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Impact of bio-intensive management strategies for major pests of okra

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Abstract
Okra is an important vegetable crop grown throughout the year in India. The productivity of okra in India is low compared to other countries due to yield losses caused by insect pests, diseases and nematodes. The crop is attacked by more than 72 insect pests and infests the crop from seedling to harvest stage. Field study was undertaken at Krishi Vigyan Kendra, Thirupathisaram, Kanyakumari District, Tamil Nadu, India at 10 acres crop area in five different villages farmers field to demonstrated the bio-intensive integrated management practices. Findings of the study revealed that the major pests of okra fruit borer damage (1.40 % in FLD as compared with 17.10 % in check), leaf hopper population (2.79 nos. / leaf in FLD and in check 16.30 nos. / Leaf) were reduced in recommended practices than farmers practices. Yield of okra increased by 38.89 per cent for recommended practices over farmers practices. An average net profit of Rs.99, 642/ha was recorded in recommended practices whereas it was Rs.59, 972 in farmers practices. Benefit Cost Ratio was 3.34 under demonstrations while it was 2.42 for control.

Keywords: Front line demonstrations, okra, major insects, bio-agents, impact, adoption

1. Introduction

Okra (*Abelmoschus esculentus* Moench) is one of the most important vegetable crops and it is widely cultivated as a *Kharif* and summer season crop and plays an important role in total vegetable production in India. The okra vegetable is available throughout the year at steady and stable market price and sometimes fetches higher price compared to other commonly available vegetables. The main aim of Krishi Vigyan Kendra is to reduce the time lag between generation of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. Krishi Vigyan Kendra are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different 'micro farming' situations in a district [1]. Front line demonstration (FLD) is a long term educational activity conducted in a systematic manner in farmer's fields to test the worth of a new practice/technology. Farmers in India are still producing crops based on the knowledge transmitted to them by their forefathers leading to a grossly unscientific agronomic, nutrient management and pest management practices. Now most of the solanaceous vegetables are available throughout the year. However, there is a risk of severe damage by insect pests and diseases. Particularly, the insects that damage these crops range in their ability to reduce yields at different growth stages. Moreover, insects that transmit disease agents, such as whitefly or thrips vectored plant viruses, can also have similar devastating effects on yield. Vulnerability of the solanaceous vegetables to insect pests and diseases continues to be one of the major factors responsible for the lower productivity with wider fluctuation [7]. Growers rely heavily use of chemical insecticides will leave considerable toxic residues on the okra fruits. Considering the changing scenario in demand of okra vegetable, there is further need for increasing productivity and profitability along with the quality production in the country. Realizing the importance of extending bio-intensive technologies for management of major insect pests in okra crop at farmer's level, front line demonstrations (FLDs) were conducted at Krishi Vigyan Kendra, Kanyakumari to show the productivity potential and profitability of need based plant protection.

2. Materials and Methods

2.1. Bio-intensive management strategy for major pest management

The main objective of Front Line Demonstrations (FLDs) was to demonstrate newly released plant protection technologies at the farmer's holding under different farming situations. Due to lack of awareness of new technologies among the farmers, Krishi Vigyan Kendra (KVK), Thirupathisaram, Kanyakumari, Tamil Nadu, India to demonstrated the bio-intensive integrated management practices *viz*., seed treatment (each 8 g / kg of seeds) & soil application (each 2.5 kg / ha) with *Trichoderma viride* & *Pseudomonas fluorescencs,* soil application with neem cake @ 250 kg / ha, yellow sticky trap @ 12 / ha, install pheromone trap @ 12 / ha, release of *Trichogramma chilonis* Ishii @ 8cc / ha for four times at weekly intervals and need based application of Neem formulation (Azadirachtin 10000 ppm) @ 1000 ml / ha for the suppression of major pests *viz*., fruit boring insects, *Helicoverpa armigera* (Hubner) and *Earias vitella* (Fab.), leaf hopper, *Amrasca biguttula biguttula* (Ishida) and whitefly, *Bemisia tabaci* (Gennadius) of okra. The FLD was conducted in 10 acres okra crop (Hybrid CO (BH)-1) area under different villages. The farmer's practices prevailing in the region were treated as control.

Adjacent to the IPM field, another plot was maintained as control wherein farmers applied only insecticides and called as farmers practice. Farmers sprayed insecticides *viz.*, monocrotophos, cypermethrin, lambda cyhalothrin, imidacloprid etc., paired plot design was adopted. Observation on healthy fruits and fruits with bore hole during each harvest were made and then per cent fruit damage was calculated.

For yield assessment, fruits were picked on weekly basis from demo plot and also in farmers practices during the entire growing period, weighed and the cumulative per plot yield of all the pickings were taken and transformed into total yield in tons per hectare.

2.2. Statistical Analysis

The data gathered from field experiments were subjected to statistical analysis [2] and the means were compared with Duncan Multiple Range Test (DMRT).

3. Results and Discussion

The data presented in (Table 1 & 2) indicated that there was much difference in the yield of okra both in the demonstration and farmers practices. The results clearly indicated that the farmers practices prevailing in the region was treated as control (average fruit borer damage was 17.10 % in comparison with the recommended practices (seed treatment (each 8 g / kg of seeds) & soil application (each 2.5 kg / ha) with *T. viride* & *P. fluorescencs*, soil application with neem cake @ 250 kg / ha, yellow sticky trap @ 12 / ha, install pheromone trap @ 12 / ha, *T. chilonis* @ 5cc / ha and need based application of Neem formulation (Azadirachtin 10000 ppm) @ 1000 ml / ha) (average fruit borer damage was 1.40 %). The sucking pests population also reduced in the recommended practices compared to farmers practices. The yield of okra was increased by 38.89 per cent for recommended practices over control (Table 1). An average net profit of Rs.99, 642 /ha was recorded in recommended practices whereas it was Rs.42, 664 / ha in farmers practices. The benefit: cost ratio was 3.34 under demonstrations while it was 1.94 for control. Front line demonstration of recommended bio-intensive IPM technology revealed that yield potential and net income from okra cultivation could be enhanced to greater extent. There was a significant difference in yield of okra with bio-intensive technology than farmer's practices. B: C ratio of okra crop under bio-intensive practices was higher (84.61 %) than farmer's practices. It showed the impact of bio-intensive pest management practices on okra. The factors responsible for low B:C ratio under farmers practices was poor adoption of all the recommended package of practices for okra crop in the region. These findings are in conformity with the results reported by Hiremath and Nagaraju [3], Manjarekar *et al.* [6], Sharma [8], Sharma and Sharma [9] and Thakor and Patel [12]. Singh *et al.* [10] and Sumathi *et al.* [11] reported an increase in productivity of tomato, brinjal and chilli due to adoption of improved technology by the farmers through FLDs in the farmer's field. Kumar *et al.* [4, 5] recorded incremental cost - benefit ratio (ICBR) value of 3.1 to 10.3 for need based plant protection in oilseed under rain fed and irrigated condition through FLD.

Table 1: Impact of bio-intensive integrated approaches against major insect pests of okra

Technology	Parameters with unit				
	Fruit borer damage (%)	Fruit damage reduction (%)	Leaf hopper population/leaf	Intensity of YMV (%)	Sex pheromone trap – Average moth catch/trap/week
Recommended practices*	1.40^{a}	91.85	2.79^{a}	0.28^{a}	12
Farmers practices*	17.10^{b}	-	16.30^{b}	3.00^{b}	-

* Mean of 10 farmers' field
In a column, means followed by a common letter (s) are not significantly different by DMRT (P= 0.05)

Table 2: Yield and economic analysis of front line demonstrations on okra

Technology	Yield (q/ha)	% Increase in yield over farmer's practices	Gross cost (Rs./ha)	Gross return (Rs./ha)	Net Return (Rs./ha)	B:C ratio**	% increase in adoption (n=50)
Recommended practices *	225^{a}	38.89	42496.00	142138.00	99642.20	3.34	86.15
Farmers practices*	162^{b}	-	52734.00	102636.00	42664.00	1.94	-
* Economics to be worked out based total cost of production per unit area and not on critical inputs alone ** B:C ratio = Gross return/Gross cost							

* Mean of 10 farmers field
In a column, means followed by a common letter (s) are not significantly different by DMRT (P= 0.05)

4. Conclusion

The vast majority of farmers growing okra in this region are small holders and benefit from this technology would increase the productivity, convenience and time savings. After conducting the FLD programme in farmers field, most of the farmers became aware about recommended bio-intensive integrated pest management technologies of okra crop. The economic, environmental, and social benefits derived from adoption of this improved bio-intensive tools have very positive implications for the farmers and their surrounding communities. The adoption of bio-intensive plant protection technology increased the net income. There is need to adopt multiprolonged strategy that involves enhancing income of okra farmers through effective management of insect pests with the adoption of bio-intensive technology. Hence, the technology may be popularized to mitigate the extension gap.

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6. References

1. Das P. Proceedings of the Meeting of DDG (AE), ICAR, with Officials of State Departments, ICAR Institutes and Agricultural Universities, NRC Mithun, Jharmapani; Zonal Coordinating Unit, Zone-III, Barapani, Meghalaya, India. Quoted by V. Venkatasubramanian, Sanjeev M. V. and A. K. Singha in Concepts, Approaches and Methodologies for Technology Application and Transfer- a resource book for KVKs IInd Eds. 2007, 6.
2. Gomez KA, Gomez AA. Statistical procedures for agricultural research. John Wiley and Sons. New York. 1985, 650.
3. Hiremath SM, Nagaraju MV. Evaluation of front line demonstration trials on onion in Haveri district of Karnataka. Karnataka Journal of Agricultural Sciences. 2009; 22(5):1092-1093.
4. Kumar GDS, Padmaiah M, Ramana Rao SV. Frontline demonstrations on need based plant protection in oilseeds: impact in enhancing productivity and profitability under farmers' condition. Indian Journal of Plant Protection. 2014; 42(2):105-109.
5. Kumar S, Chauhan S. Production performance and total factor productivity growth oil seeds in India, In changing global vegetable oil scenario: Issue and challenges before India (Ed Hedge DM), Indian Society of Oil seeds Research, Hyderabad. 2007, 239-246.
6. Manjarekar RG, Mandavkar PM, Hanmante AA, Talathi MS**.** Impact of Front Line Demonstration on Okra in Raigad District of Maharashtra. Journal of Krishi Vigyan. 2015**;** 4(1):37-40.
7. Rabindra RJ, Sunil Joshi, Veenakumari K. Biological control of insect pests of oilseeds in India, In changing global vegetable oil scenario: Issue and challenges before India (Ed Hedge DM), Indian Society of Oilseeds Research, Hyderabad. 2007, 101-142.
8. Sharma OP. Moth bean yield improvement through frontline demonstrations, Agricultural Extension Review. 2003; 15(5):11-13.
9. Sharma RN, Sharma KC. Evaluation of Front Line Demonstration trials on oilseeds in barren district of Rajasthan". Madhya Pradesh Journal of Extension Education. VII: 2004, 72-75.
10. Singh R, Soni RL, Singh V, Bugalia HL. Dissemination of improved production technologies of solanaceous vegetables in Banswara district of Rajasthan through Frontline demonstrations. Rajasthan Journal of Extension Education. 2011; 19:97-100.
11. Sumathi E, Manimaran R, Ilamaran M. Impact of integrated pest management strategies for shoot and fruit borer in brinjal. Journal of Entomology and Zoology Studies. 2018; 6(2):266-269.
12. Thakor RF, Patel AR. Usefulness of Krishi Vigyan Kendra as perceived by the sugarcane growers. Gujarat Journal of Extension Education. 2006; XVI-XVII:51-54.