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Impact of Front Line Demonstrations of INM in Okra During Off Season in the Dang District of Gujarat

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Abstract

Okra is the major vegetable crops grown in the Dang district of Gujarat state especially during the *rabi* season which can be consider as off season as okra is the main crop of *kharif* and *summer* season. One of the major constraints of low productivity of okra may be due to partial adoption of recommended package of practices by the growers. So, to address the yield gap, the front line demonstrations on integrated nutrient management (INM) along with scientific package of practices in okra were conducted for three consecutive years from 2012-13 to 2014-15 on farmer's field in different villages of the Dang district. Prevailing farmers' practices were treated as control for comparison with recommended practices. In the three years data, it was observed that due to adoption of INM along with scientific package of practices, average yield of 96.0 q ha^{-1} was obtained in demonstrated plot over 83.7 q ha^{-1} in control plots with an additional yield of 12.3 q ha^{-1} and increasing the average productivity of okra by 14.8%. The average extension and technology gap were found to be 11.0 and 24.0 q ha^{-1}, respectively with the technology index of 20.0% during the demonstration years. Besides this, the demonstrated plots gave higher gross return of ₹ 1,13,533.00 ha^{-1}, net return of ₹ 71,300.00 ha^{-1} with higher benefit cost ratio of 2.69 as compared to farmer's practice during the three years of study.

Keywords: Okra, front line demonstrations, INM, yield, extension gap, technology gap

1. Introduction

Okra (*Abelmoschus esculentus* L. Moench) is an annual vegetable crop and generally grown in *kharif* and summer season as the climate is most suitable for its growth and development but in the Dangs it is largely cultivated during *rabi* season which is consider as off season for this crop. Even though the yield is somewhat less in *rabi* as comparable to other seasons the farmer's are getting higher returns within a short period of time. It is one of the important vegetable crop generally propagated by the seed and pods are good source of iron, iodine, vitamin A, B and C. Okra thrives in all kinds of soils, but it grows best in a friable well manured soil (Yawalkar and Ram, 2004). The major problems identified were inappropriate nutrient management, narrow spacing, higher seed rate per unit area, higher infestation of pest and diseases due to off season and forest area, etc. So, the demonstrations were conducted on INM with guidance on other crop management practices to increase the yield and returns of okra by imparting trainings, field visits, field days and diagnostic visits at farmer's fields.

2. Materials and Methods

The present study was carried out by Krishi Vigyan Kendra, Navsari Agricultural University, Waghai, District-Dangs, Gujarat state, India on integrated nutrient management (INM) in okra for three consecutive years viz. 2012-13, 2013-14 and 2014–15 during *rabi* season. Total 30 demonstrations in a 15 ha area were conducted on farmer's field and each frontline demonstration was laid out on 0.5 ha area while adjacent 0.5 ha was considered as control for comparison (farmer's practice). Dangs district comes under South Gujarat Heavy Rainfall Zone–I and Agro Ecological Situation-I having total 172366 ha land. Out of that, 53.74% is occupied with forest and only 33.80% of land comes under cultivated and cultivable fallow. The district is remote forest area and characterized mainly by tribals. Soils of the area under study were lateritic, shallow to medium in depth, low to moderately fertile, medium to high in slope, normal to slightly acidic pH and the average annual rainfall of this area is 1800 to 2000 mm with 85 to 95 average rainy days (Anonymous, 2014). The critical inputs like chemical fertilizers (Urea, SSP and MoP), biofertilizers (Azotobacter, PSB and KMS) and manures (vermi compost) were provided from the KVK along with trainings on all the recommended package of practices of NAU, Navsari like suitable varieties (YVMV tolerant), plant spacing (45×30 cm^2), paired row planting (30x30x60 cm^3), seed rate (5 kg ha^{-1}) recommended dose of fertilizers (150:50:50 kg NPK ha^{-1}), biofertilizers (2 liters ha^{-1}), application of FYM (15-20 t ha^{-1}) and vermi compost, use of bio control agents (*Trichoderma* & *Pseudomonas),* drip irrigation, mulching (25–30 micron black polyethylene plastic film) and integrated pest, disease & weed management practices (growing marigold as trap crop, spraying of neem based insecticide, use of yellow sticky cards, pheromone traps and timely management). Field days were also conducted in each cluster to show the results of front line demonstration to the farmers of the same and neighbouring villages. The data on yield and returns were collected by KVK, scientists with frequent field visits during 2012–13 to 2014–15 from front line demonstration and farmer's practices plots and finally extension gap, technology gap, and technology index were calculated as given by Samui et al. (2000) as follow. The details of numbers and area of demonstrations along with farming situation during the period of the study are presented in Table 1.

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

$$\text{Benefit: Cost Ratio} = \frac{\text{Gross return}}{\text{Cost of cultivation}}$$

Technology gap=Potential yield- Demonstration yield

Extension gap=Demonstration yield-Yield under farmer's practice

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

Table 1: Details of farming situation during the three years of FLDs on INM in okra in the Dang district of Gujarat

Crop	Season/ Year	No. of farmers	Area (ha)	Farming situation	Soil type	Status of soil			Previous crop	Sowing date	Harvest date	Seasonal rainfall (mm)	No. of rainy days
						N	P	K					
Okra	*Rabi*, 2012–13	10	5.0	Irrigated	Lateritic black	L	M	H	Paddy	2nd week of Nov., 2012	2nd week of April, 2013	3203	91
Okra	*Rabi*, 2013–14	10	5.0	Irrigated	Lateritic black	H	M	H	Paddy	1st week of Nov., 2013	1st week of April, 2014	2038	60
Okra	*Rabi*, 2014–15	10	5.0	Irrigated	Lateritic black	H	M	H	Paddy	4th week of Nov., 2014	4th week of March, 2014	1658	50

3. Results and Discussion

The data with respect to yield and economic returns are presented in Table-2, whereas the data pertaining to extension gap, technology gap and technology index are presented in Table 3.

3.1. Yield

The results revealed that due to front line demonstration on okra, yield ranged from 94.0 to 98.0 q ha^{-1} in demonstration

Table 2: Yield and economic impact of FLDs on INM in okra in the Dang district of Gujarat

Year	NF	Area (ha)	Yield (q ha^{-1}) Demo			LC	CY %	Economics of demonstration (₹ ha^{-1})				Economics of farmer's practices (local-check) (₹ ha^{-1})			
			High	Low	Ave.			Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
2012-13	10	5.0	98.0	90.0	94.0	85.0	10.6	41000	98000	57000	2.40	35000	68210	33210	1.95
2013-14	10	5.0	100.0	89.0	96.0	84.0	14.3	42500	115200	72700	2.71	38200	100800	62600	2.64
2014-15	10	5.0	102.0	90.0	98.0	82.0	19.5	43200	127400	84200	2.95	38700	106600	67900	2.75
Average	--	--	100.0	89.7	96.0	83.7	14.8	42233	113533	71300	2.69	37300	91870	54570	2.45

NF: No. of farmers; LC: Local check; CY: % change in Yield

Table 3: Extension gap, technology gap and technology index in okra production under FLD

Years	Potential yield (q ha^{-1})	Ave. Demonstration yield (q ha^{-1})	Farmer's practices (local) yield (q ha^{-1})	Extension gap (q ha^{-1})	Technology gap (q ha^{-1})	Technology index (%)
2012-13	120	94.0	85.0	9.0	26.0	21.7
2013-14	120	96.0	84.0	8.0	24.0	20.0
2014-15	120	98.0	82.0	16.0	22.0	18.3
Average	120	96.0	83.7	11.0	24.0	20.0

plots and from 82.0 to 85.0 q ha^{-1} in farmer's practice plot in three years of demonstration (Table 2). An average yield of 96.0 q ha^{-1} was obtained under demonstration plots as compared to 83.7 q ha^{-1} in farmer's practices plots during the three years. This results clearly indicated that the higher average yield in demonstration plots over the years compare to farmers practice may be due to knowledge and adoption of full package of practices i.e. use of recommended dose of fertilizers through INM, bio fertilizer, vermicompost, and timely application of plant protection chemicals. Similar results were also reported by Kalalbandi et al. (2006) in chilli crop as well as by Dhemre and Desale (2010) in okra crop. The increment in yield ranged between 10.6 to 19.5% and the three years average increase in yield of okra was 14.8%. The above findings are in similarity with the findings of Balai et al. (2013) and Singh et al. (2011) in vegetable crops. However variations in the yield of okra in different years might be due to the variations in environmental factors like soil fertility, moisture availability, rainfall, etc, and the change in the location of demonstrations every year.

3.2. Economic returns

The input and output prices of commodities prevailed during the study of demonstrations were taken for calculating cost of cultivation, gross return, net return and benefit: cost ratio and the data is presented in Table 2. The cultivation of okra under INM and other improved technologies gave higher net return of ₹ 57,000.00 ha^{-1}, ₹ 72,700.00 ha^{-1} and ₹ 84,200 ha^{-1} during the years 2012–13, 2013–14 and 2014–15, respectively with an average net return of ₹ 71,300.00 ha^{-1} which was higher as compared to farmer's practices (₹ 54,570.00 ha^{-1}). The benefit cost ratio of okra ranged from 2.40 to 2.95 in demonstration plots and from 1.95 to 2.75 in farmer's practice plots during three years of demonstration with an average of 2.69 in demonstration and 2.45 under farmer's practices. This may be due to higher yield obtained under improved technologies as compared to local check (farmers practice). This finding is similar with the findings of Singh et al. (2011) in solanaceous vegetables and Shalini et al. (2016) in tomato.

3.3. Extension gap

Extension gap of 9.0, 8.0 and 16.0 q ha^{-1} was observed during the years 2012–13, 2013–14 and 2014–15, respectively (Table 3). On an average extension gap under three year FLD programme was 11.0 q ha^{-1}. This emphasized the need to educate the farmers through various techniques for the adoption of improved agricultural production technologies to reverse this trend of extension gap. More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap (Teggelli et al., 2015 in pigeon pea).

3.4. Technology gap

The technology gap, that is the differences between potential yield and yield of demonstration plots was 26.0, 24.0 and 22.0 q ha^{-1} during the years 2012-13, 2013-14 and 2014-15, respectively (Table 3). On an average technology gap under three year FLD programme was 24 q ha^{-1}. This may be due to the variations in soil fertility, managerial skills of individual farmer's and climatic conditions of the area. Hence, location specific recommendations are necessary to bridge this gap (*Singh* et al., 2011 in solanaceous vegetables).

3.5. Technology index

The technology index shows the feasibility of the demonstrated technology at the farmer's field. The technology index varied from 18.3 to 21.7 (Table 3). On an average technology index of 20.0 % was observed during the three years of FLD programme, which shows the effectiveness of technical interventions. This accelerates the adoption of demonstrated technical interventions to increase the yield performance of okra.

4. Conclusion

The FLD produced a significant positive result and provided an opportunity to demonstrate the productivity potential and profitability of the latest technology (intervention) under the real farming situation. By conducting demonstrations of INM and improved scientific technologies, yield potential of okra can be increased to a great extent. This will substantially increase the income as well as the livelihood of the farming community. There is a need to adopt multi-pronged strategy that involves enhancing okra production through improved technologies in Dang district of Gujarat state.

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