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Pulses Production in India: Trend and Decomposition Analysis

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ABSTRACT

Pulses is a major source of protein for a huge section of India particularly vegetarian population. In the present study, an attempt has been made to analyze the trend in production of total pulses crop in India for the period 1950-51 to 2014-15, i.e. past six decades in India. The gross area under total pulses in India was in the range of 19-25 million ha per year over these six decades. The average production of total pulses was in the range of 8 million tonnes to 15 million tonnes per annum over the 6 decades. However, the yield of total pulses was increase over the year. The yield of total pulses was 400 kg/ha during 1950's which increase to above 700 kg/ha during 2014-15. The compound growth rate of yield over six decades was positive and significant while area and production are non-significant. The decomposition analysis shows that increase in production of pulses during the period 1995-2014 was mainly due to yield effect. Since the supply of resources especially land is limited in nature, productivity of pulses should be boosted up by adoption of improved technologies like hybrid pulses cultivation and various technique of production to meet the future increased demand.

Keywords: Pulses, production, compound growth rate, decomposition analysis

Pulses are part of the legume family, but the term "pulse" refers only to the dried seed. It has been considered as the poor man's only source of protein. Pulses are not only the important food grain to supply protein which forms part of the vegetarian diet, but also are useful in many ways. Dried peas, edible beans, lentils and chickpeas are the most common varieties of pulses. Besides being a rich source of protein, they are also important for sustainable agriculture.

In India, pulses grown in 22-33 million hectares of the area with an annual production of 13- 15 million tons (mt). India is the largest producer (25 per cent of global production), consumer (27 per cent of world consumption) and importer (14 per cent) of pulses in the world (Mohanty and Satyasai, 2015). The major pulse crops grown in India are chickpea, pigeon pea, lentil, mungbean, black gram, green gram, cowpea and field pea. Pulses enrich the soil fertility by fixing atmospheric nitrogen in the root nodules and improve the soil structure (Asthana and Chaturvedi, 1999). The tap root system opens the soil into deeper strata and heavy leaf protein increases the soil organic matter and improves the soil structure. Pulses are an ideal crop for mixed and intercropping. With this backdrop, the paper has examined (i) the trend and growth in area, production and yield of pulses (ii) source of increase in pulses production by decomposition analysis.

METHODOLOGY

The data for the period 1950-2015 on area, production, and yield of pulses were compiled from the Indian Agricultural Statistics and Agricultural Statistics at a Glance, Government of India.

In order to analyze the growth in of area, production and yield of pulses, the compound growth rate analysis was carried. The compound growth function was specified as follows:

$$Y = ab^t e^u$$

Y = area/production/yield

a = Intercept

t = Year

b = 1 + r

r = Growth rate

To study the contribution of area, Yield and the interaction of area and yield towards increasing the pulses production in India, a decomposition analysis has been performed and is expressed as,

$$\Delta P = A_B{}^*\Delta Y + Y_B{}^*\Delta A + \Delta A^*\Delta Y$$

(Yield effect) (Area Effect) (Interaction effect)

Where,

$\Delta P = P_C - P_B$

$\Delta Y = Y_C - Y_B$

$\Delta A = A_C - A_B$

A_B, P_B and Y_B are the area, production and yield of pulses for the base year.

A_C, P_C and Y_C are the area, production and yield of pulses for the current year.

The analysis is done for 3 periods i.e. 1995-2005, 2006-2014 and 1995-2014.

RESULTS AND DISCUSSION

Trend in area, production and yield of pulse crops in India

The trend in area, production and yield of pulses of India was given in Fig. 1.

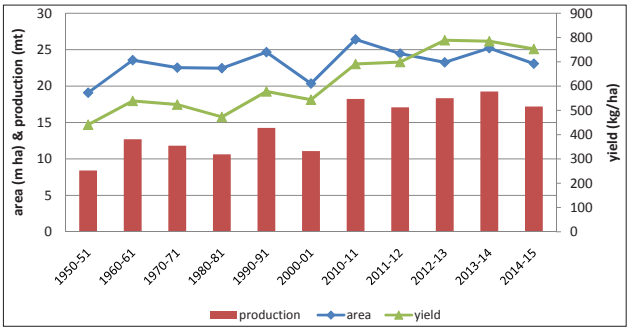

Fig. 1: Trend in Area, Production and Yield of pulses in India source: DES, 2016

In 2014-15, India produced 17mt of pulses from an area of 23 mha with a productivity of 753 Kg/ha. The area under pulses has shown increasing trend from 1950-51 (19 mha) to 1990-91 (24 mha). However, during 2000-01, it was declined to 20 m ha but in the next 10 years it shows increasing trend and it was 26 m ha during 2010-11. During the next four years i.e., from 2011-12 to 2014-15, the area under pulses decline marginally from 24 mha to 23 mha. Further, the production and yield of pulses also increase over the year. The pulses production in India during 1950-51 was 8.4 m tonnes with a productivity of 441 kg/ha which increase to 17 m tonnes with a productivity of 753 kg/ha during 2014-15.

The compound growth rates of area, production and yield of pulses were computed and presented in Table 1.

Table 1: Compound growth rate of area, production and productivity of pulses over the six decades

	Area	Production	Yield
1950-51 to 1964-65	0.62**	1.62**	0.13 ^{NS}
(pre green revolution)	(1.47)	(0.65)	(0.44)
1966-67 to 1994-95	0.12 ^{NS}	0.91**	0.78**
(post green revolution)	(0.08)	(0.22)	(0.19)
1996 -97 to 2014-15			
(post-economic	0.63 **	-4.34 **	1.44**
liberalization)	(0.23)	(1.09)	(0.32)
1950-51 to 2014-15	0.08^{NS}	0.01^{NS}	0.67 **
	(0.04)	(0.15)	(0.07)

*** significant at 5 per cent; NS: non-significant*

Figure in the parentheses are standard errors.

The growth rate of area and production were positive and significant during the pre-green revolution while the growth rate of yield was positive but non-significant. Hence, the increase in production before the green revolution was mainly due to increase in pulses area. During the post-green revolution, production and yield was positive and significant while the growth in area is non-significant, i.e. during the post green revolution the increase in production was mainly due to increase in yield by adoption of high yielding varieties of pulses.

However, the compound growth rate of pulses production was negative and significant during post Economic liberalization despite of positive and significant growth rate of area and yield. When the entire time period under study is considered (1950-51 to 2014-15), only compound growth rate of yield is significant while that of area and production are positive but non- significant. Overall, the production of pulses has increase over the year mainly due to increase in yield.

Area, Production and Productivity of Pulses in Major Growing States of India–TE 2014-15

The state-wise break up of area, production and yield of pulses is presented in Table 2.

Table 2: Share in Area, production and productivity of Pulses among major states in India (TE 2014-15)

Sl. No.	States/UTs	Area (000 ha)	Production (000 tonnes)	Yield (kg/ha)
1	Madhya Pradesh	5335.73 (22)	800.17 (14)	897.67
2	Rajasthan	3674.03(15)	797.57 (14)	606.67
3	Maharashtra	3455.33 (15)	1258.17 (22)	690.33
4	Karnataka	2363.33 (10)	673.60 (11)	604.67
5	Uttar Pradesh	2331.00 (10)	553.67(9)	828.33
6	Andhra Pradesh	1689.00 (7)	354.00(6)	830.33
7	Chhattisgarh	861.57 (4)	78.83(1)	643.00
8	Other	4140.17	1327.80	
9	India	23850.17	5843.80	775.67

Note: *figure in the parentheses indicates the percentage share.*

It may be noted that Madhya Pradesh, Rajasthan, Maharashtra, Karnataka and UP occupied the top five positions in cultivated area. But there is a slight change in the order as far as production is concerned. Maharashtra tops with 22 per cent of total production followed by Madhya Pradesh and Rajasthan with 14 per cent each and Karnataka by 11 per cent. Other states like Uttar Pradesh, Andhra Pradesh, Chhattisgarh are the important pulses producing states. However, highest yield of pulses was observed in Kerala (2015 kg/ha) followed by Himachal Pradesh (1473 kg/ha) and Bihar (1049 kg/ha) during TE 2014-15.

Decomposition Analysis

To estimate the percentage contribution of area, yield and the interaction of area and yield in increasing production of pulses, a decomposition analysis was carried out and presented in Table 3 for the three periods i.e., 1995-2005, 2006-2014 and overall 1995-2014. The results are presented in Table 3. Table 3 shows that during 1995-2005, all the three effects are positive and yield effect is very high accounting for 93.96 per cent. However, in the next period (2006-2014), the area and interaction effect was negative, indicating the production increase was solely due to yield effect. When the entire time period is considered (1995-2014), all three effects were found to be positive and yield and area effects contribute 88 and 8 per cent respectively towards the increase in total production.

Table 3: Percentage decompositions of area, yield and their interaction towards increasing production of pulses in India

Effect/Year	1995-2005	2006-2014	1995-14
Yield Effect	93.96	102.62	88.18
Area Effect	5.59	-2.13	8.67
Interaction Effect	0.46	-0.49	3.16

SUMMARY AND CONCLUSION

From the study, an increasing trend in area, production and productivity of pulses is observed. However, the compound growth rate of yield over six decades was positive and significant while area and production are non-significant. The supply of pulses was unable to meet the growing domestic demand inspite of the growing trend in area, production. The increase in production before the green revolution was mainly due to increase in pulses area, while in the post green revolution the increase in production was mainly due to increase in yield by adoption of high yielding varieties of pulses. The compound growth rate of pulses production was negative and significant during post Economic liberalization despite the positive and significant growth rate of area and yield.

The major pulses growing states are Madhya Pradesh, Rajasthan, Maharashtra, Karnataka and UP. The decomposition analysis concluded that increase in production of pulses during the period 1995-14 shows that yield effect has more contribution than area effect and interaction of area and yield. Since the supply of resources is limited in nature, to meet the future increased demand, productivity of pulses should be boosted up by adoption of improved technologies like hybrid pulses cultivation and various technique of production.

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