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Analysis of variability on pulses in India

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Abstract
This is attempted to examine the variability in area, production, yield and value of output over the period of 25 years. Over all period classified into three periods based on the decade variability examined for all three decades and overall all period also considered. All the pulses showed same variability for all three period except masoor which indicated more variability in Period Ⅰ but all other pulses in Period Ⅱ. For all pulses value of output most varied component fallowed by productivity, area and yield showed less variation. Among all pulses moong showed highest variability for overall period and horse gram indicated very less variability. Low productivity, low net return, pulses have been marginalized by highly remunerative competing crops.

Keywords: production, pulses, variability

Introduction
Pulses are grain legumes have been major part of the Indian diet and rich source of nutrients. Pulses are known as "Poor men's meat and rich men's vegetable". According to FAO (1994), pulses, a subgroup of legumes, are crop plant members of the Leguminosae family (commonly known as the pea family) that produce edible seeds, which are used for human and animal consumption. Pulses are rich source of protein which is available at economical price, pulses contain carbohydrates 55 to 60 per cent, rich in calcium and iron. India is a largest producer of pulses in world producing of pulses 19.98 million tonnes covering the area of 25.26 million hectare with the yield of 652 kg per hectare (GOI, 2016-17). Madhya Pradesh is largest contributor of pulses which contribute about 5.12 million tonnes with the area coverage 22.81 per cent of total pulses fallowed by Rajasthan and Maharashtra both in area and production respectively (GOI, 2016-17). India primarily produces Bengal gram, red gram, lentil, green gram and black gram are the major pluses along with some other pulses. For majority vegetarian population in India pulses are the major source of protein. Pulses and pulse crop residues are also major sources of high quality livestock feed in India. In India pulses are cultivated on marginal lands under rain fed conditions. Because of the high level variation in the pulse production due to both biotic and abiotic stress and price volatility farmers are not very interested on taking up pulse cultivation in spite of high wholesale pulse prices in recent years. Farmers are getting attracted towards high value low volume crops like cash crops like cotton, maize and oilseeds because of better return and lower risks. United Nations (UN) General Assembly, at its 68th session declared 2016 as the International Year of Pulses (IYP) (UN, 2013) to bring awareness in the production of pulses. Since the early 1960s, world production of pulses has increased by about one percent per annum, reaching 77.47 million tonnes area coverage of 85.19 million hectare with average production of 909 kg/ hectare in 2016 (GOI, 2016-17)**.** India is the major pulse producing country with the area coverage of 25.26 million hectare of world production backing of 25.79 percent of world production. Myanmar, Canada and China also largest contribution to the world pulse production respectively (GOI, 2016-17)**.** In developed countries, pulses represent a less important part of traditional diets and a fair share of the production is destined for export. However, per capita consumption of pulses has been increasing due to enrich health benefit and international migration.

Research Methodology
Primarily secondary data collected from various sources like central statistical organization (CSO), food and agriculture organization (FAO) and Agriculture statistics at a glance by ministry of agriculture and farmer welfare. For the whole country period from 1990-91 to 2014-15, for various pulses like gram, arhar, moong, masoor, uad, horse gram and total pulses

data collected to study instability and decomposition of pulses.

Measurement of instability

Instability is the deviation from the trend. It can be measured by using co-efficient of variation. The standard deviation as percentage of means called as co-efficient of variation.

$$CV = \frac{\sigma}{\mu} \times 100$$

Where,

CV = Co-efficient of variation

σ = Standard deviation of the variable

μ = Mean of the variable.

Results and Discussion

Instability analysis of Gram

In order to study the instability of gram area, production, yield and value of output for the overall period (1990-15), calculated and it was found 15.38 per cent variation in the area, 24.16 per cent variation in production, 10.46 per cent variation in and yield 68.95 per cent in value of output (Table 1). During the first period Ⅰ (1990-00), 12.22 per cent variation was observed for area. 15.92 per cent variation for production, 7.74 per cent variation for yield and 32.71 per cent variation for the value of output observed. During period Ⅱ (2000-10), 13.23 per cent variation for area, 19.46 per cent variation in production, 7.77 per cent variation in yield, and 36.96 per cent variation for value of output were obtained. During period Ⅲ (2010-15), 8.08 per cent variation for area, 10.55 per cent variation for production, 6.36 per cent variation for yield, and 16.90 per cent variation for value of output obtained. Period Ⅱ showed more variation for all the variables as compared to other sub-period of study (Table 1).

Table 1: Instability analysis of Gram

Items	Particulars	Period Ⅰ (1990-00)	Period Ⅱ (2000-10)	Period Ⅲ (2010-15)	Overall (1990-15)
Area	SD	850.92	917.45	714.48	1126.61
	Mean	6959.8	6929.6	8837	7323.16
	CV	12.22%	13.23%	8.08%	15.38%
Production	SD	858.70	1108.93	878.27	1473.97
	Mean	5391.1	5697.1	8322.8	6099.84
	CV	15.92%	19.46%	10.55%	24.16%
Yield	SD	59.86	63.45	59.94	86.21
	Mean	773.2	816.5	941.6	824.20
	CV	7.74%	7.77%	6.36%	10.46%
Value of Output	SD	168680.30	398005.05	406393.30	770618.19
	Mean	515575.9	1076786.1	2403609.2	1117666.64
	CV	32.71	36.96%	16.90%	68.95%

SD: Standard deviation

CV: Co-efficient of variation

Instability of Arhar

Considered the overall period (1990-15), the year to year fluctuation in area allocated by the farmers for arhar cultivation in the country was 6.86 per cent, whereas variability in production and yield was estimated to be 13.87 and 10.20 per cent respectively. The very high fluctuation was observed for value of arhar output in the country during the overall period i.e. 64.87 per cent (Table 2). During period Ⅰ (1990-00), the variability in area, production, yield and value of output was found to be 2.95, 13.44, 12.05 and 30.63 per cent respectively. In case of period Ⅱ (2000-10), year to year variability in land allocation under arhar production was 3.61 per cent, whereas in case of production, yield and value of output for arhar was found to be 11.39, 8.93, and 41.78 respectively. During period Ⅲ (2010-15), the year to year fluctuation in area allocated by the Indian farmers under arhar crop was 5.24 per cent. The variability for production, yield and value of output for arhar was found to be 6.90, 9.53 and 18.99 respectively (Table 2).

Table 2: Instability of Arhar

Items	Particulars	Period Ⅰ (1990-00)	Period Ⅱ (2000-10)	Period Ⅲ (2010-15)	Overall (1990-15)
Area	SD	102.77	126.74	210.11	246.67
	Mean	3482.9	3506.7	4005	3596.84
	CV	2.95%	3.61%	5.24%	6.86%
Production	SD	314.70	276.45	200.51	345.09
	Mean	2341.5	2425.5	2903.8	2487.56
	CV	13.44%	11.39%	6.90%	13.87%
Yield	SD	82.86	61.70	69.30	71.04
	Mean	687.2	690.8	727	696.60
	CV	12.05%	8.93%	9.53%	10.20%
Value of Output	SD	93097.26	216698.58	220823.18	364244.34
	Mean	303918.1	518597	1162599.6	561525.96
	CV	30.63%	41.78%	18.99%	64.87%

SD: Standard deviation

CV: Co-efficient of variation

Instability of Moong

During overall period (1990-15), of the study, very high variability was observed for the value of output of the moong with 82.03 per cent. The year to year fluctuation in area, production and yield was found to be 8.64, 23.21 and 18.49 per cent respectively (Table 3). Period Ⅰ (1990-00), variability in area, production, yield and value of output was found to be 7.40, 13.71, 10.92 and 21.49 per cent respectively. During the second period (2000-10) of the study, instability for area, production, yield and value of output was 8.40, 26.64, 19.88, and 26.10 per cent respectively.

Table 3: Instability of Moong

Items	Particulars	Period Ⅰ (1990-00)	Period Ⅱ (2000-10)	Period Ⅲ (2010-15)	Overall (1990-15)
Area	SD	225.22	268.75	352.80	271.19
	Mean	3043.1	3196.3	3223.6	3140.48
	CV	7.40%	8.40%	10.94%	8.64%
Production	SD	163.77	295.38	245.87	286.21
	Mean	1194.5	1108.7	1558	1232.88
	CV	13.71%	26.64%	15.78%	23.21%
Yield	SD	42.84	68.40	29.90	72.27
	Mean	392.2	344	481.6	390.80
	CV	10.92%	19.88%	6.20%	18.49%
Value of Output	SD	28176.56	62389.63	172879.05	240365.64
	Mean	131063.	238975.8	725080.6	293031.76
	CV	21.49%	26.10%	23.84%	82.03%

SD: Standard deviation
CV: Co-efficient of variation

In period Ⅲ (2010-15), the year to year fluctuation in area, production, yield and value of output for moong crop was 10.94, 15.78, 6.20 and 23.84 per cent respectively (Table 3). It is clear from the above discussion that, moong cultivation in the country was not reliable and we cannot establish processing plant for the moong crop due to vary high fluctuation.

Instability for Masoor

Considered the overall period (1990-15) of study, the variability in area allocation by the farmers for masoor cultivation in the country was 9.15 per cent, whereas year to year variability in production, yield and value of output for masoor was found to be 12.20, 8.07 and 65.24 per cent respectively. During first period (1990-00) variation in area, production, yield and value of output was 8.29, 13.27, 7.39 and 40.70 per cent respectively. Period Ⅱ (2000-10), year to year fluctuation was of 4.50, 7.42, 6.41, and 37.13 for area, production, yields and value output respectively. In the Period Ⅲ (2010-15), annual variability of 7.02 percent in area, 6.63 per cent variation in production, 11.19 per cent variation in yield and 19.53 per cent variation in value of output were found (Table 4).

Table 4: Instability of Masoor

Items	Particulars	Period Ⅰ (1990-00)	Period Ⅱ (2000-10)	Period Ⅲ (2010-15)	Overall (1990-15)
Area	SD	105.21	64.55	103.79	125.91
	Mean	1268.5	1432.8	1478.4	1376.20
	CV	8.29%	4.50%	7.02%	9.15%
Production	SD	112.45	70.17	68.81	112.74
	Mean	847.3	945	1037.8	924.48
	CV	13.27%	7.42%	6.63%	12.20%
Yield	SD	49.27	42.29	79.04	54.18
	Mean	666.6	659.7	705.8	671.68
	CV	7.39%	6.41%	11.19%	8.07%
Value of Output	SD	38381.94	77914.99	79705.53	132591.51
	Mean	94298.2	209795.7	407940.8	203225.72
	CV	40.70%	37.13%	19.53%	65.24%

SD: Standard deviation
CV: Co-efficient of variation

Table 5: Instability of Horse gram

Items	Particulars	Period Ⅰ (1990-00)	Period Ⅱ (2000-10)	Period Ⅲ (2010-15)	Overall (1990-15)
Area	SD	202.85	110.08	31.23	303.77
	Mean	1128.8	687.9	231.8	821.20
	CV	17.97%	16.00%	13.47%	36.99%
Production	SD	95.70	47.28	31.23	118.92
	Mean	452.4	270.3	231.8	335.44
	CV	21.15%	17.49%	13.36%	35.45%
Yield	SD	21.40	50.59	48.56	54.24
	Mean	399.4	395.6	489.6	415.92
	CV	5.35%	12.78%	9.91%	13.04%

Value of Output	SD	3829.46	8654.66	14876.63	15516.70
	Mean	22418.5	28431.8	56675.2	31675.16
	CV	17.08%	30.44%	26.24%	48.99%

SD: Standard deviation
CV: Co-efficient of variation

Instability of Horse gram

Considering the overall period (1990-15) year to year variation in the area, production, yield and value of output was 36.99, 35.45, 13.04, and 48.99 per cent respectively. In period Ⅰ (1990-00) variation of 17.97, 21.15, 5.35 and 17.08 per cent was observed for area, production, yield and value output respectively. In period Ⅱ (2000-10) year to year fluctuation in area, production, yield and value of output was 16.00, 17.49, 12.78, and 30.44 per cent. In the period Ⅲ (2010-15) variability in area, production, yield and value of output was 13.47, 13.36, 9.91 and 26.24 per cent respectively (Table 5).

Table 6: Instability of Urd

Items	Particulars	Period Ⅰ (1990-00)	Period Ⅱ (2000-10)	Period Ⅲ (2010-15)	Overall (1990-15)
Area	SD	230.93	917.45	84.74	220.31
	Mean	3050.1	6929.6	3192.4	3111.00
	CV	7.57%	13.23%	2.65%	7.08%
Production	SD	137.28	119.55	120.35	224.31
	Mean	1395	1362.4	1838.6	1470.68
	CV	9.84%	8.77%	6.54%	15.25%
Yield	SD	25.46	19.25	35.92	59.27
	Mean	457.1	435.3	576.2	472.20
	CV	5.57%	4.42%	6.23%	12.55%
Value of Output	SD	42557.54	90217.45	161769.9	243121.26
	Mean	154085.3	293942.1	754711.4	330153.24
	CV	27.61%	30.69%	21.43%	73.64%

SD: Standard deviation
CV: Co-efficient of variation

Instability of Urd

Considered the overall period (1990-15) of study, high year to year variation was observed and it was 7.08, 15.25, 12.55 and 73.64 per cent for area, production, yield and value of output was observed (Table 6). In period Ⅰ (1990-00) variation of 7.57, 9.84, 5.57 and 27.61 per cent were found for area, production, yield and value output respectively. During period Ⅱ (2000-10) variation in area, production, yield and value of output was 13.23, 8.77, 4.42, and 30.69 per cent respectively. In the Period Ⅲ (2010-15) variation of 2.65, percent in area, 6.54 per cent variation in production, 6.23 per cent variation in yield and 21.43 per cent variation in value of output remarked (Table 6)

Instability of Total pulses

Considered the overall period (1990-15), the year to year fluctuation in area, production, yield and value of output was found to be 5.91, 15.42, 10.69 and 67.52 per cent respectively. In period Ⅰ (1990-00), variation of 4.07, 6.42, 6.19 and 28.28 per cent for area, production, yield and value output respectively was noticed. During period Ⅱ (2000-10) variation of 5.07, 10.52, 6.36, and 33.60 for area, production, yield and value output respectively was noticed. In the period Ⅲ (2010-15), variation of 5.21, percent in area, 15.42 per cent variation in production, 10.69 per cent variation in yield and 67.52 per cent variation in value of output observed (Table 7).

Table 7: Instability of Total pulses

Items	Particulars	Period Ⅰ (1990-00)	Period Ⅱ (2000-10)	Period Ⅲ (2010-15)	Overall (1990-15)
Area	SD	925.99	1130.57	1280.74	1354.11
	Mean	22706.1	22286.5	24578.6	22912.76
	CV	4.07%	5.07%	5.21%	5.91%
Production	SD	845.61	1422.83	907.40	2200.28
	Mean	13155.1	13517.5	18015.6	14272.16
	CV	6.42%	10.52%	5.03%	15.42%
Yield	SD	36.64	38.38	43.72	66.76
	Mean	591.5	602.9	732.6	624.28
	CV	6.19%	6.36%	5.96%	10.69%
Value of Output	SD	388427.88	887846.52	959397.39	1909234.22
	Mean	1373130.7	2641667	6109355.2	2827790.12
	CV	28.28%	33.60%	15.70%	67.52%

SD: Standard deviation
CV: Co-efficient of variation

Conclusion

This research concludes that value of output indicated more variability fallowed by production for all the pulses compare to area and yield. Whereas overall period showed much variability for the pulses compare to decadal in all the pulses. Gram, Arhar, Moong, Horse gram, Uad, and Total pulses

indicated higher variability in the Period Ⅱ except Masoor where it revealed much variability in the Period Ⅰ. Almost all pulses showed same variability trend in all the three periods. Moong showed highest variability for overall period and horse gram showed very less variability among all pulses.

References

1. Achoth L, Nagaraj N, Keshavareddy TR, Rebello NSP, Ramana RA. Study of the growth and variability of pulse production in Karnataka. Asian Economic Review. 1988; 30(2):274-287.
2. Bera, Nandi. Variability in Pulses Production of West Bengal. Economic Affairs. 2011; 56(2):2-33.
3. Bharathi SV, Shareefi SM, Raju VT. Instability of pulses production in Andhra Pradesh - an economic analysis. Agricultural Situation in India.1992; 47(8):631-635.
4. Deoghare PR, Chandra R, Singh VP. An analysis of production, consumption and constraint to growth of pulses in India. Agricultural Situation in India. 1991; 46(5):291-294.
5. Dey AK, Banerjee BN. Production and marketing of pulses and oilseeds. Production and marketing of pulses and oilseed. 1991; 12 (3):128-132.
6. Dingar SM, Prasad V, Nigam RK. Production performance of pulses in Uttar Pradesh. Indian Journal of Pulses Research. 1998; 11(2):109- 114.
7. Food and Agriculture Organization of United Nation. Food Outlook Biannual Report on global food market 2016; ISSN 0251-1959. 51(2):420-436.
8. Gajbhiye S, Wankhade RN, Kakde SJ. Growth and instability of chickpea production in Vidarbha region of Maharasthra. International Journal of Commerce and Business Management. 2010; 3(2):172-174.
9. Government of India. Agriculture statistics at glance 2016. Ministry of Agriculture and farmers welfare, Department of Agriculture co-operation and farmers welfare, Directorate of Economics and Statistics, Government of India, New Delhi, 2017.
10. Jain KK, Singh AJ. An economic analysis of growth and instability in pulse production in Punjab. Agricultural Situation in India. 1991; 46(1):3-8.
11. Panda RK. Growth and instability in the agriculture of Orissa - an interregional analysis, Agricultural Situation in India. 1992; 46(12):915-920.
12. Parmar GD, Khunt KA, Naik GD, Desai DB. Economic performance of the pulses in South Gujarat. Agricultural Situation in India. 1994; 48(10):721-724.
13. Rahman NMF, Imam MF. Growth, instability and forecasting of pigeon pea, chickpea and field pea pulse production in Bangladesh. Bangladesh Journal of Agricultural Economics. 2008; 31(½):81-95.
14. Sahu PK, Sarkar C, Dey G, Debsankar Gupta, Rakhee Banerjee. Statistical account of pulse production in World, India and West Bengal during pre-green revolution, green revolution and post-green revolution periods. Environment and Ecology. 2007; 25S (3A):925-929.
15. Sharma RA. Current status and constraints to higher productivity of pulses. Agricultural Reviews. 1998; 19(4):264-269.
16. Singh Pushpa, Singh KM, Nasim Ahmad, Brajesh Shahi. Changing Scenario of Pulses in India: An analysis of its growth and instability in eastern state. 2017; MPRA Paper No. 80270.
17. Singh Usha. A comparative study on the productivity level of pulses and other crops. Journal of Research, Birsa Agricultural Universit. 2001; 13(2):211-213.
18. Tirphathy S, Srinviasa Gowda MV. An analysis of growth, instability and area response of groundnut in Orissa. Indian Journal of Agricultural Economics. 1993; 48(1):345-350.
19. [Weblink: http://www.un.org/en/ga/.]. [Visited on 12 June 2018].