Changing Scenario of Pulses in India: An Analysis of its Growth and Instability in Eastern States

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Abstract

Despite of deceleration in area and marginal rise in production due to higher productivity growth rate but gross decline in area and production is perceived to be a major threat towards future food and nutritional security of the country as well as the Eastern states. Framing strategies to overcome the present gloomy situation may be considered as a greatest ever challenge faced by policy makers as well as agricultural scientists. The strategies for stepping up domestic production must include development and adoption of modern technology including high yielding varieties, better monetary incentives to farmers to make pulses cultivation more remunerative than competitive crops, assured market which will motivate farmers to allocate more land for pulses cultivation. The minimum support price should be greater coordination with farm harvest price and market price. The Inputs constraints particularly quality seeds, fertilizers and lifesaving irrigation growth are not enough as compared to rice and wheat crops.

Liberalized and subsidized import of pulses of India helps to meet demand-supply gaps, which have occurred because of stagnation in the area under cultivation, very slow growth in yield, poor increase in production and speedy increase in population. Ban on export and re-export of pulses make the closure of Indian pulses processing units. Problems of pulses economy can be solved with the increase the sources of production. Effective and continuous efforts are needed to increase the area under cultivation with better technological and logistic support.

Key Words: Pulses, Eastern India, Production of Pulses, Growth

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Introduction

Till the 'fifties, the Eastern Region was reputedly the most prosperous region in the country, maintaining a lead over the other regions with highest food grain yield of 644 kg/ha as against 608, 554 and 390 kg/ha in northern, southern and western regions, respectively. However with the advent of the Green Revolution, which ushered in the 'western' model based on large scale adoption of HYV seeds, chemical fertilizers and supplemental irrigation along with plant protection measures it lost its leading position. Although successful in North Western India, it has not been widely replicated in the Eastern region due to a variety of constraints rooted to socio-economic features, fragmented and smaller land holdings as well as institutional, organizational, technological and developmental inadequacies. The Eastern Region comprising of Eastern UP (85,844 sq km), Bihar including Jharkhand(1,73,877 sq km), West Bengal (88,752 sq km), Assam (78,438 sq km), Orissa (1,55,707 sq km), and Chhattisgarh(1,44,422 sq km) occupying about 28% of the country's geographical area with food grain production of 58 million tons (34.6% of the total) and inhabited by about 35% of the country's population. It has 1.24 times higher population density than the national average Agricultural is below its potential in this region resulting in large proportion of the population remaining below the poverty line and malnutrition prone. Per capita availability of cultivated land in the Eastern Region is lowest in the country and most of the farm holdings are marginal to small, and highly fragmented, hampering the adoption of high-tech agriculture. But the region is rich in rain, surface and ground water resources with average annual rainfall ranging from 1100 to 2000 mm. However, there is occurrence of long drought spells or, heavy monsoon rains resulting in flooding, making crop cultivation during the kharif season uncertain. Ground water potential is also high (30 million ha-m) with less than 20 percent is being utilized.

Cultivation of pulses is an integral part of cropping system of Eastern India as whole with an area of 3239.3 thousand ha area under total pulses and production of 1861.2 thousand tones with an average yield of 524 Kg/ha even after excluding eastern UP and Chhattisgarh, and was equivalent to the national average in 1970-71. However, during the last four decades there has been a drastic with reduction in pulses area with only 2284.5 thousand ha area and in production of 1865.8 thousand tones only in 2013-14 which has marginally increased. The shift in area from pulse crops to other crops has been quite significant and these area

substituted by other cereal crops mainly rice and wheat. This decline in pulses area has been largely attributed to relatively higher profitability of rice and wheat as comparison to legumes (Malik 1994). The net per capita per day availability of pulses have declined from 61 gms to 32 gms during 1951 to 2010 in India, and in states like Bihar, it is estimated to be only 18gms/capita/day. Unlike anywhere else in the world, pulses are staple food for majority of Indians. India due to its ever increasing population is the largest consumer of pulses, yet every year nearly a quarter of our demand has to be met through imports. Only 16% of the area for cultivation of pulses has access to irrigation. In comparison, nearly 93% of area under wheat cultivation and 59% of the area under rice cultivation has irrigation facility. This shows up in the lower productivity of pulses 6-7 quintals per hectare. There is an increased gap in demand- supply and the shortfall in pulses has been attributed to number of factor, major ones being the increasing population, rising income of the people, geographical shift, abrupt climate change, complex disease–pest syndrome, socio- economic policies and input constrains (Ali and Gupta, 2012), besides other economic factor like lack of assured market, ineffective government procurement, lack of minimum support price making pulses cultivation less remunerative as compared to other crops.

Objective

The objective of this study is to analyze the growth and instability in area, production and productivity of pulse crops in eastern India and suggest ways and means to increase their area and productivity for sustaining not only the soil health but also reduce reliance on imports for meeting the domestic demand.

Material and Methods

To analyze the trends in growth of area, production and productivity of pulse crops in Eastern India, secondary data regarding area, production and productivity of total pulses in four and half decades from 1970-71 to 2014-15 that is 1970-71 to 1984-85, 1985-86 to 1999-2000, 2000-01 to 2014-15 and the compound annual growth rate and instability were analyzed.

Compound growth rate were calculated using the following equation

$$y = ab^t$$

or $$logy = loga + tlogb$$

CGR (%) = [(antilog(b)-1)] x 100

Where,

t is the time in years. (Independent variable)

y is area, production or productivity (Dependent variables)

The parameters *'a'* and *'b'* are calculated by applying method of Ordinary Least Square (OLS)

The study has taken into account the eastern Indian states namely, Bihar, Jharkhand, West Bengal, Odisha, Assam for computing the growth rates in area, production and productivity, however, and Chhattisgarh only for period after year 2000, but Eastern Uttar Pradesh have not been included due to lack of data for these states.

Results and Discussion

Analysis of CGR of area, production and yield of total pulses in Eastern India and India

The perusal of shows that overall there has been a similar trend in the status of area and production of pulses in both eastern India and country as whole. Between periods of 1970-71 to 1984-85 CGR was 0.36 in area 0.75 production and 0.39 in productivity for eastern India as compared to 0.13, 0.29 and 0.16 CGR of area, production and yield respectively of the country as a whole. The picture started to change from the period of 1985-86 to 1999 to 2000 when a very visible CGR is seen in area under pulse cultivation resulting in corresponding negative CGR in production and yield of pulses both at national and eastern region basis. The situation has improved marginally during the period of 2000-01 to 2014-15. But in the period of 1970-71 to 2014-15 there was negative growth in 0.52 in area of total pulses and 0.16 in production in Eastern India as compared to CGR of 0.03 and 0.45 in area and production of total pulses respectively at national level (Fig. 1).

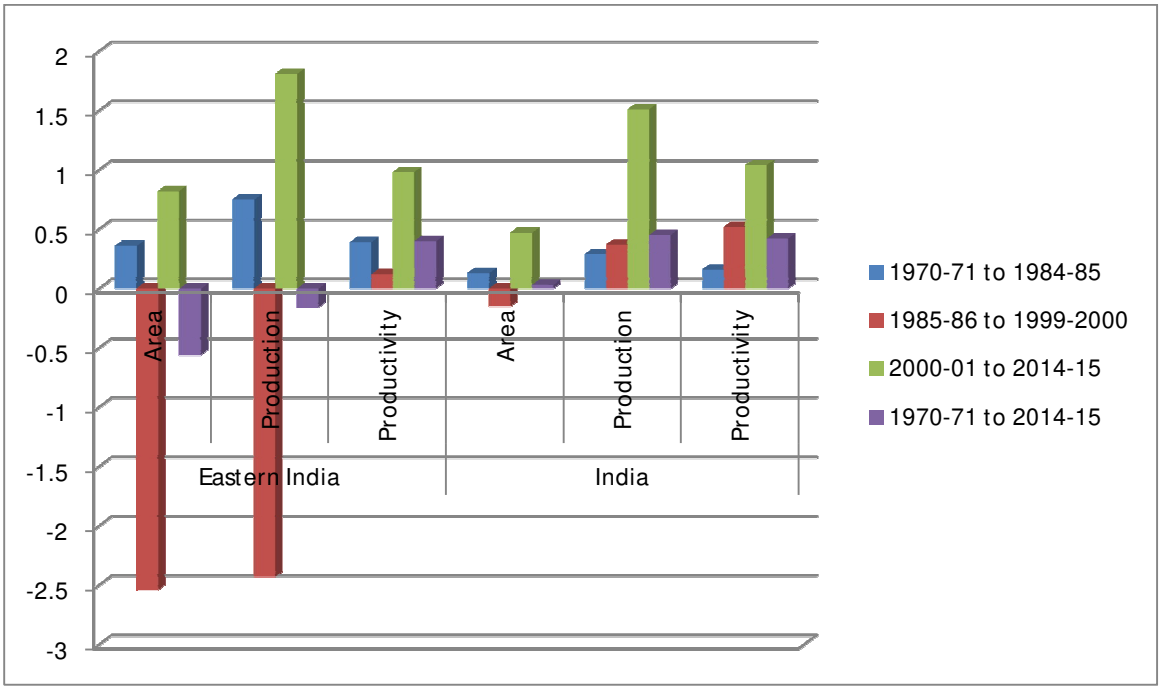

Fig 1. CGR of Eastern India and India during period of last 45 years

State wise analysis of CAGR of area, production and yield of total pulses:

As per analysis there were the highest down fall in growth rate of total pulses area (-1.28) in W. Bengal and Bihar followed by Orissa (-0.69) which were major traditional pulse growing states. But this decrease is seen in all the eastern states under study. Decreased producThe Shift of traditional pulse growing area resulted in decreased production and slowly pulse cultivation became poor crop mostly grown in rain fed condition and resulting in high yield fluctuation every year. Owing to high instability in productivity there has been an incessant decline in area of pulses area, production and productivity during last four and half decades in all the eastern states (Table-1).

Table 1: Growth scenario of pulses area, production and productivity of sates of Eastern India during last 45 years

EASTERN STATES	1970-71 to 1984-85			1985-86 to 1999-2000			2000-01 to 2014-15			1970-71 to 2014-15		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Assam	1.38	1.45	0.07	-0.48	0.44	0.92	0.43	0.43	0.43	**0.19**	**0.66**	**0.48**
Bihar	-0.78	1.09	1.88	-1.29	-1.06	0.23	-1.10	-0.18	0.93	**-0.91**	**-0.18**	**0.74**
Odisha	2.66	3.08	0.41	-4.03	-5.50	-1.53	0.92	2.27	1.34	**-0.69**	**-0.83**	**-0.13**
W. Bengal	-1.74	-1.63	0.11	-1.84	-1.39	0.46	-0.41	0.31	0.72	**-1.28**	**-0.74**	**0.55**
Jharkhand	-1.83	-3.49	-1.69	-1.07	0.54	1.63	5.63	6.86	1.19	**0.24**	**0.66**	**0.42**
Chhattisgarh							1.70	3.18	1.46			

*State wise area production and yield of total pulses during TE,1980, 1990, 2000, 2010***:**

The major pulse growing states i.e., Bihar, W. Bengal and Odisha occupied 1291.2, 501, 1714.7 thousand ha respectively under pulses in TE 1980 which declined to nearly 569.4 & 420.5 thousand ha of Bihar and Jharkhand and 193.3 and 825.4 thousand ha in W.Bengal and Odisha respectively in TE 2010 (Table 2).

State wise productivity:

In case of state wise productivity was seen lot of variation with minimum ranged 420kg /ha in Assam and the highest was recorded in Bihar 576 kg /ha followed by W. Bengal 511 kg /ha, and Odisha 463 kg /ha however the national average recorded 447 kg /ha during TE 1980 (Table 2).This high yield trend is visible in TE 2010 also with the nearly all states showing greater yield than national average of 672.6 Kg/ha as compared to 900kg/ha in Bihar, 869kg/ha in Jharkhand, 858.6kg/h of W. Bengal. All this shows greater potential of this region to become the pulse bowl of country.

Scope for cultivation of Pulse crops in rice fallows of Eastern India:

It is most unlikely that any additional area will be available for pulses cultivation in future, due to more returns with cereals under irrigation and also due to shrinking land base for

agriculture. However, of the 44.6 million ha of rice grown in India, about 11.7 million hectares remains fallow during the *rabi* (post-rainy season) after harvest of *kharif* (rainy season) rice. Nearly 82% of the rainfed rice fallow lands (RRFL) are located in the states of Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, and West Bengal. The residual moisture left in the soil at the time of rice harvest is sufficient to raise short-duration pulses and oilseed crops and rice fallows can be converted into productive lands. Introduction of pulses such as lentil, mungbean, urdbean, Lathyrus, field peas in rice fallows can augment the domestic availability pulses, which are in short supply and will also help in restoration the soil health. The small seeded varieties of pulses may find prominence under Utera cultivation (relay cropping) in the states of Assam, Bihar, Chhattisgarh, Jharkhand and West Bengal. In low land areas with excessive soil moisture, lentil is more suitable and assured than chickpea. Rice -lentil system can be popularized in the lowlands areas of Bihar, Jharkhand, Eastern UP and West Bengal. Rice fallows can also be a profitably used for Groundnut cultivation in *Char* area of Bihar, Eastern UP, Mahananda *char* of Odisha, Brahmaputra valley of Assam.

Rainfed Rice Fallow Lands (RRFL) represent diverse soil types and climatic conditions as indicated by the GIS analysis; thus a variety of pulses such as soybean, cowpea, mungbean black gram, chickpea, lentil, khesari, horse gram, faba bean, and pea etc can be grown in these regions. Since pulses have wide adaptive mechanisms such as very deep rooting system in pigeon pea and chickpea, high degree of dehydration tolerance, phenotypic plasticity, wide ranging sensitivity towards photo thermo periods and higher moisture retention capacity. The *Utera* cultivation of pulses can be made more effective by using short duration and high yielding varieties of rice, as rice will be vacating the field in September-October. In lowland areas with excessive moisture, lentil is more suitable and assured than chickpea. Consequently, the rice-lentil system can be made more popular in the lowlands of eastern Uttar Pradesh, Bihar, Jharkhand and West Bengal.

Conclusion

Despite of deceleration in area and positive but marginal rise in production due to higher productivity growth rate but gross decline in area and production is perceived to be a major threat towards future food and nutritional security of the country as well as the Eastern states. Framing strategies to overcome the present gloomy situation may be considered as a greatest ever challenge faced by policy makers as well as agricultural scientists. If experts are to be believed, the situation would be critical in the long run if the problems related to pulses production are not properly addressed. Import may resolved the present crises temporarily but higher dependence on import will put heavy pressure on state exchequer in one hand and crop

diversification in favour of corn and oilseeds in major exporting countries might aggravate the crisis in the future on the other. The present situation necessitates long term planning to augment production. The strategies for stepping up domestic production must include development and adoption of modern technology including high yielding varieties, better monetary incentives to farmers to make pulses cultivation more remunerative than competitive crops, assured market which will motivate farmers to allocate more land for pulses cultivation. The minimum support price should be greater coordination with farm harvest price and market price. The Inputs constraints particularly quality seeds, fertilizers and lifesaving irrigation growth are not enough as compared to rice and wheat crops. Liberalized and subsidized import of pulses of India helps to meet demand-supply gaps, which have occurred because of stagnation in the area under cultivation, very slow growth in yield, poor increase in production and speedy increase in population. Ban on export and re-export of pulses make the closure of Indian pulses processing units. Problems of pulses economy can be solved with the increase the sources of production. Effective and continuous efforts are needed to increase the area under cultivation with better technological and logistic support.

References

Joshi, P.K. 1998. Performance of Grain Legumes in the Indo-Gangetic Plain. In: J.V.D.K. Kumar Rao, C. Johansen (ed.) Residual Effects of Legumes in Rice and Wheat Cropping Systems of the Indo-Gangetic Plain. International Crop Research Institutes for Semi-Arid Tropics (ICRISTAT). Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi, 1998. ISBN 81-204-1297-4. pp 3-12

Kumar, Amalendu and Singh KM.2016.An Evaluation of Factors Affecting Pulses Production and Consumption in Bihar.Journal of AgriSearch. 3(4):226-230. http://dx.doi.org/10.21921/jas.v3i4.6707

Malik, R.P.S. 1994. Public policy and sustainable agricultural development - a natural resource accounting approach. *Indian Journal of Agricultural Economics.* 49(4):569-578.

Singh, A.K, Manibhushan, Bhatt, B.P Singh, K.M., and Upadhaya, A. 2013. An Analysis of Oilseeds and Pulses Scenario in Eastern India during 2050-51. *Journal of Agricultural Science* 5(1): 241-249.

Singh, Pushpa; Shahi, Brajesh and Singh, K.M. 2016. Enhancing Pulses Production in India for Improved Livelihood and Nutritional Security: An Analysis of Constraints and Strategies. DOI: http://dx.doi.org/10.13140/RG.2.2.30789.24805

Singh, Pushpa, Shahi, B. and Singh, K.M.2016. Pulses Production in Bihar: An Overview of Constraints and Opportunities. *Journal of AgriSearch*. 3(3):176-184.DOI: http://dx.doi.org/10.21921/jas.v3i3.11381

Singh, Pushpa, Shahi, B. and Singh, K.M.2016.Trends of Pulses Production, Consumption and Import in India: Current Scenario and Strategies. DOI: http://dx.doi.org/10.13140/RG.2.1.2872.1520

Table 2: State wise area production and yield of total pulses during TE 1980 to 2010.

Eastern States	1980-1981			1990-1991			2000-2001			2010-2011		
	Area	**Production**	**Yield**	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**
Assam	111.0	46.76	420	114.43	50.93	445	115.1	64	552	120.46	67.7	563
Orissa	1714.7	799.06	463.6	2038.0	111.7	546	667.3	253.9	379	825.4	390.2	472
Bihar	1291.2	746.1	576	1155	867.3	752.3	758.9	638.2	838.6	569.4	512.5	900
W. Benegal	501	255.6	511	307.1	579.7	630	266	201.9	757.3	193.3	166.3	858.6
Jharkhand	-	-	-	-	-	-	-	-	-	420.5	253.5	869.3
Chhatisgarh	-	-	-	-	-	-	-	-	-	823.2	507	615.6
India	**22.85**	**10.23**	**447**	**23.53**	**13.06**	**553**	**21.16**	**12.69**	**595**	**24.78**	**16.70**	**672.6**

India- Area (million ha) ; Production (million tonnes) ; Yield (Kg/ha)

States- Area (thousand ha); Production (thousand tonnes); Yield (Kg/ha)