The Pharma Innovation Journal 2019; 8(4): 436-439

www.ThePharmaJournal.com

The Pharma Innovation

**ISSN (E): 2277- 7695**
**ISSN (P): 2349-8242**
**NAAS Rating: 5.03**
TPI 2019; 8(4): 436-439

www.thepharmajournal.com
Received: 01-02-2019
Accepted: 05-03-2019

**Devegowda SR**
PhD Research Scholar, Department of Agricultural Economics, Banaras Hindu University, Varanasi, Uttar Pradesh, India

**OP Singh**
Assistant Professor, Department of Agricultural Economics, Banaras Hindu University, Varanasi, Uttar Pradesh, India

**Shivananda P Yarazari**
PhD Research Scholar, Department of Extension Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India

**Saket Kushwaha**
Vice-Chancellor, Rajiv Gandhi University, Papum Pare, Itanagar, Arunachal Pradesh, India

**Correspondence**
**Devegowda SR**
PhD Research Scholar, Department of Agricultural Economics, Banaras Hindu University, Varanasi, Uttar Pradesh, India

# Effect of area and yield on the production of pulses in India

**Devegowda SR, OP Singh, Shivananda P Yarazari and Saket Kushwaha**

**Abstract**
Study attempted to examine the effect of area, yield and interaction between area and yield on the production also called as decomposition of pulses. Data of more than 25 years collected, classified into Period Ⅰ, Period Ⅱ and Period Ⅲ along with these period overall period also taken into consideration and analyzed for pulses found that Period Ⅰ (1990-00) masoor showed negative effect by yield, gram arhar total pulses showed negative effect by area and except gram all other pulses showed negative interaction effect on production. Period Ⅱ where horse gram showed negative effect of yield, masoor showed negative effect of area and interaction effect on production of pulses. In Period Ⅲ where all pulses showed positive effect in yield, except gram and moong all other pulses showed negative effect of area and all pulses indicated negative interaction effect except gram on production. For overall period negative effect of yield indicated by horse gram, negative area and interaction effect by moong and uad. Over all study concluded that yield effect is higher than area effect fallowed by interaction effect in pulse production.

**Keywords:** pulses, decomposition**,** interaction effect

## Introduction
About 54.6 per cent Indian population is predominantly dependent on agriculture contributing about 17 per cent to the total gross value added (GVA) of the country in the year 2016-17. Total geographical area of the country is 328.7 million hectares, of which 141.4 million hectares is the reported net sown area and 200.9 million hectare accounting cropping intensity of 142 per cent. Growth of agriculture GVA to total GVA is about 1.2 per cent. 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. 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)**.** Principle pulses in world production are Beans, chickpea and peas. Among all the major pulses cultivated globally, lentil has been performing well at productivity level (1150 kg. per ha) but chick pea production has made it a leading crop among pulse crops in the world pulses are traditionally grown in developing countries, which contribute 70 per cent of pulse production globally (except for dry peas). Among developing economies, Asia played a significant role in pulse production. It accounted for 86.1 per cent in chick pea, 84.9 per cent in pigeon pea and 55.6 per cent in lentil production globally during 2001-13. India is top most pulse producing country in the world contributing about 24 percent to the world pulses fallowed by Canada and Myanmar in 2016 (FAO 2016).

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.

## Research Methodology

### Decomposition of analysis

To estimate the contribution of area, productivity and interaction of the two in total production, the following additive scheme of decomposition can be used:

$$P = A0\ (Yn - Y_0) + Y_0\ (An - A_0) + \Delta A \Delta Y$$
$$1 = [(Y\ \Delta A)/P]\ [(A\ \Delta Y)/P]\ [(\Delta A\ \Delta Y)/P]$$

Where,

P = Change in production, $A_0$ = Area in base year, An = Area in current year, $Y_0$ = Yield in base year, Yn = Yield in current year, $\Delta A$ = Change in area ($An - A_0$), $\Delta Y$ = Change in yield ($Yn - Y_0$).

## Results and Discussion

### Decomposition of Gram

Decomposition analysis was carried out to find the contribution of area effect, yield effect and interaction effect for the overall period (1990-15), where area effect of 43.23 per cent, yield effect of 41.57 per cent, interaction effect of 15.18 per cent noted. Period Ⅰ (1990-00), yield effect of 102.95 per cent, area effect showed of 16.76 per cent and interaction effect showed 13.80 per cent. Period Ⅱ (2000-10), yield effect of 22.35 per cent, area effect of 69.85 per cent, interaction effect of 7.78 per cent. Period Ⅲ (2010-15) where area effect of 25.27, per cent yield effect of 74.05 per cent, and interaction effect of 0.67 per cent recorded It is clear from the Table 1 that area was major responsible factor for growth of overall production of gram followed by yield effect and interaction effect.

**Table 1:** Decomposition of Gram

| Items | Period Ⅰ (1990-00) | Period Ⅱ (2000-10) | Period Ⅲ (2010-15) | Overall (1990-15) |
|---|---|---|---|---|
| Yield effect | 102.95% | 22.35% | 25.27% | 41.57% |
| Area effect | -16.76% | 69.85% | 74.05% | 43.23% |
| Interaction effect | 13.80% | 7.78% | 0.67% | 15.18% |

### Decomposition of Arhar

Decomposition analysis was carried out to find the contribution of area effect, yield effect and interaction effect for the overall period (1990-15), where area effect of 68.81 per cent, yield effect of 25.74 per cent, interaction effect of 5.44 per cent noted. Period Ⅰ (1990-00) area showed effect of 213.43 per cent, yield effect showed of -102.16 per cent and interaction effect showed -11.26 per cent. Period Ⅱ (2000-10), area effect of 82.87 per cent, yield effect of 15.10 per cent, interaction effect of 2.01 per cent. Period Ⅲ (2010-15), where area effect of 207.18, per cent yield effect of -96.77 per cent, interaction effect of -10.40 per cent recorded (Table 2).

**Table 2:** Decomposition of Arhar

| Items | Period Ⅰ (1990-00) | Period Ⅱ (2000-10) | Period Ⅲ (2010-15) | Overall (1990-15) |
|---|---|---|---|---|
| Yield effect | 213.43% | 82.87% | 207.18% | 68.81% |
| Area effect | -102.16% | 15.10% | -96.77% | 25.74% |
| Interaction effect | -11.26% | 2.01% | -10.40% | 5.44% |

### Decomposition of Moong

Decomposition analysis suggests that area is the main responsible factor for the growth of moong production in the country followed by the yield effect. During overall period yield effect was 346.74 per cent for enhancing overall production of moong in the country and area and interaction (area and yield) effect on moong production was found to be -221.7 and -25.04 per cent respectively (Table 3). During period (1990-00) the yield was main responsible factor for overall growth in production of moong crop followed by area contribution. The interaction effect was negatively correlated to overall production of moong crop in the country. During second period (2000-10) and third period (2010-15) area was main responsible factor for growth of moong production in the country followed by yield (Table 3).

**Table 3:** Decomposition of Moong

| Items | Period Ⅰ (1990-00) | Period Ⅱ (2000-10) | Period Ⅲ (2010-15) | Overall (1990-15) |
|---|---|---|---|---|
| Yield effect | 68.55% | 18.76% | 23.15% | 346.74% |
| Area effect | 37.37% | 80.09% | 78.26% | -221.7% |
| Interaction effect | -5.93% | 1.13% | -1.41% | -25.04% |

### Decomposition of Masoor

Decomposition analysis was carried out to find the share of area, yield and interaction effect to overall growth in masoor production in the country and it was found that yield was major responsible factor for overall growth of masoor production in the country followed by area (Table 4). During the overall period (1990-15) where area effect of 34.00 per cent, yield effect of 59.80 per cent, interaction effect of 6.19 per cent. During period Ⅰ (1990-00) area effect was -3.91 per cent, yield effect showed of 104.52 per cent and interaction effect showed -0.61 per cent.

**Table 4:** Decomposition of Masoor

| Items | Period Ⅰ (1990-00) | Period Ⅱ (2000-10) | Period Ⅲ (2010-15) | Overall (1990-15) |
|---|---|---|---|---|
| Yield effect | -3.91% | 453.15% | 887.41% | 34.00% |
| Area effect | 104.52% | -336.48% | -719.82% | 59.80% |
| Interaction effect | -0.61% | -16.67% | -67.59% | 6.19% |

In period Ⅱ (2000-10) area effect was 453.15 per cent, yield effect of -336.48 per cent and interaction effect was -16.67 per cent. In period Ⅲ (2010-15) area effect was 887.41, per cent yield effect of -719.82 per cent, interaction effect of -67.59 per cent recorded (Table 4).

**Decomposition of Horse gram**

The decomposition analysis for horsegram suggests that area was important factor for overall production of horsegram in the country during the study period. During overall period (1990-15) yield effect, area effect and interaction effect was -29.65, 110.02, and 19.63 per cent. In period Ⅰ (1990-00) area showed contribution to overall production of horsegram was 22.16 per cent, yield effect 84.71 per cent and interaction effect -6.87 per cent. During period Ⅱ (2000-10) area effect of -62.36 per cent, yield effect of 142.60 per cent and interaction effect of 19.75 per cent. Period Ⅲ (2010-15) where area effect of 124.59, per cent yield effect of -23.44 per cent, and interaction effect of -1.14 per cent (Table 5).

**Table 5:** Decomposition of Horse gram

| Items | Period Ⅰ (1990-00) | Period Ⅱ (2000-10) | Period Ⅲ (2010-15) | Overall (1990-15) |
|---|---|---|---|---|
| Yield effect | 22.16% | -62.36% | 124.59% | -29.65% |
| Area effect | 84.71% | 142.60% | -23.44% | 110.02% |
| Interaction effect | -6.87% | 19.75% | -1.14% | 19.63% |

**Decomposition of Urd**

During overall period (1990-15) of study yield effect of 129.33 per cent, area effect of -23.29 per cent, interaction effect of -6.03 per cent in the overall growth of urd production in the country. Period Ⅰ (1990-00) area showed effect of 26.93 per cent, yield effect showed of 75.79 per cent and interaction effect showed -2.72 per cent. Period Ⅱ (2000-10) area effect of -12.06 per cent, yield effect of 110.78 per cent, interaction effect of 1.27 per cent was observed. Period Ⅲ (2010-15) where area effect of 235.43, per cent yield effect of -130.72 per cent, interaction effect of -4.70 per cent documented (Table 6).

**Table 6:** Decomposition of Urd

| Items | Period Ⅰ (1990-00) | Period Ⅱ (2000-10) | Period Ⅲ (2010-15) | Overall (1990-15) |
|---|---|---|---|---|
| Yield effect | 26.93% | -12.06% | 235.43% | 129.33% |
| Area effect | 75.79% | 110.78% | -130.72% | -23.29% |
| Interaction effect | -2.72% | 1.27% | -4.70% | -6.03% |

**Decomposition of Total pulses**

The decomposition analysis suggests that, yield was major responsible factor for growth in total pulses production in the country. During overall period (1990-15), yield effect of 88.10 per cent, area effect of 8.78 per cent, interaction effect of 3.11 per cent noticed. In period Ⅰ (1990-00) area showed effect of 156.40 per cent, yield effect showed of -51.73 per cent and interaction effect showed -4.66 per cent. During period Ⅱ (2000-10) area effect of 53.98 per cent, yield effect of 40.72 per cent, interaction effect of 5.28 per cent. Period Ⅲ (2010-15) where area effect of 243.05, per cent yield effect of -136.15 per cent, interaction effect of -6.89 per cent noted (Table 7).

**Table 7:** Decomposition of Total pulses

| Items | Period Ⅰ (1990-00) | Period Ⅱ (2000-10) | Period Ⅲ (2010-15) | Overall (1990-15) |
|---|---|---|---|---|
| Yield effect | 156.40% | 53.98% | 243.05% | 88.10% |
| Area effect | -51.73% | 40.72% | -136.15% | 8.78% |
| Interaction effect | -4.66% | 5.28% | -6.89% | 3.11% |

**Conclusion**

This study carried out to know about effect of area, yield and interaction effect on the production of pulses. Where over all period divided into Period Ⅰ, Period Ⅱ and Period Ⅲ to know about decadal effect. In Period Ⅰ masoor showed negative effect by yield, gram arhar total pulses showed negative effect by area and except gram all other pulses showed negative interaction effect on production. Period Ⅱ where horse gram showed negative effect of yield, masoor showed negative effect of area and interaction effect on production of pulses. In Period Ⅲ where all pulses showed positive effect in yield, except gram and moong all other pulses showed negative effect of area and all pulses indicated negative interaction effect except gram on production.

For overall period negative effect of yield indicated by horse gram, negative area and interaction effect by moong and uad. Over all study concluded that yield effect is higher than area effect fallowed by interaction effect in pulse production.

**References**

1. Ardeshna NJ, Shiyani RL. Spatio-temporal growth performance of pulses: a case of Gujarat. Economic Affairs (Calcutta). 2011; 56(1):85-97.
2. 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.
3. Devi Latika YT, Arivelarasan, Jenny Kapngaihlian. Pulses Production in India: Trend and Decomposition Analysis. Economic Affairs. 2017; 62(3):435-438.
4. Dingar SM, Prasad V, Nigam RK. Production performance of pulses in Uttar Pradesh. Indian Journal of Pulses Research. 1998; 11(2):109-114.
5. Food and Agriculture Organization of United Nation. Food Outlook Biannual Report on global food market 2016; ISSN 0251-1959. 51(2):420-436.
6. Gajbhiye SB, Kakde SJ. Performance of chickpea production in Akola district of Maharashtra. International Journal of Forestry and Crop Improvement. 2011; 2(1):30-32.
7. 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.
8. Jitendra Singh, Rashi Mittal, Singh SP. Progress, potentiality and strategies of pulses production in planned economy of India, Agricultural Situation in India. 2009; 65(10):629-640.
9. Kumar D. Problems, prospects and management strategies of pulse production under rainfed situations. Sustainable development of dryland agriculture in India, 1995, 335-373.
10. Pandey DP, Mahatma Gandhi. An empirical study of trends in production and marketing of pulses in two villages of U.P. and M.P. International Journal of Commerce and Business Management. 2011; 4(1):6-11.
11. 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.
12. 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.
13. Sharma RA. Current status and constraints to higher productivity of pulses. Agricultural Reviews. 1998; 19(4):264-269.
14. Shrivastava A. Temporal analysis of growth rates of pulses and their decomposition in Vindhya Plateau of M.P. JNKVV Research Journal. 1993; 27(1):82-84.
15. Singh Usha. A comparative study on the productivity level of pulses and other crops. Journal of Research. 2001; 13(2):211-213.
16. 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.
17. [Weblink: http://www.un.org/en/ga/.]. [Visited on 12 June 2018].