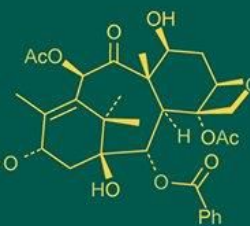
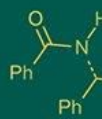


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating: 5.29
IJABR 2025; SP-9(3): 412-416
www.biochemjournal.com
Received: 03-01-2024
Accepted: 08-02-2025

Vandana Shukla
Department of Plant
Pathology, College of
Agriculture and Research
Station, Jashpur, Indira
Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Pritansha Bhagat
Department of Entomology,
College of Agriculture and
Research Station, Jashpur,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Anupama Lakra
Department of Vegetable
Science, College of Agriculture
and Research Station, Jashpur,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Payal Devi
Department of Entomology,
College of Horticulture and
Research Station, Arjunda,
Balod, Mahatma Gandhi
Udyanikee Evam
Vanikee Vishwavidyalaya,
Durg, Chhattisgarh, India

Corresponding Author:
Vandana Shukla
Department of Plant
Pathology, College of
Agriculture and Research
Station, Jashpur, Indira
Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Assessment of yield and economics of chickpea (*Cicer arietinum* L.) in Dhamtari district of Chhattisgarh

Vandana Shukla, Pritansha Bhagat, Anupama Lakra and Payal Devi

DOI: <https://www.doi.org/10.33545/26174693.2025.v9.i3Sf.4003>

Abstract

Dhamtari district of Chhattisgarh is agriculturally very crucial in phrases of productivity and production. In Dhamtari chickpea cultivation may be very not unusual however its productivity will be very low due to wilt complicated to set up the production ability of crop On Farm Trials (OFTs) is the correct device. On Farm Trials (OFTs) is a unique approach to provide a direct interface among researcher and farmers because the scientists are right away involved in making plans, execution and tracking of the demonstrations the prevailing observe became executed to assess the impact of On Farm Trials (OFTs) of chickpea crop within the Dhamtari district of Chhattisgarh kingdom generation demonstration of chickpea (*Cicer arietinum* L.) come to be aimed to enhance the manufacturing after bringing new areas in to cultivation in Dhamtari district of Chhattisgarh. The vacant fields of rice-fallow underneath medium black soils with restricted irrigation have been decided on. studies had been performed to evaluate yield and economics of a entire package deal with animproved types, proper tillage, right seed charge, line sowing using seed cum fertilizer drill, seed remedy with bio-fungicide *Trichoderma* sp. (mainly for wilt complicated manipulate), twin inoculation of Rhizobium + PSB, RDF as in keeping with IGKV, water control at important degrees, weed management and application of IPM module for the manipulate of insect (specifically on gram pod borer) resulted in increase in yield in gram crop over the take a look at plots under On Farm Trials (OFTs) for 2 years (2020-21 and 2021-22). The outcomes of 10 plots every zero.4 ha confirmed an increase in yield of 48.23 and fifty four.28 consistent with cent over farmer's exercise in the course of the twelve months 2020-21 and 2021-22, respectively common way of years emerge as decided to be notably higher for yield (13.05 q/ha), net income (Rs. 46193/ha) and B:C ratio (three.50) in comparison to manipulate.

Keywords: Chickpea, extension yield gap, on farm trial, rice fallow, technology gap, technology index

Introduction

Pulses, being a huge supply of protein, are a essential element of the diet for the majority of impoverished and vegetarian humans in India. While combined with cereals, pulses provide a properly-balanced vegetarian protein supply that is specially beneficial for the frame in step with surveys achieved in families, there was a lower within the intake of pulses, which has caused an increase in malnutrition and a decrease in protein intake. India is still a home to approximately 24% of undernourished humans globally (Sharma *et al.*, 2016) [13]. The commonplace each day availability of pulses in step with character in India is still incredibly low, ranging from forty two to forty seven grams. The growth price has been particularly stagnant, with first-class a mild growth located in present day years that is due to the fact the populace has grown significantly, and there has been little to no growth inside the production of pulses no matter the increasing charges of pulses, the location and manufacturing of pulses have remained extensively solid for the duration of the last few years the complete area below pulses in India numerous among 23 and 25 million hectares, resulting in a manufacturing of 15 to 19 million tonnes. The modern-day yield of pulses ranged from 700 to 790 kg consistent with hectare notwithstanding the fact that there was a slight upward push in pulse productiveness these days, it nevertheless falls quick of the global average productiveness (840 kg/ha) notably, India holds the name of being the most important producer, importer, and consumer of pulses within the complete worldwide. The Indian institute of pulses research, Kanpur, has projected the united states of a's demand of pulses at 39 million tonnes with the aid of 2050, as a manner to require pulses manufacturing to increase at an annual charge of two 2%.

To be able to meet the growing call for, the U.S. have to increase its pulse manufacturing and preserve competitiveness to guard domestic manufacturing to accomplish this, it's miles important to create and placed into effect advanced crop production strategies, along with supportive rules and market incentives, to encourage farmers to expand their cultivation of pulses the whole production of pulses inside the one year 2019-20 is projected to be 23.02 million tonnes, which is 2.76 million tonnes better than the average manufacturing of 20.26 million tonnes over the past five years. India holds the discover of the most crucial producer and purchaser of pulses globally, contributing approximately 29 percentage of the area's vicinity and 19 percent of the sector's manufacturing some of the unique kinds of pulses, chickpea (*Cicer arietinum* L.) holds the best significance as a crop. Regardless of being the most vital manufacturer of chickpea inside the international, India nevertheless is based on imports from countries like Australia, Russia, and others to satisfy its domestic demand. One of the reasons for this end up the low productivity of 995 kg/ha, which became substantially lower than the sector's highest productivity of 3759 kg/ha (Anon, 2016) ^[1].

In Chhattisgarh, rice is one of the number one flowers grown beneath open and bore nicely irrigation gadget due to inadequate availability of floor water, majority of rice location become kept as fallow for the duration of Rabi. In some packets of rice fallow chickpea have become in exercise beneath broadcasting technique of cultivation in black soils within the ones farming situations wherein black soils existed with constrained irrigation assets, chickpea can be promoted with new generation. The location, production and productiveness of chickpea of Chhattisgarh and in district Dhamtari is likewise quite low as compared to exceptional states, countrywide acreage and manufacturing. The reason of low productivity of pulses is due to use of vintage sorts, better seed charge and broadcasting approach of sowing and biotic/abiotic stresses inside the district. To bridge the yield hollow most of the capability and found out yield, some of the technology had been recommended as essential viz., deep summer time ploughing once in three years, soil take a look at based fertiliser utility, seed treatment with Rhizobium, application of PSB and *Trichoderma viridi*, use of wilt tolerant sorts, set up of fowl perches, nipping at 15-20 cm pinnacle, irrigations first at branching and 2nd at pod initiation degree, well timed weed manage and spray of NSKE 5% or Azadirachtin 0.03% (three hundred ppm) at pre-flowering degree. The On Farm Trials (OFTs) in pulses is a unique programme started via Ministry of Agriculture, authorities of India, executed under close supervision of farm scientists.

Primary objective of OFT's in pulses is to demonstrate popularize the improved agro era on farmer's fields below numerous farming conditions for effective switch of generated technology fill the gap amongst stepped forward generation adopted/indigenous generation to enhance pulse productivity farm profits for sustaining the manufacturing systems in particular beneath rainfed farming (Choudhary *et al.*, 2009b) ^[2]. preserving in view the above statistics, an in depth intervention along with cluster the front-line demonstrations turned into carried out to switch the generated farm era via OFT's in chickpea in district Dhamtari with the targets of enhancing productiveness, profitability narrowing in the extension yield gaps. KVK

Sambalpur, Dhamtari under the guidance of the Indira Gandhi Krishi Vishvavidyalaya, Raipur, C.G. and ATARI Jabalpur initiated to set up the cluster frontline demonstration at farmers subject with the goal to demonstrate the stepped forward chickpea manufacturing generation viz., deep summer season ploughing once in 3 years, soil take a look at based fertilizer utility, seed remedy with Rhizobium, software program of PSB and *Trichoderma viridi*, use of wilt tolerant sorts, installation of hen perches, nipping at 15-20 cm top, irrigations first at branching and second at pod initiation degree, well timed weed control and spray of NSKE 5% or Azadirachtin zero.03% (3 hundred ppm) at pre-flowering level in Dhamtari district and improve the heart beat production. Technological extension yield gaps below chickpea on this complete examine also are furnished in this paper for framing suitable extension method for powerful switch of era to target farmers inside the district Dhamtari introduce and disseminate stepped forward forms of Chickpea to growth the crop yield during 2020-21 and 2021-22.

Materials and Methods

The present take a look at was accomplished by way of manner of the Krishi Vigyan Kendra, Sambalpur, Dhamtari (Chhattisgarh) throughout rabi season from 2020-21 to 2021-22 (02 years) on the farmers' fields of different 5 villages of Dhamtari district of Chhattisgarh. The vicinity of rice fallow under medium-black soils having incredible irrigation facilities become decided on inside the villages of Dhamtari district of Chhattisgarh United States of America. Pre-seasonal interaction emerge as completed in some unspecified time in the future of the initiation 365 days, 2020-21 and gathered facts on present practices, yields, earnings and problems confronted via the farmers primarily based at the accumulated statistics, technological gaps have been identified and a suitable demonstration bundle come to be organized. due to the fact the seed and wilt complex have been an vital issue which impacts manufacturing adversely, a new chickpea range, rvg-202 became determined on in competition to current antique variety (jaki 9218 and jg14) and *Trichoderma viridi* was used as bio-manage agent in competition to wilt disorder and verified as an entire package with a endorsed package deal of practices by using united states agricultural university (Indira Gandhi Krishi Vishvavidyalaya, Raipur, C.G.) (Table 1). In well known 10on farm trials in 4 ha place in distinct villages have been carried out. Chickpea fields from adjacent place within the equal village had been taken into consideration as manipulate (farmer's exercise) materials for the demonstrations with apprehend to offs and farmer's practices had been given in table 1. In every 12 months a preseasonal education and three trainings inside the route of the crop length had been carried out to put together the farmers on implementation of decided on bundle of practices. The vital inputs have been supplied to the farmers with the useful resource of buying certified seed of rvg-202 from KVK, Kawardha district of Chhattisgarh, *Trichoderma viridi*, PSB and rhizobium lifestyle from bio control laboratory, IGKV, Raipur and last were offered from community marketplace and nonmonetary inputs like well timed sowing in strains and properly timed weeding were done. The demonstration farmers were facilitated through KVK scientists in appearing area operations like sowing, spraying, weeding, harvesting and so forth at a few level

within the course of schooling and visits data on cost of cultivation, percentage disease index (PDI), yield and gross returns were amassed from each determined on farmer as well as from non-operating towards farmer for the assessment. From the gathered statistics, recommend values

for fee of cultivation, PDI, yield, gross returns, internet income and B:C ratio had been labored out on the premise of prevailing marketplace prices of inputs and minimum guide charges of outputs.

Table 1: Details of different components of assessed technology against the farmer's practice of chickpea

Sr. No.	Component	Farmer's Practice	Assessed Technology	Gap
1	Seed rate (kg/ha)	100 kg/ha	75 kg/ha	Partial gap
2	Seed treatment	No	Seed treatment with <i>Trichoderma viridi</i> @ 10 g/kg and Carbendazim @0.1%	Full gap
3	Method of sowing	Broadcasting	Line sowing	Full gap
4	Bio-fertilizer	No	Rhizobium & PSB	Full gap
5	Chemical fertilizers	DAP @ 125 kg/ha	Soil test based application	Partial gap
6	Weed control	No	Spraying of Pendimethalin @ 2.5 l/ ha as Pre-emergence	Full gap
7	Wilt management	No	<i>Tricoderma viridi</i> soil application @ 10 kg/ha	Full gap
8	Number of irrigations	2	2	No gap
9	Pest management	Botanical and Chemical spray	Azadirachtin 0.03% @ 5 ml/l at pre-flowering stage and need based chemical spray	Partial gap

The technology gap, extension gap and technology index were calculated using the following Formulae given by (Samui *et al.*, 2000) ^[11].

Technology gap = Potential yield-Demonstration yield

Extension gap = Demonstration yield-yield under existing practice

Technology index = {(Potential yield-Demonstration yield)/Potential yield} x 100

Results and Discussion

Yield and Economics

During the first year of assessment (2020-21) obtained higher yields in technology demonstration with a mean of 12.60 q/ha which was 48.23 percent higher than farmer's practice (8.5 q/ha). With mean gross returns of Rs. 60480/ha realized higher net profits in demonstration (Rs. 41430/ha) compared to control (Rs. 23300/ha). However, cost of cultivation was higher in demonstration as incurred towards critical inputs particularly seed. Overall superior performance of demonstrated technology over farmer's practice was resulted an additional income of Rs. 20328/ha with high B:C ratio (3.50) compared to control (2.54). Despite of increased cost of cultivation for the second year (2021-22), it was reduced during subsequent years over control in the year 2021-22. For both the years, increased yields were obtained in demonstration with an increase of 48.23 and 54.28 percent for the year 2020-21 and 2021-22, respectively. With combined effect of yield increase and cost saving, achieved higher net profits of Rs. 41430/ha and Rs. 50955/ha for the year 2020-21 and 2021-22, respectively as compared to control (Table 2). The results obtained in the present study were in line with the findings of Yasa *et al* (2020) ^[15] who reported the higher net returns (Rs. 47,825/ha) and benefit cost ratio (1.91) for chickpea gained through the improved production technologies demonstrated under CFLD programme.

During the second year of demonstration (2021-22), increased yield (54.28 %) and cost saving were contributed to an additional income of Rs. 22525/ha by recording higher

B:C ratio of 3.84 over control (2.75). These results were in accordance with the earlier findings of Mauria *et al* (2017) ^[7], Meena (2017) ^[8], Purushottam *et al* (2012) ^[10] and Narwale *et al* (2009) ^[9] as reported higher yield of demonstration plots compared to the control plots. The cumulative data analysis over two years revealed that, the superiority of demonstrated technology by recording yield increase of 32.5 percent with the average additional income of Rs. 14921/ha over control. Similarly the yield increase of chickpea was ranged from 7.10 to 47.28 percent under demonstration over the farmer's practice as reported by Lakshmi *et al* (2017) ^[6].

Benefit to Cost ratio

The overall cumulative mean for B:C ratio was recorded as 3.50 and 2.54 for demonstration and farmer's practice, respectively. Overall superior performance was proved for the demonstrated technology by exhibiting significant higher values for yield, net profit and B:C ratio (Table 3). Present results were in line with the earlier findings of Jayalakshmi *et al* (2018) ^[4] who reported higher net profits in demonstration with an additional income of Rs 7743/ha and B:C ratio of 2.09 against control (1.59). Over two years of chickpea demonstration with improved package of practices including a new variety (RVG 202) and use of Bio-control agent for wilt disease management identified 4.43q/ha as extension yield gap which was filled through the assessed technology with an additional investment of Rs. 1653/ha. However, still there was a considerable technology yield gap (4.95 q/ha) to catch the potential yield of 18 q/ha as signified by the technology index of 27.50 percent. Technology yield gap found in this study might be due to variations in the soil fertility status, time of sowing and seasonal weather conditions as similarly concluded by Tomar *et al* (2010) ^[14] and this could be overcome by developing fine tuned location specific package. The overall findings of present study were in concurrence with the earlier findings of Kaur *et al* (2019) ^[5] who reported 16.28 percent increase in yield of chickpea demonstration plots over farmer's practice, and also similarly found technology gap of 125kg/ha, extension gap of 264 kg/ha and technology index of 6.23 percent.

Table 2: Yield performance of chickpea under CFLDs at farmer's field

Year	Yield q/ha		% yield Increase over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index %
	Demonstration	Farmer's practice				
2020-21	12.60	8.50	48.23	5.40	4.10	30
2021-22	13.50	8.75	54.28	4.50	4.75	25
Average	13.05	8.62	51.25	4.95	4.42	27.5

Table 3: Economical comparison between recommended practice and farmers practice

Year	Gross cost (Rs./ha)		Gross return (Rs./ha)		Net return (Rs./ha)		B:C Ratio	
	Demonstration	Farmer's practice	Demonstration	Farmer's practice	Demonstration	Farmer's practice	Demonstration	Farmer's practice
2020-21	19050	17500	60480	40800	41430	23300	3.17	2.33
2021-22	17895	16195	68850	44625	50955	28430	3.84	2.75
Average	18473	16848	64665	42713	46193	25865	3.50	2.54

**Fig 1:** Different technology demonstration activities at farmer's field

Conclusion

Improved technology with use of Bio-control agent *i.e.*, *Trichoderma viridi* for cultivation of chickpea under rice-fallow was proved profitable in the present yield economics assessment. It could help the farmers to better utilize the vacant land of rice-fallow and it adds to the pulses production in the district.

Acknowledgements

Financial help received from ICAR-ATARI, Zone X, Jabalpur under NFSM-Pulses, Directorate of Pulses Development, Ministry of Agriculture & Farmers Welfare, Gov't of India is duly acknowledged.

References

1. Anonymous. Agricultural statistics at a glance-2018. Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare, Government of India; 2016.
2. Choudhary AK, Yadav DS, Singh A. Technological extension yield gaps in oilseeds in Mandi district of

Himachal Pradesh. Indian Journal of Soil Conservation. 2009;37(3):224-229.

3. Economics Times. India's food grain production to hit a record high of 291.95 million tonnes 2019-20. The Economic Times. 18 Feb 2020.
4. Jayalakshmi M, Prasad Babu G, Chowdary KR, Vijayabhinandana B, Subba Rao M. Impact of cluster frontline demonstrations (CFLDs) on pulse production, productivity, profitability, and transfer of technologies in Kurnool District of Andhra Pradesh, India. International Journal of Current Microbiology and Applied Sciences. 2018;7(12):937-947.
5. Kaur J, Singh V, Aulakh GS, Raina D. Assessment of front line demonstrations on chickpea in Ferozepur district of Punjab. Journal of Food Legumes. 2019;32(1):49-52.
6. Lakshmi DV, Vijay Kumar P, Padma Veni C. Impact of cluster frontline demonstrations to transfer of technologies in pulse production under NFSM. Bulletin of Environmental Pharmacology and Life Sciences. 2017;6(1):418-421.

7. Mauriya AK, Kumar V, Kumari A, Kumar P, Kumari M, Hoda MZ. Impact of cluster front line demonstrations on productivity and profitability of chickpea (*Cicer arietinum* L.). Journal of Food Legumes. 2017;30(1):57-60.
8. Meena ML. Effect of front line demonstrations of chickpea Cv. RSG-888 on farmer's field in rainfed condition of Rajasthan, India. Asian Journal of Agricultural Extension, Economics and Sociology. 2017;18(2):1-7.
9. Narwale SS, Pawar AD, Lambade BM, Ugle NS. Yield maximization of chickpea through INM applied to sorghum-chickpea cropping sequence under irrigated condition. Legume Research. 2009;32(4):282-285.
10. Purushottam, Singh SK, Chaudhary RN, Kumar K, Praharaj CS, Krishna B. Assessment of technological inputs for major pulses in Bundelkhand region. Journal of Food Legumes. 2012;25(1):61-65.
11. Samui SK, Maitra S, Roy DK, Mondal AK, Saha D. Evaluation on front line demonstration on groundnut (*Arachis hypogea* L.). Journal of the Indian Society of Coastal Agricultural Research. 2000;18(1):180-183.
12. Shalendra, Gummagolmath KC, Sharma, Purushottam, Patil SM. Role of pulses in the food and nutritional security in India. Journal of Food Legumes. 2013;26(2):124-129.
13. Sharma, Purushottam, Dwivedi S, Singh D. Global poverty, hunger, and malnutrition: A situational analysis. In: Singh U, Praharaj CS, Singh SS, Singh NP, editors. Biofortification of Food Crops. Springer, India, New Delhi; 2016. p. 19-30.
14. Tomar RKS. Maximization of productivity for chickpea (*Cicer arietinum* L.) through improved technologies in farmer's field. Indian Journal of Natural Products and Resources. 2010;1(4):515-517.
15. Yasa V, Rao B. Assessment of yield and economics of chickpea (*Cicer arietinum* L.) in Peddapalli district of Telangana State. Journal of Krishi Vigyan. 2020;8(2):16-20.