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Impact of Front Line Demonstration on the Yield and Economics of Chickpea (*Cicer arietinum* L.) in Sidhi District of Madhya Pradesh

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ABSTRACT

In front line demonstration on chickpea, highest grain yield (15.32 q/ha) was recorded in variety JG-226. It was 92.7 per cent higher yield over the farmers practice (7.95 q/ha). An average yield of 13.11 q/ha was recorded in on-farm testing and front line demonstration and in farmers practice it was just 8.05 q/ha. Thus, the average technology gap, extension gap and technology index of 16.89 q/ha, 5.05 q/ha and 56.30 per cent respectively were obtained between demonstrated and farmers practice. The average yield of chick pea increased 62.42 per cent over farmers practice, while the year wise variation in yield increase was 49.8 to 92.7 per cent.

Keywords : Chickpea, FLD, Impact, Adoption gap, B: C ratio

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is the premier pulse crop widely consumed in India. It is an important *rabi* season food legume having extensive geographical distribution and contributing 39 per cent to the total production of pulse in the country (Singh *et al.,* 2013). It is the cheapest source of protein and is the inseparable part of the daily diets of every Indians. It also plays an important role in sustainable agriculture enriching the soil through biological nitrogen fixation (BNF). It is a good source of protein (18-22 %), carbohydrate (52-70 %), fat (4-10 %), minerals (calcium, phosphorus, iron) and vitamins. It is an excellent animal feed. Its straw also had good forage value. The world's total production of chick pea hovers around 8.5 million metric tons annually and is grown over 10.7 million hectares of land approximately. Its average productivity is 789 kg/ha. The major chick pea producing states are Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharastra, Andhra Pradesh, Gujrat, Karnatka, Haryana, Bihar and West Bengal. Sidhi district of Madhya Pradesh occupies 37,800 hectares of land and 16,200 tons production with average productivity of 431 kg/ha of chick pea. Its productivity is far below the potential yield. Abiotic stresses are responsible for declining of yield potential(Singh *et al.,* 2013). Through much progress has been made in the field of agriculture research and education, but benefits of these developments could not be realized by the farming community because of low adoption of technologies at the farmers level. Front line demonstration (FLDs) is introduced by the Indian Council of Agricultural Research, New Delhi with inception of technology mission of pulse and oil seed crops during mid eighties. The field demonstration took place under the close supervision of scientist of the KVKs.

MATERIALS AND METHODS

Front line demonstration (FLDs) on chickpea was conducted by Krishi Vigya Kendra, Sidhi (M.P.) during the year 2008 to 2010 in two villages *viz.* Chabari and Hadbado of district Sidhi. 68 number of demonstrations was conducted in two villages. In general soil of the area under study was sandy loam with low to medium fertility status. The component demonstration of front line technology in chickpea was comprised of improved variety JG-130, JG-63, JG-226, JG-16, proper tillage,

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proper seed rate and sowing method, balance dose of fertilizer (18kg Nitrogen + 46 kg P_2O_5 /ha), use of *Trichoderma* @ of 5g/kg of seed as seed treatment, proper irrigation, weed management and protection measure (Table 1). Total 24ha area was covered in three 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 the 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 (Eq. 1 to 4) as given below-

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

$$\text{Technology gap} = \text{Potential yield} - \text{Demonstrated yield} \quad \text{(Eq. 2)}$$

$$\text{Extension gap} = \text{Demonstrated yield} - \text{Yield under existing practice} \quad \text{(Eq. 3)}$$

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

RESULTS AND DISCUSSION

The gap between the existing and recommended technologies of chickpea in district Sidhi is presented in table 1. Full gap was observed in case of use of HYVs, sowing method, seed treatment, fertilizer dose and weed management and partial gap was observed in irrigation and plant protection measure, which definitely was the reason of not achieving potential yield. Farmers were not aware about recommended technologies. Farmers in general 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. Farmers followed broadcast method of sowing against the recommended line sowing and because of this, they applied higher seed rate than the recommended.

Yield

During three years of frontier technologies results obtained are presented in table 2. The results revealed that due to front line demonstration on chick pea an average yield was recorded 13.11q/ha under demonstrated plots as compared farmers practice 8.05 q/ha. The highest yield in the FLD plot was 15.32 q/ha in 2008 and in farmers practice 9.2 q/ha during 2007-08 and lowest yield was recorded in 2007-08. This results clearly indicated that the higher average grain yield in demonstration plots over the years compare to local check due to knowledge and adoption of full package of practices i.e. appropriate varieties such as JG-130, JG-63, JG-226, JG-16 etc., timely sowing, seed treatment with *Trichoderma* @ 5g/kg of seed, use of balanced dose of fertilizer (18 kg N and 46 kg P_2O_5 per ha), method and time of sowing, timely weed management and need based

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

Particulars	Technological intervention	Existing practices	Gap
Variety	JG-130, JG-63, JG-226 and JG-16	Old and degenerated	Full gap
Land preparation	Three ploughing	Three ploughing	Nil
Seed rate	75-100 kg/ha on the basis of seed size	100-120 kg/ha	Higher seed rate
Sowing method	Line sowing (R x R 30 cm) (P x P 10 cm) and 6 cm deep	Line sowing (R x R 20 cm) (P x P 5 cm) and 8 cm deep	Partial gap
Seed treatment	Trichoderma powder@ 5g/kg of seed	No seed treatment	Full gap
Fertilizer dose	18 kg N and 46 kg P_2O_5/ha	No use of fertilizer	Full gap
Weed management	Two mechanical weeding, at 30 and 60 days after sowing	No weeding	Full gap
Irrigation	One at pre flowering and one at pod development stage	One irrigation	Partial gap
Plant protection	Need based plant protection measure	No plant protection	Full gap

plant protection. The average yield of chickpea increased 62.42 per cent. The yield of chickpea could be increased over the yield obtained under farmers practices (use of non-descriptive local variety, no use of the balanced dose of fertilizer, untimely sowing and no control measure adopted for pest management) of chickpea cultivation. The above findings are in similarity with the findings of Singh (2002).

Technology gap

The technology gap, the differences between potential yield and yield of demonstration plots were 15.3, 19.8, 15.1, 14.68, 19.48 and 16.98 q/ha during 2007-08, 2007-08, 2008-09, 2008-09, 2009-10 and 2009-10 respectively. On an average technology gap under three year FLD programme was 16.89 q/ha. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation.

Extension gap

Extension gap of 5.50, 3.40, 6.17, 7.35,3.57 and 4.33 q/ha were observed during 2007-08, 2007-08, 2008-09, 2008-09, 2009-10 and 2009-10 respectively. On an average extension gap was observed 5.05 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

The technology index shows the feasibility of the demonstrated technology at the farmers field. The technology index varied from 48.93 to 66 per cent (Table-2). On an average technology index was observed 56.30 per cent during the three years of FLD programme, which shows the efficacy of good performance of technical interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield performance of chick pea.

Economic return

The inputs and outputs prices of commodities prevailed during the study of demonstration were taken for calculating net return and benefit: cost ratio (Table 2). The cultivation of chick pea under improved technologies gave higher net return of Rs. 22190, 10630, 23280, 11824 and 19312 per ha respectively as compared to farmers practices. Similar findings were reported by kirar *et al*. (2006). The benefit cost ratio of chick pea cultivation under improved cultivation practices were 2.56, 1.64, 3.48, 2.24 and 2.52 as compared to 1.68, 1.19, 2.79, 2.01, 1.84 and 2.32 under farmers practices. This may be due to higher yield obtained under improved technologies compared to local check (farmers practice). This finding is in corroboration with the findings of Mokidue et al, (2011).

CONCLUSION

The FLD produces 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.

Table 2. Gap in grain yield production and economic impact of chick pea varieties under OFTs and FLDs.

Year	Variety	No. of Trials	Area (ha)	Average Yield (q/ha)		Per cent increase	Technology gap (q/ha)	Extension gap (q/ha)	Techno-logical index (%)	Net Return		B.C.Ratio	
				Trial	Framers practice					Trial	Framer's practice	Trial	Farmer's practice
2007-08	JG-130	12	5.0	14.70	9.20	59.8	15.3	5.50	51.00	22190	9380	2.56	1.68
2007-08	JG-63	05	2.0	10.20	6.80	50.0	19.8	3.40	66.00	10630	6350	1.64	1.19
2008-09	JG-63	05	2.0	14.89	8.72	70.8	15.1	6.17	50.36	23280	12840	3.58	2.79
2008-09	JG-226	12	5.0	15.32	7.95	92.7	14.68	7.35	48.93	23800	9560	3.48	2.01
2009-10	JG-63	12	5.0	10.52	6.95	51.4	19.48	3.57	64.93	11824	7000	2.24	1.84
2009-10	JG-16	05	2.0	13.02	8.69	49.8	16.98	4.33	56.60	19312	11611	2.52	2.32
Total/Average		51	21	13.11	8.05	62.42	16.89	5.05	56.30				

This could be circumvent some of the constraints in the existing transfer of technology system in the district, Sidhi of Madhya Pradesh. The productivity gain under FLD over existing practices of chick pea cultivation created greater awareness and motivated the other farmers to adopt suitable production technology of chickpea in the district. The constraints faced by the farmers were different for different technologies. Efforts should, therefore, be made by the extension agencies in their transfer of technology programmes to consider the constraints as perceived by the farmers in this investigations as well as personal. Therefore, for enhancing the production & productivity of chickpea crop, strategy should be made for getting the more and more recommended technologies adopted by the farmers (Raj *et al.,* 2013 and Sharma *et al.,* 2011).

The variation in per cent increase in the yield was found due to the lack of knowledge, and poor socio economic condition. Under sustainable agricultural practices, with this study it is concluded that the OFTs and FLDs programmes were effective in changing attitude, skill and knowledge of improved package and practices of HYV of chickpea adoption.

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