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Effectiveness of Farmers Field School for Integrated Pest Management in Tomato

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ABSTRACT

Farmers field schools (FFS) have emerged as effective transfer of technology tools for promotion IPM packages, as the experiences show in different countries. In this direction an effort was made by the Division of Extension and Training, Indian Institute of Horticultural Research (IIHR), Bangalore, to popularize the IPM package developed by II HR through Farmer Field School (FFS). A predominantly tomato growing village called Agrahara in Bangalore north taluk of Bangalore Rural district was selected for implementation of FFS. The objective was to convince the farmers about the philosophy of IPM and facilitate the identification and effective management of pest and diseases . The paper focuses on the impact of IPM in terms of reduction in pest and disease levels, effect on level of usage of chemicals and reduction in the cost of cultivation compared to farmer's practice. The study found that through farmer FFS, IPM can be successfully implemented . There was significant reduction in the usage of chemicals and the knowledge of farmers was also substantially increased.

With increasing consumer awareness of pesticide residue problems in agricultural and horticultural crops, it has become imperative on the part of scientists, extension workers and farmers to practice farming in a way that is less dependent on chemical pesticides and fungicides . Research institutes have developed many packages that are more eco- friendly and less dependent on chemical pesticides. One such package is the "Integrated Pest Management practices in tomato" developed by Indian Institute of Horticultural Research (IIHR), Banglore. The package has been found to be effective at different farmers fields . The need of the hour is to promote such technologies among farmers. To popularize the package among farmers and to make it more sustainable , the farmer have to be taught and trained in a way that they feel part of the programme. There are many innovative ways of promoting IPM. One such innovative, effective, economical , eco- friendly and safe approach is Farmers Field School (FFS). FFS approach utilizes participatory methods to help develop their analytical skills, critical thinking, promote creativity, and help them to make better decisions (Kenmore 1997), With this objective in mind Farmer Field School was implemented in a predominantly tomato growing village viz. Agrahara in Bangalore rural district of Karnataka state.

METHODOLOGY

A multidisciplinary team of scientists from the field of extension education, vegetable crops, entomology and pathology was formed to conduct the FFS. Fifteen farmers were selected for the programme. The selected farmers were tomato growers with more than 10 years of experience. They were growing hybrid tomatoes with the seedling being purchased from nursery. The team made weekly visits to farmers and had interaction with farmers on – farm at different stages of crop growth. The nurserymen were also involved in the first few contact classes and trained to produce healthy seedlings. The programme was conducted during Kharif and Rabi, 2006. For comparison purpose 15 farmers from neighbouring village were selected who had been following chemical control (taken as farmers' practice).

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Participant farmers were involved in collecting the data on various pest and disease incidence parameters and impact. Care was taken to involve farmers at each stage of the programme implementation. Farmers noted down all the practices and their observation in their field note book. Farmers took keen interest during all the classes were conducted in the field itself. The team of scientists used to visit one field at weekly interval and farmers used to discuss their problems there in the field itself with the live specimen. The specimen was discussed along with its symptoms and their problems there remedy. The two way process of communication between scientists and farmers and farmers facilitated effective learning among the farmers. Farmers gave their ideas at each and every stage. Perceived impact of technologies was identified through ranking technology (Ray and Mondal, 2004).

IPM package : The IPM package promoted during the process included following components : Land preparation done with 25 tonnes of FYM and one tone of FYM enriched with *Trichoderma harzianum;* transplanting 25 days old tomato and 50-days old marigold seedling simultaneously in a pattern of one row of marigold for every 16 row of tomato; at 15 days after planting (DAP), spraying with one systemic insecticide (imidachlorpid); application of poison bait, Nuclear Polyhedrosis Virus (HaNPV) Thrice at 28,35 and 42 days after transplanting, Neem seed kernal extract (NSKE) or neem soap (3 times) and need based 1-2 fungicides and insecticides .

RESULTS AND DISCUSSION

Impact of IPM on pest and disease incidence and yield

The results indicated that there was marked reduction in the frequency of application of insecticide and fungicide as seen in Table 1.The t-test values show that there was significant difference on different parameters between the IPM and non- IPM plots. The frequency of insecticide spray came down to 2.5 (IPM plots) from 8.5 times per crop in farmers' practice. Frequency of fungicides came down to 3 as compared to 4.5 in farmer practice. The incidence of tomato spotted wilt virus (TSWV) was 7.6 per cent in IPM compared to 25.6 per cent in farmers' practice. The incidence of wilt was nil as farmers were growing wilt resistant varieties. The incidence of blight (early blight by Alternaria solani and late blight by Phythophthora infestans) reduced from 7.79 per cent to 4 per cent . The marketable yield obtained was 51.3 t/ha in IPM plots compared to 44.6 t/ha in farmers' practice . The results indicated that when farmers adopt IPM package, they can bring down the quantum of chemicals used. At the same time the pest and disease incidence is effectively managed along with production of pesticide residue free tomato which is safe to environment and the consumers' health.

Table 1. Performance of Integrated Pest Management field as against Non IPM in tomato

Sl. No.	Particulars	IPM	Non IPM	t values
1.	Frequency of insecticides (No. of times)	2.50	8.50	- 13.6**
2.	Frequency of fungicides (No. of times)	3.0	4.50	- 7.13**
3.	Leaf miner in main field (% leaf affected)	8.50	26.61	-14.76**
4.	Tomato spotted wilt virus (TOSPO %)	7.7	16.4	- 7.73**
5.	Fruit borer (% fruit damaged)	7.75	21.88	-9.36**
6.	Blight (% leaf affected)	4.00	7.79	- 4.68**
7.	Marketable Yield (Hybrid–Abhinava) (t/ha)**	51.3	44.6	10.39**

**Highly significant

Perceived impact of IPM technology components

The technology components along with their rank scores are depicted in the Table 2. Some of the practices like application of Trichoderma in nursery and main field, use of NPV and marigold traps , application of neem seed kernal extract/neem soap and application of neem cake scored high rank. According to them application of Trichoderma in nursery mortality and low incidence of wilt in main field. Thus the farmers could save on seed cost which is very high for hybrids by using less seed rate. Application of neem seed kernal extract was good because it caused no health hazard and the material was locally available and cheaper compared to pesticides . In addition there was no fear of pest resurgence. Application of neem cake effectively controlled the leaf miner in addition to providing nutrient to plants. Use of systemic insecticide (Imidachlorpid) in nursery , main field resulted in less incidence of pests in nursery, very less incidence of leaf miner in main field, preplanned spray, without waiting for the pests and reduction of seedling mortality in main farmers. Change in acquisition, assimilation and utilization information of IPM resulted in change in knowledge of tomato growers. Continuous exchange of information, learning and assimilation of knowledge on various components of IPM package helped farmers for better adoption and continuing adoption of innovations including other improved practices .

Partial budget analysis

Partial budget analysis revealed that by following IPM practices in tomato farmers could increase their net income to the level of Rs. 26,032 /- per ha (Table 2). Hence adoption of IPM practices, if followed properly was more profitable. Despite the use of new inputs additionally and extra cost incurred, the net profit of adoption of IPM was more than farmer practice of pest and disease management. Due to reduction in quantity of chemical pesticides and fungicides in IPM practice, along with economic benefits, social and environmental benefits were also reaped by the IPM adopters.

Table 2. Partial budget analysis for Integrated Pest Management in tomato per ha

Debit (Rs/ha) Increase in costs	**Amount**	**Credit (Rs./ha) Decrease in cost**	**Amount**
Due to Trichoderma application	300	Saving in cost	
Neem Cake	2350	Insecticides	4800
NPV	1395	Fungicides	1800
Imidachlorpid	523		
Marigold	200		
Foliar nutrition (Vegetable special)	800		
Poison bait	1500	Total decrease in cost	6,600
Total increase in cost	7368	Increase in returns Increase in marketable yield (6.7 tonne)*	26,800
Decrease in returns	---		
A.Total increase cost and reduced return	7368	B. Total reduced costs and increased returns	33,400
Net change in Income/loss(B-A)=	Rs. 26,032/-		

*Assuming the sale price of tomato @ Rs. 4/kg which is the average price of tomato during rabi season

CONCLUSION

The Farmer Field School approach is found to be effective in promoting IPM package among farmers. Due to FFS farmers had increased knowledge level and developed positive attitude about advantages of IPM package. In addition, yield could also be increased. Hence multidisciplinary team approach in FFS is highly beneficial in terms of promoting IPM and bringing economic benefits to the farmers and enhancing social and environmental benefits among farming community. When farmers are involved in the programme the programme can be sustainable .

REFERENCES

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