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ASSESSMENT OF TECHNOLOGY GAP AND RODUCTIVITY GAIN THROUGH FRONT LINE DEMONSTRATION IN CHICKPEA

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ABSTRACT

Total 60 Front Line Demonstrations on chickpea variety RSG-888 were conducted at farmers' fields in district Jhunjhunu (Rajasthan) during two consecutive *rabi* seasons 2010-11 and 2011-12. On overall average basis, 21.60 % higher grain yield was recorded under demonstrations than the farmers traditional practices (check). The extension gap, technology gap and technology index were 335 kg per ha, 630 kg per ha and 25.20 %, respectively. An additional investments of Rs. 2650 per ha coupled with scientific monitoring of demonstrations and non-monetary factors resulted in additional return of Rs. 8505 per ha. Fluctuating minimum support price of chickpea during both the study years influenced the economic returns per unit area. On two years average basis incremental benefit: cost ratio was found as 3.09.

Key words: Chickpea, Economics, Extension gap, Gap analysis, Grain yield, Technology gap.

INTRODUCTION

Pulses, or 'daal,' are an integral part of the average Indian meal. A large proportion of the Indian population is vegetarian, and pulses form the main source of protein. The protein content in pulses is about 18–25 per cent. This makes pulses one of the cheapest sources of protein for human consumption. However, the per capita domestic consumption of pulses has declined from 60g / day in 1970–71 to 36g / day in 2007–08. The productivity of pulses in India has been very low, at 638kg / ha, compared to best-in-class yields of about 1,900kg / ha in Canada and the US (Anonymous, 2010).

Chickpea commonly known as gram, bengal gram and garbanzo beans is an important rabi pulse crop of India. It occupies about 38.71 per cent of area and 48.28 per cent of the total pulses production in India. In Rajasthan state the total area under Chickpea cultivation is 12.31 Lac ha (16.70 per cent of the nation) with the estimated production of 05.73 L. tonnes (09.73 per cent of the nation) and average productivity of chickpea in the state is 465 kg/ha. So far as Jhunjhunu district of Rajasthan is concerned total area under chickpea cultivation is 87.6 thousand hectares with productivity of 813 kg/ ha (Anonymous, 2009-10). The shortfall of pulses which is to be minimized either by increasing the area or by increasing the productivity levels of pulses was also indicated by Gupta *et al.*(2004). The pulse production targeted to be 32 million tons with the productivity of 850 kg/ha for the period of 2007-12 by Govt. of India (Yadav and Kumar, 2007). Till date the productivity level of pulses is not sufficient on account of several biotic and abiotic stresses besides unavailability of quality seeds of improved varieties in time and poor crop management practices due to unawareness and non-adoption of recommended production and plant protection technologies. There are so many appropriate technologies generated at agricultural universities and research stations but the productivity of chickpea is still very low due to poor transfer of technology from the points of its development to the points of its utilization and only a little new knowledge percolates to the farmers fields hence a wide gap has been observed between knowledge of production and knowledge of utilization.

To achieve target of additional production of pulses, it is necessary to concentrate efforts on scientific cultivation of chickpea. Therefore, Front

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Line Demonstration (FLD) of pulses on farmers field may be helpful to established the technology at farming community. The basic objective of this programme is to demonstrate improved proven technology of recently released, early maturing, high yielding, bold seeded, disease resistant varieties in a compact block with IPNM, IWM & IPM at farmers field (Table 1) through Krishi Vigyan Kendr'ss to bring in enhanced application of modern technologies to generate yield data with farmers feedback. Keeping the importance of this, KVK, Jhunjhunu conducted total 60 demonstrations on chickpea crop at farmers field in *rabi* 2010-11 and 2011-12. The objectives were as follows:

To exhibit the performance of recognised and recommended high yielding chickpea varieties with full recommended package of practices for higher crop yields.

To compare the yield levels of local check (farmers field) and FLD organised by KVK.

To collect and consider the feedback information for further improvement in research and extension programme.

MATERIALS AND METHODS

Front line demonstrations on chickpea variety RSG-888 were conducted at 60 selected farmers field in a compact block in district Jhunjhunu (Rajasthan) during *rabi* 2010-11 and 2011-12. The villages in which FLDs and to be conducted are selected on the basis of non adoption of the improved and recommended variety (RSG-888). After selection of the village, most responsive key farmers having their land on road or approachable side are selected, so that the performance of the demonstrated technology can be seen by other farmers. The soils of the district are generally sandy loam in texture, low in nitrogen, low to medium in phosphorus and medium to high in potash. All the demonstrations were of 0.5 ha area each and were conducted using recommended package of practices. Farmers were provided with quality seed of chickpea variety RSG-888, DAP fertilizer, insecticides for plant protection purpose, suitable herbicide for weed control, required fungicide and culture packets for seed treatment, zinc and sulphur for balanced nutrition to the farmers during both the years of the study. The sowing was done during mid October to last week of October under assured irrigated conditions and harvested during last week of March. The demonstrations on farmers fields were regularly monitored by the scientists of KVK Jhunjhunu right from sowing to harvesting. The grain yield of demonstration crop was recorded and analysed. Different parameters as suggested by Yadav *et al.* (2004) were used for calculating gap analysis, costs and returns. The detail of different parameters are as follows:

Extension gap = Demonstration yield (D_1) - Farmers practice yield (F_1)

Technology gap = Potential yield (P_1) - Demonstration yield (D_1)

Technology index = Potential yield (P_1)- Demonstration yield (D_1) x 100/ Potential yield (P_1)

Additional return = Demonstration return (D_r)- Farmers practice return (F_r)

Effective gain = Additional return(A_r) - Additional cost (A_c)

Incremental B:C ratio = Additional return(A_r) / Additional cost (A_c)

RESULTS AND DISCUSSION

Grain yield: The increase in grain yield under demonstration was 20.52 to 22.68 % over farmers local practices. On an average 21.60% yield advantage was recorded under demonstrations carried out with improved cultivation technology as compared to farmers traditional way of chickpea cultivation.

TABLE 1: Particulars showing the details of chickpea growing under front line demonstrations and existing farmers practices

Particulars	Demonstration practices	Farmer practices
Variety	RSG-888	Locally available
Seed rate (Kg/ha)	60	40-45
Sowing method	Line sowing (30x10 cm)	Line sowing (45x10 cm)
Sowing depth(cm)	8-10 6-8	
Fertilizer dose (Kg N-P-K/ha)	20-45-0 50-60 kg DAP/ha	
Use of secondary nutrients/micronutrients	Use of sulphur & zinc for balanced nutrition	No use
Weed control	Herbicide application	Hand weeding
Plant protection	Need based insecticide & fungicide spray	One spray of insecticide

TABLE 2: Grain yield and gap analysis of front line demonstrations on Chickpea at farmers' field

Year of demonstration	No. Of demonstrations	Variety	Potential yield (Kg/ha)	Demonstration yield (Kg/ha)	Farmers practice yield (Kg/ha)	Increase over Farmers practice (%)	Extension gap (Kg/ha)	Technology gap (Kg/ha)	Technology index (%)
2010-11	30	RSG-888	2500	1468	1218	20.52	250	1032	41.28
2011-12	30	RSG-888	2500	2272	1852	22.68	420	228	09.12
Average	30	-	2500	1870	1535	21.60	335	630	25.20

Gap analysis: An extension gap of 250-420 kg per hectare in yield was found between demonstrated technology and farmers practices during both the years. Average extension gap was 335 kg per hectare (Table 2). Such gap might be attributed to adoption of improved technology in demonstrations which resulted in higher grain yield than the traditional farmers' practices. Wide technology gaps were observed during both the years, the lowest (228 kg/ ha) and the highest (1032 kg/ha) were reported in 2011-12 and 2010-11, respectively. On two years average basis, technology gap of total 60 demonstrations was observed as 630 kg per hectare. This technology gap during different years could be due to more feasibility of recommended technologies during study period. Similarly, the technology index for all the demonstrations during study period were in accordance with technology gap. Higher technology index (41.28%) reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology.

Economic analysis: Different variables like quality seed, fertilizers, bio fertilizers, herbicides and pesticides were considered as cash inputs for the demonstrations as well as farmers practice and on an average an additional investment of Rs. 2650 per ha was made under demonstrations. Economic returns as a function of grain yield and minimum support price (MSP) sale price varied during both the years. Maximum return was obtained during 2011-12 due to higher grain yield and higher MSP sale price as declared by government of India. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The incremental benefit: cost ratio (IBCR) was 2.50 and 3.68 in 2010-11 and 2011-12, respectively (Table 3). Overall IBCR was found as 3.09.

The results confirm the findings of front line demonstrations on oilseed and pulse crops by Singh *et al* (2000), Singh *et al* (2002), Thakral and Bhatnagar (2002), Yadav *et al* (2004) and Lathwal, (2010).

CONCLUSION

Adoption of improved chickpea production technologies in demonstrations, on an average

TABLE 3: Economic analysis of front line demonstrations on chickpea at farmers' field

Year of demonstration	Cost of cash input (Rs./ha)		Additional cost in demonstration (Rs./ha)	Sale price (MSP) of grain (Rs./qtl.)	Total returns (Rs./ha)		Additional return in demonstration (Rs./ha)	Effective gain (Rs./ha)	Incremental B:C ratio (IBCR)
	Demonstration	Farmers practice			Demonstration	Farmers practice			
2010-11	12500	10400	2100	2100	30828	25578	5250	3150	1:2.50
2011-12	17500	14300	3200	2800	63616	51856	11760	8560	1:3.68
Average	15000	12350	2650	2450	47222	38717	8505	5855	1:3.09

increased 21.60% grain yield over the local check. This increase was recorded with little extra spending of Rs. 2650/ha. This amount is not big enough that even a small & marginal farmer can afford to this. This proved that it is not the cost that deters the farmers from adoption of latest technology but ignorance is the primary reason and it is quite appropriate to call such yield gap as extension gap. The average extension gap was found to be 335 kg per hectare. The IBCR (3.09) is sufficiently high to motivate the farmers for adoption of technology. Therefore, Front Line Demonstrations program of chickpea was effective in changing attitude, skill and knowledge of improved / recommended practices of chickpea cultivation including adoption. This also improved the relationship between farmers and scientists and built confidence between them. The demonstration farmers acted also as primary source of information on the improved practices of chickpea cultivation and also acted as source of good quality pure seeds in their locality and surrounding area for the next crop. The concept of Front Line Demonstration for chickpea may be applied to all categories of farmers for speedy and wider dissemination of the recommended practices to the farming community. This will help in the removal of the cross-sectional barrier of the farming population.

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