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Front line demonstration for management of chilli viral complex

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Abstract

The Krishi Vigyan Kendra (KVK) in Bhadradri Kothagudem conducted Front Line Demonstrations (FLD) on management of chilli viral complex during 2019-20, 2020-21, and 2021-22. These demonstrations compared the effectiveness of technology-demonstrated with traditional farmer practices. The results showed that the technology-demonstrated plots had higher cost-benefit ratios (BC Ratio) of 2.49:1, 2.33:1, and 2.36:1 compared to the BC ratios of 1.96:1, 1.89:1, and 1.94:1 in the farmers' practice plots during the corresponding years. Additionally, farmers practiced plots typically sprayed pesticide mixtures after noticing pests.

Keywords: Chilli, cultural methods, sticky traps, pesticides

Introduction

Chilli (*Capsicum annuum* L.) is an economically significant and widely grown crop in India. It serves as both a culinary essential and a source of medicinal compounds and vital nutrients (Tiwary *et al.*, 2005) [5]. However, like other crops, chillies are vulnerable to a variety of pests, diseases, and viral infections. Twenty-four viruses have been reported to affect chillies naturally, with eleven identified in India. These viruses are often transmitted by insect vectors such as aphids, thrips, and whiteflies, making disease management more complex. Severe infestations have resulted in 100 percent losses of marketable fruit, as noted by Zehra *et al.*, 2017 [11]. Venkatesh *et al.* (1998) [9] reported that the chilli viral complex is caused by Chilli leaf curl Geminivirus (CLCV), transmitted by *Bemisia tabaci*, as well as by thrips (*Scirtothrips dorsalis*) and mites (*Polyphagotarsonemus latus*). Infected plants exhibit symptoms such as leaf curling, stunting, mosaic patterns, and poor fruit quality, leading to significant yield losses and a decrease in the crop's economic value. To combat these challenges, location-specific integrated disease management strategies that are economically viable, socially acceptable, and environmentally sustainable are essential. Unfortunately, farmers often lack the knowledge and support needed to implement effective disease management practices. In Bhadradri Kothagudem district, where chilli cultivation is prevalent, farmers face substantial disease pressure without a clear understanding of the impact or appropriate management strategies. Therefore, Front Line

Demonstration (FLD) was conducted to demonstrate the potential damage and effective management approaches for these agricultural threats.

Materials and Methods

The present study was undertaken at ten different farmers fields of Bhadradri Kothagudem district of Telangana with two treatments viz., technology demonstration and check (farmers practice) (Table 1). The experiment was conducted consecutively for three years i.e. during 2019-20, 2020-21, and 2021-22 within its operational area.

Table 1: Details of treatments followed in farmers fields

Treatment 1 (Technology demonstration)	Treatment 2 (Farmers Practice)
1. Seed treatment with Imidacloprid @ 8 g/Kg seed	Spraying of Acephate @1.5 g/l after noticing the sucking pest
2. Application of fipronil granules@ 80 g/cent nursery	
3. Installation of yellow and blue sticky traps @8/acre	
4. Sowing of border crop like maize or sorghum	
5. Removal and destruction of virus infected plants	
6. Need based application of pesticides, fipronil 0.3% granules @ 8 Kg/acre for control of sucking pests	

Table 2: Difference between technological intervention and farmers practice

Technology intervention	Farmers practice	Gap
Seed treatment.	Not Followed	Full Gap
Application of insecticides at nursery	Not Followed	Full Gap
Sticky traps	Not Followed	Full Gap
Border crop	Not Followed	Full Gap
Removal and destruction of virus infected plants	Not Followed	Full Gap
Need based spray	Indiscriminate use of insecticides	Partial Gap

The methodology for the Front Line Demonstrations (FLD) followed guidelines outlined by Choudhary (1999) ^[1], including experimental design, site selection, farmer selection, demonstration layout, and farmer participation. Agronomic practices were rigorously applied, which cultivated in plots size of 0.4 hectares across ten locations for each treatment. Affected plants were observed in each plot by recording total number of plants as well as diseased plants. The data was collected at fortnightly intervals on incidence.

Percent disease incidence was calculated by following formula suggested by Nene (1972) ^[4]. The disease in observed fields was expressed as

$$\text{Disease Incidence} = \frac{\text{Number of diseased leaves}}{\text{Total number of leaves assessed}} \times 100$$

Yield data were collected from both technology-assessed plots and farmers' practice plots. Using parameters such as extension gap, technology gap, yield gap, and technology index, as outlined by Rajashekhar *et al.* (2022) ^[6], Samui *et al.* (2000) ^[8], and Lakshmi Narayanamma *et al.* (2023) ^[3], the economic impact of treatments was assessed through benefit-cost ratio calculations.

Extension gap (Kg/ha) = Demonstrations yield – Yield under existing farmer's practice

Technology gap (Kg/ha) = Potential Yield – Demo Yield

Additional return = Demonstration return – farmer's practice return

$$\text{Yield gap (\%)} = \frac{\text{Extension gap}}{\text{Yield under farmers practice}} \times 100$$

$$\text{Technology gap (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

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

Results and Discussion

Based on the current findings and subsequent data analysis over three consecutive years, it was observed that disease incidence was lower in the technology-demonstrated plots compared to farmers' practice plots. This reduction can be attributed to regular monitoring of disease incidence and the judicious use of integrated disease management strategies, resulting in a reduced disease load. Viral incidence was higher in farmers' practice plots, with percentages of 23.73, 21.28, and 18.20 per cent during 2019, 2020, and 2021, respectively, while technology-demonstrated plots had lower incidence of 11.97, 14.42, and 11.83 per cent during the corresponding years.

Regarding yields, technology-demonstrated plots recorded higher yields (4878, 4702, and 4921 Kg/ha) compared to farmers' practice plots (4350, 4222, and 4439 Kg/ha) during 2019, 2020, and 2021, respectively. This translated into higher net returns for technology-demonstrated plots (Rs 1,78,890/-, Rs 1,73,830/-, and Rs 1,82,077/ha) compared to farmers' practice plots (Rs 1,29,940/-, Rs 1,28,430/-, and Rs 1,64,243/-) during the same periods. Overall, the benefit-cost ratio was higher in the treatment plots compared to the control plots throughout the experimentation period, indicating the effectiveness of the technology in reducing pest and disease incidences, increasing yields, and improving economic returns.

Table 3: Per cent viral incidence at different locations

		Per cent incidence / locations										Mean
		1	2	3	4	5	6	7	8	9	10	
2019-20	Farmers Practice	20.5	30.1	29.2	25.3	12.6	21.3	20.5	20.3	26.7	30.8	23.73
	Demo	10.9	16	12.3	14.5	10.5	7.5	5.5	15.5	11	16	11.97
2020-21	Farmers Practice	22.3	21.3	25.6	30.4	28.6	18.2	14.5	16.2	18.2	17.5	21.28
	Demo	15.2	16.3	14.8	14.8	17.6	18.3	15.6	8.9	12.5	10.2	14.42
2021-22	Farmers Practice	20.3	18.9	19.2	18.2	20.5	15.6	12.3	14.2	18.5	24.3	18.20
	Demo	10.2	12.3	14.5	16.3	15.2	8.9	9.4	9.7	10.5	11.3	11.83

Table 4: Economic impact of experiment

Year	Yield (Kg/ha)		Net returns (Rs. /ha)		B:C Ratio	
	Demo	Farmers Practice	Demo	Farmers Practice	Demo	Farmers Practice
2019-20	4878	4350	1,78,890	1,29,940	2.49:1	1.96:1
2020-21	4702	4222	1,73,830	1,28,430	2.33:1	1.89:1
2021-22	4921	4439	1,82,077	1,64,243	2.36:1	1.94:1

Table 5: Grain yield and gap analysis

Year	Yield gap (%)	Extension gap (Q/ha)	Technology gap (Q/ha)	Technology index (%)	Additional returns (Rs.)
2019-20	12.0	528	622	11.3	48950
2020-21	11.36	480	798	14.3	45400
2021-22	12.61	482	579	10.5	17834

The findings align with prior studies, showing higher incidence of virus in farmers' practiced plots compared to those implementing the technology resulting in a lower benefit-cost ratio (BC Ratio) for the farmer. Similar results were reported by several earlier workers. The efficiency of management of viral complex and controlling of insect pests was well documented by many workers in India on chilli crop fields (Venzon *et al.*, 2008; Pandey *et al.*, 2010; Elvis *et al.*, 2014)^[10, 7, 2].

Conclusion

Based on the findings of this study, it can be inferred that location-specific management have become crucial due to the dynamic virus patterns across seasons and agro-ecosystems. The noticeable yield disparity between farmers' practice and technology-demonstrated plots underscores the urgent necessity for robust extension services to educate farmers on adoption of improved technologies. Furthermore, the lower yield levels observed in local practice indicate room for improvement through the adoption of recommended strategies.

The Front-Line Demonstration (FLD) intervention has proven highly effective in enhancing net returns among farmers. The positive outcomes observed in technology-demonstrated plots warrant wider implementation across the Bhadradi Kothagudem district. These results can be leveraged to encourage farmers to adopt these practices, thereby reducing unnecessary and unwarranted usage of insecticides and fungicides.

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Authors' contribution

Regarding author contributions, this work was a collaborative effort involving all authors. Each author thoroughly reviewed and approved the final manuscript.

References

1. Choudhary BN. Krishi Vigyan Kendra-A guide for KVK managers. Publication, Division of Agricultural Extension, ICAR; c1999. p. 73-78.
2. Asare-Bediako E, Addo-Quaye A, Bi-Kusi A. Comparative efficacy of plant extracts in managing whitefly (*Bemisia tabaci* Gen) and leaf curl disease in okra (*Abelmoschus esculentus* L). *Am J Agric Sci Technol*. 2014;2(1):31-41.
3. Narayanamma VL, Ratnakar V, Vishwatej R, Ram Prasad M, Shiva B, Veeranna G, *et al.* Demonstration on management strategies of stem weevil *Pemphorus affinis* (Faust) and its economic impact in cotton. *Pharma Innov J*. 2023;12(6):317-320.
4. Nene YL. A survey of viral diseases of pulse crops in Uttar Pradesh. *G.B. Pant Univ Agric Technol Pantnagar Res Bull*. 1972;4:911.
5. Tiwary A, Kaushik MP, Pandey KS, Dangy RS.

Adoptability and production of hottest chilli variety under Gwalior agroclimatic conditions. *Curr Sci*. 2005;88(10):1545-1546.

6. Rajashekhar M, Prabhakar Reddy T, Chandrashekara KM, Rajashekar B, Jagan Mohan Reddy M, Ramakrishna K, *et al.* Evaluation of integrated pest management module for pink bollworm, *Pectinophora gossypiella* (Saunders) and its economic analysis under farmer's field conditions. *Int J Pest Manag*. 2022;68(3):1-9.
7. Pandey SK, Mathur AC, Srivastav M. Management of leaf curl disease of chilli (*Capsicum annuum* L.). *Int J Virol*. 2010;6(4):246-250.
8. Samui SK, Maitra S, Roy DK, Mondal AK, Saha D. Evaluation of front-line demonstration on groundnut (*Arachis hypogaea* L.) in Sundarbans. *J Indian Soc Coastal Agric Res*. 2000;18(2):180-183.
9. Venkatesh HM, Muniappa V, Ravi KS, Prasad KPR. Management of chilli leaf curl complex. In: Reddy PP, Kumar NKK, Varghese A, editors. *Advances in IPM for horticultural crops. Proceedings of the First National Symposium on Pest Management in Horticulture Crops: Environmental Implications and Thrusts*; 1998 Sep 15-17; Bangalore, India. p. 111-117.
10. Venzon M, Consolac-ao RM, Jose MR, Silveira DV, Rondinelli A, Angelo P. Acaricidal efficacy of neem against *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae). *Crop Prot*. 2008;27:869-872.
11. Zehra SB, Ahmad A, Sharma A, Sofi S, Lateef A, Bashir Z, *et al.* Chilli leaf curl virus: An emerging threat to chilli in India. *Int J Pure Appl Biosci*. 2017;5(5):404-414.