RESEARCH ARTICLE

IMPACT OF FRONTLINE DEMONSTRATION ON ORGANIC NUTRIENT MANAGEMENT IN OKRA IN MAMIT DISTRICT, MIZORAM, INDIA

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Abstract: Frontline demonstration on organic nutrient management of okra was conducted by KVK Mamit during the period from 2019-20 and 2020-21in different location of Mamit District. KVK provided all critical inputs *i.e.* seeds, FYM, bio fertilizers etc. to the farmers. The productivity and economics of 20 FLD farmers as well as 20non-FLD farmers were investigated during 2019-20 and 2020-21. The results of FLD revealed that yield of the demonstration were recorded 79 q/ha and 83q/ha in subsequent years with a mean of 81q/ha against the potential yield of 100 q/ha. The per cent increase yield in demonstration 29.51 during 2019-20 and 20.29% during 2020-21 respectively. The mean technology gap of 19.0 q/ha has indicates that there is still big scope for increasing the yield. The average ranges of extension gap (14.0 – 18.0 q/ha) and technology index (17.00 - 21.00%) were during the period under study. The demonstrated field gave higher mean gross return (Rs. 170,300 /ha) and mean net returns (Rs. 96,000/ha) with average benefit: cost ratio (2.29) compared to the local checks (2.01). Present results clearly show that the yield and economics of okra can be boost up by adoption of recommended technology. Overall it is concluded that frontline demonstrations (FLD) proved an effective tool for increasing the productivity of okra.

Keywords: FLD, Okra, Organic nutrient management, Technology gap, Extension gap, Yield, Economics

INTRODUCTION

Okra[*Abelmoschus esculentus* (L.) Moench] is native of Tropical Africa, belonged to Malvaceae family and grows all through the tropics and subtropics. It is one of the most important vegetables cultivated and consumed allover India. It is rich in many nutrients and particularly high in vitamin C and K. Okra is rich source of antioxidants which reduce risk of serious diseases, prevent inflammation and contribute to overall health. It contains polyphenols which is beneficial to heart and brain health. Okra contains a protein called lectin, which is anti-cancerous. Okra is a short duration crop propagated through seeds, valued for its tender and scrumptious green fruits used in curries, soups or in canned, dehydrated or frozen forms for off-season consumption (Neeraja *et al.*, 2004). The dried seed of okra can provide oil (13-22%) and protein (22-24%). Mucilage from the stem and roots of okra is used for clarifying sugarcane juice in jaggery production. Fully mature fruits and stem containing crude fibre are used in the paper industry. Okra can be grown in a wide range of soils. However, it grows best in loose, friable, well-drained sandy loam soils rich in organic matter. It also gives good yield in heavy soils with good drainage. A pH range of 6.0-6.8 is considered as optimum. Alkaline, saline soils and soils with poor drainage are not good for this crop. India is the largest producer of okra in the world Total area under okra cultivation in India was estimated to be 509020hawith an annual production of 6094940metric tonnes (Horticulture Statistics Division, DAC&FW, 2018).The area under okra cultivation in Mizoram was 3630 ha with production of 25020metric tonnes. Organic vegetable cultivation offers one of the most sustainable farming systems provides sustainability in production by importing better resistance against various biotic and abiotic stresses. Organic farming is a holistic approach to improve the health of underlying productivity of the soil. Due to less or no application of fertilizers and chemicals in production process, in comparison to the other progressive states, most of the areas of Mizoram are considered as organic by default. Use of organic manures, bio-fertilizers and other organic inputs in vegetables cultivation is still in its initial stage in Mizoram. Focusing on thatthe present frontline demonstration (FLD) on organic nutrient management in okra was undertaken by KVK Mamit in the farmer's field of four different villages (Darlak, Lengte, Rulpuihlim, Dialdawk) of Mamit District in 2019-20 & 2020-21with the objective to promote organic nutrient management in okra for higher yield, quality and sustainable production. Whilethe farmers were growing okra in conventional method of cultivation with FYM only without following any package due inadequate technical knowhow and risk factor.

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Cultivation of Okra by using organic source of nutrient

METHODS AND MATERIALS

The frontline demonstration on organic nutrient management in field pea had conducted in four villages (Darlak, Lengte, Rulpuihlim & Dialdawk) of Mamit District 2019-20. From each village's five farmers were selected to make a total sample size twenty front line demonstrations. The critical inputs were providing to farmers as per recommended package of practices for cultivation of organic nutrient management developed by ICAR –NOFRI, Tadong, Gangtok. Demonstrations at farmer's fields were regularly monitored by Subject Matter Specialists (SMSs) of Krishi Vigyan Kendra, Mamit from the time of sowing to harvesting and marketing. Basic data of all 20 farmers were collected before and after frontline demonstration by personal interview with the help of well-structured interview scheduled. "The interview schedule was developed through discussion with experts, scientists and extension officers of Horticulture department in the district. Before initiating the demonstration, the beneficiary farmers were given skill training on various technological aspect of field pea cultivation including organic nutrient management" Kumar *et al.* (2018).The details of technology demonstrated are as below (Table 1).

Table 1. Details of technological interventions followed under farmer's practices and demonstration

Cluster Frontline Demonstration (Demonstrated Package)	**Farmers Practice (Local Check)**
Variety: *Kashi Kranti* Seed rate: 10 kg/ha Spacing 50cm X45 cm Seed rate 10 kg /ha Seed treatment with bio fertilizer AZB and PSB@ 7.5g each per 100g of seeds Manure application FYM 5t/ha & vermin compost 1t/ha with Rock phosphate 313kg/ha Time of sowing – Second fortnight of Mayto first fortnight of June Manure application: FYM@ 5t /ha @ land preparation and Vermicompost@ 2.5 t/ha Land preparation: Minimum tillage operation. Plant protection: As per package of practise recommended with technology	Variety: *Kashi Kranti* Seed rate: 10 kg/ha Seed treatment - No Seed treatment Sowing method – Broadcasting Time of sowing – Second fortnight of May first fortnight of June Manure application- Not specific apply very few quantity of FYM Land preparation: Minimum tillage operation. Plant protection: not applied

The production and economic performance of frontline demonstrations, data on output were gathered from FLDs as well as local plots, and ultimately yield, cost of cultivation, net returns with the benefit cost ratio were calculated. Data on demonstrated plot yield was obtained using data from FLD conducted in the farmer's field under the close supervision of subject Matter Specialists (SMSs)

from Krishi Vigyan Kendra, Mamit in various locations throughout the district. Furthermore, data on actual yield obtained by farmers on their farms using their own management practices was gathered. The collected data were processed, tabulated, classified, and analysed in terms of mean per cent score and rank in view of the study's objectives. Using these data, the distinctions between potential yield and demonstration plot yield (Yield gap-I), variation between demonstration plot yield and actual yield or yield under existing practise (Yield gap-II), and distinction between potential yield and actual yield (Total yield gap) were calculated. The extension gap, technology gap, and technology index were determined using the formula proposed by Samui *et al.* (2000).

Technological gap (yield gap-I) = Potential yield - Demonstration plot yield

Extension gap (yield gap- II) = Demonstration - Actual yield (Farmers plot yield practice)

Total yield gap = Potential yield - Actual yield.

Technology index (%) = Technology gap/Potential yield x 100

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following head:

Growth Attributes and Yield

A comparison of growth attributes and yield performance between demonstrated practices and local checks is shown in Table 2. Results indicated that, the FLD recorded lesser number of days to flowering (41days), days to fruiting (47) and higher No. of fruits/ plant (15), average fruit length (14.9 cm) compared to farmers practices which were days to flowering (43days), days to fruiting (49) No. of fruits/ plant (10), average fruit length (11.2 cm) recorded in farmers practice Choudhary *et al.* (2009) and Kachari&Barooah (2020) reported similar result.

Table 2. Pooled data (2019-20& 2020-21) of FLD on growth attributes and yield of okra

Sl. No.	Parameter	Demonstration	Farmers Practices
1.	Days to flowering	41	43
2.	Days to fruiting	47	49
3.	No. of fruits/ plant	15	10
4.	Average fruit length (cm)	14.9	11.2

Yield Gap

The yield gaps are presented in Table 3. The potential yield of okra var.Kashi Kranti was found to be 100.00 q/ha and the demonstration plot yield was sustainable higher than that in the local check in all the years of the study (2019-20 and 2020-21) which was recorded 79.00 q/ha &83 q/ha by frontline demonstrations during 2019-20 and 2020-21 respectively. Whereas the actual yield obtained by the farmers on their farm with their own management practices was 61.00 q/ha &69.00 q/ha during 2019-20 and 2020-21 respectively. It performed better in demonstration plots due to application of manure and other management practices Thus the FLD might have a positive impact on farming community in the district by enhancing yield to a tune of 29.51% during 2019-20 and 20.29% during 2020-21 respectively, over the local check Kumar *et al.* (2018). The findings demonstrate that the front line demonstrations had a positive impact on the Mamit district farming community, as they were motivated by the application of organic nutrient Management and other good agricultural practises used in the FLD plots. This finding is in corroboration with the findings of Choudhary *et al.* (2009), Kumar *et al.* (2018); Premsekhar *et al.* (2009) and Kachari & Barooah (2020).

"Yield of the front line demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology and extension gaps" Choudhary *et al.* (2009) & Hiremath and Nagaraju's (2009).

Table 3. Yield and yield difference of okra under front line demonstrations

Year	No. of FLDs	Yield (q/ha)		Additional yield over local check (q/ha)	Per cent increase yield over local check
		FLD	Local Check		
2019-20	20	79.00	61.00	18.00	29.51
2020-21	20	83.00	69.00	14.00	20.29
Mean	20	81.00	65.00	16.00	24.90

Technology Gap

"The technology gap is the difference or gap between the demonstration yield and potential yield and it was 21.00q and 17.00q, 2019-20 and 2020-21 respectively (Table 4). The technological gap may be attributed to the dissimilarity in the soil fertility status, acidity to erratic rainfall and other vagaries of weather conditions" Mukherjee N (2003)(Table 4).

Table 4. Yield gap and technology index in cluster front line demonstrations

Year	No. of FLDs	Technology gap (q/ha)	Extension Gap (q/ha)	Technology Index (%)
2019-20	20	21	18.00	21.00
2020-21	20	17	14.00	17.00
Mean	20	19	16.00	19.00

Extension Gap

"The extension gap is the difference or gap between demonstration yield and farmers practices (control). Extension gap ranged from 14.0 – 18.0 q/ha during the period under study (Table 4). This extension gap should be assigned to adoption of improved transfer technology in demonstrations practices resulted in higher head yield than traditional farmer practices. This emphasized the need to educate the farmers through various means for more adoption of improved high yielding varieties and newly improved agricultural technologies to bridge the wide extension gap Kumar *et al*.(2018).Farmers' increased use of organic nutrient management practices and improve verities will help to reverse the alarming trend of a widening extension gap. Farmers will eventually ignore old practices in favour of new technologies as a result of the new technologies. This finding is consistent with Hiremath and Nagaraju's (2009) findings.

Technology Index

The technology index indicates the feasibility of various and evolving technologies in farmer's fields, with a lower value indicating greater feasibility. The technology index was reduced from 21.00 to 17.00 per cent during 2019-20 to 2020-21 (Table 4) which shows the higher feasibility of the demonstrated technology. This finding corroborates results of Premsekhar *et al.* (2009) and Kachari&Barooah (2020).

Economics of Front Line Demonstration

Economic assessment of yield performance demonstrated that during the research period, participating farmers in FLDs not only obtained higher output but also higher prices for their food compared to those in local markets Lal *et al*. (2016). Table 5 depicts the economics of field pea production under front-line demonstrations. The results of economic analysis of okra production revealed that mean cost of cultivation increased in demonstration practice (Rs 74300/ha) as compared to farmers practice plot check (Rs 68,000 /ha) and it was recorded higher mean gross return (Rs. 170,300 /ha) and mean net returns (Rs. 96,000/ha) whereas in farmers practice the mean gross returns (Rs 136,900 /ha) and mean net returns (Rs 68,900 /ha). And with the average benefit: cost ratio of demonstration plot (2.29) compared to the farmers practice (2.01) over the study period. These results are in line with finding of Kumar *et al.* (2018), Premsekhar *et al.* (2009) and Kachari & Barooah (2020).

Table 5. Economics of front line demonstration:

Year	Cost of cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B: C Ratio	
	FLD	Local Check	FLD	Local Check	FLD	Local Check	FLD	Local Check
2019-20	73000	67000	158000	122000	85000	55000	2.16	1.82
2020-21	75600	69000	182600	151800	107000	82800	2.42	2.20
Mean	74300	68000	170300	136900	96000	68900	2.29	2.01

CONCLUSION

The study concluded that the results of the present study clearly demonstrated that Organic nutrient management practices was found superior in term of increasing production and productivity of okra this may be due to improvement of soil fertility. The FLD programme is an effective tool for increasing the production and productivity of field pea and changing the knowledge, attitude and skill of the farmers. To quickly and widely disseminate the advised techniques to other farmers as well as to other crops, the concept of frontline demonstration can be used to all farmer categories, including progressive farmers.

Conflict of Interest: Authors have declared that Conflict of Interest exists.

Author contributions. All authors were equally contributed in conceived and designed the analysis; collected the data; contributed data or analysis tools; performed the analysis wrote the paper.

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REFERENCES

Choudhary, A.K., Yadav, D.S. and Singh, A. (2009). Technological and extension yield gaps in oilseeds in Mandi district of Himachal Pradesh. *Ind. J Soil Cons.*, **37**(3):224-229.
Google Scholar

Hiremath, S.M. and Nagaraju, M.V. (2009). Evaluation of front line demonstration trials on onion in Haveri district of Karnataka. *Karnataka J. Agric. Sci.*; **22**(5):1092-1093.
Google Scholar

Kachari, Manisha and Barooah, Luna (2020). Comparative study on use of organic inputs in Okra [*Abelmoschus esculentus* (L). Moench] *Journal of Pharmacognosy and Phytochemistry*, **9**(5): 292-295.
Google Scholar

Kumar, S., Nongthombam, J., Chaudhary, K.P., Prakash, O. and Swaroop, J. (2018). Economics and impact of FLD on broccoli yield at farmers filed of Aizawl District Mizoram. *Agro-Economist*, **5**(2):81-86.
Google Scholar

Lal, G., Mehta, R.S., Meena, R.S., Meena, N.K. and Choudhry, M.L. (2016).Impact of front line demonstration (FLDS) on yield enhancement of coriander: A case study in TSP area of Pratapgarh. E News Letter ICAR- *National Research Centre on Seed Spices*, **8**(3): 5-6.
Google Scholar

Mukherjee, N. (2003). Participatory, learning and action. Concept, Publishing Company, New Delhi, Pp.63-65.
Google Scholar

Neeraja, G., Vijaya, M., Chiranjeevi, C. and Gautham, B. (2004). Screening of okra hybrids against pest and diseases. *Indian Journal of Plant Protection*, **32**(1):129-131.
Google Scholar

Premsekhar, M. and Rajashree, V. (2009). Influence of organic manures on growth, yield and quality of okra, *American Eurasian Journal Sustainable Agriculture*, **3**(1): 6-8.
Google Scholar

Rajput, Savita, Rajput, Angad, Singh, Verma, S.K. and Jain, V. (2016). Impact of Front Line Demonstration on Okra (*Abelmoschus esculentus* (L.) *J. Krishi Vigyan*, **5**(1): 74-76.
Google Scholar

Sahu, A. K., Kumar, S. and Maji, S. (2014). Effect of biofertilizers and inorganic fertilizers on vegetative growth and yield of okra [Abelmoschus esculentus (L.) Moench]. *International Journal of Agricultural Sciences*, **10**: 558-561.
Google Scholar

Samui, S.K., Maitra, S., Roy, D.K., Mondal, A.K. and Saha, D. (2000). Evaluation on frontline demonstration on groundnut (*Arachis hypogaea* L.). *J. Indian Soc. Coastal Agric. Res.*, **18**(2):180-183.
Google Scholar

Shree Sangeeta, Kumari Reena, Singh, Vijay Kumar and Kumar, Sunil (2022). Response of Plant Growth Regulators on Growth, Yield and Quality of Okra cv. Kashi Kranti, *International Journal of Plant & Soil Science*, **34**(20): 688-692.
Google Scholar

Suchitra, S. and Manivannan, K. (2012). Studies on the influence of organic inputs on the growth and yield of bhindi, vegetable cowpea in various seasons. *Indian Journal of Plant Sciences*, **1**(2-3): 124-132.
Google Scholar