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Impact of Front-Line Demonstrations on Yield and Economics of Chickpea in Dahod District of Gujarat

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ABSTRACT

The major constraint for low productivity of chickpea in the Dahod district of Gujarat is non-adoption of recommended package of practices and lack of awareness about the improved chickpea cultivation. To replace this old age technology, Krishi Vigyan Kendra (KVK), AAU, Dahod conducted 25 front line demonstrations across 12 villages of Dahod district on high yielding rainfed variety Gujarat Junagadh Gram 3 (GJG 3) during Rabi season 2019-20 to 2021-22. Results showed that farmers could increase the chickpea productivity notably by switching over to improved variety and adoption of improved production technology. From the front-line demonstrations, it was observed that the improved chickpea variety Gujarat Junagadh Gram 3 recorded the average yield (1300 kg/ha) compared to the farmers' practices variety i.e. Gujarat Gram 1 (1047 kg/ha) during the demonstrations year. The increase in the demonstration yield over farmer's practices was 24.19 %. Technology gap and the technology index values were 475 kg/ha and 26.76, respectively. The decline in overall yield and area under cultivation of chickpea in Dahod district due to lack of improved variety seed resulting lower yield. The increase in yield of chickpea under front line demonstrations was due to spreading of improved rainfed variety and latest technology viz. seed treatment with bio-fertilizers, recommended seed rate, recommended dose of fertilizers and plant protection measure.

Keywords: Chickpea, FLD, Technological gap, Extension gap, Technological index

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INTRODUCTION

Pulses are considered as an important part of food crop occupying a unique position in agriculture and also an important component of food grain crops because of their high nutritive value. Pulses also have inherent capacity to fix atmospheric nitrogen and adaptability to a wide range of agro-ecological, cropping system and management ability. Among the pulses, chickpea or bengalgram or gram (Cicer arietinum L.) is one of the important grain legumes of the world which is grown in 44 countries across five continents. India is the largest producer of chickpea accounting to 75 per cent of world production. The major chickpea growing states in India are Maharashtra, Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Rajasthan, Uttar Pradesh and Gujarat. (Dudhadhe et al., 2009). Being a leguminous and hardy crop, chickpea does very well under dry tracts, which receive an annual rainfall of 60-100 cm. It grows on a very light sandy loam to heavy textured clay soil. It is used in many forms as dal, chhole, in sweets and many attractive dishes. Its leaves contain malic and citric acids, which are useful for stomach ailments, and it is best blood purifier. It contains about 18-22% protein, 62% carbohydrates and good amount of fat; besides, being rich Ca, Fe and vit-C and vit-B1. Its feed and straw are highly rich in nutrients. Chickpea can fix up to 140 kg nitrogen per hectare in the growing period. Chickpea in India is grown on 7.58 mha with 5.75 million tonne production and an average productivity of 793 kg/ha (Rai and Saxena, 1995). Maharashtra is one the major chickpea growing state in the country. Gujarat shares 2.92, 3.65 and 0.25 per cent area, production and productivity, respectively of the nation under chickpea. However, at present the average productivity in the state is high (1008 kg/ha) compared to national level (Anonymous, 2013). During 2000-01 the productivity was far below (517 kg/ha) than the national level (744 kg/ha). This is not because of availability of improved seeds of varieties but full efforts in conduction of front-line demonstrations of improved package of practices on chickpea at farmers' field. Under chickpea cultivation more than 90% area of Gujarat State comes in rainfed areas, where farmer generally retain their own seeds, which are of poor quality besides being admixture of various varieties. Timely non-availability of improved varieties due to non-systematic seed multiplication of chickpea is one of the factors responsible for low pulse production in rainfed farming up to 1991. In the state major chickpea grown rainfed areas are Ghed, Bhal and Dahod. In these areas chickpea varieties like Dahod Yellow were grown at farmers' field under conserved soil moisture conditions. But the farmers are not interested to grow these varieties. The main drawbacks of these varieties are that they are poor yielder, susceptible to wilt diseases with a minimum market value of seeds. Farmers are unhappy to grow these varieties and who grow these varieties hardly obtained 500-600 kg grains/ha (Poonia and Pithiya, 2011).

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MATERIALS AND METHODS

In present study impact of front-line demonstration on chickpea variety GJG 3 against local check was evaluated through Front Line Demonstration conducted as farmer's fields during the rabi season 2019-20 to 2021-22. The study was carried out by the Krishi Vigyan Kendra, Anand agricultural University, Dahod. Total 25 demonstrations were conducted on the selected farmer's field of twelve adopted villages and covering an area of 10.0 ha. Farmers were advised to use proper seed rate with recommended package of practices. The seeds were planted in 2nd fortnight of October. The sowing method keeping 45 × 10 cm spacing with 62.5 kg per ha. seed rate was demonstrated on their fields. A basal application of 20 kg N + 40 kg P2O5 /ha in the form of Urea and DAP. The seed was treated before sowing with Rhizobium and PSB culture @ 10 ml/kg of seed as per recommendations to control pest infection.

The soil in Dahod district, in general has neutral pH (7.8). Electrical conductivity (0.4 dS/m), too, is low. Organic carbon, nitrogen and phosphorus content of the soil are medium whereas, Potassium content is high (C-DAP of Dahod district, 2010). So, overall, the soil fertility indices are good for agriculture point of view. The FLD was conducted to study the gaps between potential yield and demonstration yield, extension gap and technology index. In the present study, the data on output of chickpea cultivation were recorded from FLD plots, besides the data on local variety adopted by the farmers of this region were also collected. The difference between FLD and local check were chickpea variety. However, other critical inputs such as recommended dose of fertilizers, agrochemicals and rest of the agronomical practices was did similar. The demonstration farmers were facilitated by KVK scientists in performing field operations i.e. sowing, spraying, weeding, harvesting, grading etc. during the course of training and visits. The technologies demonstrated are maintained and compared with local variety. The technology gap, extension gap and technological index (Samui et al., 2000) were calculated by using following formula as given below

$$\text{Per cent increase yield} = \frac{\text{Demonstration yield-Farmer's yield}}{\text{Farmer's yield}} \times 100 \quad \text{..... Eq. 1}$$

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

$$\text{Extension gap} = \text{Di (Demonstration Yield) - Fi (Farmer's yield)} \quad \text{..... Eq. 3}$$

$$\text{Per cent increase yield} = \frac{\text{Technology Gap}}{\text{Potential yield}} \times 100 \quad \text{..... Eq. 4}$$

RESULTS AND DISCUSSION

The results indicate that FLDs has given a good impact over farming communities of Dahod district as they were motivated by the new recommended high yielding chickpea variety suitable for rainfed condition. Moreover, from first year onwards, farmers cooperated enthusiastically in carrying out FLDs which leads to positive results in the subsequent year. The similar results of yield enhancement in chickpea in front line demonstration had also documented by Poonia and Pithia (2011) in chickpea, and Bezbaruah and Deka (2020) in green gram. The technological gap (4.55, 5.45 and 4.25 q/ha in the year 2019-20, 2020-21 and 2021-22, respectively) reflected the farmer's cooperation, in carrying out such demonstrations with encouraging results in subsequent year. The technology gap observed may be attributed to variability in the soil fertility status and agro climatic conditions. The existing gap which ranged from 2.30 to 2.90 q/ha during the period of study emphasized the need to educate the farmers through various means for the adoption of improved agricultural technologies to reserve this trend of wide extension gap. More adoption of recent production technologies with high yielding varieties will subsequently change this alarming trend galloping the extension gap.

The technology index shows the feasibility of the evolved technology at the farmer's field. The lowest value of technology index which indicate the more feasibility of the technology. As such, increased the technology index from 23.94 to 30.70 per cent indicated that the demonstrated technology was feasible (Table 1). The results of the present study are in recurrence with the findings of Kacha and Patel (2015) in Okra and Bar and Das (2015) in pegionpea. The benefit cost ratio of the front-line demonstration revealed that B:C ratio from recommended practice were subsequently higher than the local check i.e. farmers practices during the period of study (Table 2). Average net return per hectare from the demonstration was Rs. 45348.00, while from the local check Rs. 33595.00 during the 2019-20 to 2021-22. The benefit cost ratio of demonstration was observed 3.47, 2.86 and 2.87 while, in local check was found 3.07, 2.44 and 2.41 during the demonstration year (2019-20 to 2021-22). Similar finding was reported by Sharma (2003) in moth bean.

Table 1: Productivity, technology gap, technology index, extension gap of chickpea as grown under FLD and local variety

Years	Area (ha.)	No. of FLDs	Demonstration Yield (q/ha)			Yield of Local check (q/ha)	Potential yield (q/ha)	Increased yield (%)	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
			Highest	Lowest	Average						
2019-20	10	25	15.78	11.40	13.20	10.80	17.75	22.22	2.40	04.55	25.63
2020-21	10	25	14.70	10.95	12.30	10.00		23.00	2.30	05.45	30.70
2021-22	10	25	15.95	12.30	13.50	10.60		27.36	2.90	04.25	23.94

Table 2: Economic Impact of chickpea as yield under FLD and traditional package of practices

Year	Average Cost of cultivation (Rs./ha)		Average Gross Return (Rs./ha)		Average Net Return (Profit) (Rs./ha)		Benefit-Cost Ratio (Gross Return / Gross Cost)	
	Demo.	Local Check	Demo.	Local Check	Demo.	Local Check	Demo.	Local Check
2019-20	19800.00	18300.00	68640.00	56160.00	48840.00	37860.00	3.47	3.07
2020-21	22355.00	21345.00	63960.00	52000.00	41605.00	30655.00	2.86	2.44
2021-22	24600.00	22850.00	70200.00	55120.00	45600.00	32270.00	2.85	2.41

*Chickpea selling price @ Rs. 52.0 per kg grain

CONCLUSION

The findings of the study revealed that wide gap exist in demonstration yield and farmer's practices in chickpea varieties due to technology and extension gap in Dahod district of Gujarat. The per cent increment in yield of chickpea to the extent of 22 to 27 % in FLDs over the farmers practice created greater awareness and motivated the other farmers to adopt the improved package of practices of chickpea. These demonstration trails also enhance the relationship and confidence between farmers and KVK scientists. The recipient farmers of FLDs also play an important role as source of information and quality seeds for wider dissemination of the improved varieties of chickpea for other nearby farmers. It is concluded that the FLD programme is a successful tool in enhancing the production and productivity of chickpea crop through changing the knowledge, attitude and skill of farmers.

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