International Journal of Agriculture and Allied Sciences July-December 9(2), 44-48, 2024
ISSN 2583-6336, NAAS Rated 2.47: Peer Reviewed

IMPACT ANALYSIS OF FRONT LINE DEMONSTRATION ON TOMATO OF BIO FUNGICIDE IN SONBHADRA DISTRICT OF UTTAR PRADESH, INDIA

T.D.Mishra*, Praveen Charan**
Subject Matter Specialist Horticulture, Director Extension
Directorate of Extension,
Sam Higginbottom University of Agriculture, Technology & Sciences,
Prayagraj – 211007 (U.P.) India.

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 tomato covering an area of 2.5 hectare in Sonbhadra district of Uttar Pradesh to exhibit latest production technologies and compared it with farmer's practice. An attempt has also been made to know the productivity of spray demonstration of bio extract (Systemic Fungicide, F- 7) and the adoption of latest production technologies by the farmers were randomly selected from villages. The results were compared between Field Demonstration plots and control plots. From the demonstrations, it was observed that the improved tomato variety Arka Vikas recorded the higher yield 456 q/ha from the fields treated with F7 botanical fungicide and 434 quintal when the fungal management was done by the use of Mancozeb and Carbondesym as treated regularly at weekly intervals with botanical extract F-7 and compared to the use of chemical fungicides used as an when required. The extension gap, technology gap and technology index were recorded 22 q/ha, 144.00 q/ha and 24.00%, respectively. The increment in yield of tomato crop under demonstrations of using of bio extract (Systemic Fungicide, F-7) was due to spreading of improved and latest technology viz. seed treatment with F-7 and chemical fungicide, seed inoculation with bio fungicide, recommended seed rate, leaf curl resistant variety, line sowing, proper dose of fertilizers and plant protection measures. Use of botanical fungicide F-7 gave higher mean net return of Rs. 4,71,700.00 per hectare with a benefit cost ratio 6.26 as compared to chemical fungicides (Rs. 3,39,410.00 per hectare cost benefit ratio 4.95).

KEY WORDS: Field demonstration, tomato, yield (Bio extract - Systemic fungicide), extension gap, technology gap, technology index, BC ratio.

The tomato (*Solanum lycopersicum* L.), is a plant of the Solanaceae family that grown both outdoors and inside for its fruits. it is one of the most important vegetable crops in the world. Tomatoes can contribute significantly to a healthy diet and can be eaten raw in salads, cooked like vegetables, and as a component of other prepared dishes. A sizable portion of the world's tomato production is used by processing firms to make products including tomato juice, puree, paste, ketchup, and dried pulp. Lycopene, potassium, iron, folic acid, and vitamins are just a few of the phytochemicals and minerals that are rich in tomatoes. It is renowned as a food that is both protective and productive. Since tomatoes provide better yields and may be grown in a variety of cropping systems as they have a high economic value. Tomatoes, a warm-season vegetable crop, are especially vulnerable to frost and killed in subfreezing temperatures. Previously, tomatoes were only cultivated during specific seasons, but this has changed over the last few decades. Tomatoes are, now grown all year long. Tomatoes are India's third most important crop,

behind tomatoes and onions. India is the world's second-largest tomato producer, producing over 21195 thousand MT of tomatoes each year in an area of approximately 813.00 million ha. In Uttar Pradesh, tomatoes are grown on around one million hectares of land, yielding 951thousand MT / ha, sharing 4.68% of all tomatoes produced in India during the fiscal year 2021- 2022. Because of local demand, tomatoes are a prominent commercial vegetable production in the Sonbhadra area. One such effective technology transfer technique that demonstrates how new technologies can boost yield and profit is front- line demonstration. Because tomatoes make great storage and truck gardening crops, they are advantageous to local growers. Front line demonstration was organized to cover the aforementioned possibility and boost agricultural income.

Materials and Methods

One such efficient method of transferring technology is front-line demonstration, which demonstrates how new technologies may raise yield and profit. The Impact Analysis of Front Line Demonstration on Tomato were conducted by the Directorate of Extension, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (U.P.) India., during summer season 2023-24 on farmer's field of adopted villages in Sonbhdra district of Uttar Pradesh, India.

The average temperature in this region is 31.4°C, and there is 700 mm of rainfall on average per year. In general, the sandy to sandy loam soils in the study area had medium to low fertility levels. The investigation of 10 demonstrations was carried out at farmers' fields on 5.0 ha of land. Each frontline demonstration was set up on 0.25 ha of land, with the nearby 0.3 ha serving as the comparison control (farmer's practice). Leaf curl resistant variety Arka Vikas was presented at ICAR-IIVR, Varanasi, incorporating all recommended practices like nursery management, raised bed planting, recommended fertilizer rate and integrated pest management to grow better crops. Comparison was made between the regular use of F-7 botanical fungicide at weekly intervals and chemical fungicide 'as and when required. Field days were also held in each cluster to exhibit farmers from the same village and other villages, the outcomes of front-line demonstrations. In demonstration plot, regular use of F-7 systemic fungicide was done at weekly intervals and the use of chemical fungicides was done as and when required through front line demonstration of different locations.

This product Bio Extract (**Systemic Fungicide-F7**) is made by the Hari Organic Manure Limited, Janakpuri, district Saharanpur. Systemic Fungicide F-7 is a bio extract produced by herbs which stops the reproduction of fungi after entering

the plant cells and reduces the penetration of fungal hyphae into these cells. Being a natural pesticide, it not only kills fungal hyphae but also inactivates them. The Systemic Fungicide (F-7) gives strength and vigor to the plants. Plants are healthy and give good yields and effective in both prevention and treatment. Regular spray 3-4 ml/liter of water from the time of transplant to the time of final harvest was made and repeat after 7 days. While other side we use the chemical fungicides such like Mancozeb and Carbondysem in same half part of the field as and when required and then found the production effect on the crop.

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 pesticide 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 both front line demonstration plots as well as control plots (farmers practices) and finally the extension gap, technology gap and technology index were worked out **(Samui *et al.*, 2000)** as given below:

3. RESULTS AND DISCUSSION

3.1 Yield Interpretations

According to the data in Table 2, the average yields in farmer practice plots 408 q/ha, whereas 456 q/ ha in demonstration plots. The crop yield of in comparison to farmers practice, there was an increase of 5.07 % higher grain yield of tomato crop, respectively during 2023-2024 following recommended practice. However, variations in the yield of tomatoes in different years might be due to variations in soil moisture availability, rainfall, and changes in the location of demonstrations every year.

The higher production of tomato crop yield obtained under recommended practice was due to the regular use of botanical extract *i.e.* **Systemic Fungicide (F-7).**

These results demonstrated that the full execution of the practices specified in Table 1 as well as the knowledge acquired through training and interactions with the scientists had an impact on the demonstration plots' higher average yield over time compared to farmers' practices. As a result, the production of tomatoes can be increased by the regular use of F-7.

3.2 Extension Gap

During the research study, an extension gap of 22 q/ha was noted. Under the study FLD program. 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 Tomato.

3.3 Technology Gap

The technology gap and the disparities between the potential yield and yield of demonstration plots were 144 q/ha. Similar results have been reported by Singh *et al.* (2011) and Mishra *et al.* (2009). This can be a result of the region's meteorological circumstances, the productivity of the soil, and individual farmers' skills in management. Therefore, to close these gaps, location-specific suggestions are required.

3.4 Technology Index

The technology index demonstrates the viability of the technology used in the farmer's field. According to Table 3, the technology index was found 24.00 %. This quickens the implementation of bio fungicide **(Systemic Fungicide, F-7)** technological solutions to boost tomatoes' 5.06 percent yield performance. According to Singh et al. (2011) and Mishra *et al.* (2009), these results are consistent.

3.5 Economics of front line demonstration

To assess the economic feasibility of the demonstration technologies over the control, a number of economic measures, including the cost of cultivation, net return, and B: C ratio, were determined. The economic viability of improved, tested technology over farmers' practice was calculated and expressed in the form of a B: C ratio based on the current price of inputs and outputs costs. During the study, the gross cost of cultivation varied from Rs.
75.500 /ha and Rs. 68,590 in demonstration plots and farmer practice plots, respectively. The demonstration's increased cost was mostly brought on by the need to purchase F-7 botanical fungicide in extra quantity as compared to chemical fungicides labor.

Tomato production employing the regular use of fungicide F-7 produced higher net returns of Rs. 4,71,700 per ha in the years 2023-2024 with compared to traditional chemical fungicides (Rs. 3,39,410). The B: C ratio was recorded to be higher under demonstration against control during all the year of study. The benefit-cost ratio fluctuated from 6.25 in the demonstration plots and 4.95 in the farmer's practice plots during the course of the year of study. This might be as a result of the use of botanical extract producing higher yields and better marketing prices than the chemical fungicides. The results of Srivastava *et al.* (2022), Meena *et al.* (2022) and Singh *et al.*, (2011) in the case of tomatoes and other crops are comparable to this conclusion.

The scientific approach of tomato production can significantly minimize the technological gap, resulting in higher tomato yield in the area and, in turn, better economic conditions for the producers. Furthermore, extension organizations in the district must give sufficient technical assistance to farmers through various educational and extension approaches in order to close the extension gap for greater tomato production in Uttar Pradesh's mid-plain area.

Conclusion

The demonstration's results underline the potential for **increased productivity and profitability** in tomato cultivation when using advanced methods like bio fungicide F-7. 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 extension gaps.

The use of **botanical extracts** for plant pest management, as seen in the study with the bio fungicide **Systemic Fungicide F-7**, 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- 1: Distinctions between the demonstration package of practices and farmer practices

Crop operations	Demonstration	Farmer's practices
Improved Variety	Arka Vikas	Arka Vikas
Seed rate	250 gm/ha	250 gm/ha
Seed treatment	Seed was treated with F-7 20 ml/ kg seeds	Seed treatment Bovistin @ 2 gm/ kg seed
Nursery Raising time	First week of March	First week of March
Nursery Raising	Nursery Raising on ridge bed and line sowing	Nursery Raising on ridge bed and line sowing
Transplanting method	Raised bed transplanting with plant spacing - 60 cm X 45 cm	Raised bed transplanting with plant spacing - 60 cm X 45 cm
Transplanting time	Last week of March	Last week of March
Fertilizer dose	Recommended dose of fertilizers @ 100 Kg N, 80 Kg P_2O_5 and 100Kg, K2O/ha	Recommended dose of fertilizers @ 100 Kg N, 80 Kg P_2O_5 and 100Kg, K2O/ha
Weedicide Application/ dose	Pendimethalin @ 3.2liter/ha was applied 48hrs within Transplanting.	Pendimethalin @ 3.2liter/ha
Pesticide Application/ dose	Systemic Fungicide (F-7) At weekly intervals from the time of transplant till the time of final harvest	Mencozeb and Carbondysem as and when required

Table- 2: Productivity, in tomato under FLD during 2023-24

Year	Variety	No. of farmer	Area (ha)	Average Yield (q/ha)			
				Potential	Trial (Botanical Fungicide F-7)	Farmers practice (Chemical Fungicides)	% increase over farmers practice
2023-24	Arka Vikas	20	2.5	600	456	434	5.07

Table 3: Technology gap, technology index and extension gap in tomato under FLD during 2023-24

Year	Variety	No. of farmer	Area (ha)	Potential	Technology gap (q/ha)	Extension Gap (q/ha)	Technological Index (%)
2023-24	Arka Vikas	10	2.5	600.00	144.00	22.00	24.00

Table 4: Analysis of economics of tomato under FLD and farmers practice during 2023-2024

Year	Variety	Cost of cultivation (Rs./ha)		Gross Income (Rs./ha)		Net Return (Rs./ha)		B:C Ratio	
		Trial (F-7 fungicide)	Farmers practice (Chemical fungicides)	Trial (F-7 fungicide)	Farmers practice (Chemical fungicides)	Trial (F-7 fungicide)	Farmers practice (Chemical fungicides)	Trial (F-7 fungicide)	Farmers practice (Chemical fungicides)
2023-24	Arka Vikas	75500	68590	547200	408000	471700	339410	6.25	4.95

REFERENCES:

Anonymous (NHB Database). National Horticulture Board, Ministry of Agriculture of India; 2013. Available:nhb.gov.in

Collins EJ, Bowyer C, Tsouza A, Chopra M.Tomatoes: **(2022)** An Extensive Review of the Associated Health Impacts of Tomatoes and Factors That Can Affect Their Cultivation, Biology (Basel). Feb. 11(2):239 10.

Hadibi T, Mennouche D, Arıcı M, Yunfeng W, Boubekri A, Kong D, Li M.(2023) Energy and enviro-economic analysis of tomato slices solar drying: An experimental approach. Solar Energy.;15;253:250-61.

Kaloo: Tomato Allied Publication Pvt. Ltd, New Delhi-203 220; 1986.

Kumar A, Kumar R, Yadav VPS, Kumar R. (2010): Impact assessment of frontal demonstration of Bajara in Haryana state, Indian Re. J Ext. Edu. 10(1):105-108.

Meena K, Srivastava R, Kumari AR, Rai (2022) A, Singh S, Chaudhari RP, Rai TN. Performance of Lentil (*Lens culinaris*) Varieties under Rice-Lentil Cropping System in Eastern Part of India. AMA. 52:6183-6190

Meena K, Srivastva R, Singh S, Tiwari A. Performance of Pigeonpea (*Cajanus cajan* L.) Varieties Sown on Ridge under Front Line Demonstration at Farmer's Field in Deoria District of Uttar Pradesh, India. IJPSS. 2022;34(23):764-77.

Mishra DK, Paliwal DK, Tailer RS, Deshwal AK(2009). Impact of a frontline demonstration on yield enhancement of tomato. Indian Res. J Ext. Edu. 9(3):26-28.

Mishra PK, Singh PN, Singh SN, (2014) Pradeep Kumar. Adaptation extent and horizontalspread of Tomato (*Lycopericon esculentum* Mill.) cultivation through frontline demonstration in eastern Uttar Pradesh of India. European Journal of Biotechnology and Bioscience. 41(6):40-44.

Samui SK, Mitra S, Roy DK, Mandel AK, Saha D.(2000); Evaluation of frunt line demonstration on groundnut., J Indian Soc. Costal Agric. Res. 18(2):180- 183.

Singh D. (2023); Impact of Front Line Demonstrations on The Yield and Economics of Tomato (*Lycopersicon esculentum* Mill.) In Bharatpur and Alwar District of Eastern Rajasthan. International Journal of Agriculture Sciences, ISSN.:0975-3710.

Singh R, Soni RL, Singh V, Bugalia HL(2011). Dissemination of improved production technologies of solanaceae vegetables in Banswara district of Rajasthan through Frontline demonstration. Raj. J Extn., Edu. ;19:97-100.

Srivastava R., Meena K., Tiwari A., Singh N., and Behera T K. (2020): Yield and Economics of Kharif Onion (*Allium cepa* L.) under Front Line Demonstration in Eastern Plain Zone of Uttar Pradesh, India. IJPSS, 34(23):1034-1040.