International Journal of Agriculture and Allied Sciences July-December 9(2), 67- 70, 2024
ISSN 2583-6336, NAAS Rated 2.47: Peer Reviewed

IMPACT OF FRONT LINE DEMONSTRATION ON THE YIELD OF CHILLI (*Capsicum annuum L.* CV) GREEN JWALA, IN SONBHADRA DISTRICT OF UTTARPRADESH, INDIA

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ABSTRACT: The present study was conducted by Directorate of Extension, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (U.P.) India, during 2023-2024 in the Rabi season with demonstrations on Chilli (Suraj Mukhi) covering an area of 5.0 hectare in Sonbhadra district of Uttar Pradesh to exhibit the use of VIRCON-H for the control of viral diseases as yellow vein mosaic, leaf curl ,bunchy top and many more , drastically reducing the production both quantitively and qualitatively in chilly crop. Study was also focused on the efficacy of VIRCON-H in suppressing fungal diseases by boosting the immune system of chilly plant. Front line demonstrations were conducted at farming situations with participation of farmers. The cultivation practices in these FLDs (*i.e.* use of improved cultivars, proper nursery raising, balanced fertilizer application etc.) were kept the same except that the demonstration plots were sprayed at 7 day intervals regularly from nursery to the last day of harvest with 5 ml VIRCON-H per liter water and the control with available chemical fungicides on "as and when required basis" .In the treated plots yield was 190 quintals per hectare increased the yield by 13.16 per cent, on average as compared to the control plots (165 q/ha). The highest extension gap was 25 q/ha with the use of botanical extract VIRCON-H to the treated with chemical fungicides, the technology index, which is inversely correlated to the feasibility of the improved technology index in the farmers' fields, was 13.63 per cent. The adoption of improved technology under FLDs resulted in higher gross returns (Rs.209000 /ha) with the use of botanical extract (VIRCON H), net returns in control plots (Rs.163500/ha) and benefit: cost ratio (1:3.59) as compared to Chemical Fungicides. The growth in production because by using the bio extract (VIRCON H) chilly size was longer, less deformed and fetched a better price. .

KEY WORDS*:* Chilli, Yield, botanical extract, Technology gap, productivity, demonstration, impact, front line

Chilli (*Capsicum annuum* L.) is one of the most valuable spice crops in India. The crop is grown largely for its fruit. It is an indispensable spice essentially used in every Indian cuisine due to its pungency, spice, taste, appealing odour and flavour. Chilli fruits are rich source of Vitamin C, A and E. In spite of the increasing demand for the crop the yield is low to fulfill the domestic demand. Main reasons for low yield in chilli are low coverage of high yielding varieties/hybrids, heavy incidence of pest and disease and lack of adoption of scientific package of practices (Indira *et al.,* 2001). The improved technologies developed by research institutes were also found to be financially attractive. Yet adoption levels for several components of the improved technology were low emphasizing the need for better dissemination (Kiresur *et al.,* 2001). Several biotic, abiotic and socio-economic constraints inhibit exploitation of the yield potential and these are needed to be addressed.

Crop growth and yield are limited through poor plant nutrition and uncertain water availability during the growth cycle. Inappropriate management may further reduce the fertility of soil (Rabbinge, 1995). Demonstration is one of the most powerful extension tools in communication of new ideas, methods and techniques in agricultural development. It helps to convince the farmers faster than any other method through the process of observing, hearing, learning by doing and experiencing things (Pathak, 1999). The improved cultivation practices followed in the national demonstrations have already shown high yield potentials (Anonymous, 2012).

Sonbhadra district has sizable area under chilli cultivation but the productivity is very low. The low productivity of chilli crops poses a threat to economic security of small and marginal farmers. There has been great competition in the market for chilli and hence, there isa need to improve the crop with respect to production and quality. Keeping the above points in view, the frontline demonstrations (FLD) on chilli was initiated with objectives of showing the productive potentials of the improved production technologies under real farm situations over locally cultivated chilli crop.

MATERIALS AND METHOD

The impact of demonstration of spray of bio extract (VIRCON H) on chilli were conducted by the Directorate of Extension, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj,(UP), India, during summer season 2023-24 on farmer's field of adopted villages in Sonbhadra district of Uttar Pradesh, India. An area of 5.0 ha was covered with plot size 0.25 ha under front line demonstration with active participation of 20 farmers. Planting of seedlings was done during March - April with a spacing of 45 x 30 cm inall the plots. A local high yielding variety Suraj mukhi prone to virus was used.

Both treated and control plots were incorporated with same recommended practices like nursery management, weed management, raised bed planting, recommended fertilizer rate and the only difference was that the treated plots were sprayed with VIRCON H 5ml per litre water at 7 days interval from nursery stage to the last day of harvest and the control with chemical fungicides on "as and when required basis". The objective was also to demonstrate integrated pest management to grow better crops. Field days were also held in each cluster to exhibit farmers from the same village and other villages, the outcomes of front-line demonstrations. Fertilizers were given as per improved practices as basal dose as well as top dressing. Materials for the presentstudy with respect to FLDs and farmers practices are given in Table 1.

About bio extract (VIRCON H)

This product Bio Extract (VIRCON H) is made by the Hari Organic Manure Limited, Janakpuri, district Saharanpur. The gift of Ayurveda is the essence of herbs, which effectively prevents viral diseases on crops. VIRCON-H helps plants in making proteins, which prevents the reproduction of viruses and also stop them from spreading to healthy plants. The effect of VIRCON-H is initially seen on flowers and fruits. Flowers are formed healthy and drop is greatly minimized. Fruits get bigger in size, are less coccoid and they fetch a better price. New leaves emerge less twisted and healthy. Residual side effects are minimal. VIRCON-H is sprayed at 7 day interval from nursery to the last day of harvest. While in control we use chemical fungicides such as Trichoderma viride and Mancozeb onas and when required basis. Production effect on both sides was compared.

Before conducting impact of the demonstration a list of farmers was prepared from group meetings and specific skill training was imparted to the selected farmers regarding different aspects of cultivation etc. were followed as suggested by Choudhary (1999) and Venkattakumar *et al*. (2010). Material for the present study is given in Table 1. Incase of local check plots, existing practices being used by farmers were followed. This demonstration is a direct comparison of Vircon-H and chemical fungicides and their role in suppressing plant viral diseases. Vector control was managed chemically in treated and control plots by the use of same insecticide.

Visit of farmers and extension functionaries was organized at demonstration plots to disseminate the message at large scale. The demonstration farmers were facilitated by Directorate of Extension Scientists in performing field operations like sowing, weeding, irrigation, spraying, bio extract and harvesting etc. during the course of training and visit. The necessary steps for selection of site and farmers, layout of demonstration etc. were followed as suggested by Choudhary (1999**).** The traditional practices were maintained in case of local checks. The data were collected from frontline demonstration plots as well as controlplots (farmer's practices) and finally the extension gap, technology gap and technology index were worked out **(Samui *et al.*, 2000).**

Table- 1: Particulars showing the details of chilli cultivation under front line demonstrationand existing farmer practices

Operation	**Demonstrated plots**	**Control plots**
Variety	Suraj Mukhi High yielding local variety prone to virus	Same as treated plots
Seed treatment	Seed treatment with Trichoderma viride and VIRCON H	Seed treatment with mercury
Raising of seedlings	Raised nursery beds	Raised nursery beds
Fertilizer application	FYM – 25 t/ha N:P:K@100:50:50 kg/ha, dipping of seedlings with bio-fertilizers (VAM andAzospirillum)	FYM – 25 t/ha N:P:K@100:50:50 kg/ha, dipping of seedlings with bio-fertilizers(VAM and Azospirillum)
Pest management	(VIRCON-H) At weekly intervals from nurserytill the time of final harvest	Adoption of plant protection measures with Chemical fungicide Mancozeb
Vector control	Chemical insecticides as and when required	Same as in the demonstrated plots

Observations and Analysis

The results obtained from the present study as well as discussions have been summarized under following heads:

Yield and yield parameters

A comparison of yield parameters and productivity levels between the treated and the control is shown in Table 2. Yield and yield attributing parameters *viz.*, number of fruits per plant, fruit length (cm), fruit diameter (cm), fruit yield (g/ plant), total fresh fruit (kg/ha) were recorded highest in demonstration plots as compared to control plots. On an average 13.16 per cent more yield of chilli was recorded due to regular use of Botanical viricide (VIRCON H) as compared to Chemical Fungicides. The yield of trail filed was found 190 q/ha and 165 q/ha

in the farmers field practices. Singh *et al.* (2011) also reported increase in yield of 28.22 per cent in tomato, 29.17 per cent in chilli and 21.43 per cent in Chilli through FLDs on improved production technology. Similarly, yield enhancement in different crops in front line demonstration has amply been documented by (Kumar *et al.,* 2010 and Singh and Sharma, 2004). The results indicated that the frontline demonstrations have given a good impact over the farming community of Sonbhadra district as they were motivated by the new agricultural technologies applied in the FLD plots.

Technology gap

The technology gap in the demonstration yield over potential yield was 30 q/ha for chilli.The technological gap may be attributed to the dissimilarity in the soil fertility status and weatherconditions (Mukherjee, 2003) (Table 2). Hence, variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations

Extension gap

The highest extension gap of 15 q/ha (Table 2) was recorded during the period ofstudy 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. This highlighted the necessity to inform farmers about the adoption of better agricultural production technology with the use of botanical products in order to counteract the trend of the vast extension gap. This frightening tendency of the use of chemical fungicides that prevails in the mind of the farmer can be easily overpowered by the use of botanical pesticides in the cultivation of Chilli.

Technology index

The technology index shows the feasibility of the evolved technology at the farmer's fields. The technology index was found 13.63%. The lower the value of technology index more is the feasibility of the technology (Jeengar *et al.,* 2006).

Economic return

The input and output prices of commodities prevailed during the demonstrations were taken for calculating cost of cultivation, gross returns, net returns and benefit: cost ratio (Table 3). With the adoption of improved technology under FLDs, higher gross returns (Rs.209000/ha), net returns (Rs. 163500/ha) and B : C ratio (1:3.59) was recorded as compared to farmers practices of Rs. 181500 / ha gross return, Rs. 139180/ha net return and B : C ratio of 1:3.29. This may be due to higher yields obtained due to regular use of botanical extract (VIRCON H) use weekly interval as compared to farmer's chemical fungicides. These results are in conformity with the findings of Hiremath *et al. (*2009) and Mokidue *et al*. (2011).

CONCLUSIONS

Frontline demonstration is the most suitable method for assessing the performance of the improved technology as it directly involves the scientists in conducting the demonstrations at the farmers' field which enables them to have firsthand information related to the technology. The demonstration's results underline the potential for increased productivity and profitability in chilli cultivation when using advanced methods like bio extract VIRCON H. However, to fully leverage this potential, extension services, resource accessibility, and farmer education must be strengthened. Additionally, fine-tuning the technologies based on local conditions and continuously monitoring the outcomes will help further bridge the technology and extensiongaps.

The use of botanical extracts for plant pest management, as seen in the study with the bio anti-virus VIRCON H, aligns well with the current trend of organic farming. This shift reflects farmers' growing interest in sustainable agriculture, where there is a focus on reducing reliance on synthetic chemicals and adopting natural alternatives and has increasingly gained attention from both consumers and the government over time.

Table- 2: Productivity, technology gap, extension gap and technology index of chilli under FLDs and existing practices

Year	Area (ha)	No. of farmers	Yield q/ha			Increase over farmers practice (%)	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
			Potential	Trial (VIRCON H fungicide)	Farmers practice (Chemical fungicides)				
2023 – 24	5	10	220	190	165	13.15	30	15	13.63

Table- 3: Average Cost of cultivation (Rs. /ha) as affected by improved and local technologies

Year	Average cost of cultivation (Rs/ha)		Average gross return (Rs. /ha)		Average net return (Rs. /ha)		B : C ratio	
	Trial (Vircon H fungicide)	Farmers practice (Chemical fungicides)	Trial (vircon H Fungicide)	Farmers practice (Chemical fungicides)	Trial (vircon H fungicide)	Farmers practice (Chemical fungicide)	Trial (vircon-H fungicide)	Farmers practice (Chemic al fungicide)
2023-24	45500	42320	209000	181500	163500	139180	3.59	3.29

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