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Research paper

Evaluation of frontline demonstration of new technology on chickpea (*Cicer arietinum* L.) in Dang district of Gujarat

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ABSTRACT

In majority of the area of Dang district of Gujarat, chickpea is grown under rainfed condition with neither improved varieties nor with recommended practices. The Krishi Vigyan Kendra, Navsari Agricultural University, Dang has organized 323 numbers of FLDs. This programme is with the objective to demonstrate the improved variety of chickpea (GG 5) for production potential. The demonstrated variety GG 5 performed better in all years compare to farmer's variety (2018-19 to 2020-21). In the FLDs, the results revealed that seed yield (1102 kg/ha) of improved technology was higher as compared to farmers' practice (825 kg/ha). Higher gross returns, net returns and benefit cost ratio were also recorded in FLDs plots as compared to farmer's practice. The average technology gap, extension gap and technology index were calculated as 1398 kg/ha, 227 kg/ha and 55.93 per cent, respectively. Every year, extension gap was lower than technology gap indicating the need to educate farmers in adoption of improved technologies. Thus, it is suggested that location-specific approaches would be needed to bridge the productivity gap of chickpea crop in the region.

Key words: Chickpea, Extension gap, Potential yield, Technological gap, Technology index

INTRODUCTION

Chickpea is one of important pulse crop in India, accounting 75 percent of world production. Chickpea in India is grown on 9.70 m ha area with 11.08 mt production and an average productivity of 1217 kg/ha (DAC, 2021). Gujarat produces 1.28 mt on 0.82 m ha area with an average productivity of 1568 kg/ha and thus, contributes 8.29% to the nation's area and 10.67% of production of chickpea (DAC, 2021). Regarding the Dang district, there was a total of 16112 ha area under chickpea, producing 16685 MT with an average productivity of 1036 kg/ha (Anonymous, 2022).

Chickpea is an important *rabi* pulse crop for livelihood and nutritional security of farmers in Dang district of Gujarat. The productivity of chickpea in the Dang district is far below as compared to the potential yield (2500 kg/ha) due to non-availability of quality seed, infestation of wilt disease, deterioration in soil health and poor adoption of improved agronomical practices. Farmers generally retain their own seeds, which are of poor quality besides being admixture of various varieties. Considering these observations, the aim of FLD was to identify the production constraints of the technology and extension gap through various extension methods and technologies. The Indian Council of Agricultural Research has implemented a new fully funded programme in mid-eighties i.e., FLDs for transfer of technology to farmers. The main objective of FLD is to demonstrate newly released crop production technologies and its management practices at the farmer's fields under existing farming situations and in different agro-climatic regions (Rao *et al.*, 2007; Meena, 2011). While demonstrating the technologies at the farmer's fields, the scientists are required to study the factors contributing to higher crop production, production constraints and thereby, generate production data and feedback information. Under this unique programme, Krishi Vigyan Kendra, NAU, Dang has conducted 323 demonstrations during 2018-19 to 2020-21 to evaluate the performance of improved technologies of chickpea production at farmers' field.

MATERIALS AND METHODS

The FLDs were conducted in different village of Dang district during *rabi* season of the year

2018-19, 2019-20 and 2020-21. With 71 hectares of area coverage, 323 number of demonstrations under chickpea were laid out with improved management practices using high yielding variety ‘GG 5’. Before conducting FLDs, group meeting and specific skill training was imparted to the selected farmers regarding different aspect of cultivation (Venkattakumar *et al.*, 2010). The chickpea variety GG 5 was sown in 45 × 10 cm spacing with seed rate of 65 kg/ha. The package of proven technologies like, line sowing, seed treatment, FYM as per recommendation, timely weed management, plant protection measure and whole package were applied in demonstrations. The data were collected from both demonstrated as well as farmers practices plots and finally the extension gap, technology gap, technology index along with benefit cost ratio were worked out by using following formulas (Raj *et al.*, 2013):

Technology gap = Pi (Potential yield) – Di (Demonstration yield)

Extension gap = Di (Demonstration yield) – Fi (Farmers yield)

Technology index (%) = ([(Potential yield-Demonstration yield))/(Potential yield]) X 100

RESULTS AND DISCUSSION

Chickpea yield

Results of FLDs indicated that the cultivation practices comprised under FLD *viz.*, use of improved variety (GG 5), balanced application of bio fertilizers and FYM as per recommendation, line sowing and timely weed management. The findings of impact of FLDs on chickpea variety GG 5 is presented in table 1. The GG - 5 recorded three years average yield of as 11.02 q/ha as compared to local variety 8.25 q/ha. The average percent increase in yield was recorded as 33.58% during these three years of FLD programme. Similar yield enhancement in different crops in frontline demonstration has been documented by Dwivedi *et al.* (2019), Patel and Patel (2020), Singh *et al.* (2020) and Meena *et al.* (2022). It is evident from the results that the yield of improved variety was found better than the local variety under same environment conditions. Farmers were motivated by results of demonstrated agro-technologies applied in the FLDs and it is anticipated that they would adopt these technologies in future.

Technology gap

The technology gap in the demonstration ranged from 13.52 to 14.32 q/ha yields over potential yield (Table 1). The technology gap observed may be attributed to the dissimilarity in soil fertility, salinity and erratic rainfall and other vagaries of weather conditions in the area. Hence, variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations (Mukherjee (2003), Mitra and Samajdar (2010) and Ola *et al.* (2021).

Extension gap

The extension gaps ranged from 2.63 to 3.01q/ha during the period of demonstration emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology (Table 1). This finding is in corroboration with the findings of Hiremath and Nagaraju (2010) and Undhad *et al.* (2019).

Technology Index

The technology index shows the feasibility of the technology at the farmer’s field. The lower the value of technology index more is the feasibility. The technology index was from 54.08% (2020-21) to 57.28% (2018-19) and average technology index was

Table 1. Effect of new technology on average yield, extension gap, technology gap and technology index

Year	Area (ha)	No of Demo	Potential yield (q/ha)	Average yield (q/ha)		% Yield increase over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
				Demo	FP				
2018-19	35	193	25	10.68	08.05	32.60	14.32	02.63	57.28
2019-20	25	75	25	10.89	08.21	32.56	14.11	02.68	56.44
2020-21	11	55	25	11.48	08.47	35.59	13.52	03.01	54.08
Mean value			25	11.02	08.25	33.58	13.98	02.77	55.93

FP: Farmer practices, Demo: Demonstrations

Table 2. Effect on new technology on economics of the different experimental year

Year	Cost of cultivation (Rs/ha)		Gross return (Rs/ha)		Net return (Rs/ha)		B:C Ratio		Net return increased over FP (%)
	Demo	FP	Demo	FP	Demo	FP	Demo	FP	
2019-20	12,500	11,000	37,391	28,221	24,891	17,221	02.98	01.96	44.54
2020-21	15,500	13,800	50,094	37,789	34,595	23,989	03.23	02.73	44.21
2021-22	16,500	13,800	53,153	38,962	37,153	25,162	03.32	02.82	47.66
Mean	14,833	12,866	46,879	34,990	32,213	22,124	03.18	02.50	45.47

55.93% (Table 1). These findings corroborate with the findings of Mokidue *et al.* (2011).

Economic

The input and output prices of commodities prevailed during each year of demonstration were taken for calculating cost of cultivation, gross return, net return and benefit cost ratio (Table 2). While the net return from farmer practises ranged from Rs. 17,221/- to Rs. 25,162/-, the net return from suggested practises ranged from Rs. 24,891/- to Rs. 37,153/-. It means that net return from demonstration was higher than the farmer practices. The benefit cost ratio was also calculated. The average benefit cost ratios of under recommended practices was higher (3.18) as compared to farmers' practice (2.50). Benefit cost ratios was higher may be due to higher yield obtained under recommended practices compared to farmer's practices. Similar result has been reported earlier by Gathiye *et al.* (2019), Prajapati *et al.* (2019) and Kumar *et al.* (2022).

CONCLUSION

From forgoing discussion, it can be concluded that by conducting FLDs of improved variety with intervention of proven technologies in farmer's field, chickpea productivity enhanced to a great extent which increased the income level of farmers and improved the livelihood of farming community.

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