RESEARCH ARTICLE

EVALUATION OF THE PRODUCTIVITY FOR CHICKPEA (*CICER ARIETINUM* L.) THROUGH CLUSTER FRONTLINE DEMONSTRATION IN FARMERS FIELD IN DHAR DISTRICT (M.P.)

S.S. Chauhan[1], K.S. Kirad[1], G.S. Gathiye[1], S.S. Dhakad*, J.S. Rajpoot[1] and M.S. Jadon[2]

RVSKVV, Krishi Vigyan Kendra, Shajapur (M.P)
[1]RVSKVV Krishi Vigyan Kendra, Dhar (M.P)
[2]RVSKVV, Krishi Vigyan Kendra, Dewas (M.P)
Email: sudhirdhakad@rediffmail.com

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Abstract: The cluster frontline demonstration (CFLDs) on chickpea was conducted by Krishi Vigyan Kendra, Dhar during the rabi season of 2016-17 to 2018-19. The results revealed that improved seed of JAKI – 9218 + seed treatment with ((2g Thiram + 1g carbendazim kg/seed) + Rhizobium + P.S.B.@ 5g per kg of seed) + plant protection (Pheromone trap 3 no./acre+ insecticide) recorded average highest yield 17.50 q/ha followed by 12.90 q/ha in control plot. The same trend was found in case of gross and net monetary returns, which was Rs. 94,788/- and Rs. 70,745/- ha and for control Rs. 68931/- and Rs. 48098/-ha respectively. Benefit cost ratio for demonstration and control was 3.96 and 3.32, respectively. The extension gap ranging between 4.29 to 4.86 q/ha. Data on technology index reduced from 12.5 percent (2016-17) to 13.4% (2018-19), exhibited the feasibility of technology demonstration in this region. It can be concluded that the pulses production could be enhanced by encouraging the farmers through adoption of recommended technologies which were followed in the CFLDs.

Keywords: CFLDs, Chickpea, Extension gap, Technology gap

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is a major pulse of India. It occupies about 38 percent of area under pulses and contributes about 50 percent of the total pulse production in India. It is grown throughout the country except on high altitude of Northern and north eastern regions & costal peninsula. Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Andhra Pradesh, Karnataka, Gujarat, Chhattisgarh, Haryana, Bihar, Odisha, and West Bengal arc the major chickpea producing state sharing over 95 percent area. Pulses arc the important source of proteins and essential component of diet. The area, production and productivity of the pulses in the country is 25.21 million hectare, 19.78 million tones and 7.85 q/ha respectively. Chickpea is an important rabi crop mainly sown in September – November and harvested in February. Chickpea is the premier food legume crop in India is covering about of 9.93 Mha with production of 9.53 m tons and productivity of 9.60 q/ha (Anonymous, 2014). Chickpea is an important pulse crop of Madhya Pradesh and grown in 3.16 million hectares of land annually, producing 3.33 million tons with average productivity of 1044 kg ha. As far as the chickpea cultivation is Raisen district of M.P. is concerned, it is grown on 0.17 lakh hectare of land annually producing 0.19 lakh tones with the average productivity of 16.29 q/ha.

In Madhya Pradesh average productivity of chickpea is very low (10.44 q/ha) as compare to genetic potential. This is because of low adoption of recommended production technologies and lack of knowledge of chickpea production in general and conviction about latest technologies. Major a biotic stress viz low moisture content in soil, low organic matter content, soil type, terminal drought and biotic stresses are also responsible for low yield. Among the biotic stress, the gram pod borer is a major pest occurring for 75 per cent pod damage in the crop. (Krishan Kant *et a1*2007).

Dhakad *et al*., (2018) studied the effect of impact of front line demonstration on the yield and economics of chickpea (Cicer arietinum L.) in tribal area in Dhar district of Madhya Pradesh during 2010-11 and 2011-12 for JG-16 variety and 2009-10 and 2012-13 for JG-11 variety of chickpea. The improved technologies consisting use of modern variety, seed treatment with rhizobium and PSB culture, balanced fertilizer application and integrated pest management. FLD recorded higher yield as compared to farmer's local practice. The average results of two pooled data revealed that the front line demonstration on chickpea an average yield was recorded 14.95 q/ha under demonstrated plots as compare to farmers practice 11.98 q/ha for JG 11 variety and average yield was recorded 13.95 q/ha under demonstrated plots as compare to farmers practice 8.74 q/ha for JG 16 variety. The improved technology gave higher gross return, net return with higher benefit cost ratio as farmer's practices.

Yasa and Rao (2020) concluded that improved technology for cultivation of chickpea under rice-fallow was proved profitable in the present yield economics assessment and it could help the farmers to better utilize the vacant land of rice-fallow and it adds to the pulses production in the district.

Dhakad *et al* (2020) concluded that average results of three pooled data revealed that the front line demonstration on chickpea an average yield was

*Corresponding Author

recorded 18.24 q/ha under demonstrated plots as compare to farmers practice 15.31 q/ha. and improved technology gave higher gross return, net return with higher benefit cost ratio as farmer's practices.

The present study was undertaken to evaluate the difference between demonstrated technologies through CFLDs demonstration vis-a-vis practices followed by the local farmers.

MATERIALS AND METHODS

The present study was conducted in Dhar district of Madhya Pradesh . In this study 100 Tribal farmers were selected from 6 different villages viz., Tornod, Harsora, Dharsikheda, Utavad, Hatod and Panala of Dhar, Badnawar & Nalcha Block of Dhar District. The technologies included improved variety of JAKI – 9218 + seed treatment with (2g thiram + 1g carbendazim kg/seed) before sowing for reducing seed and soil borne fungal diseases. Phosphorus solubilizing bacteria (PSB) have been identified, which improve availability of phosphorus to plants. Thus, seed treatment with PSB is recommended. The seeds also be inoculated with Rhizobium culture. The seeds treated first with fungicides and then with PSB and Rhizobium, following the procedure recommended by suppliers and plant protection (Pheromone trap 3 no./acre+ insecticide) were tested under the demonstration. Deep ploughing was done during the April month. Crop was sown between 25 October to 10 November with a spacing of 30 cm x 10 cm and seed rate was 75 kg/ha. An entire dose of N and P through Di ammonium Phosphate & murate of potash was applied as basal before sowing. In this programme total 100 farmers were associated. The total area covered in 3 year period was 120 hectares for demonstration of improved practices of Chickpea. In the demonstration one control plot was also kept where farmers practices was carried out .The yield data was collected from the selected FLD farmers by random crop cutting method. The constraints as perceived by respondents were scored on the basis of magnitude of the problem as per Meena and Sisodiya (2004). The responses were recorded and converted in to mean per cent score and ranked accordingly as per Warde *et al* (1991).The extension gap, technology gap and the technology index were work out with the help of formulas given by Samui *et al* (2000) as mentioned below:

(1) Technology gap = Potential yield- demonstration yield

(2) Extension gap = Demonstration yield - farmer's yield

(3) Technology Index

$$= \frac{\text{Technology gap}}{\text{Potential Yield}} \times 100$$

Table 1. Difference between recommended practices and existing farmer practices under chickpea FLD.

Crop operations	Recommended practices	Farmers practice	Gap
Variety	JAKI-9218	JG-218/ Vijay (Old)	Full gap
Land preparation	One deep ploughing with soil turning plough and inter cross ploughing.	One cultivator ploughing and two inter cross ploughing	Nil
Seed rate (Kg/ha)	75	100	Full gap
Seed treatment	Trichoderma viridi + Rhizobium 5 gm/kg.	No seed treatment.	hill gap
Fertilizer dose (Kg/ha)	DAP (130 Kg)	DAP (50 Kg)	Partial gap
Sowing method	30x10 cm Row to row and plant to plant	Line sowing	Nil
Plant protection	Pheromone trap (10) + Bird percher 50/ha + One spray of insecticide	One spray of insecticide	Partial gap

RESULTS AND DISCUSSION

During the study period it was observed that the demonstration trials have increased the yield over the farmers' practices (Table 2) and Full gap observed in most of production technology was the reason of not achieving potential yield. Farmers were not aware about recommended technologies.

Yield

The results revealed that due to FLD on chick pea an average yield was recorded 17.50 q/ ha under demonstrated plots as compared farmers' practice (12.90 q/ha). The highest yield in the FLD plot was 17.66 q/ha during year 2017-18 and in farmers' practice, it was 12.80 q/ha in the same year and lowest yield was recorded in the year 2018-19. The average yield of chick pea is increased by 35.68 % over control plot. The results clearly indicated that the higher average seed yield in demonstration plots over the years compared to local check was due to knowledge and adoption of full package of practices i.e. appropriate varieties such as JAKI-9218, timely sowing, seed treatment with bio fertilizers viz. Rhizobium and phosphorus solubalizing bacteria

(PSB), Trichoderma @ 5g/kg of seed, use of balanced dose of fertilizer, method and time of sowing with proper spacing, timely weed management, irrigation water management, pulse magic spray at lowering and pod development stage, need based plant protection and grading of the seeds.

The above findings were in agreement with the findings of Singh *et al* (2014) and Tomar (2010). The higher yield of chickpea under improved technology was due to use of latest high yielding varieties, integrated nutrient management and integrated pest management.

Table 2. Productivity, Extension Gap, Technology gap and technology index of chickpea as grown under FIB and existing package of practices.

Year	Area (ha)	No. of Demo	Potential yield (q/ha)	Yield q/ha		% increase over F.P.	Extension gap q ha-'	Technology gap glia-1	Technology Index (%)
				R.P.	F.P				
2016-17	40	100	20.00	17.50	12.85	36.18	4.65	2.50	12.5
2017-18	40	100	20.00	17.66	12.80	37.97	4.86	2.34	11.7
2018-19	40	100	20.00	17.33	13.04	32.90	4.29	2.67	13.35
Mean	**40**	**100**	**20.00**	**17.50**	**12.90**	**35.68**	**4.60**	**2.50**	**12.52**

Technology gap

The technology gap means the differences between potential yield and yield of demonstration plot. The demonstration plot yields (Table2), were 2.50, 2.34 and 2.67 q/ha during 2016-17, 2017-18, and 2018-19, respectively. On an average technology gap under three year FLD programme was 2.50 q/ ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, crop production practices and local climatic situation.

Extension gap

Extension gap means the differences between demonstration plot yield and farmers yield. Extension gap of 4.65, 4.86 and 4.29 q/ha (Table 2) were observed during 2016-17, 2017-18, and 2018-19 respectively. On an average extension gap under six year FLD programme was 4.60 q/ha which emphasized the need to educate the farmers through various extension means i.e. front line demonstration for adoption of improved production and protection technologies, to revert the trend of wide extension gap. More and more use of latest production technologies with high yielding varieties will subsequently change this alarming trend of galloping extension gap.

Technology Index

Technology index indicates the feasibility of the evolved technology in the farmers' fields. Lower the value of technology index, higher is the feasibility of the improved technology. The technology index varied from 11.7 to 13.35 per cent (Table 2). On an average technology index was observed 12.52 per cent during the three years of FLD programme, which showed the efficacy of good performance of technical interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of pigeon pea.

Economic return

Data in Table 3 revealed that the cost involved in the adoption of improved technology in chick pea varied and was more profitable. The cultivation of chick pea under improved technologies gave higher net return of Rs. 86,275, 63,820 and 62,150/- ha, respectively, as compared to farmers practices (Rs 58,243/-, 42,475/- and 43,575/- per ha in 2016-17, 2017-18, and 2018-19 respectively). An average net return and B: C of demonstration field was Rs. 4.7, 3.6 and 3.5, respectively as compared to farmers practice (Rs 3.98, 2.98 & 3.0 in 2016-17, 2017-18, and 2018-19 respectively. Similar findings were reported by Singh *et al* (2014). The benefit cost ratio of chick pea cultivation under improved practices has higher than farmers' practices in all the years and this may be due to higher yield obtained under improved technologies compared to local check (farmers' practice). This finding was in corroboration with the findings of Mokidue *et al* (2011) Tomar (2010), Nirwal *et al*., (2013) and Dhakad *et al*., (2018 & 2020)

Table 3. Economic analysis of demonstration and farmers practices

Year	Cost of cultivation		Gross return		Net return		Additional cost	Additional net return	B:C ratio
	RP	F.P.	R.P.	F.P.	R.P.	FP			
2016-17	23130	19500	109395	77743	86265	58243	3630	31652	4.7
2017-18	24500	21500	88320	63975	63820	42475	3000	24345	3.6

2018-19	24500	21500	86650	65075	62150	43575	3000	21575	3.5
Mean	**24043**	**20833**	**94788**	**68931**	**70745**	**48098**	**3210**	**25857**	**4.0**

CONCLUSION

It is concluded from the study that there exists a gap between the potential and demonstration yields in wilt tolerant chick pea mainly due to technology and extension gaps and also due to the lack of awareness about new technology. The FLD produced a significant positive result and provided the researcher an opportunity to demonstrate the productivity potential and profitability of the latest technology (Intervention) under real farming situation, which they have been advocating for long time.

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