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IMPACT OF FRONT LINE DEMONSTARTION ON YIELD AND PROFITABILITY OF CHICKPEA (*CICER ARIETINUM*) IN SAGAR DISTRICT OF BUNDELKHAND REGION OF MADHYA PRADESH, INDIA

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Abstract

Chickpea is also known as gram, Bengal gram and chana in hindi. It belongs to family Leguminosae. It is the major pulse crop used in the diet of vegetarian in India and it is a good source of protein. Front line demonstration were conducted at 76 farmers field under 30.4 ha in 13 villages, to demonstrate production potential and economic benefits of improved technologies comprised *viz*., wilt tolerant and resistant varieties (JG 130, Vishal, JAKI 92-18 and JG 16) with seed rate of 75 kg/ha, line sowing with spacing of 45 cm (R-R) and 20 cm (P-P), seed treatment and seed inoculation, balance dose of fertilizer, weed management and plant protection measures. The demonstrations were carried out at Sagar district of Madhya Pradesh during *rabi* season of 2007-08 to 2010-11. The improved technologies gave higher yields and recorded mean yield of 9.17 q/ha which was 22.20 per cent higher than that obtained with farmers practice yields 7.48 q/ha.

Key words : Chickpea, demonstration, FLD programme.

Introduction

Pulses are good source of protein and commonly called the poor man's meat (Reddy *et al*., 2007). Pulses are grown in an area of 22-23 million hectares with an annual production of 13-18 million tons. India accounts for 33 per cent of the world production of area and 22 per cent of the world production of pulses. About 90 per cent the global pigeon pea, 645 per cent of chickpea and 37 per cent of lentil area falls in India, corresponding to 93, 68 and 32 per cent of the global production, respectively (FAO STAT, 2011).

Chickpea is most important pulse crop of India in terms of both area and production. It is a good source of protein, carbohydrate, fat, minerals and vitamins. It is an excellent animal feed. Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Gujarat, Andhra Pradesh and Karnataka are the major chickpea growing states sharing over 95 per cent area. During last five decades, chickpea has registered significant increase in production, which is primarily due to introduction of high yielding and disease resistant varieties and adoption of improved production technologies. Eventhough, pulses production increased significantly during the last decade but continuing the faster growth is a bigger challenge for researchers, extension agencies and policy makers to fulfill the domestic demand of its in India. The existing technology has the potential of doubling production without increasing area under chickpea as well as existing yield gap among all zones is largest in the Northeast zones can be filled by farmers adoption of the recommended package of practices (Reddy *et al*., 2007). Keeping this in view, front line demonstrations of chickpea were conducted, to demonstrate the production potential of latest improved technologies on farmer's field availability of input responsive varieties of chickpea.

Materials and Methods

Front line demonstration (FLDs) on chickpea was conducted by Krishi Vigyan Kendra, Sagar (M.P.), India during the period from 2007-08 to 2010-11 in 13 villages *viz*., Baddaua, Semadhana, Rajakhedi, Badona, Chanatoria, Kanheragond, Salaiyagazi, Agaria, Baroda, Bhapel, Sidgava, Rahatgarh and Richai of Sagar district. Total 76 demonstrations were conducted. In general soil

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of the area under under study was sandy loam with low to medium fertility status. The component demonstration of front line technology in chickpea was comprised i.e. improved variety JG 130, Vishal, JAKI 92-18, JG 16, proper tillage, proper seed rate and sowing method, balance dose of fertilizer (18 kg N + 46 kg P_2O_5/ha), use of carboxin @ 3 g/kg of seed as seed treatment with *Rhizobium* and PSB culture inoculation @ 10 gm/kg of seed, proper irrigation, weed management and plant protection measure (table 1). Total 30.4 ha area was covered in four consecutive years. In the demonstration, one control plot was also kept where farmers practices was carried out. The FLD was conducted to study the technology gap between potential yield and demonstrated yield, extension gap between demonstrated yield and yield under existing practice and technology index. The yield data were collected from both the demonstration and farmers practice by random crop cutting method and analyzed by using simple statistical tools. The technology gap, extension gap and technological index (Samui *et al*., 2000) were calculated by using following formula as given below:

$$\text{Per cent increase yield} = \frac{\text{Demonstration yield} - \text{Farmer practice yield}}{\text{Farmer practice yield}} \times 100$$

Technology gap = Potential yield – Demonstration yield.

Extension gap = Demonstration yield – Farmer practice yield.

$$\text{Technology index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$$

Results and Discussion

The gap between the existing and recommended technologies of chickpea in Sagar district was presented in table 1. Full gap was observed in case of HYVs, seed treatment, seed inoculation, fertilizer dose and weed management whereas, partial gap was observed in spacing, irrigation and plant protection measure, which definitely was the reason of not achieving potential yield. Farmers were not aware about recommended technologies. In general, farmers used local or old age varieties instead of the recommended high yielding resistant varieties. Unavailability of seed in time and lack of awareness were the main reasons.

During four years of FLD results obtained are presented in table 2. The data in table 2 revealed that an average yield was recorded 9.17 q/ha under demonstrated plots as compare to farmers practice 7.48 q/ha. The highest yield 11.07 q/ha was found in demonstrated plot during 2008-09 and 8.82 q/ha under farmers practice in 2008-09. This results clearly indicated that the higher average grain yield in demonstration plots over the years compare to farmers practice due to knowledge and adoption of full package of practices i.e. suitable varieties such as JG 130, Vishal, JAKI 92-18, JG 16 etc, timely sowing, seed treatment, use of balance dose of fertilizer, timely weed management and need based plant protection. The average yield of chickpea increased 21.20 per cent. The yield of chickpea could be increased over the yield obtained under farmers practice (use of old variety, untimely sowing, no use of balanced dose of fertilizer, no plant protection measure) of chickpea cultivation. The above findings are in similarly with the findings of Singh (2002).

The technology gap were 8.08, 6.93, 8.05 and 12.27 q/ha during 2007-08, 2008-09, 2009-10 and 2010-11, respectively. On an average technology gap under four years FLD programme was 8.83 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation. Extension gap of 1.35, 2.25, 1.79 and 1.35 q/ha were observed during 2007-08, 2008-09, 2009-10 and 2010-11, respectively. On an average extension gap was observed 1.68 q/ha, which emphasized the need to educate the farmers through various extension means. The technology index varied from 38.5 to 61.35 per cent (table 2). On an average technology index was observed 48.76 per cent, which shows the efficacy of good performance of technical interventions. This will accelerate the yield performance of chickpea.

The economic viability of improved technologies over farmer' practices were calculated depending on prevailing prices of inputs and outputs costs (table 3). It was found that cost of cultivation of chickpea varied from Rs. 7321 to Rs. 9837/ha with an average of Rs. 8410/ha of demonstration as against the variation in cost of cultivation from Rs. 7031 to Rs. 8283/ha with an average of Rs. 7579/ha in farmers practice. Cultivation of chickpea under demonstration gave higher net return ranged from Rs. 7169 to Rs. 19247/ha with a mean value of Rs. 13302/ha as compared to farmers practice which recorded Rs. 5753 to Rs. 14137/ha with a mean of Rs. 10190/ha. The higher benefit cost ratio 2.68, 3.62, 2.58 and 1.73 were found under demonstration compared to 2.49, 3.01, 2.27 and 1.69 under farmers practice in the corresponding seasons. This may be due to higher yields obtained under demonstrations compared to farmers practice.

Table 1 : Differences between technological intervention and farmers practices under front line demonstration on chickpea.

S. no.	Component	Technological intervention	Farmers practice	Gap
1.	Land preparation	Three ploughing	Three ploughing	Nil
2.	Variety	JG 130, Vishal, JAKI 92-18 and JG 130	Old mix variety	Full
3.	Seed rate	75 kg/ha	100-120 kg/ha	Higher seed rate
4.	Seed treatment	Carboxin @ 3 g/kg of seed	No seed treatment	Full
5.	Seed inoculation	*Rhizobium* and PSB culture @ 10 g/kg of seed	No seed inoculation	Full
6.	Sowing method	Line sowing	Line sowing	No
7.	Spacing	Row to row 45 cm and plant to plant 20 cm	Row to row 25 cm and plant to plant 10 cm	Partial
8.	Fertilizer dose	18 kg N + 46 kg P_2O_5/ha (50 kg DAP)	No use	Full
9.	Weed management	Two mechanical weeding	No weeding	Full
10.	Irrigation	Two irrigations at pre flowering and pod development stage	One irrigation	Partial
11.	Plant protection	i)Need based insecticide spray ii) Use ofcorrect dose and time of insecticide	i) Application of insecticide with out knowledge ii) Use of incorrect dose	Partial

Table 2 : Productivity, extension gap, technology gap and technology index of chickpea as grown under FLD and existing package of practices.

Year	Area (ha)	No. of demonstration	Variety	Average yield (q/ha)			% increase in yield over farmer practice	Extension gap (q/ha)	Technology gap (q/ha)	Technology index
				Potential	Demonstration	Farmers practice				
2007-08	4.80	12	JG 130	16	7.92	6.57	20.5	1.35	8.08	50.5
2008-09	4.80	12	Vishal	18	11.07	8.82	25.5	2.25	6.93	38.5
2009-10	4.80	12	JAKI 92-18	18	9.95	8.16	21.6	1.79	8.05	44.7
2010-11	16.00	40	JG 16	20	7.73	6.38	21.22	1.35	12.27	61.35
Total average	30.40	76	-	-	9.17	7.48	22.20	1.68	8.83	48.76

Table 3: Profitability of chickpea through front line demonstration.

Year	Average cost of cultivation (Rs/ha)		Average gross return (Rs/ha)		Average net return (Rs/ha)		Benefit cost ratio	
	Demonstration	Farmers practice	Demonstration	Farmers practice	Demonstration	Farmers practice	Demonstration	Farmers practice
2007-08	7990	7105	21384	17739	13394	10634	2.68	2.49
2008-09	7321	7031	26568	21168	19247	14137	3.62	3.01
2009-10	8493	7898	21890	17952	13397	10054	2.58	2.27
2010-11	9837	8283	17006	14036	7169	5753	1.73	1.69
Average	8410	7579	21712	17724	13302	10190	2.65	2.36

Note : Cost of grain yield has been estimated at prevailing market price i.e Rs 2700,2400,2200 and 2200/quintal during 2007-08, 2008-09, 2009-10 and 2010-11, respectively.

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