International Journal of Agriculture and Allied Sciences July-December 9(2), 77- 82, 2024
ISSN 2583-6336, NAAS Rated 2.47: Peer Reviewed

IMPACT ASSESSMENT OF FRONTLINE DEMONSTRATIONS OF HERBAL BIO EXTRACT ON CAPSICUM IN DISTRICT SONBHADRA OF UTTAR PRADESH, INDIA

T.D.Mishra* and 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 capsicum covering an area of 5.0 hectare in Sonbhadra district of Uttar Pradesh to exhibit the potential of herbal extracts in comparison to chemical fungicides in terms of yield, net returns and above all their safety to human health.The results were compared between Field Demonstration plots and control plots. From the demonstrations, it was observed that the improved Capsicumvariety BHARAT recorded highest yield 240 q/ha from the fields treated with Wilt Free botanical extracts used to control fungal diseases mainly wilt (fungal, bacterial and nematode) treated regularly at weekly intervals as compared to the farmers' practice ofcontrolling fungal infections by the use of chemical fungicides. Wilt played havoc during the time of winter fog and a good number of capsicum plants died during this period after wilting. Plant mortalitywas much higher in the control plots in comparison to plots regularly treated with Wilt- free. The fungal management was done in control plots by use of Mancozeb and Propiconazole as chemical fungicides used as a when required. Theincrease in the demonstration yield over farmer's practices was 9.16 % by using the Wilt Free botanical Extract. The extension gap, technology gap and technology index were recorded 22 q/ha, 60.00 q/ha and 20.00 % respectively. The increment in yield of Capsicum crop under demonstrations of using of bio extract (Wilt free) was due to less number of plant mortality in the plots sprayed at weekly intervals with Wilt -Free@ 10ml per lit water .seed treatment with bio plant extract wilt free. Drenching and foliar sprays were made with chemical fungicides mainly Mancozeb and Propiconazole on the basis of "as and when required". Use of botanical fungicide wilt free gave higher mean net return of Rs. 594500.00 per hectare with a benefit cost ratio 4.73 as compared to chemical fungicides uses (Rs. 470010.00 per hectare benefit cost ratio 3.97).

KEY WORDS: Field demonstration, capsicum, yield, botanical extract (Wilt Free), extension gap, technology gap, technology index, BC ratio.

Capsicum (*Capsicum annuum* L.) is an annual and day neutral plant belongs to Solanaceae family. It is a one of the most important vegetable crops grown in India as well asin the world, because of its nutritive value, flavor, color and is considered as one of the major commercial crops of the world (Tiwari *et al*. 2013). It is relatively non- pungent or less pungent with thick flesh and is the world's second most important vegetable crop after tomato. Sweet pepper has little energy value but the nutritive value of sweet pepper is high especially for vitamin A and vitamin C (Roy *et al*. 2011). In India, capsicum is grown for its mature fruits and widely used in stuffing, baking and consumed as salad, noodles and soup preparations (Kumari and Kaushal, 2014).

Production of any crop can be increased by supplying quality inputs. Nutrition plays an important role in the growth and development of any crop including capsicum, because it is known to exhibit positive response to the application of nitrogenous, phosphoric and potassium fertilizers. Fertilizer is one of the major factors of crop production (Satyanarayana *et al*., 2002). Combined application of organic and inorganic fertilizers attained a great significance in vegetable production as large amount of nutrients required for continuous production, hectare-1 yield of vegetables and fertilizer alone cannot sustain the productivity of soils under highly intensive cropping systems. Further, use of organic manures in integrated nutrient management helps in mitigating multiple nutrient deficiencies. Soil health is one of the key factors which decide the yield (Singh and Jain, 2004). Organic manures are basic source of essential plant nutrients and applied in large quantities. Application of organic manures to soil not only improves the physical properties but also increases the availability of nutrients. It supplies the plant nutrients including micronutrients to increases the yield of crop (Saravaiya, 2010).

The vegetables are rich source of vitamins, minerals and essential nutrients required for good health of human being. So, vegetables are economically important crops. They may be grown in varied environmental conditions except harsh climatic conditions and on most of the soils. Better management practices in terms of nutrient management, weed management, intercultural operations, insect pest and disease management could be translated to higher yields. The frontline demonstrations (FLDs) were conducted in two blocks

of the district Sonbhadra by Directorate of Extension, to improve the vegetable yield levels and create awareness among farmers. In the present study, comparison was made between the use of botanical extracts as fungicides on weekly basis and the use of chemical fungicides on ‘ as and when required basis.The vegetables grown in the frontline demonstrations were capsicum.

It is renowned as a food that is both protective and productive. Since capsicum provide better yields and may be grown in a variety of cropping systems as they have a high economic value. Capsicum is a warm-season vegetable crop, is especially vulnerable to frost and killed in subfreezing temperatures. Previously, capsicum was only cultivated during specific seasons, but this has changed over the last few decades. Capsicum is now grown all year long. Capsicum is India's third most important crop, behind capsicum and onions. India is the world's second-largest capsicum producer, producing over 21195 thousand MT of capsicum each year in an area of approximately 813.00 million ha. In Uttar Pradesh, capsicum is grown on around one million hectares of land, yielding 951 thousand MT / ha, sharing 4.68% of all capsicum produced in India during the fiscal year 2021- 2022. Because of local demand, capsicums 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 capsicum 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.

Bio extract is a mass-produced, biologically based agent manufactured from a living microorganism or a natural product and which is sold for the control of plant pests (Organization for Economic Co-operation and Development (OECD), 2000) Bio extracts are made from the substances that control pests by non-toxic mechanisms and have been used in different forms since human civilization. Bio extracts have more potential benefits for agriculture as well as public health programs Bio extracts consist of various microbial extracts, bio chemicals generated from microbes and other natural sources. These are usually made by growing and concentrating naturally existing organisms and their metabolites, such as bacteria and other microorganisms, fungus, nematodes wilt, etc. These are frequently considered vital components of IPM programs and have gained a lot of practical attention as alternatives to chemical and synthetic extracts. Bio extracts could be dived from arsenals (e.g. nematodes), plants such as Chrysanthemum, Azadirachta (Neem), and microorganisms (e.g. Bacillus thurningenes, Trichoderma, Pseudomonas), and include living organisms (natural enemies their product (phytochemicals, microbial products) which can be used for the management of pest injurious (Mazid *et al* 2011) The potential benefits of the utilization of bio extracts in agriculture and public health programs are considerable the present paper provides an overview of bio extracts and their classification formulations application current status and prospects.

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 Analysis offrontline Demonstration on Capsicum was conducted by the Directorate of Extension, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (U.P.) India., during Rabi season 2023-24 on farmer’s field of adopted villages in Sonbhadra 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. Over the investigation's five years, 12 demonstrations were carried out at farmers' fields on 3.0 ha of land. Each frontline demonstration was set up on 0.40 ha of land, with the nearby 0.40 ha serving as the comparison control (farmer's practice). Comparison was made between the regular use of Wilt free botanical fungicide at weekly intervals and chemical fungicide ‘as and when required such as Mancozeb and Propiconazole. In demonstration plot, regular use of Wilt Free fungicide was done at weekly intervals and the use of chemical fungicides was done as and when required for the farmer practices through use of quality seeds of improved variety (Bharat), line sowing, recommended dose botanical extract (Wilt Free), timely irrigation and plant protection management were demonstrated on the farmer’s field through front line demonstration of different locations.

Bio Extract (Wilt Free)

This product is made by the Hari Organic Manure Limited, Janakpuri, district Saharanpur. Wilt-free is a phloem friendly fungicide ie it can be easily translocated from leaves to roots. It is an herbal product that prevents root rot caused by fungus and nematodes. This disease is also often called Wilt (Ukatha). It is completely safe for the environment. And by being absorbed into the plant, it creates rot resistance in it. Wilt Free can be mixed with almost all types of insecticides and micro nutrients during spraying with the regular weekly interval to the last day of harvest of the crop. Using the bio extract on the crop, 10 ml. / liter of water or 800-1000 ml. / Acre Crops according to size and age of crops: - All crops in which damping of, root rot or wilt occurs. While

on other side we use the chemical fungicides such like Mancozeb, Propiconazole 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 (Wilt free) 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 frontline 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**).**:

RESULTS AND DISCUSSION

Yield Interpretations

According to the data in Table 2, the average yield in farmer practice plots 180 q/ ha, whereas 240 q/ ha in demonstration plots. There was an increase of 33.33 % higher fruit yield of capsicum crop in plots treated regularly at weekly intervals with Wilt- Free in comparison to plots treated with chemical fungicides on the "as and when needed" The production reduction in the control plots (chemical fungal control) was due to the high mortality of plants. The higher production of capsicum crop yield obtained under recommended practice was due to the regular use of bio extract, *i.e.* Wilt free.

These results demonstrated that the full execution of the practices specified in Table 1as 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 capsicum might be enhanced compared to the yield gained using farmers' traditional methods of growing capsicum. The findings shown here are comparable to those of Singh *et al.* (2007) and documented yield increase in several crops in frontline demonstrations.

Extension Gap

The extension gap of 22 q/ha was noted. This highlighted the necessity to inform farmers about the adoption of better agricultural production technology with the use of botanical extract 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 Capsicum.

Technology Gap

The technology gap and the disparities between the potential yield and yield of demonstration plots were 60 q/ha. 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.

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 20.00 %. This quickens the implementation of bio extract (Wilt Free) technological solutions to boost capsicum and 9.16 percent yield performance.

Economics of frontline 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 (Table 4) based on the current price of inputs and outputs costs. During the study, the gross cost of cultivation from 65450.00 /ha and Rs. 61350.00 in demonstration plots and control plots, respectively. The demonstration's increased cost was by the need to purchase Wilt Free botanical fungicide in extra quantity as compared to chemical fungicides and labor.

Capsicum production employing the regular use of fungicide wilt free improved technology produced higher net returns of Rs. 594500 per ha in the years 2023-24, with an average net return of compared to traditional chemical fungicides (Rs. 470010.00).

The benefit to cost ratio (B:C) from using recommended practice were comparatively higher than the farmer's practices of the demonstration (Table 4). The return per ha from the frontline demonstrations were higher than that of farmer practices. The range of benefit cost ratio of frontline demonstration of varied from 6.33, while BC ratio for farmer's practices varied from 4.87 that is lower than that of FLDs.

In conclusion, the results of frontline demonstration convincingly brought out that the yield of capsicum could be increased by 9.16 percent higher over the traditional chemical fungicides in the district. This study clearly reflects the extension and technological gap exist at grass root level. The increase in yield clearly indicates the positive impact of better management practices followed in the frontline demonstrations on the vegetables yield. Thus, it could also be concluded that e better management interventions for the

cultivation reduce the extension and technology gap to great extent. This would sustainably increase the income as well as the livelihood of the farmer of this district.

CONCLUSIONS

The productivity and profitability gain reflected under FLD over existing capsicum cultivation practices has raised awareness and motivated other farmers in the Sonbhadra district to adopt the demonstrated technologies for capsicum production, which helps to improve vegetable production, consumption, nutritional security, and overall livelihood security in the districts of Uttar Pradesh's mid plain belt.

The demonstration's results underline the potential for increased productivity and profitability in Capsicum cultivation when using advanced methods like bio fungicide Wilt Free. 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 extract Wilt Free, 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 farmerpractices

Parameters	**Demonstration**	**Farmer's Practice**
Variety	Bharat (Capsicum)	Bharat (Capsicum)
Seed Rate	250 g ha-1(Capsicum)	250 g ha-1(Capsicum)
Seed Treatment	Seed treatment with bio extract (Wilt Free)	Seed treatment Carbendazim 50% WP
Time of sowing	Mid-October (Capsicum)	Mid-October (Capsicum)
Method of sowing	Transplanting for Capsicum	Transplanting for Capsicum
Fertilizer application	Recommended fertilizer application, N:P: K @120:60:90(kg/ha)	Recommended fertilizer application, N:P: K @120:60:90(kg/ha)
Weed Management	Use of recommended weedicides	Use of recommended weedicides
Plant protection measures	application of bio extracts as (Wilt Free) use at weekly interval till the last day of harvest	Propiconazole and Mancozeb Application of chemical pesticide as and when needed

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

Year	Variety	No. of farmer	Area (ha)	Average Yield (q/ha)			Increase over farmers practice (%)
				Potential	Trial (Botanical fungicide-wilt free)	Farmers practice (Botanical fungicide)	
2023-24	Bharat	12	3	300.00	240	218	9.16

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

Year	Variety	No. of farmer	Area (ha)	Potential	Technology gap (q/ha)	Extension Gap (q/ha)	Technological Index (%)
2023-24	Bharat	12	3	300.00	60.00	22	20

Table- 4: Analysis of economics of capsicum under FLD and farmers practice during2023-24

Year	Variety	Cost of cultivation (Rs. /ha)		Gross Income (Rs. /ha)		Net Return (Rs. /ha)		B:C Ratio	
		Trial (Wilt Free fungicide)	Farmers practice (Chemical fungicides)	Trial (Wilt Free fungicide)	Farmers practice (Chemical fungicides)	Trial (Wilt Free fungicide)	Farmers practice (Chemical fungicides)	Trial (Wilt Free fungicide)	Farmer s practice (Chemical fungicide)
2023-24	Bharat	125500	118590	720000	588600	455900	470010	4.73	3.96

REFERENCES

Balai C.M., Jalwania, R., Verma L.N., Bairwa R. K., and Regar P.C. (2013) Economic impact of Front Line Demonstrations on Vegetables in Tribal Belt of Rajasthan. *Current Agriculture Research Journal*.

Dudek, S.G. 2001, *Nutitionsessientials for nusing practice*. Philadelphia: Lippincott. Glare, T., J. Caradus, W. Gelernter, T. Jackson, N Keyhanı, J. Kohl, P. Marrone, L. Morinand A. Stewart 2012 Have broextracts come of age? *Trends in Biotechnol*. 30(5) 250- 258

Katiyar H., Verma S.K., Singh K, Chandra N., and Lodhi S.K. (2017) Yield gap analysis in vegetable crops through on farm testing. *Journal of Pharmacognosy and Phytochemistry*. SP1: 773-775

Kour D., K. L. Rana, A. N. Yadav, N. Yadav, M. Kumar, V. Kumar, et al 2020 Microbial biofertilizers bioresources and eco- f riendly technologies for agricultural and environmental Süstainability: *Blocata Agric Biotechno*l. 23 101487.

Kumari R, Kaushal A. Drip fertigation in sweet pepper: A Review. *International Journal of Engineering Research and Applications*. 2014; 8(4):144-149.

Mazid, S, J. C. Kalds and R. C. Rajkhows 2011 A review on the use of bioextracts in insect pest management *Int J Sci Adv Technol. 1*(7) 100-178.

Nawaz, M. J. Mabubu and H. Hua 2016 Current status and advancement of bioextracts, Microbial and botanical extracts *J. Entomol. Zool. Stud* 4(2) 241-246.

Painkra G.P., Salam D.C., and Mishra R.K. (2012) Role of front line demonstrations on yield enhancement of different crops in Sarguja district of Chhatishgarh. *Crop Research*. Print ISSN: 0970-4884.

Roy SS, Khan MSI, Pall KK. Nitrogen and phosphorus efficiency on the fruit sizeand yield of capsicum. *Journal of Experimental Sciences*. 2011; 2(1):32-37.

Samui, S. K,,Mitra, S., Roy, D.K., Mandal, A, K and Saha, D. 2000 Evalusation of front line demonstration on groundnut. *Jounal of the Indian Society Costal Agriculture Research* 18(2):180-183.

Sanjeev Ahuja, Opinder Singh and Makkar, G.S. 2020. Frontline Demonstrations of Capsicum, Turmeric, Garlic and Chilli in District Rupnagar in Sub-mountainous Zone of Punjab. Int.J.Curr.Microbiol.App.Sci. 9(07): 3690-3696.

Saravaiya SN, Patel NB, Ahir MP, Patel NM, Desai KD, Patel JB. Integrated nutrient management (INM) approach for brinjal (*Solanum melongena* L.) and other s olanaceous vegetables-A Review. *Agricultural Research Communication Centre*. 2010; 31(2):79-92

Satyanarayana V, Prasad PVV, Murthy VRK, Boote KJ. Influence of integrated use of farmyard manure and inorganic fertilizers on yield and yield components of irrigated lowland rice. *Journal of plant Nutrition*. 2002; 25(10):2081-2090.

Tiwari SP, Panigrahi HK, Sharma D. Effect of different fertigation levels on morpho-physiological characters and yield of capsicum under greenhouse condition. *International Journal of Agricultural Sciences*. 2013; 1(9):111-113.

Yadav, A N., R. Kumar, S. Kumar V Kumar, T. Sugitha, B. Singh, et al 2017. Beneficial microbiomes biodiversity and potential biotechnological applications for sustainable agriculture and human health *J Appl Biol Biotechnol*. 5. 45-5