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Impact of Frontline Demonstrations on Yield and Economics of Chickpea in Gariyaband District of Chhattisgarh State

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ABSTRACT

Chickpea is an important rabi season pulse crop. Low productivity of chickpea is due to inappropriate production practices and diminishing soil fertility due to continuous adoption of rice-rice cropping system in the tribal areas of Gariyaband district is a cause of concern at large. To overcome this problem KVK, Gariyaband conducted 52 frontline demonstrations using improved management practices during 2012-13 to 2015-16 in Rabi season in 4 villages (Potia, Amethi, Dhamna, Mahonda) of Gariyaband district. There was an appreciable increase in yield level of 77.5 per cent in chickpea under demonstration plots. The highest seed yield 13.52 q ha-1 was recorded in 2015-16, which was 83.9 per cent more over the farmer's practice (7.35 q ha-1). The highest extension gap 6.17 q ha-1 was recorded during 2015-16. The lower values of Technology gap (6.48 q ha-1) and Technology index (32.40 %) were recorded during 2015-16. The improved technology gave higher gross returns, net returns with higher benefit cost ratio as compared to farmer's practices.

Keywords : Chickpea, extension gap, farmers practice, frontline demonstration, technology gap, technology index,

INTRODUCTION

Chickpea *(Cicer arietinum)* generally known as Chana / Gram or Bengal gram in India is an important leguminous food grain. Chickpea is a highly nutritious grain legume crop and is widely appreciated as health food. It is a protein rich supplement to cereal based diets especially to the poor in developing countries where people are vegetarians. In Chhattisgarh, during 2013-14 chickpea was cultivated in an area of 276.5 thousand ha with an annual production of 213.2 thousand ton and productivity of 771 kg/ha (Project Coordinator Report, AICRIP on Chickpea). However, during 2013-14 in Gariyaband district chickpea was spread over an area of 0.79 thousand ha with a production of 0.56 thousand MT and productivity of 709 kg/ha which was less than the state as well as national average of 960 kg/ha (Agriculture Statistics, Government of Chhattisgarh, 2013-14.). This is not only because of unavailability of improved varieties but also due to lack of adoption of improved production technologies. Since chickpea is a drought tolerant crop and can be grown on residual moisture, there is ample scope for expanding area under chickpea in the rice fallows available. Besides this, continuous cultivation of rice- rice cropping system has led to the decline in soil fertility. Thus the existing rice- rice cropping system has to be changed and farmers have to be encouraged to include chickpea as the 2nd crop after rice in order to bring more area under chickpea, increase annual production of chickpea at the district level and at the same time sustain the soil health. Thus, frontline demonstrations were successfully organized by the Krishi Vigyan Kendra with an objective to demonstrate and popularize the improved agro-technology on farmers' field under varied existing farming situations and also to enhance the pulse productivity and farm gains through pulses intensification and diversification for sustaining the production systems.

METHODOLOGY

Frontline demonstrations on chickpea were conducted at farmers' field of Gariyaband district, Chhattisgarh State to assess its performance during Rabi seasons of the year 2012, 2013, 2014 and 2015 in four villages (Potia, Amethi, Dhamna, Mahonda) of Gariyaband district. During these four years (2012-2015), 20.8 hectares under chickpea were demonstrated with

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improved management practices using improved varieties JG14 and JAKI 9218. Total 52 farmers were closely associated with chickpea demonstrations. In general, the soil of the area under study was sandy loam with low to medium fertility status. Each demonstration was of 1.0 acre area and the components of demonstration comprised of improved varieties, proper tillage, proper seed rate, line sowing using seed cum fertilizer drill, proper fertilization, seed treatment with chemical fungicide, dual inoculation of Rhizobium + PSB, soil application of Trichoderma, proper irrigation, weed management and protection measures. In the demonstration one control plot was also kept in which the farmers practices were carried out. The sowing was done during Mid November under irrigated conditions and harvested during last fortnight of March. The demonstrations on farmers' fields were regularly monitored by Krishi Vigyan Kendra, Gariyaband right from sowing to harvesting. The yield data were collected from both the demonstration and farmers practice using random crop cutting method and analyzed. The technology gap, extension gap and technological index (Samui et. al., 2000) were calculated by using following formula (Eq. 1 to 4) as given below-

$$\text{Percent increase yield} = \frac{\text{Demonstration yield - Farmers yield}}{\text{Farmers yield}} \times 100 \quad \text{(Eq. 1)}$$

Technology gap = Potential yield - Demonstration yield (Eq. 2)

Extension gap = Demonstration yield - Farmers practice yield (Eq. 3)

$$\text{Technology index} = \frac{\text{Potential yield–Demonstration yield}\times 100}{\text{Potential yield}} \quad \text{(Eq.4)}$$

RESULTS AND DISCUSSION

A total of 52 Frontline demonstrations were conducted at farmer's field in their farming situation. Table 1 indicates the factors considered for selection of critical input under FLD. A complete gap was observed in adoption of recommended practices over farmer's practice with regard to variety, sowing method, seed treatment, seed inoculation, sowing method, fertilizers, weed control and plant protection measures whereas partial gap was noted for irrigation.

The study revealed that improved technology registered overall 77.5 per cent increase in seed yield over the farmers practice. Data recorded in Table 2 reflects that the average yield under demonstration fluctuated and ranged from 11.20 to 13.52 during 2012-13 to 2015-16 and the highest yield of chickpea (13.52 q ha-1) was obtained during 2015-16 as compared to the farmers practice (7.35 q ha-1). It was evident from the yield levels recorded in demonstrations that the improved package of practices can boost the yield significantly. These results confirm those obtained by conducting FLD trials on various pulse crops (Das and Willey,1991)

Table 1: Differences between Technological intervention and farmers practices under FLD on chickpea

Particulars	Technological Intervention	Farmers Practice
Variety	JG 14 & JAKI 9218	Local
Sowing Method	Line Sowing	Broadcasting
Seed treatment	Carbendazim @ 3g/kg seed	No use of fungicide
Seed inoculation	Rhizobium (2.5g/kg seed) and PSB culture (2.5 g/kg seed)	No use of cultures
Fertilizer dose	20:40:20 kg N:P:K ha^{-1} + Soil application of *Trichoderma* enriched FYM at the time of final ploughing	Imbalanced Use
Weed management	Pre-emergence application of Pendimethalin (0-3 DAS) fb 2 hand weedings at 25 DAS and 55 DAS	No weeding
Irrigation	One at pre flowering and one at pod development stage	One irrigation
Plant Protection	Need based plant protection measure	No plant protection

Table 2: Productivity, Extension gap, Technology gap and Technology Index of Chickpea as grown under FLD and existing package of practices

Year	No. of Demo.	Area	Yield q/ha		(%)Increase over FP	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
			FLD	Farmers Practice				
2012-13	12	4.8	11.20	6.35	56.64	4.85	8.80	44.00
2013-14	16	6.4	12.96	7.28	55.77	5.68	7.04	35.20
2014-15	12	4.8	12.15	7.08	49.08	5.07	7.85	39.25
2015-16	12	4.8	13.52	7.35	59.06	6.17	6.48	32.40

Extension gap

Extension gap of 4.85, 5.68, 5.07 and 6.17 q ha-1 were observed during 2012-13, 2013-14, 2014-15 and 2015-16 respectively. On an average, extension gap under four year FLD programme was 5.44 q ha-1 which emphasized the need to educate the farmers through various means for adoption of improved agricultural production technologies to reverse these trends of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trends galloping extension gap.The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology (Table 1). This finding is in corroboration with the findings of Hiremath and Nagaraju, (2010).

Technology gap

The technology gap observed ranged from 6.48 q ha-1 to 8.80 q ha-1. The technology gap observed may be attributed to the dissimilarity in the soil fertility status, agricultural practices and local weather conditions (Mukherjee, 2003). Hence variety wise and location specific recommendation appears to be necessary to minimize the technology gap for yield level of different situations.

Technology index

Similarly, the technology index for all the demonstrations during different years were in accordance with technology gap. The technology index shows the feasibility of the demonstrated technology at the farmer's fields and lower the value of technology index more is the feasibility of the technology demonstrated (Jeengar, et al., 2006). Higher technology index reflects the inadequacy in transferring the proven technology to the farmers and insufficient extension services for transfer of technology. Technology index was lowest (32.40 %) during 2015-16 and was highest (44.00 %) during 2012-13. As such, reduction of technology index from 44.0% (2012-13) to 32.40 per cent (2015-16) exhibited the feasibility of technology demonstrated. The average technology index observed during the four years of FLD programme was 37.71 per cent which shows the efficacy of good performance of technical interventions.

Economic analysis

The economic feasibility of improved technology over traditional farmers' practices was calculated depending on the prevailing prices of inputs and output cost (Table 3). The cultivation of chickpea under improved technologies gave higher net returns of Rs. 22235, 28046, 24736.25 and 29722.4 per hectare respectively as compared to farmers' practices. The benefit cost ratio of chick pea cultivation under improved cultivation practices were 2.96, 3.31, 2.79 and 3.10 as compared to 2.26, 2.54, 2.38 and 2.48 under farmer's practices in all the years. This may be due to higher yields obtained under improved technologies compared to local check (farmers practice). This finding is in corroboration with the findings of Mokidue *et. al.,* 2011.

Table 3: Economic Analysis of demonstration and farmers practice

Year	Cost of cultivation (₹/ha)		Additional cost in demo (₹/ha)	Gross returns (₹ /ha)		Net returns (₹/ha)		Additional return in Demo (₹/ha)	Effective gain (₹/ha)	B:C ratio	
	Demo	FP		Demo	FP	Demo	FP			Demo	FP
2012-13	11365	9500	1865	33600	21450	22235	11950	10285	8420	2.96	2.26
2013-14	12130	10150	1980	40176	25792	28046	15642	12404	10424	3.31	2.54
2014-15	13840	10875	2965	38576.25	25876.25	24736.25	15001.25	9735	6770	2.79	2.38
2015-16	14150	11120	3030	43872.4	27582.5	29722.4	16462.5	13259.9	10229.9	3.10	2.48

MSP 2012-13:3000, 13-14: 3100, 14-15: 3175, 15-16:3245

CONCLUSION

Demonstration at field level provides an opportunity to display the productivity potential and profitability of the latest technology under the natural farming conditions. The productivity gain under FLD over existing practices of chickpea cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of chickpea in the district.

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REFERENCES

Anonymous. 2013-14. Agriculture Statistics, Department of Agriculture. Government of Chhattisgarh. http://cgagridept.nic.in/

Das, P.K. and Willey, R.W. 1991. A farmer's participatory approach to the development of improved sustainable technologies for the resource poor rainfed areas of the eastern plateau of India. Extension Strategies for Rainfed Agriculture. Ed. Indian Society of Extension Education. New Delhi, India pp 199-205.

Dixit,G.P. 2014. Project Coordinators Report. AICRIP on Chickpea.ICAR, IIPR, Kanpur.p 34

Hiremath, S.M. and Nagaraju, M.V. 2010. Evaluation of on-farmfront line demonstrations on the yield of chilli., *Karnataka J. Agric. Sci.,* 23 (2), 341-342.

Jeengar, K.L., Panwar, P. and Pareek, O.P. 2006. Front line demonstration on maize in Bhilwara District of Rajasthan, Current Agriculture, 30(1/2),115-116.

Mokidue, I., Mohanty, A.K. and Sanjay, K. 2011. Correlating growth, yield and adoption of urd bean technologies. *Indian J. Ex. Edu.* 11(2), 20-24.

Mukherjee, N. 2003. Participatory, learning and action. Concept, Publishing Company, New Delhi, Pp.63-65.

Samui, S.K., Mitra, S., Roy, D.K., Mandal, A.K. and Saha, D. 2000. Evaluation of front line demonstration on groundnut. *Journal of the Indian Society Costal Agricultural Research,* 18(2), 180-183.