Researches regarding the confirmation of sunflower hibrises by influence of technological verifications in the south water area of Romania

Eremia, Florentina

USAMV Bucuresti

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RESEARCHES REGARDING THE CONFIRMATION OF SUNFLOWER HIBRISES BY INFLUENCE OF TECHNOLOGICAL VERIFICATIONS IN THE SOUTH WATER AREA OF ROMANIA

EREMIA FLORENTINA[1]

Abstract: *The main purpose of this paper is to determine the best sunflower hybrids (Helianthus annuus) suitable for the southern part of Romania, which under different conditions of fertilization and technology will lead to the achievement of large and stable productions. The experience was located at INCDA Fundulea, on a uniform chernozem soil in terms of fertility and microrelief. The experimental module was of the trifactor type and was arranged according to the subdivision parcel method in three rehearsals. The cultivation of the plants was carried out under optimum conditions, specific to the culture area, in the non-irrigated version, the genotypes taken into study consisting of three hybrids: Performer, Barolo RO and PR64A89. The conclusions are to determine the associated influence of three crop factors, namely plant density, fertilization and hybrid influence on sunflower production under the climatic year 2013.*

Keywords: *sunflower, technological links, production, quality*

INTRODUCTION

Sunflower is one of the most important oily plant grown globally (13% of world oil production) and the most important oily plant in Romania. The oil extracted from sunflower achenes is semi-solid and is characterized by pleasant color, taste and smell, high content of vitamins (A, D, E, K) and aromatic substances. In addition, sunflower oil is very well preserved over a long period of time. The oil is extracted by pressing, with a normal yield of about 45%. At one hectare of sunflower, 900 to 950 kg of oil can be obtained at the level of current production, and the plant is thus very economical.

The oil can also be used to make the oleic acid needed in the wool industry, soap as an adjuvant in the manufacture of pesticides, as a boiling oil for paints. Phosphatides produced during the oil extraction process allow large-scale manufacture of lecithin, much appreciated in the food industry: bakery, chocolate, cake, and sausage.

Sunflower cakes are among the most valuable, given their high protein content (45-55%) and their richness in methionine. The high vitamin B content of the complex B. Sunflower contains more riboflavin than soy or peanuts and has a better phosphocalcic equilibrium compared to other cocoons.

High content in cellulose limits their use in feeding monogastrics. Crops from husked seeds do not have this inconvenience. Sunflower seeds can be consumed directly (roasted seeds) more widespread consumption patterns in the US, Scandinavian countries, some Mediterranean countries and Eastern Europe. The varieties intended for this purpose provide around 550 calories /100 g of consumed seeds.

Calidails can be used as feed, especially for sheep (containing 7% protein and up to 57% carbohydrates), assuming a nutritional value similar to medium quality hay. From the ground husks (pericarp), ethyl alcohol, furfurol is extracted, or they can be used for the preparation of fodder yeast, a valuable protein feed for animals and birds.

The strain is very rich in potassium and can be used to produce potassium carbonate or other products. Stems are still used as a source of heat (locally or in the industry for the production of acoustic plates). The sunflower is also an excellent melliferous plant. On 1 ha of sunflower, 30-130 kg of honey (or 15-40 kg) honey / bee family).

From the agricultural point of view it is important that the sunflower releases the land early (end of August - beginning of September), allowing good ground preparation for the following wheat.

[1] Drd. Ing. Florentina Eremia – U.S.A.M.V. Bucuresti eremiaflorentina89@yahoo.com

Sunflower spending is not too high: moderate nitrogen and phosphorus fattening, high potassium requirements, but abundant refunds; the costs for the seed are comparable to corn. Sunflower often accommodates, better than corn, on soils of medium quality and better supports water stress.

For cultivation technology (sowing, sowing, harvesting, etc.), sunflower does not require specialized agricultural equipment. At the same time, agricultural works, land preparation, sowing, chemical weed control, harvesting can be done without hindering works for other agricultural crops.

Among the inconveniences of sunflower is the susceptibility to disease, which implies very serious rotation restrictions, excluding monoculture and returning to the field earlier than 6 years. Difficulties of location after many plants with which it has common diseases and pests. Large water consumption and nutrients in the soil, which requires the fertilization of pre-cultures by applying higher doses of fertilizers.

In our country, sunflower has, among other cultures, a very important place. Due to economic importance and favorable conditions, sunflower will continue to hold a significant place in our country's agriculture. The average yield per hectare at national level is very dependent on the evolution of climatic conditions and the natural fertility of soils. Efficient use of natural resources for sunflower crops in order to achieve economically viable production requires rigorous zoning of hybrids, depending on their climatic resources and biological requirements.

MATERIAL AND METHODS

The experiments aimed to determine methods of increasing the productivity of sunflower crops in the climatic conditions in the southern area of Romania. To determine the optimal sunflower cultivation technology, it was investigated its reaction at different densities, on different fertilization agrofonds, with different hybrids, as well as the interaction of these factors. Also, the evolution of the sunflower quality indices was followed. Location of the experience, observations and determinations were made during the agricultural year 2013, with the following factors and graduations:

• Sunflower hybrid: a1 - Performer, a2 - KWS Barolo RO, a3 - PR64A89

• fertilization with nitrogen and phosphorus: b1 - unfertilized, b2 - $N_{100}P_{50}$, b3 - manure 20 t / ha (applied to the pre-culture)

• plant density: c1 – 50.000 plants / ha, c2 – 60.000 plants / ha

The experience was located at INCDA Fundulea, on a uniform chernozem soil in terms of fertility and microrelief. The experimental module was of the trifactor type and was arranged according to the subdivision parcel method in three rehearsals.

RESULTS AND DISCUSSIONS

The correlation of natural conditions with the biological requirements of sunflower culture has led to the delimitation of 5 areas of favorability:

a) The Ist area comprises the areas of the Romanian Plain, the south of Dobrogea and the Plain of Oltenia. Featured Hybrids: Select, Festiv, Fundulea 206, Super, Alex, Florom 249, Justin, Performer, Florom 328, Turbo, Favorite, Wonder, Saturn, Top-75, Venus.

b) The IInd area is represented by the Western Plain (Timis and Arad counties). Recommended hybrids: Felix, Select, Festiv, Florom 249, Alex, Romina, Rapid, Performer, Fundulea 206, Favorite, Lovrin 338 Timis, Wonder, Saturn, Top-75, Venus.

c) The IIIrd area includes the non-irrigated areas in the North of the Romanian Plain and the Neirigian Plateau Dobrogea, being appreciated as a medium favorable for the sunflower culture. Recommended hybrids: Select, Super, Festiv, Fundulea 206, Florom 249, Turbo, Favorit, Romina, Rapid, Alex, Justin, Wonder, Saturn, Top-75, Venus.

d) The IVth area is represented by the Western Plain (Bihor, Satu-Mare counties). Recommended hybrids: Select, Festive, Felix, Florom 249, Turbo, Favorit, Alex, Rapid, Romina, Timis, Wonder, Saturn, Top-75, Venus.
e) The Vth area includes the Jijia Plain, Barlad Plateau and the Transylvanian Plain. Recommended hybrids: Festive, Super, Select, Felix, Fundulea 206, Florom 249, Alex, Rapid, Justin, Wonder, Saturn, Top-75, Venus.

The problem addressed included objectives that aimed to optimize the crop technology in order to obtain a maximum and constant production of sunflower, in the soil and climate conditions in southern Romania, also aiming to increase the economic efficiency and the protection of the environment.

The experimental scheme is of trifactor type, 3x3x2 form, arranged according to the subdivision parcel method, in three repetitions. The experimental results obtained were statistically processed using the variance analysis method (Ceapoiu, 1968).

The sunflower culture has been placed on a uniform land in terms of fertility and microrelief. The total area of the experience was 11760 m2.

Total area for experimental parcel - 168 m2; and the yieldable area - 112 m2. The precursor lath was wheat in all years of experimentation.

In order to organize the experience, a biological material consisting of 3 sunflower hybrids was used. The hybrids that constituted the biological material are part of the lists of creations from INCDA Fundulea and foreign (Pionier and KWS), which through genetic research on sunflower, obtained hybrids with notable performances, corresponding to the new requirements of the culture technologies and zoning. Cultivation was carried out under the conditions of the optimal crop-specific technology for the three hybrids.

The associated influence of hybrids, fertilization, and plant density on sunflower production in 2013 (Table 1, Fig. 1) determined a yield of 3.370 kg/ha using the PR64A89 hybrid by applying a $N_{100}P_{50}$ nitrogen dose density of 60.000 plants / ha, followed by the KWS Barolo RO hybrid with a yield of 3.183 kg/ha. The smallest sunflower production was obtained using the Performer hybrid, resulting in a production of 1.913 kg/ha, by applying a $N_{100}P_{50}$ nitrogen dose and a density of 50.000 plants/ha .

Regarding the hybrids, production growth is statistically assured in favor of the PR64A89 hybrid, but any of the hybrids studied can be cultivated, depending on the concrete conditions of each farm. Obtaining a sunflower production of more than 3.370 kg/ha is possible by applying a $N_{100}P_{50}$ nitrogen dose; non-application of chemical fertilizers results in a reduction in production of 470 kg / ha (Table 1, Figure 1).

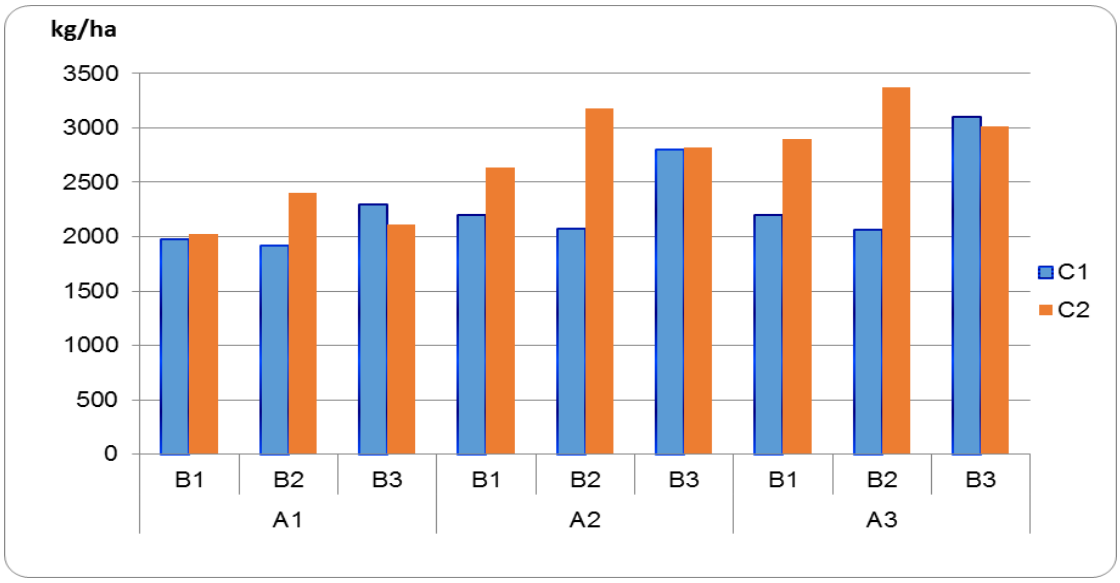
Table 1 Associated influence of hybrid, fertilization and plant density on sunflower production (average - in 2013) (kg/ha)

Varianta		Hibridul C1	Hibridul C2	Productia medie
A1	B1	1980	2021	2001
	B2	1913	2406	2160
	B3	2296	2110	2203
A2	B1	2200	2633	2417
	B2	2073	3183	2628
	B3	2803	2816	2810
A3	B1	2203	2900	2552
	B2	2060	3370	2715
	B3	3100	3016	3058
Productia medie		2292	2717	**2505**

DL (P 5%) - 160.1 DL (P 1%) – 204.1 DL (P 0.1%)- 406.2

Source: personal calculation

Figure 1. Influence of hybrid, fertilization and plant density on sunflower production



Source: personal calculation

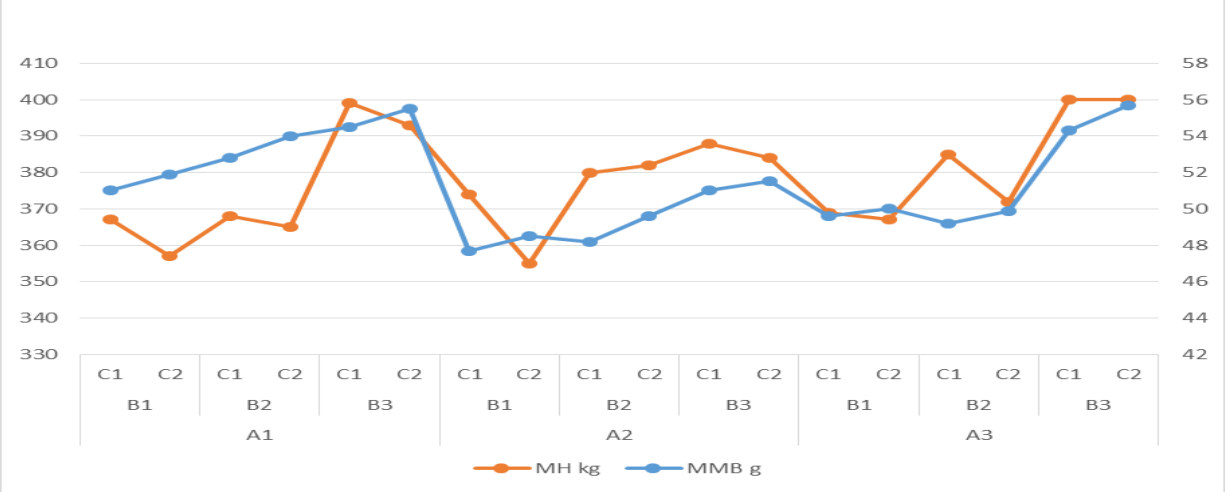
By comparing graduation averages, the mass of 1.000 grains (MMB) in sunflower is influenced by plant density and crop fertilization. Thus, the highest MMB values were obtained at a plant density of 60.000 plants / ha, on a fertilized basis with 20 t / ha manure (applied to the pre-culture), the MMB values obtained were 399.0 g at hybrid PR64A89 versus 388 g in the Performer hybrid (Fig. 2).

Regarding the to hybrids, although the production increase is statistically assured, the difference is relatively small so that any of the three hybrids can be taken in the culture.

The results obtained in terms of the hectolitre (MH) mass in sunflower crops show that the highest values were obtained at the plant density of 50.000 plants/ha, on a fertilized basis with 20 t/ha of manure, 56 kg on the PR64A89 hybrid, 55.5 kg for the Performer hybrid, and 54 kg for the KWS Barolo RO hybrid (Figure 2).

Regarding the reaction of the hybrids to the interaction of the studied factors, a similar behavior of the three hybrids is observed, the values of MMB and MH values being close..

Figure 2. Influence of hybrid, fertilization and plant density on MMB and MH at sunflower



Source: personal calculation

CONCLUSIONS

Under the conditions of 2013, the influence of the hybrid on sunflower production shows a relatively small differentiation of hybrids. From the data obtained, it results that the highest production of 3370kg/ha was obtained at the PR64A89 hybrid. The use of the Barolo RO hybrid produced a production of 3.183 kg/ha, compared to the Performer, which was 1.913 kg/ha, the difference being significant.

The influence of crop fertilization on sunflower production in the year 2013 by applying 20t /ha of manure to the previous crop yielded an average yield of 3.058 kg/ha for the PR64A89 hybrid compared with unfertilized control variant, which yielded 2.203 kg/ha. The production differences obtained are very significant or distinctly significant to the control.

The influence of plant density on sunflower production by using a plant density of 50.000 pl /ha resulted in a yield of 3.100 kg/ha in the PR64A89 hybrid compared to the control variant, the Performer hybrid with a production of 2.296 kg/ha. Plant density of 50 thousand pl/ha resulted in a significantly negative yield reduction of 804 kg/ha.

By analyzing the interaction of all the factors studied, we can notice a reduction in production of the three hybrids used (Performer, Barolo RO and PR64A89) in the non-fertilized version, with values statistically insured as very significant or significant, ranging between 200 – 1.457 kg/ha.

Regarding the reaction of the hybrids to the interaction of the studied factors, we can observe a similar behavior of them, the productions being comparable depending on the applied technological variant.

In conclusion, depending on the evolution of the climatic elements of the agricultural year and the applied crop technology, the variant for 2013 included the fertilization of the $N_{100}P_{50}$ culture, the density of 60 thousand pl/ha and the cultivation of the hybrid PR64A89 followed by KWS Barolo RO.

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