Archives of Current Research International

Volume 25, Issue 4, Page 114-119, 2025; Article no.ACRI.133002
ISSN: 2454-7077

Productivity of Major Pulses in Cropping Systems Adopted by Farmers in Chhattisgarh Plains in India

Shivaji Limje [a*], M. A. Khan [b] and Sevak A. Dhenge [c]

[a] Pt.SKS College of Agriculture and Research Station (IGKV), Rajnandgaon, CG, India.
[b] Department of Agricultural Extension, IGKV, Raipur, CG, India.
[c] RABL College of Agriculture and Research Station (IGKV), Chhuikhadan, CG, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/acri/2025/v25i41141

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://pr.sdiarticle5.com/review-history/133002

Original Research Article

Received: 18/01/2025
Accepted: 22/03/2025
Published: 25/03/2025

ABSTRACT

The present study was conducted in four districts comprising 320 sample farmers in pulse-based cropping systems in Chhattisgarh plains to ascertain their knowledge, production and productivity pulse crops. The selected pulse growing farmers were interviewed with the help of a well-structured and pre-tested interview schedule. The findings of the study showed that, rice (40.1-48q/ha), wheat (12.1-14q/ha), gram (8-10q/ha), arhar (7.1-9q/ha), mung (6.1-8q/ha), urd, peas, and lathyrus (5.1-7q/ha), lentil (6q/ha) and soybean (5q/ha) are among the pulse crops with higher productivity at Chhattisgarh Plains. Moreover, the majority of the respondents, cultivated local variety of gram crop followed by mung, arhar, urd, lentil, pea and lathyrus crop. The results suggested a need for more efforts to make the farmers of the sample area aware of the adoption of the improved verities of the pulses, cereals, and oilseed crops by demonstration, training, field visits, and farm publications also

**Corresponding author: Email: shivajilimje@gmail.com;*

Cite as: *Limje, Shivaji, M. A. Khan, and Sevak A. Dhenge. 2025. "Productivity of Major Pulses in Cropping Systems Adopted by Farmers in Chhattisgarh Plains in India". Archives of Current Research International 25 (4):114-19. https://doi.org/10.9734/acri/2025/v25i41141.*

arrange the market for selling of farm produced without any middleman that can help in getting more profit. The finding also suggested addressing the constraints about the production of the improved varieties of pulses, cereals, and oilseed crops.

Keywords: Pulse; crop; lentil, farm; oilseed crops.

1. INTRODUCTION

India produces 25 percent of the world's pulses. To meet the growing demand of an increasing population, which is projected to require 38 million tons of pulses by 2030, an annual production increase of 2.2 percent is necessary. Pulses production in India has increased with 3.73 per cent annual growth rate from 18.17 mt in 2009-10 to 27.93 mt in 2020-21 (Murugananthi et al. 2024) Despite their significant nutritional benefits, pulses also play a crucial role in enhancing soil fertility, improving yield stability, and promoting sustainable agriculture (Agarwa et al. 2024). Chhattisgarh state was established on November 1, 2000, comprises 33 districts, and has a total cultivated area of approximately 5.9 million hectares (Sharma et al., 2014; Adarsh et al., 2019). The state is geographically classified into three distinct Agro-climatic zones viz., Chhattisgarh Plains, Bastar Plateau, and Northern Hills zone covering 51 percent, 28 percent, and 21 percent of the geographical area, respectively (Ghosh et al., 2007). The climate of Chhattisgarh falls under the hot and humid category, with an annual average rainfall ranging between 1200-1400 mm. Agriculture with diverse cropping patterns is the backbone of the state. Paddy, wheat, maize, groundnut, pulses, and oilseed crops are the major crops cultivated in the state. Among the other crops, the state has contributed only 1 percent in area and production to the pulses-producing states in India (Seth *et al.* 2022; Ray et al., 2023). Pulses are major sources of proteins among vegetarians in India, and complement the staple cereals in the diets with proteins, essential amino acids, vitamins, and minerals (Prajapati *et al.* 2025). They contain 22-24% protein, which is almost twice the protein in wheat and thrice that of rice. India is the largest producer and consumer of pulses in the world. Major pulses grown in India include chickpea or Bengal gram (*Cicer arietinum*), pigeon pea or red gram (*Cajanus cajan*), lentil (*Lens culinaris*), urban or black gram (*Vigna mungo*), mungbean or green gram (*Vigna radiata*), etc. More popular among these are chickpeas, pigeon peas, mungbean, urdbean, and lentils. India has a key place in global pulse production and contributes about 25 percent to the total pulse basket. About a dozen pulse crops, namely chickpea, pigeon pea, mung, urd, lentil, field pea, Lathyrus, cowpea, moth bean, horse gram, and ricebean are cultivated in different agroecological regions. Among the major pulse crops, gram is an important crop of Chhattisgarh and occupies a premier position in both area and production in the state. The major pulse-growing districts in Chhattisgarh states are Rajnandgaon, Durg, Balod, Bemetara, Kabidham etc. Considering the importance of pulse crops, the present research is an effort to study the productivity of major pulse crops in pulse-based cropping systems adopted by farmers in Chhattisgarh plains.

2. METHODOLOGY

The present investigation was conducted in four major pulse-growing districts of Chhattisgarh plains. In each district, two blocks were selected for the study randomly. In each selected block four villages were selected randomly. Thus, a total of thirty-two villages were selected to draw the sample of respondents for the study. Ten farmers from each village were selected randomly to comprise a sample of 320 respondents for the study purpose. The data were collected with the help of a predesigned structured interview schedule. Information was collected through the personal interview method. The purpose of the interview was clearly explained to each respondent. Collected data were tabulated and analyzed using a formula.

3. RESULTS

3.1 Productivity

3.1.1 Productivity of different crops

The data pertaining to the productivity of various crops grown by the respondents in the study area in different seasons are assembled in Table 1 and Fig. 1.The results revealed that the majority of rice growing respondents (35.94%) arrive between 40.1 to 48 q/ha productivity (Singh and Varshney, 2010) followed by 23.43 per cent respondents got upto 32 q/ha, 20.94 per

cent respondents 32.1 to 40 q/ha, and 19.69 per cent who received the rice productivity over 48 q/ha.The results showed that the majority of soybean growing respondents (56.91%) obtained up to 5 q/ha, followed by 30.89 per cent respondents between 5.1to 8 q/ha and 12.20 per cent who received the productivity over 8 q/ha..The results indicated that the majority of wheat growing respondents (39.88%) arrive between 12.1to 14 q/ha productivity, followed by 36.20 per cent respondents obtained up to 12 q/ha, and 23.92 per cent who received the wheat productivity over 14 q/ha.

The results showed that the majority of gram-growing respondents (67.50%) arrived between 8 to 10 q/ha productivity, followed by 23.43 percent of respondents who obtained up to 8.1 q/ha, and 9.07 percent who received gram productivity over 10 q/ha.The majority of respondents received

Table 1. Distribution of respondents according to productivity of different crops

S. No	Crop	Productivity (q/ha)	Frequency	Percentage
1.	Rice	Up to 32	75	23.43
	(n=320)	32.1 to 40	67	20.94
		40.1 to 48	115	35.94
		Above 48	63	19.69
		Average Productivity (q/ha)	39.98	
2.	Soybean	Up to 5	70	56.91
	(n=123)	5.1 to 8	38	30.89
		Above 8	15	12.20
		Average Productivity (q/ha)	5.34	
3.	Wheat	Up to 12	59	36.20
	(n=163)	12.1 to 14	65	39.88
		Above 14	39	23.92
		Average Productivity (q/ha)	6.5	
4.	Arhar	Up to 7	35	15.28
	(n=229)	7.1 to 9	114	49.78
		9.1 to 11	75	32.76
		Above 11	5	2.18
		Average Productivity (q/ha)	8.58	
5.	Gram	Up to 8	75	23.43
	(n=320)	8.1 to 10	216	67.50
		Above 10	29	9.07
		Average Productivity (q/ha)	8.82	
6.	Lathyrus	up to 5	53	42.74
	(n=124)	5.1 to 7	64	51.61
		Above 7	7	5.65
		Average Productivity (q/ha)	5.25	
7.	Lentil	Up to 6	88	56.77
	(n=155)	6.1 to 8	64	41.29
		above 8	3	1.94
		Average Productivity (q/ha)	3.92	
8.	Pea	Up to 5	16	16.67
	(n=96)	5.1 to 7	65	67.70
		Above 7	15	15.63
		Average Productivity (q/ha)	5.96	
9.	Mung	Up to 6	84	42.63
	(n=197)	6.1 to 8	107	54.32
		above 8	6	3.05
		Average Productivity (q/ha)	6.28	
10.	Urd	Up to 5	103	40.39
	(n=255)	5.1 to 7	144	56.47
		Above 7	8	3.14
		Average Productivity (q/ha)	5.19	

yields for arhar production of between 7.1 to 9 q/ha (49.78%) and between 9 and 11 q/ha (32.76%), respectively. However, it was found that 15.28 and 2.18 percent of respondents had yields of up to 7 q/ha and more than 11 q/ha, respectively. Regarding mung production, 54.32 percent of respondents attained between 6.1 to 8 q/ha, followed by 42.63 percent who attained up to 6 q/ha, and 3.05 percent who attained more than 8 /ha. Regarding the productivity of the urd crop, the findings indicate that most of the urd growing respondents (56.47) harvested between 5.1 to 7 q/ha, followed by 40.39 percent of urd growers obtained up to 5 q/ha. It was also found that 3.14 percent of respondents obtained above 7 q/ha productivity respectively.

Regarding Lathyrus, the majority of those who reported cultivating it (51.61) harvested 5.1 to 7 q/ha, while 42.74 and 5.65 percent of those who reported growing it received up to 5 q/ha and over 7 q/ha yields, respectively. The data regarding the productivity of lentils reveals that 56.77 percent of the lentil-growing respondents got up to 6 q/ha yield, followed by 6 to 8 q/ha and above 8 q/ha yield obtained by 41.29 and 1.94 percent of the respondents, respectively. The results show that most respondents who cultivate peas (67.70%) have productivity levels between 5.1 to 7 q/ha, whereas 16.67 and 15.63per cent of respondents had productivity levels up to 5 and above 7 q/ha, respectively. The result of average yields regarding major pulse crops produced by the respondents in the study area showed that the gram 8.82q/ha, mung, 6.28q/ha, and 8.58 q/ha arhar got by the respondents, on the other hand the productivity of urd 5.19q/ha, lathyrus, 5.25q/ha, lentils, 3.92q/ha, and pea 5.96 q/ha were found in the study area.

3.1.2 Variety wise productivity of major pulse crops

The data about the cultivation of different varieties of the respondents and their productivity scenario are compiled in Table 2. The findings indicated that variety-wise distribution regarding gram crop, the majority of the respondents (72.18%) were growing local variety with average productivity of 4.6 q/ha, followed by JG-11 (14.06%) with average productivity of 11.3 q/ha, Vaibhav (7.5%) with 9.2 q/ha productivity, JG-74 (6.25%) with 9.5 q/ha yield. Regarding mung crop, about 75.12 percent of the respondents were growing the local variety with the average productivity of 4.1 q/ha, followed by pairi mung (10.16%) with average productivity of 7.3 q/ha and HUM-16 (9.65%) with an average yield of 8.2 q/ha.Regarding the arhar crop about 65.06 percent of the respondents were growing local variety with average productivity of 6.4 q/ha, followed by the popular Asha variety grown by 34.92 percent of respondents with average productivity of 9.3 q/ha, Regarding urd crop majority of the respondents (77.25%) were growing the local variety with the average productivity of 4.5 q/ha, followed by TAU-1 (15.69%) with average productivity of 8.1 q/ha and TAU-94-2 (7.06%) with an average yield of 6.3 q/ha.In the case of Lathyrus, all of the respondents used to grow the local varieties with an average productivity of 3.6 q/ha.Regarding lentil crops about 80 percent of the respondents were growing the local variety with an average productivity of 3.2 q/ha, followed by JL-3 (20.00%) with an average productivity of 5.2 q/ha. Regarding pea crop, the majority of the respondents (85.41%) were growing the local varieties with an average productivity of 3.5 q/ha, followed by Prakash (14.59%) with average productivity of 6.5 q/ha (Agarwal et al., 2024).

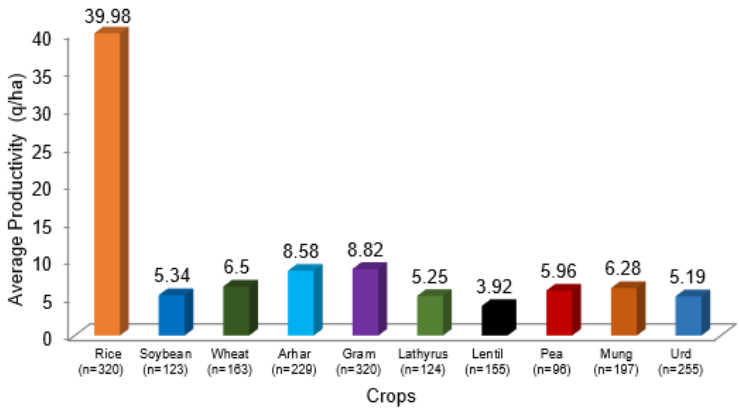

Fig. 1 Respondents wise average productivity of different crops

Table 2. Distribution of respondents according to variety wise productivity of major pulse crops

Sl. No	Crop	Variety	Respondents		Productivity		
			F	%	Max.	Min.	Avrg.
1	Gram (n=320)	JG-11	45	14.06	14.3	8.3	11.3
		JG-74	20	6.25	13	6	9.5
		Viabhav	24	7.5	13.5	5.0	9.2
		Radhey (Local)	231	72.18	6.2	3.1	4.6
2	Mung (n=197)	HUM-16	19	9.65	10.4	6	8.2
		HUM-12	10	5.07	8.3	4.3	6.3
		Pairi mung	20	10.16	11.3	3.3	7.3
		Local	148	75.12	6.1	2.1.	4.1
3	Arhar (n=229)	Asha	80	34.92	12.2	6.4	9.3
		Local	149	65.06	8.4	4.4	6.4
4	Urd (n=255)	TAU-1	40	15.69	10.1	6.1	8.1
		TAU-94-2	18	7.06	8.3	4.3	6.3
		Local	197	77.25	6	3	4.5
5	Lathyrus (n=124)	Local	124	100	5.1	2.1	3.6
6	Lentil (n=155)	JL-3	31	20	7.2	3.2	5.2
		Local	124	80	4.3	2.3	3.2
7	Pea (n=96)	Prakash	14	14.59	10	3	6.5
		Local	82	85.41	5	2	3.5

4. DISCUSSION

The study was undertaken to examine the productivity of major pulses in pulse-based cropping systems adopted by farmers in the Chhattisgarh Plains in India. In the sample area, farmers cultivated different crops like rice, wheat, gram, arhar, mung, urd, peas, lathyrus, soybean, and lentils. The study found that among the cereal crops rice and wheat were cultivated in the kharif and rabbi seasons respectively, which means these crops as main staple crops of the study areas in the cereal crops. Alongside cereals crops, pulse crops arhar, and urd, were also prominently grown during the Kharif season, and gram, peas, lathyrus, and lentils were cultivated in the rabbi season. In oilseed crops, only soybean crop was cultivated in the rabbi season. Different pulse crops cultivated by the farmers were identified as the major pulse crops primarily for subsistence purposes, which is extensive production used for market. These findings highlight that farmers cannot rely on a single crop to meet both dietary needs of the family. In the results most of the farmers adopted local varieties of the different crops, this means that the farmers were unaware of the improved varieties of the pulse crops results low productivity (Singh *et al.* 2017; Singh and Praharaj 2019, Singh 2021; Prajapati *et al.* 2025). So, there is a need to create awareness among the farmers about the adoption of various improved varieties cultivating crops under the pulse can increase the productivity and production that can significantly enhance the livelihoods and household security of farmers by improving the efficiency and sustainability of their agricultural practices.

5. CONCLUSION

The findings towards productivity of major pulse crops show that respondents (67.50%) of gramobtained 8 to 10 q/ha productivity, regarding productivity of arhar crop, (49.78%) gained 7 to 9 q/ha The data regarding productivity of mung reveals that 54.32 percent got 6 to 8 q/ha yield, the data also indicated that 56.47 percenof the urd growing respondents gained 5 to 7 q/ha productivity, while regarding Lathyrus, majority of the Lathyrus growing respondents (51.61%) harvested 5 to 7 q/ha, the data regarding productivity of lentil reveals that 56.77 per cent of the lentil growing respondents got up to 6 q/ha yield, whereas pea respondents (67.70%) received 5 to 7 q/ha productivity, popular pulse crops in the study area had an average yield of 8.82 and 6.28, 8.58q/ha. Gram, Mung, and Arhar are each however Urd, Lathyrus, Lentils, and Pea are each 5.19, 5.25, 3.92, and 5.96q/ha. The study highlighted the the effectiveness of cropping systems in enhancing soil fertility,

improving yield stability, and promoting sustainable agriculture. The results can aid researchers, agronomists, and policymakers in identifying optimal cropping patterns and developing strategies to increase pulse productivity in similar agro-climatic regions. Additionally, the study contributes to the ongoing efforts to promote food security and improve farmers' livelihoods through diversified and resilient cropping systems.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

Adarsh, S., Jacob, J., & Giffy, T. (2019). Role of pulses in cropping systems: A review. *Agricultural Reviews, 40*(3).

Agarwal, D., Devra, S. J., & R. R. S. (2024). Pulses in India: Comprehensive analysis of production, challenges, and strategic vision for 2030. *Journal of Experimental Agriculture International, 46*(11), 293–304.

Ghosh, P. K., Bandyopadhyay, K. K., Wanjari, R. H., Manna, M. C., Misra, A. K., Mohanty, M., & Rao, A. S. (2007). Legume effect for enhancing productivity and nutrient use-efficiency in major cropping systems—An Indian perspective: A review. *Journal of Sustainable Agriculture, 30*(1), 59–86.

Murugananthi, D., Shivakumar, K. M., Palanichamy, N. V., Prabha, S. A., Somasundaram, E., Rohini, A., Devi, R. P., Selvanayaki, S., & Kavitha, P. G. (2024). Demand and supply projections for pulses in India. *Legume Research, 47*(8), 1335–1341.

Prajapati, D., Gaur, A. S., Pathak, J., Mishra, S., Kumar, A., Yadav, K., & Kumar, S. (2023). A review: Pulses production, productivity, status, and way forward for enhancing farmers' income of Bundelkhand region, India. *International Journal of Environment and Climate Change, 13*(11), 353–362.

Ray, L. I., Swetha, K., Singh, A. K., & Singh, N. J. (2023). Water productivity of major pulses—A review. *Agricultural Water Management, 281*, 108249.

Seth, M. K., Chandrakar, M. R., & Homendra Siwana. (2022). An economic analysis and compound growth rate of major pulses in the northern part of Chhattisgarh. *Economic Affairs, 67*(01 Spl.), 93–100.

Sharma, M. L., Vikhe, V. A., Dale, N. S., Anap, V. N., Umbarkar, R. B., & Labade, G. B. (2014). Adoption of existing package of practices by the farmers in rice-utera cropping system in Chhattisgarh plains. *International Journal of Communication and Business Management, 7*(1), 88–91.

Singh, A. (2021). An overview of export and import of pulses in India. *International Journal of Engineering and Management Research, 11*(4), 281–283.

Singh, P. K., & Varshney, J. G. (2010). Adoption level and constraints in rice production technology. *Indian Research Journal of Extension Education, 10*(1), 91–94.

Singh, P., Shahi, B., & Singh, K. M. (2017). Trends of pulses production: A study on the current scenario and strategies in India with special reference to Bihar. *Economic Affairs, 62*(3), 389–398.

Singh, S. K., & Praharaj, C. S. (2019). Pulses for nutritional security and ecological sustainability. *Indian Journal of Extension Education, 55*(2), 83–86.

Peer-review history:
The peer review history for this paper can be accessed here:
https://pr.sdiarticle5.com/review-history/133002