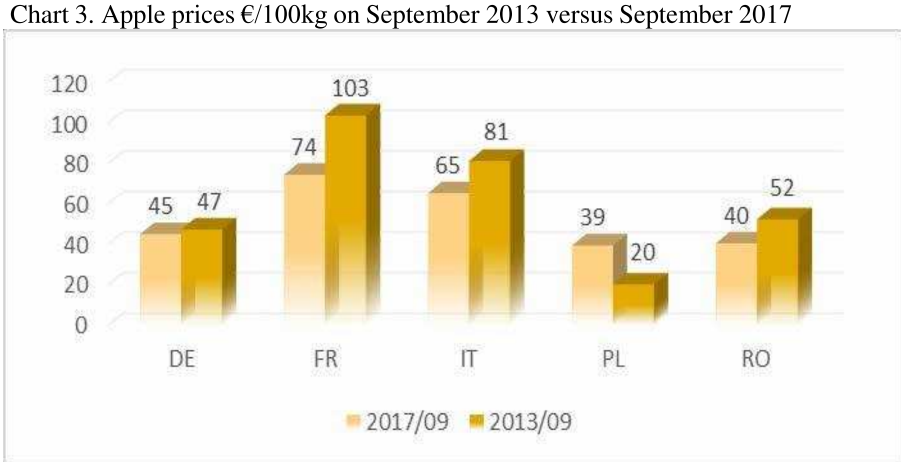
The highest discrepancies are recorded in France where, from 103 euro/100 kg in 2013, a price of 74 euro/100 kg is reached, but also Poland, which in the period 2013-2017 has doubled the apples sales price from 20 cents/kg to 40 cents, and Poland is the country with the lowest values.

During this period, Romania recorded price declines, from 52 cents/kg in 2013 to 40 cents/kg in 2017.

However, the price discrepancies recorded by the two countries, especially in 2013, when a pound of apples in Poland was 32 cents cheaper than in Romania, explains why apples were being imported in very large quantities from Poland to Romania.

At the same time, at the level of 2016, Romania made massive imports from: Italy (EUR 8.5 million), Germany (EUR 3.3 million), Hungary (EUR 1.6 million) and Austria (EUR 1.5 million) [6].

Chart 3. Apple prices €/100kg on September 2013 versus September 2017



Source: Projection according to data provided by European Comission (2018).

CONCLUSION

In the period 2013-2017, apple production in the European Union was down. Also, cultivated area has declined in most EU countries.

At the European level, Poland is a leader and, together with France and Italy, represents somewhere at 60% of EU-produced production28.

In terms of average yield per hectare, Italy is the undisputed leader with a production of about 53 tons/ha. Poland, the big producer has an average production of 16 tons/ha while Romania has the lowest production of only 6 tons per hectare.

The evolution of the price per kilogram of apples was mainly descending, in most European countries the price declining in 4 of the five countries: Germany, France, Italy and Romania.

At the level of Poland, the price was rising and in 2013-2017 it doubled from 20 cents/kg in 2013 to around 40 cents/kg in 2017, while in 2013 the price/kg in Romania was 52 cents, a strong argument that can support the presence on the Romanian market of apples imported mainly from Poland.

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EVOLUTION OF THE AMOUNT OF CHEMICAL AND NATURAL FERTILIZERS USED IN ROMANIA BETWEEN 2007 AND 2016

SMEDESCU DRAGOȘ ION[1], TUDOR VALENTINA CONSTANȚA[2], MICU MARIUS MIHAI[3], CARBARĂU COSMINA ANDREEA[4]

Abstract: *Along with irrigation, chemical and natural fertilizers play an important role in producing high yields, providing nutrients for plants, thus increasing or maintaining optimal yields. Regarding the use of chemical and natural fertilizers in general, a downward trend has been observed between 1990 and 2000, so that the application of these fertilizers in this interval has decreased by more than 800%, a period considered not very happy in the case of the Romanian agriculture. The largest producers of chemical fertilizers used by Romanian farmers come from the European Union, so that they have discovered the opportunity of the Romanian agriculture market, they have opened their representative offices in Romania, where they provide farmers with consultants meant to offer them solutions dedicated to their needs. In Romania, an overwhelming natural fertilizer is used (over 90% of the total amount of fertilizer applied) because they are at hand and cheaper. These fertilizers may come from secondary livestock farming.*

Keywords: *fertilizers, nutrients, Romanian agriculture, environmental hazard*

JEL Classification: *Q1, Q5*

INTRODUCTION

The Romanian agricultural sector continues to represent an individual and main component of the Romanian private economy. [3]

In Romania, industrial agriculture has unfortunately led to negative environmental effects, so that by 1990 the production activity generated various types of pollution, such as soil pollution, air pollution, water pollution, and due to the fact that the fertilizers over time have been widely used without regard to the specific needs of culture, the timing of their application and the way they should be applied. [6]

Deficient administration of chemical or natural fertilizers can have negative effects on both production and soil quality, the most polluting effect being due to the excessive use of nitrates.

Nowadays, due to the technologies aimed at obtaining large productions, the Romanian agriculture risks poverty, so the distribution of nutrients plays an important role in the practical agriculture. For this reason, farmers should constantly receive informations and advices on the use and application of fertilizers, to implement them in order to obtain a fair agricultural practice. [5]

Increasing the efficiency of fertilizer use with regard to their non-discriminatory use leads to environmental hazards. [1]

Appropriate treatment adds to the normal course of fertilization of both plants and soil as it plays a role in controlling preventive and curative nutrient imbalances, improving plant growth and growth. We mention that the application of chemical and natural fertilizers stimulates the formation of the root system, flourishing and fructification, and also supports resistance to disease.

MATERIAL AND METHOD

As research methods, we used documentation, analysis and data processing, secondary analysis. These methods are based on the processes of synthesis, analogy and comparative analysis. Once the information was defined, known and interpreted, the next step was the detailed documentation of the field of interest.

[1] University of Agronomic Sciences and Veterinary Medicine of Bucharest,
[2] University of Agronomic Sciences and Veterinary Medicine of Bucharest, e-mail: valentina_tudor@yahoo.com
[3] University of Agronomic Sciences and Veterinary Medicine of Bucharest,
[4] University of Agronomic Sciences and Veterinary Medicine of Bucharest,

The data used in this study was provided by the Romanian National Institute of Statistics (INSSE, 2018).

In the analysis activity, the study and documentation for the field or for the analyzed system is a starting point. These allow the analysis to get the first knowledge and information.

Documentation also involved analyzing legislation and comparing analysis of different sources studied. Proper assessment and establishment of the nutrient requirement for plants are based on: local technological conditions, soil, climate, the expected output of production, soil behavior of applied fertilizers, especially those with nitrogen, etc.

The nitrogen fertilization plan and other nutrients allow proper management of the fertilizer in an economic and environmental way.

RESULTS AND DISCUSSIONS

Today, economic and environmental challenges have a high interest in the efficiency of nutrient use. Higher prices for both crops and fertilizers have increased interest in technologies and practices to improve efficiency and economic productivity.

Moreover, losses of nutrients that harm the air and water quality can be reduced by improving the efficiency of nutrient use, especially for nitrogen (N) and phosphorus (P). [2] According to the statistics, Romania has some of the cleanest and fertile soils in Europe, because the financial possibilities of the Romanian farmers are small, based on the natural qualities and natural characteristics of the soil and on the technologies of culture. The real economy must serve through its results and through the mechanisms it uses to improve human health and the protection of the environment, as living generations that coexist and inevitably succeed in the evolution of our microcosm. [4]The fertilizer industry faces a permanent challenge to improve the efficiency of its products. This is done either by improving the fertilizers already used or by developing new types of fertilizer. [9]

The fertilizer is in many forms, from chemicals to old grass cuttings. By supplying nutrients like nitrogen, fertilizers help plants grow despite the threat of weeds and diseases. Natural fertilizers, such as manure, improve soil fertility by feeding microorganisms into the soil, reducing erosion and ensuring continuous soil hydration. On the other hand, the real effects of chemical fertilizers are not widely presented. This is partly due to the fact that they are largely untested. We understand that there is a risk of groundwater contamination and we are aware of the environmental problems it causes, but we do not fully realize what it means for our long-term health, so instead of trying to buy as many natural fertilizers possible, just shrug to it. [13]

The limited financial resources of the Romanian farmers make the application of fertilizers without adequate grounding, without a soil analysis, to show clearly what the deficiencies are. So, farmers apply a single substance, and in the long run, these irrational fertilizer applications turn into serious soil deficiencies in microelements. [8]

With the accession of Romania to the European Union, new markets were opened in 2007, culminating in an increasing growth of agricultural products. This can be covered by increasing production using the latest and most innovative substances that help feed the plants. However, Romanian farmers have understood the need to become as competitive as possible, in order to compete with Western European countries. This explains why, after 2007, Romania registered an evolution of the average yields obtained from the main crops of wheat, maize, sunflower and rape. However, permanent dependence on weather conditions and still poor technical endowment make Romanian agriculture a rudimentary one.

Advantages of chemical fertilizers

- Because nutrients are available immediately, amelioration takes place and is visible in a few days;

- The N-P-K ratio is rigorously established, making it easy to choose the grain depending on the stage of plant development;

- They are cheap and the way of use is easy to understand.

Disadvantages of chemical fertilizers:

- In most cases they are made from unconventional sources, including fossil fuels;
- They grow and develop plants but do nothing to sustain the life and health of the soil, because they do not replace many elements that are gradually exhausted from crops, which in the long run leads to soil deterioration;
- Because nutrients are easily accessible, there is a danger of overcharging. This not only can kill plants, but can disturb the whole ecosystem;
- Chemical fertilizers should be applied cyclically, which leads to the toxic accumulation in the soil of substances such as arsenic, cadmium and others, which can also be transferred to vegetables;
- Their long-term use can change the pH of the soil, affect the destruction of beneficial microbial ecosystems, may even stimulate certain harmful factors.

Advantages of natural fertilizers

- In addition to breaking down nutrients, natural fertilizers improve the structure of the soil and increase its ability to maintain water and nutrients. In the long run, they will increase soil health and fertility;
- Since slow-release fertilizers are used, they cannot produce super fertilization that damages plants;
- The risk of accumulation of toxic substances for plants is excluded or very low;
- Natural fertilizers are renewable, biodegradable, sustainable and environmentally friendly;
- Buying from commerce, natural fertilizers are expensive, but they can be obtained at low cost in the household by processing manure or composting.

Disadvantages of natural fertilizers:

- The raw material from which natural fertilizers are obtained must decompose to release the nutrients into the soil. This decomposition is done according to the laws of nature, so immediate benefits are not seen in administering these grains but only after 2-3 months;
- While largely solving plant needs, the N-P-K report is generally unknown and most often inappropriate to the plant development phase.

Table 1. Amount of chemical and natural fertilizers used in agriculture

Year	Categories of fertilizers	Chemical	Nitrogen	Phosphate	Potash	Natural
2007	Tons 100% active substance	387.216	265.487	103.324	18.405	13.497.929
2010	Tons 100% active substance	480.586	305.757	123.331	51.500	15.231.715
2010/2007	%	19,43	13,17	16,22	64,26	11,38
2011	Tons 100% active substance	486.944	313.333	126.249	47.362	14.510.194
2011/2010	%	1,31	2,42	2,31	-8,74	-4,97
2012	Tons 100% active substance	437.972	289.963	113.035	34.974	13.292.617
2012/2011	%	-11,18	-8,06	-11,69	-35,42	-9,16
2013	Tons 100% active substance	491.831	344.468	113.823	33.540	13.580.267
2013/2012	%	10,95	15,82	0,69	-4,28	2,12
2014	Tons 100% active substance	452.239	303.562	118.574	30.103	16.261.702
2014/2013	%	-8.75	-13.48	4.01	-11.42	16.49
2015	Tons 100% active substance	532.702	357.352	132.657	42.693	15.212.325
2015/2014	%	15.10	15.05	10.62	29.49	-6.90

2016	**Tons 100% active substance**	514.126	344.311	126.189	43.626	14.927.199
2016/2015	%	-3.61	-3.79	-5.13	2.14	-1.91

Source: Calculations obtained on the basis of data provided by the Romanian National Institute of Statistics (2018)

Over the three year period from 2007 to 2010 there is an upward trend, where the interest for potassium fertilizers increased by 64.26%, while the lowest increase is recorded among the natural ones of only 11.38%.

Year 2012, compared to 2011, reduces the quantities of fertilizers used, so that potassium compounds again show a decrease of 35.42%, while the lowest decrease is reported for nitrogenous substances.

In 2013, only potassium fertilizers dropped to 4.28, while the remainder of the fertilizer yields increases, with the highest nitrogen content of 15.82%.

The year 2014 compared to 2013 shows decreases at the level of all fertilizers, excluding natural fertilizers, which register an increase of 16.49%.

As far as the year 2015 is concerned, compared to 2014, the upward trend is only observed for natural fertilizers, which is a decrease of 6.90%, the highest increase being made for potassium fertilizers, of 29.49%.

During 2016, negative values are recorded among chemical fertilizers, nitrogenous, phosphatic and natural fertilizers, except potassium fertilizers, which show an increase of 2.14%.

Figure 1. The weight of fertilizers used in Romanian agriculture, at the level of 2007

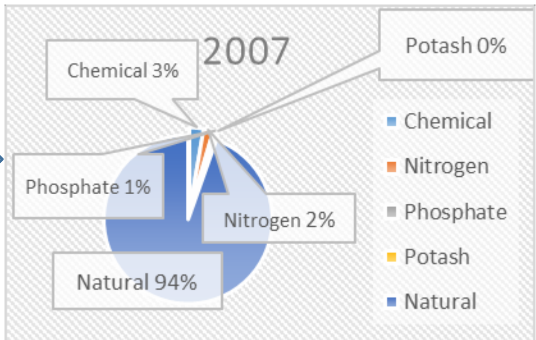


Figure 2. The weight of fertilizers used in Romanian agriculture, at the level of 2013

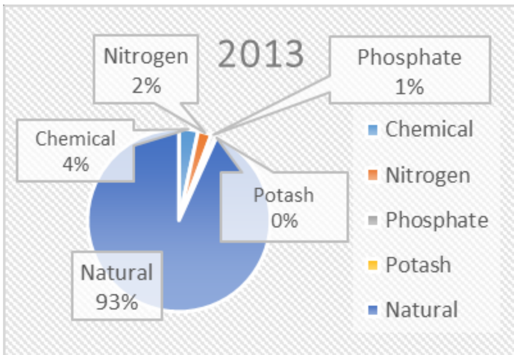
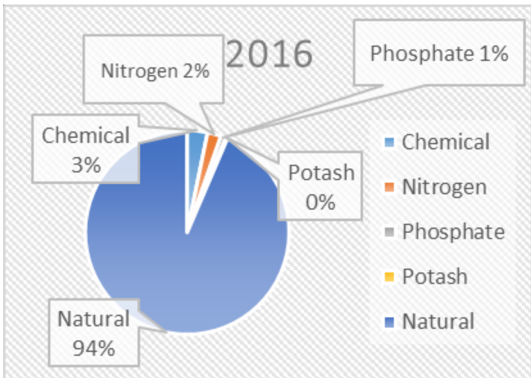


Figure 3. The weight of fertilizers used in Romanian agriculture, at the level of 2016



Overall, the amount of chemical and natural fertilizers used in agriculture shows a oscillating trend, largely due to the evolution of agricultural research that brought new products to market, which are applied in smaller quantities but have a stronger action.

The surface area of the Romanian land stock does not change significantly during the analyzed period, 2005-2014, especially after 1989, when most of the land was considered to have been owned by those who owned them before 1945, or to the heirs of these people.

Table 2. The surface of the land fund

Use of land fund	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Unit: Hectares										
Agricultural	14741214	14730956	14709299	14702279	14684963	14634436	14621427	14615057	14611883	14630072
Arable	9420205	9434542	9423255	9415135	9422529	9404008	9379489	9392262	9389254	9395303
Pastures	3364041	3334375	3329984	3333028	3313785	3288725	3279251	3270610	3273961	3272165
Meadows	1514645	1524922	1531491	1532342	1528046	15 29561	1554680	1544957	1541854	1556246
Vineyards and viticulture nurseries	224082	223701	217968	214463	215382	213571	211347	210475	210270	209417
Orchards and fruit nurseries	218241	213416	206601	207311	205221	198571	196660	196753	196544	196941

Source: Romanian National Institute of Statistics, (2018)

Throughout the analyzed period, the land fund did not show any significant changes. As can be seen from Table 2, the most important share of the land fund structure is owned by Romania's arable land, which at the year 2014 is 9,395,303 hectares.

Figure 4. Arable surface

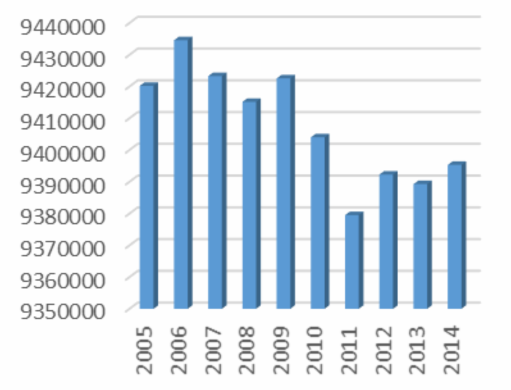
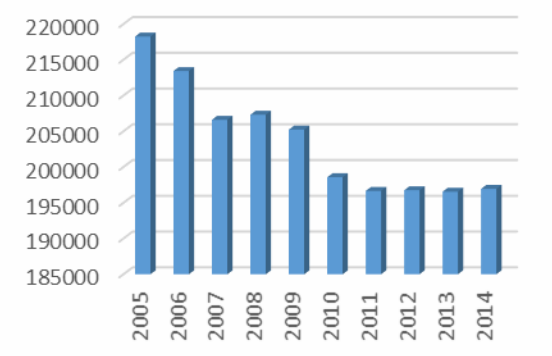


Figure 5. Orchards and fruit nurseries



At the opposite pole, with the slightest stretch, there are the orchards and nurseries that have an area of 196,941 hectares.

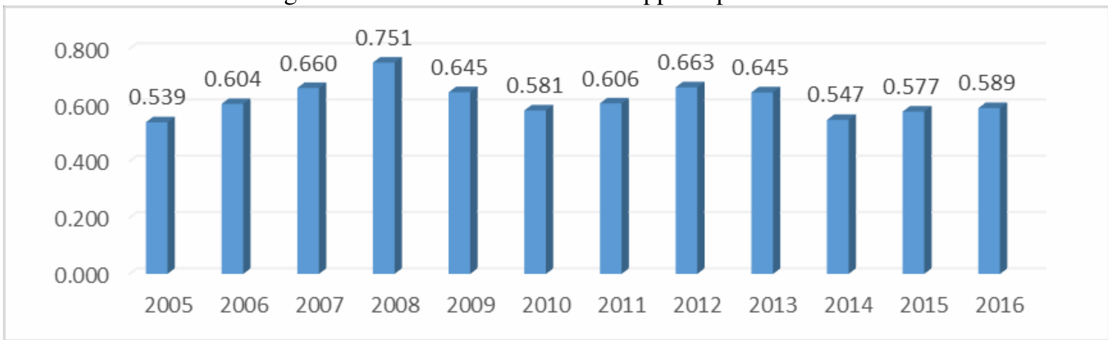
Table 3. The amount of fertilizers applied per hectare

Specification	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	UM: tons active substance											
Arable	9420205	9434542	9423255	9415135	9422529	9404008	9379489	9392262	9389254	9392262	9389254	9395303
Fertilizers	17492592	15625988	14272361	12544070	14600721	16192889	15484082	14168561	14563929	17166180	16277729	15955451
Applied fertilizers per hectare	0,539	0,604	0,660	0,751	0,645	0,581	0,606	0,663	0,645	0.547	0.577	0.589

Source: Calculations obtained on the basis of data provided by the Romanian National Institute of Statistics (2018)

Analysing the amount of chemical and natural fertilizers applied per hectare, it is found that it has a oscillating evolution, so that the largest quantity of chemical and natural fertilizers was applied in 2008, more exactly a quantity of 0.751 tonnes per hectare, with the mention that over 93% of this quantity was represented by natural fertilizers and only 7% were chemical fertilizers.

Figure 6. The amount of fertilizers applied per hectare



The lowest amount of chemical and natural fertilizer per hectare was administered in 2005, when farmers gave a quantity of 0.539 tonnes per hectare. It is worth noting that this year the farmers have administered over 94% of this amount was represented by the administration of fermented manure.

CONCLUSIONS

In conclusion, although it is still a controversial topic, the use of fertilizers from both chemical and natural sources will continue to be done to develop and support plant production to meet the growing population demand in the future. The use of chemical and natural fertilizers plays an essential role in establishing the final production. Thus, failure to apply them or poor application of these substances can lead to a decrease in production and can seriously affect the quality of the soil.

Excessive nitrogen management during the communist period has led to the manifestation of a phenomenon that currently affects certain areas of the country. Applied in excessive amounts this nitrogen has resulted in deficiencies in microelements.

It is found that the proportion of fertilizers applied to the soil is largely represented by natural fertilizers, over 90% of the amount of fertilizer applied is represented by natural fertilizers. This shows that fertilizers have a very important contribution to the quantity of agricultural products obtained by farmers. The large proportion of natural fertilizers is explained by the fact that they are at hand and the purchase price of these fertilizers is very low and sometimes comes from their own livestock activity. The fact that chemical fertilizers have a low share in the total fertilizer applied (max. 7%) is explained by the fact that the Romanian farmers allocate limited financial resources to the purchase of inputs for agriculture.

After 2007, on the Romanian market of agricultural inputs emerged important companies that provide consultancy services for the purchase of chemical fertilizers, offering integrated solutions that correspond to the needs of the farmers. Over time, a wide range of plant-based products has grown, so today, complete solutions such as N-P-K are found on the market, and they also contain essential nutrients in plant nutrition and nutrition.

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THE DYNAMICS OF APPLE-PLANTED AREAS, APPLE PRODUCTION AND APPLE PRICES IN ROMANIA

ANCUȚA MARIN[1]

Abstract: *The diversified way of eating apples as well as the versatility of the species that can be cultivated with good results under different environmental and climatic conditions has determined a particular interest for fruit growers. In Romania, apple culture occupies the first place both in terms of surface and production. Current concepts of rational nutrition place fruit consumption in a priority, primarily because they provide the human body with a wide range of vitamins, mineral salts and vital water that are so necessary for the normal physiological activity of the human body. In this paper we are looking at the dynamics of the areas planted with apple during the period 2010-2016, the dynamics of the total and average outputs, as well as the dynamics of the capitalization prices on each county. The purpose of the paper is to make some recommendations that might be useful to Romanian producers who choose apple for their business.*

Keywords: *production, apple, production dynamics, capitalization prices*

JEL Classification: *Q13, Q11, O13*

INTRODUCTION

Consumption of fresh or processed fruits (compotes, juices, jams, marmalades) is a necessity for a balanced diet. The efforts made by the World Health Organization to raise awareness of this by every individual on the planet contribute to increasing food security, on the one hand, and to increasing the importance and role of the fruit sector within the agribusiness sector on the other.

Over time, there have been changes in the crop system, species and varieties adapted to new environmental and climatic conditions have appeared. Geneticists in the horticultural field have been focusing on getting more beautiful, more productive and disease resistant fruits, to the detriment of taste. The resulting products have practically created intensive crops, which have increased profits for fruit producers around the world.

The main peculiarities of fruit production are seasonality and perishability. The seasonality of fruit production is given by the succession of the seasons and the growing season specific to each crop. The seasonality of horticultural production, the perishability, the structure and the composition of soils, the changing climate, the favorable areas of culture are a few peculiarities that must be taken into account when setting up an orchard. Add to this the technologies used, fertilizers and pesticides applied to crops.

Due to the vitamins, minerals, carbohydrates, organic acids and fiber they contain, the fruits are true "gold mines" for human health. The positive effects of daily fruit consumption are demonstrated by numerous scientific studies. The purpose of the paper is to make some recommendations that might be useful to Romanian producers who choose apple for their activity.

MATERIAL AND METHOD

In order to analyze the dynamics of the areas planted with apple, apple production and prices in Romania, the following indicators were used: the area occupied by orchards in Romania, the average apple production per county, the average apple price on county markets and the average consumption of apple per person per year by county.

The research method used is qualitative analysis. Specialized literature has been studied, which highlights the potential of the areas planted with fruit trees - apples, respectively - of the obtained productions and of the capitalization prices. The analyzed period is 2010-2016. The data were taken from the National Institute of Statistics and processed according to the objectives of the paper.

[1] PhD. Ec. Ancuța Marin – Third-grade Scientific Researcher, Research Institute for the Economy of Agriculture and Rural Development, marin.ancuta@iceadr.ro

RESULTS AND DISCUSSIONS

In order to reduce the deficits and syncopes in the supply of fruit from domestic production, it is important to zonate crops, that is, the location of the species, varieties, according to their claims to the climatic and pedological factors.

The climatic conditions in which Romanian plantations are spread are varied and strongly differentiated between them:

- 5-12°C annual average temperatures and
- 350-1.000 mm of annual average precipitation.

Regarding the thermal aspect, more than 90% of the plantations were located in areas with average annual temperatures above 7°C and below 11°C. This range of only 4 degrees represents 1/3 of the country's general thermal range. Dominant are the areas that concentrate in the 8-9°C zone for mesophilous species. The most important fruit-growing areas in Romania are located in the Getic Sub-Carpathians (Southern), the Curb Subcarpathians and the Sub-Carpathians of Moldova (Eastern), where most of the apple orchards, plum and cherry are located. The milder climate in the west of the country is conducive to peach and apricot culture. This area extends along the Danube, in the southern counties Mehedinţi, Dolj, Olt, Teleorman to Dobrogea and Constanţa-Tulcea respectively. (Table no. 1)

Table no. 1. Characterization of favorable areas for pomiculture

SPECIFICATION	AREA I	AREA II	AREA III
Characterization	Most favorable	Favorable area	
	Cultivated surface approx.50%	Cultivated surface approx.32 %	Cultivated surface approx.18%
Location	S and SE of the country, Subcarpathians of Moldova	West of the country	North and central Transylvania, North of Moldova
Distribution by counties	Mehedinţi, Dolj, Olt, Vâlcea, Argeş, Dâmboviţa, Prahova, Buzău, Bacău, Constanţa, Tulcea	Timiş, Arad, Bihor	Satu Mare, Maramureş, Bistriţa-Năsăud, Sălaj, Mureş, Suceava, Neamţ
Average annual temperatures	10-11 ºC	9-10 ºC	8-8,7 ºC
Annual average precipitation	400-500 mm	550-700 mm	600-700 mm
Air humidity	55-65%	65-75%	65-80%
Cultivated species	Apple tree, pear tree, plum tree, peach tree, apricot tree, cherry tree	Peach tree, apricot tree, almond tree	Apple tree, pear tree, plum tree, strawberries
Destination of production	Fresh consumption on the domestic and / or external markets		
	Industrialization		

Source: A. Marin et al., Study on the situation of the fruit and vegetable sector at national and community level. Analysis of the short chain of capitalization of fruit production, ASE Publishing House, Bucharest, 2017

The great unevenness between the counties regarding the area with plantations results from the fact that 19 counties (46.34%) have areas with plantations under 2.500 ha and 11 other counties have areas ranging from 2,500 to 5,000 ha. It is worth noting that most of the intensive and superintensive plantations are not located in the areas with the largest areas with plantations (Getic Subcarpathians and Cotmeana Platform), but in the Northwest of Romania and less in the Southwest of the country. So the areas with the largest fruit trees have the most extensive plantations, unfortunately technologically outmoded and therefore uncompetitive.

Compared to the multiannual average of 148.9 thousand ha, the areas under apple orchards have fallen since 2011, with an average of 8.3 ha each year by 2016.

Table no. 2. The evolution of the areas cultivated with apple orchards

Specification	**Year 2010**	**Year 2011**	**Year 2012**	**Year 2013**	**Year 2014**	**Year 2015**	**Year 2016**
Surface (thousands of ha)	198,6	140,0	142,2	144,1	140,8	138,5	138,0
Deviation from the average	49,7	-8,9	-6,7	-4,8	-8,1	-10,4	-10,9
SPA	2471,5	79,0	44,7	22,9	65,4	107,9	118,5
Variance	411,9	13,2	7,4	3,8	10,9	18,0	19,7
Standard deviation	20,3	3,6	2,7	2,0	3,3	4,2	4,4

Source: NIS data processing

According to the literature, the most popular varieties of apple varieties produced in Romania are: Ardelean, Ciprian, Florina, Frumos de Voineşti, Rebra. The highest apple production is recorded in the North-West Region, followed by South Muntenia Region, the lowest production being in the Bucharest-Ilfov Region. As a trend over time, production declined as a general trend (excluding the Northwest Region where it grew), with variations from one year to the next, among the most productive years being 2010 and 2011 (Table 3).

Table 3. Apple production by county (tons)

COUNTY	***Year 2010***	***Year 2011***	***Year 2012***	***Year 2013***	***Year 2014***	***Year 2015***	***Year 2016***
Alba	9.639	29.269	19.420	23.970	20.768	15.071	12.124
Arad	11.905	7.049	6.784	6.628	5.362	5.244	4.457
Argeș	44.928	57.358	41.987	48.531	44.749	40.671	39.453
Bacău	9.929	9.446	7.047	6.385	8.921	5.601	5.445
Bihor	9.639	29.269	19.420	23.970	20.768	15.071	12.124
Bistrița Năsăud	10.999	31.380	21.521	44.047	39.936	30.013	35.150
Botoșani	19.231	20.196	15.542	17.457	14.120	12.628	11.393
Brăila	1.275	1.822	1.018	1.644	1.734	1.306	1.239
Brașov	1.364	4.312	3.041	3.153	3.240	2.158	3.604
Buzău	19.880	20.949	13.167	16.042	15.970	14.339	13.556
Călărași	661	680	634	832	753	738	729
Caraș Severin	6.349	9.158	7.308	9.692	8.240	7.982	6.753
Cluj	4.847	8.088	5.511	7.955	7.328	7.017	7.294
Constanța	530	931	638	640	927	547	390
Covasna	4.518	5.645	2.980	2.685	3.556	2.803	2.905
Dâmbovița	83.726	63.389	60.809	56.430	41.623	44.690	61.688
Dolj	1.962	2.050	1.839	1.994	2.369	1.642	1.891
Galați	4.825	3.013	2.668	2.091	2.839	3.493	3.422
Giurgiu	1.379	1.545	1.029	1.328	1.504	2.198	1.952
Gorj	4.063	8.011	3.716	6.574	6.305	6.809	6.633
Harghita	3.917	5.942	3.909	4.368	3.925	3.912	2.935
Hunedoara	6.475	10.985	6.639	8.261	7.406	8.163	7.027
Ialomița	119	179	148	287	208	178	181

Iași	10.571	9.273	13.306	10.451	10.527	11.788	10.028
Ilfov	553	566	869	567	566	452	388
Maramureş	42.259	57.629	39.549	37.821	39.306	42.657	33.162
Mehedinți	9.718	11.252	8.139	11.166	8.519	8.943	13.546
Mureș	44.990	26.611	24.531	26.796	38.078	33.258	25.667
Neamț	9.991	13.133	9.241	10.174	10.781	12.114	10.412
Olt	3.850	7.160	3.197	4.357	5.137	5.747	5.858
Prahova	11.717	15.288	12.500	13.175	13.712	14.366	10.966
Sălaj	19.549	24.409	18.193	19.679	27.672	21.655	20.549
Satu Mare	10.829	6.069	5.888	6.023	15.695	15.711	16.448
Sibiu	20.768	10.638	8.500	12.794	11.600	7.522	9.396
Suceava	35.209	49.760	34.517	33.187	37.354	31.460	28.900
Teleorman	715	1.127	643	857	1.054	1.156	949
Timiș	12.543	6.502	3.591	4.349	4.488	5.740	3.894
Tulcea	1.714	2.428	1.403	1.254	1.484	1.353	1.240
Vâlcea	36.129	38.050	26.064	26.859	15.412	14.479	15.886
Vaslui	4.353	5.752	4.943	2.040	8.537	7.844	8.700
Vrancea	12.953	17.360	11.932	11.980	12.714	11.767	12.355
București	192	75	78	40	29	25	25
TOTAL	**550.763**	**633.748**	**473.859**	**528.533**	**525.216**	**480.311**	**470.714**

Source: NIS data processing

As shown in Table no.3, the county with the largest apple production is Dâmboviţa, followed by Argeş, Maramureş and Suceava. The largest apple production in the analyzed range was in 2010 in Dâmboviţa County, this being 83,726 tons. Also in this county, in 2014, because of the spring frost, production was almost half, respectively 41,623 tons. In Arges, the best year was 2011 with 57,358 tons and the lowest 2016 with 39,453 tons.

In Maramures, the situation was the same, the year with the highest production being in 2011 with 57,529 tons and the lowest 2016 with 33,162 tons. Suceava County also registered the same trend with 49,760 tons in 2011 and 28,900 tons in 2016 respectively.

As for apple production at country level, Table 4 shows that compared to the multiannual average of 1,272.8 thousand tons, only in 2010, 2011 and 2013 it was higher while in the other years of the series , the recorded productions were below the calculated average (Table no. 4).

Table no. 4. Evolution of total apple production

Specification	**Year 2010**	**Year 2011**	**Year 2012**	**Year 2013**	**Year 2014**	**Year 2015**	**Year 2016**
Total production (mii tone)	1.419,6	1.480,0	1.128,6	1.299,9	1.115,2	1.224,7	1.241,5
Multi-annual average (mii ha)	1272,8	1272,8	1272,8	1272,8	1272,8	1272,8	1272,8
Deviation from the average	146,8	207,2	-144,2	27,1	-157,6	-48,1	-31,3
SPA	21554,4	42937,8	20789,5	735,2	24833,3	2312,2	978,8
Variance	3592,4	7156,3	3464,9	122,5	4138,9	385,4	163,1
Standard deviation	59,9	84,6	58,9	11,1	64,3	19,6	12,8

Source: NIS data processing

Although it ranks fourth as an apple producer, Suceava County is a "champion" in terms of their sales price in the markets, the average being 3.73 lei/kg. The county with the lowest prices for selling apples in the markets is Covasna, where the average was 2.13 lei/kg. The situation presented is an anomaly because the rule is at high production low price and vice versa (Table no 5).

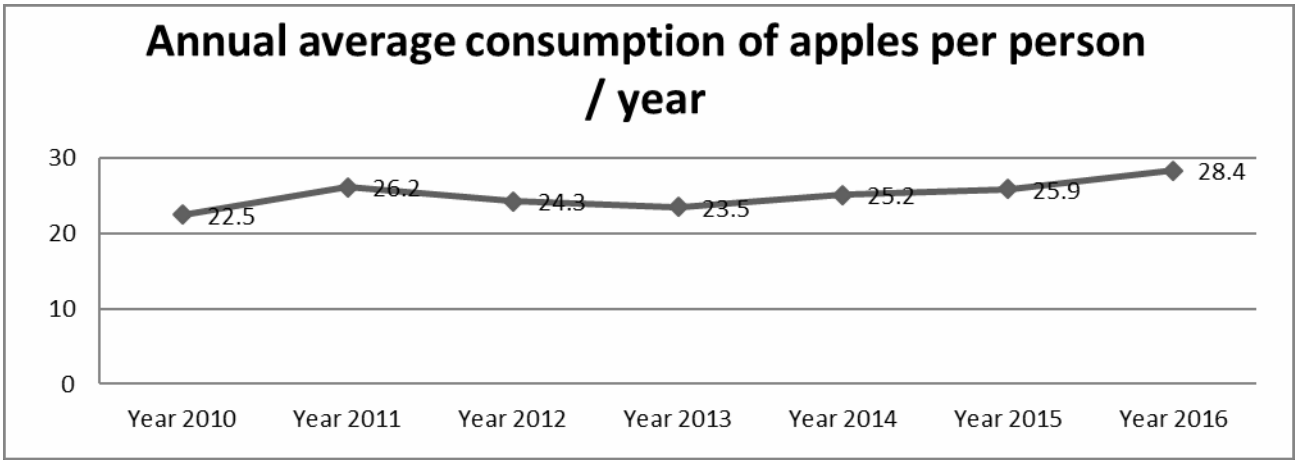
Table no. 5. Average price for capitalization of apples by county (lei/kg)

County	*Year 2013*	*Year 2014*	*Year 2015*	*average*
Suceava	3,81	3,71	3,68	3,73
Călărași	3,43	3,61	3,66	3,57
Constanța	2,98	3,79	3,78	3,52
Tulcea	3,69	3,44	3,21	3,45
București	3,47	3,06	3,29	3,27
Teleorman	3,21	3,22	3,29	3,24
Timiș	3,31	3,15	3,01	3,16
Neamț	3,35	2,95	2,81	3,04
Bihor	3,16	2,92	2,87	2,98
Arad	3,36	2,63	2,88	2,96
Vrancea	3,06	2,71	3,08	2,95
Gorj	3,04	3,02	2,76	2,94
Iași	3,01	2,95	2,86	2,94
Alba	2,97	2,78	2,99	2,91
Giurgiu	3,02	2,84	2,83	2,90
Harghita	3,05	2,91	2,65	2,87
Hunedoara	2,85	2,66	3,05	2,85
Brașov	2,81	2,89	2,82	2,84
Buzău	3,29	2,52	2,66	2,82
Mehedinți	2,64	2,82	2,97	2,81
Prahova	2,96	2,55	2,84	2,78
Cluj	2,85	2,58	2,91	2,78
Olt	2,73	2,84	2,73	2,77
Argeș	2,64	3,02	2,58	2,75
Mureș	2,73	2,58	2,86	2,72
Caraș Severin	2,74	2,79	2,61	2,71
Galați	2,01	2,93	3,19	2,71
Ialomița	2,59	2,67	2,83	2,70
Braila	2,75	2,31	2,75	2,60
Dâmbovița	2,57	2,61	2,57	2,58
Bacău	2,63	2,39	2,68	2,57
Maramureș	2,56	2,61	2,41	2,53
Vâlcea	2,37	2,36	2,83	2,52
Satu Mare	2,63	2,21	2,41	2,42
Bistrița Năsăud	2,57	2,32	2,31	2,40
Sibiu	2,32	2,29	2,58	2,40
Sălaj	2,32	2,29	2,58	2,40
Vaslui	2,21	2,56	2,25	2,34
Botoșani	2,38	2,37	2,17	2,31
Dolj	2,38	2,17	2,11	2,22
Covasna	2,25	2,08	2,05	2,13

Source: NIS data processing

Analyzing data from the 2010-2016 period the average consumption of apples per year/person increased by 5.9 kg which means 26.22% (Chart no. 1).

Chart no. 1



Source: NIS data processing

In our country, in the last years, there is a change, on a scientific basis, of the mentality of the population. Fruits contribute substantially to balancing dietary ratios, their consumption, especially fresh, preventing diseases caused by sedentary, stress and other factors that negatively affect the life of modern humans.

CONCLUSIONS

By their content of vitamins, carbohydrates and minerals, fruits contribute to maintaining and increasing the health of the population. Therefore, they must be an important part of the daily human food requirement. In our country, in the last years, there is a change, on a scientific basis, of the mentality of the population. Fruits contribute substantially to balancing dietary ratios, their consumption, especially fresh, preventing diseases caused by sedentary, stress and other factors that negatively affect the life of modern humans.

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CONSIDERATIONS ON THE FUNCTIONALITY OF SHORT CHAINS OF SALE VEGETABLES/FRUITS

CHETROIU RODICA[1], IURCHEVICI LIDIA[2]

Abstract: *The paper is part of the research carried out under the ADER Project 16.1.2 - Models of development of the short chains of valorization on primary production-services-storing-processing-marketing pathway, Stage 4 and is based on the results of applying questionnaires to vegetable / fruits producers, in order to identify the degree of functionality of the short chains of capitalization of production, as well as the problems they face. The analyzed problem refers to the context and valorization of production, the belonging of the producers to a form of association, their position regarding the functionality of the short chains, the financial resources necessary for the development of the production processes, accessing the European / national funds for the development of the activity etc.*

Keywords: *vegetables, fruits, chains of valorization, producers*

JEL Clasification: *O13, Q23*

INTRODUCTION

The short chains of valorization vegetables / fruits is aimed at selling from one producer to the consumers, by involving as few as possible intermediaries. This concept has great openness in most of the countries of the European Union, and in the last years it has an expansion in Romania, both among producers and consumers. In this way, food systems are created in which the production, processing, marketing and consumption of vegetables / fruits takes place in a relatively small geographical area.

Consumers demand for local products, with known origin, alongside the need for producers to add value to the production and marketing of their own agricultural goods, is a prerequisite for the emergence of short supply chains. Consumption of local vegetables / fruits has the effect of reducing the distances they are transported, which can bring economic, environmental and social benefits such as savings in transport costs, lowering gas emissions, and so on. [4]

Based on the results of the application of questionnaires to vegetable / fruit producers, the present paper is of high relevance and highlights the degree of functionality of short chains in our country, the context and the valorization of production within them, as well as the position of producers towards this type of organizing horticultural activity.

MATERIAL AND METHOD

The present study is based on a quantitative research (questionnaire) performed among the producers who hold agricultural holdings with vegetables and / or fruits, which took place in different horticultural areas in Romania.

The questionnaire contained 34 questions, with the possibility to provide multiple answers and was completed by 140 respondents, sampled according to certain criteria, as follows: by gender: 72.8% men, 27.2% women ; age: 10.7% between 18-25 years, 39.3% between 26-40 years, 46.4% between 41-65 years, 3.6% over 65 years; occupation: farmers 64.3%, employees 2.9%, other occupations 32.9%; residence environment: rural area 16.4%, urban environment 83.6%; level of education: gymnasium 8.6%, high school 47.9%, higher education 43.6%.

In order to synthesize the results obtained, the SPSS program (Analyze-Descriptive Statistics-Frequencies) was used.

[1]PhD. Chetroiu Rodica, Scientific researcher III – Research Institute for Agriculture Economy and Rural Development, e-mail: rodica.chetroiu@iceadr.ro

[2] Eng. Iurchevici Lidia, Scientific researcher III – Research Institute for Agriculture Economy and Rural Development, e-mail: lidia.iurchevici@iceadr.ro

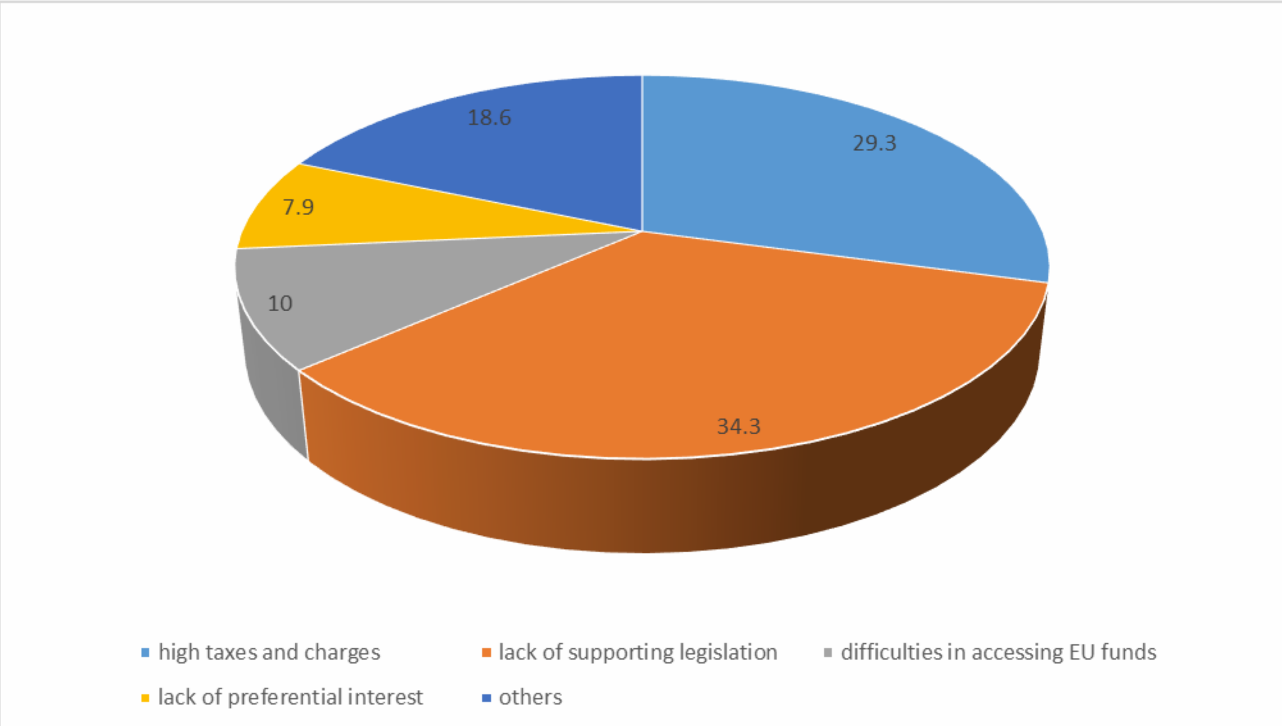
RESULTS AND DISCUSSIONS

Integration of vegetable / fruit production activities within a short chain of valorization means associating operators at the same level of the chain, such as producer cooperation, processor association, etc. [2]

Concerning the belonging to a short chain of valorization of the fruit and vegetable production, 78.6% of the respondents answered negatively and the remaining 21.4% answered affirmatively, which shows that the majority of the producers are not part of a short chain of valorization, but the intention to associate in the future is optimistic, as 82.1% consider taking part in an associative form in the near future and only 17.9% are unwilling to do so.

Regarding the reasons why they did not associate, 29.3% of respondents invoked large taxes and charges; 34.3% - lack of legislation to support small and medium-sized producers; 10% - the difficulty in accessing European funds; 7.9% - lack of loans with preferential interest for farmers; others: 18.6% (Chart 1). It results that the main reasons why they did not join the association are related to the extent to which the legislation supports the vegetable / fruit producers and the high level of taxes and duties in the domain. For other reasons, the respondents mentioned the bureaucracy, the fact that they had no one to associate with, and the lack of confidence.

Chart 1 – Distribution of the respondents according to the reasons for not belonging to a form of association



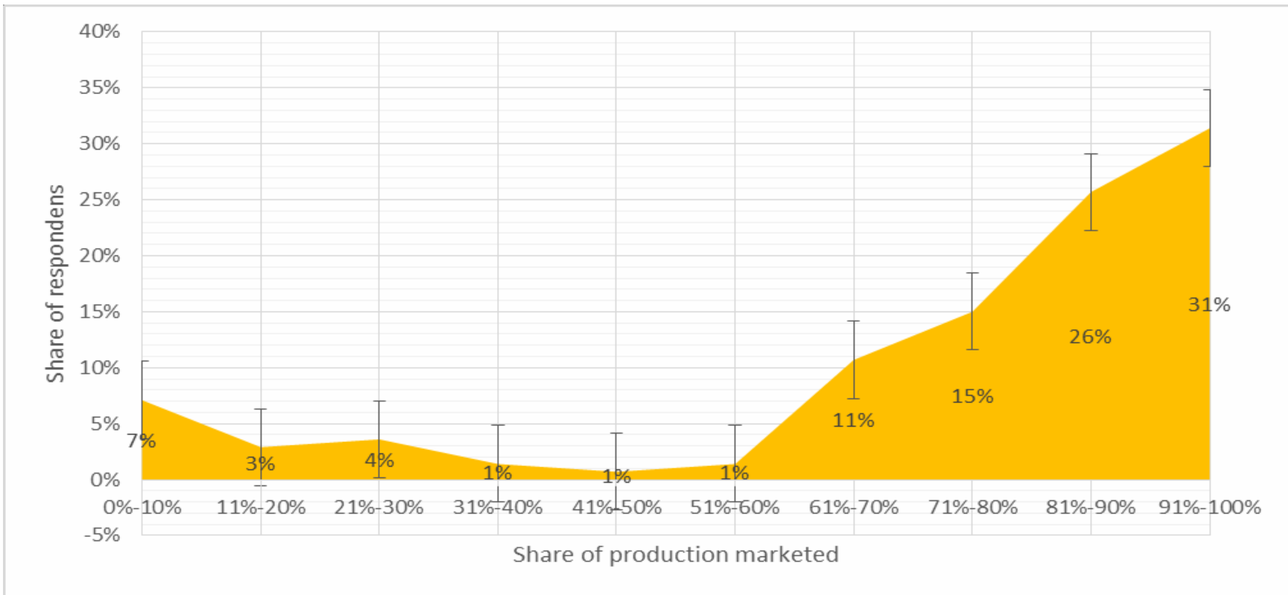
Source: SPSS processing following questionnaire [1]

The partnership approaches for strengthening the vegetable / fruit markets have proved to be effective rural development instruments. By association, new ways to sell products in larger quantities and to attract successful projects can be found. At the same time, closer links can be established between the horticultural, tourism and food sectors of a region.

On the question regarding production planning based on previously concluded contracts, 78.6% of the interviewed producers responded negatively and only 21.4% responded positively. Thus, the answer to this question can be correlated with the question of belonging to a short chain of valorization, where the percentages are identical. Therefore, failure to belong to a short chain of valorization has, among other things, a casual selling of production without a contract, which raises the degree of insecurity regarding the marketing of production and affects the resumption of future production cycles.

Another question in the questionnaire referred to the share of the production of vegetables / fruits marketed. Thus, 31.4% of the respondents said that they managed to sell between 91-100% of the produced quantity and about 26% sell between 81-90%, and 84% of the respondents sell more than half of the production (Chart 2).

Chart 2 – The share of production marketed

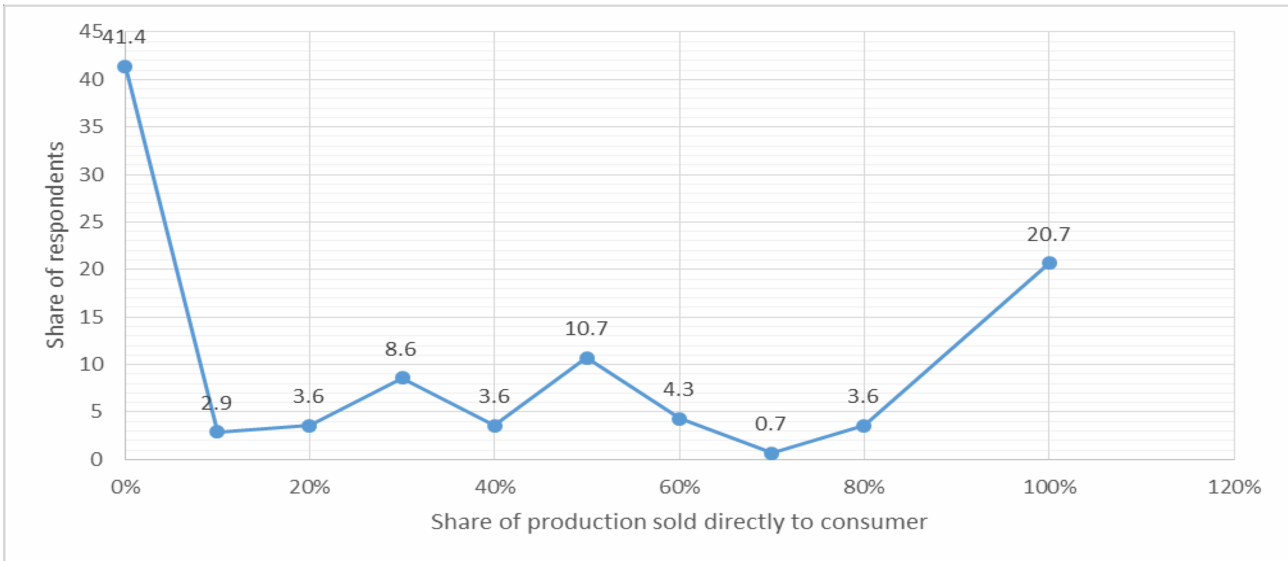


Source: SPSS processing following questionnaire

Regarding the location of selling the production obtained, most of respondents use vegetables / fruits on the local market, only 3.6% sell exclusively on the county market, 12.1% exclusively on the national market, and on the external market, 1.4% of the interviewees use half of their production.

The way of marketing of the fruit / vegetable production directly to the consumer was another question in the questionnaire, to which the respondents responded according to Chart 3, as follows: only 20.7% of them sell totally directly to the consumer on the short chain, and 41.4% do not sell directly to the consumer, meaning to an intermediary, adding another stage to the valorization of vegetables / fruit on chain.

Chart 3 – Selling vegetables / fruits production directly to consumer



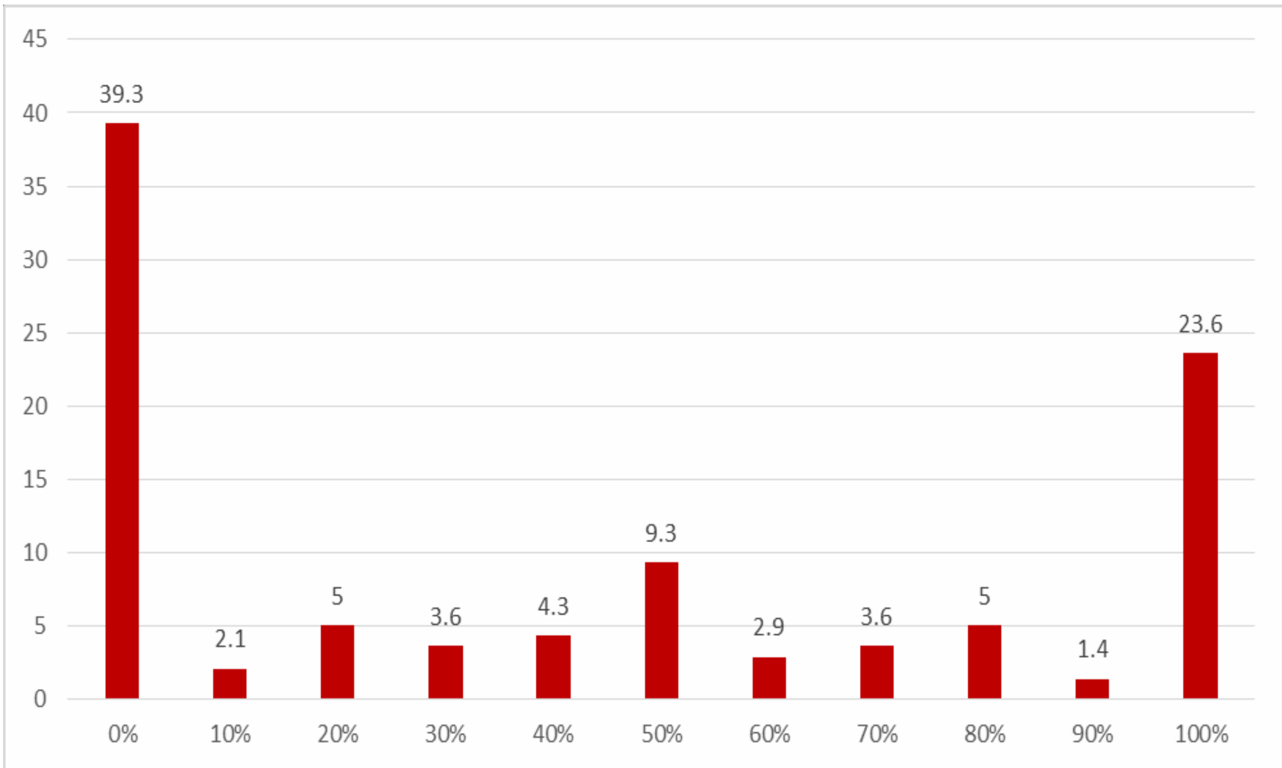
Source: SPSS processing following questionnaire

Consumers have a fundamental right to tasty and healthy vegetables / fruits local produced. The access to fresh products, in a short term, through the marketing of local products, contributes to improving the state of public health, by diversifying food regimes and preserving all organic food qualities (which are reduced by long-term conservation systems).

The short supply chain extension refers to the ability to retain the bulk of benefits for producers. This can be done without any intermediary (direct sale) or with one or more intermediaries, but the relationship between the intermediary and the producer is based on exact information on the origin of the product, the producers and the conditions under which it was processed, thus allows a contact of the consumer with production. [4]

The marketing of the production engross was also another subject of the questionnaire, to which the answers were polarized in the two extremes, namely: 39.3% of the producers do not sell engross at all and 23.6% sell exclusively by using this type of intermediary (Chart 4).

Chart 4 – Selling production engross



Source: SPSS processing following questionnaire

The Romanian producer reaches quite difficult with the production of fruit / vegetables in the big shopping centers, especially because he produces seasonally and its production is low and does not meet the quality requirements imposed by hypermarkets. [3]

To the question about the intention to integrate the farm's activity into a short chain of valorization vegetables / fruits, 32.9% responded negatively and 67.1% responded positively. So, even if in present the expansion of the short chains of valorization is currently limited, in the future, at least at the level of intent, this is a valid option amongst vegetable / fruit growers.

Regarding the perception of functionality, the respondents stated that the short chain has a medium degree of functionality compared to other forms of valorization of the obtained production (according to the SPSS methodology). They also believe that the existence of a single intermediary in the marketing process is beneficial in terms of time and money savings. Most of them appreciate that the optimal choices for their business development are accessing European funds and implementing short chains of capitalizing on production by removing intermediaries.

CONCLUSIONS

The short chains of valorization fruit / vegetable support the regional and local economy, processing, marketing and local services. When revenues are spent locally, on short chains, they remain in the region and lead to an increase in community revenue compared to regular business trades. Also, short distribution channels increase mutual interaction, meetings and mutual understanding between consumers and producers. By personal contact with the producers, they allow the establishment of reliable relationships and the immediate traceability of products for consumers.

The short chains are defined by several key features [4]: increased ability to provide information about the producer and the foodstuff; the ability to ensure a fair price (preserving added value to the producer and superior benefits for consumers); the short chain dimension: from a direct relationship to a fewer number of intermediaries.

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