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A Study on Knowledge Level of Farmers on IPM Practices in Tomato Cultivation

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A B S T R A C T

The present study was conducted to know the kknowledge level of IPM practices in tomato cultivation by farmers and to find out the relationship between the personal, socio-economic, psychological and communication characteristics of farmers with their perception, knowledge and adoption levels in Kolar and Chickaballapura Districts of Karnataka State. The data on overall knowledge level of farmers on IPM practices indicated that as high as 49.45 per cent of the farmers had medium level of knowledge followed by high (31.11 %) and low (19.44 %) level of knowledge. Variables such as tomato cultivation experience, cosmopoliteness, management orientation, economic orientation, achievement motivation, innovativeness, scientific orientation, aspiration and risk orientation were significantly related at five per cent level of significance with knowledge on IPM practices of tomato growing farmers. The remaining seven variables viz. education, attitude towards IPM practices, training programmes undergone, extension participation, farm scientist contact, extension agency contact and mass media participation were found to have significant relationship at one per cent level of significance with knowledge on IPM practices of tomato growing farmers.

***Key words*:** Knowledge, IPM, Tomato cultivation

The Green Revolution has been the major milestone in transforming the country from food deficiency to self-sufficiency during the later part of 1970s. Thereafter, the agriculture sector in India has been successful in keeping pace with ever increasing food demand of growing population. Food grains production has increased more than five folds since 1950s from 51 million tons into 298 mt in 2019-20 [1]. India's population has been growing at an annual rate of 1.8 per cent, and is expected to touch 1.3 billion mark by 2020. At this rate of population growth, the country would require additional food grains of about two million tonnes a year [2). Currently India is producing surplus cereals particularly wheat and rice capable of exporting to other countries. The declining trend in pesticide use in agriculture during the 1990s can be attributed to central government's fiscal policy and technological developments in pest management. During 1990s, taxes were raised on pesticides and phasing out of subsidies was initiated. Programmes on training of both the extension workers and farmers in the Integrated Pest Management (IPM) were started throughout the country.

Research has generated new technologies using naturally occurring enemies of insect pests (parasitoids, predators and pathogens) for use in IPM. Some important commercially available products include *Trichogramma*, *Bracons*, *Crysoperla carnea*, *Crytaemus montrouzieri*, *Bacillus thuringiensis*, *Bacillus sphaericus*. Nuclear polyhedrosis viruses (NPV) and *Trichoderma*. In addition, a number of plant products such as azadirachtin (neem), pyrethrum, nicotine, etc. are also valuable as bio-pesticides. In India, more than 160 natural enemies have been studied for their utilization against insect pests [3). Despite its techno-economic superiority over conventional chemical control, adoption of IPM remains restricted to hardly two per cent of the area treated with plant protection inputs. This estimate is based on the informed opinions of the researchers, extension personnel and policy makers. The structure of agrochemical market also suggests a similar level of adoption; biopesticides share only two per cent of the agro-chemical market in India [4). Lack of clear understanding of the IPM technologies and lack of knowledge on IPM technology severely affecting the adoption of technologies in the country and its effect is even more in case of vegetable crops where the crop loss is more due to pest and disease attack.

Integrated Pest Management (IPM) is an ecologically based strategy that focuses on long-term solution of the pests through a combination of techniques such as biological control, habitat manipulation, modification of agronomical practices, and use of resistant varieties. Embracing a single tactic to control a specific organism does not constitute IPM, even if the tactic is an essential element of the IPM system. Integration of multiple pest suppression techniques has the highest probability

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of sustaining long-term crop protection. Pesticides may be used to remove/prevent the target organism, but only when assessment with the help of monitoring and scouting indicates that they are needed to prevent economic damage. Pest control tactics, including pesticides, are carefully selected and applied to minimize risks to the human health, beneficial and non-target organisms and environment. With this back ground the present study was conducted I with following specific objectives, knowledge level of IPM practices in tomato cultivation by farmers and to find out the relationship between the personal, socio-economic, psychological and communication characteristics of farmers with their perception, knowledge and adoption levels.

MATERIALS AND METHODS

The present study was conducted in Kolar and Chickaballapura Districts of Karnataka State where tomato is being extensively cultivated. The major tomato growing taluks in Kolar (Mulabagalu, Srinivasapura and Kolar) and Chickaballapura (Chinthamani, Shidlaghatta and Chickaballapura) districts were selected for the study. Thirty tomato growing farmers were randomly selected from each of six sampled taluks. Thus, the total sample constitutes 180 farmers from six taluks of Kolar and Chickaballapura districts.

RESULTS AND DISCUSSION

Knowledge level of tomato growing farmers regarding the IPM practices

The data on overall knowledge level of tomato growing farmers regarding the IPM practices is presented in (Table 1). The data on overall knowledge level of farmers on IPM practices indicated that as high as 49.45 per cent of the farmers had medium level of knowledge followed by high (31.11%) and low (19.44%) level of knowledge.

Table 1 Overall knowledge level of tomato growing farmers regarding the IPM Practices (n = 180)

S. No.	Category	Number	Per cent	Mean	Standard deviation
1	Low	35	19.44	58.61	15.81
2	Medium	89	49.45		
3	High	56	31.11		
	Total	180	100		

The possible reasons for the farmers to have medium to high level of knowledge regarding the IPM practices in tomato cultivation may be due to the fact that farmers are well aware of advantages of the IPM practices. The outcome may be due to educational efforts made by horticultural department, non-governmental organizations, agricultural universities in general and the specific efforts made by the farmers themselves to have regular contact with subject matter specialists of Krishi Vignana Kendras, extension personnel of the state department of agriculture and gross root level extension workers of the NGOs in particular. The IPM practices have been classified under five broad headings viz. cultural practices, mechanical practices, plant origin insecticides, biological and chemical control methods [5-7].

Relationship between knowledge level of tomato growing farmers on IPM practices with their personal, socio-psychological and communication characteristics

The correlation coefficients of 22 selected personal, socio-psychological and communication characteristics of farmers with knowledge on IPM practices of tomato growing farmers is presented in (Table 2). It could be observed from the table that family size, land holding, material possession, annual income, social participation and deferred gratification had no significant relationship with knowledge level on IPM practices of tomato growing farmers. The nine variables such as tomato cultivation experience, cosmopoliteness, management orientation, economic orientation, achievement motivation, innovativeness, scientific orientation, aspiration and risk orientation were significantly related at five per cent level of significance with knowledge on IPM practices of tomato growing farmers.

The remaining seven variables viz. education, attitude towards IPM practices, training programmes undergone, extension participation, farm scientist contact, extension agency contact and mass media participation were found to have significant relationship at one per cent level of significance with knowledge on IPM practices of tomato growing farmers. The education level of the tomato growing farmers is found to have significant relationship with knowledge level on IPM practices. The possible reasons could be that, the educated tomato growing farmers actively participate in educational activities like demonstrations, field visits, exhibitions and exposure frequently to the mass media. Educated farmers also have frequent contact with extension personnel of the development departments which helped them to have more knowledge on IPM practices [8].

Table 2 Relationship between knowledge level on IPM practices of tomato growing farmers and their personal, socio-psychological and communication characteristics (n = 180)

Characteristics	Correlation coefficient (r)
Education	0.4111**
Tomato Farming experience	0.2367*
Family size	0.0699^{NS}
Land holding	0.1621^{NS}
Material possession	0.0928^{NS}
Annual income	0.1168^{NS}
Social participation	0.1326^{NS}
Cosmopoliteness	0.2222*
Management orientation	0.2491*
Attitude towards IPM practices	0.4621**
Deferred gratification	0.0787^{NS}
Economic orientation	0.1999*
Achievement motivation	0.2368*
Innovativeness	0.2500*
Scientific orientation	0.2111*
Aspiration	0.1998*
Risk orientation	0.2498*
training programmes undergone	0.4968**
Extension participation	0.3611**
Farm scientist contact	0.3012**
Extension agency contact	0.3268**
Mass media participation	0.2611**

NS: Non-Significant
*Significant at 5% level
**Significant at 1% level

The attitude towards IPM practices and knowledge level of tomato growing farmers found to have significant relationship. It may be due to the fact that farmers' positive attitude encourages them to know much about tomato cultivation in general and IPM practices in particular. Positive attitude motivates tomato growing farmers to purse continuously to acquire farm related information on tomato cultivation.

The training received and knowledge level of tomato growing farmers was found to be significantly related. The possible reasons might be due to the fact that, the extent of training programmes undergone is directly related to knowledge level of tomato growing farmers. It provides an opportunity to acquire knowledge. Further, interaction during trainings create better learning situation and helps to clarify doubts about IPM practices.

Extension participation of tomato growing farmers was significantly related with knowledge level on IPM practices. This might be due to frequent participation of respondents in extension activities like demonstrations, exhibitions, Krishimela and field days organized by developmental departments and agricultural universities ensured better knowledge acquisition and confidence on IPM practices.

Farm scientist contact and knowledge level of tomato growing farmers found to be significantly related to each other. The possible reasons could be that contact with farm scientist builds the confidence in tomato growing farmers on latest information and also provides an opportunity for the farmers to clarify complex IPM practices.

It was found that mass media participation and knowledge level of tomato growing farmers had significant relationship. The probable reasons may be due to the fact that, wide exposure to mass media would help farmers updating their knowledge with latest farm technologies. There was positive and significant relationship between tomato cultivation experience and knowledge level of farmers on IPM practices. It might be due to the fact that, year after year cultivation experience reinforced knowledge on components of IPM practices. Further, their experience made them to be a real scientist in tomato farming [9].

Cosmopoliteness of tomato growing farmers had positive and significant relationship with their knowledge level on IPM practices. It may be explained by the fact that the extent of contact with external world pays way for acquisition of wide range of farm related information with respect IPM practices. Higher cosmopoliteness behavior of tomato growing farmers develop broader prospect and better scope for exchange of ideas, facts related to IPM practices [10].

The management orientation and knowledge level of tomato growing farmers found to be significant relationship with IPM practices. Higher level of management orientation is an indication of farmers' better knowledge regarding the production and marketing activities of tomato cultivation. Planning was also essential element of management orientation which ensures correct knowledge on cultivation aspects of tomato crop [11]. The results indicated that economic orientation and knowledge level of the famers found to be have significant relationship. The possible reasons could be that farmers with high economic orientation, they focus on higher productivity which makes them to learn advanced technologies on tomato cultivation and they always try to minimize cost of cultivation and maximize profit.

Achievement motivation of tomato growing farmers was positive significant relationship with knowledge level of the farmers. It may be explained by the fact that, farmers with achievement motivation would have strong determination and ambition to achieve certain goals in their life. Sometimes they concentrate more on farming and forget their personal obligations. Always these farmers set difficult tasks and try to reach them continuously [12].

There was a positive and significant relationship between knowledge level of tomato growing farmers and innovativeness. The possible reasons could be that a farmer who is innovative would naturally try to know more about the improved technologies of IPM practices.

The scientific orientation and knowledge level of tomato growing farmers found to be having significant relationship. When the farmers are scientifically oriented, they search for alternative source of information for enhancing their knowledge. Therefore, they amass information on IPM practices from varies sources.

Aspiration of the tomato growing farmers on IPM practices and their knowledge level was positive and had significant relationship. The possible reasons may be due to the fact that, farmers with aspiration would have vision and project themselves to be on the top of the hierarchical ladder.

There was a positive and significant relationship between risk orientation and knowledge level of tomato growing farmers. Since, tomato growing farmers put all their resources at risk; they take all type of precautions to ensure assured income. Therefore, they acquire correct knowledge on IPM practices [13].

Extent of contribution of personal, socio-psychological and communication characteristics of tomato growing farmers on IPM practices and their knowledge level

All the 22 independent variables selected for the study have contributed variation to the tune of 81.00 per cent to the knowledge level of IPM practices in tomato cultivation. R^2 value of 0.810 with significant 'F' value (16.78) revealed the significance at one per cent level of regression equation in explaining the variation (Table 3).

It could be further observed from the (Table 3) that the variables such as education, tomato cultivation experience, management orientation and mass media participation were significant at five per cent level. Whereas, attitude towards IPM practices, innovativeness, training programmes undergone, extension participation, farm scientist contact and extension agency contact were significant at one per cent level of significance [14].

The improvement in the characteristics such as education, tomato cultivation experience, management orientation and mass media participation would open the avenues for the information related to any topic. Similar way these variables have significantly contributed towards the knowledge level of farmers on IPM practices. The positive attitude towards IPM practices is possible only with the sufficient knowledge [15]. Hence, it is highly contributing towards the knowledge level on IPM practices. Innovativeness, training programmes undergone, extension participation, farm scientist contact and extension agency contact all these variables play a significant role in enhancement of farmers knowledge. Hence, these variables have highly significant contribution towards the variation in knowledge level of the farmers on IPM practices.

CONCLUSION

The result on knowledge level indicates that less than half of the sampled farmers had medium level of knowledge regarding the integrated pest management practices. Therefore, the extension functionaries, such as line departments, state

agricultural universities, non-governmental organizations and the research organizations must equip and update the farmers regarding different components of integrated pest management practices. As the health of human beings, flora and fauna has got prime importance, it is the need of the hour to practice eco-friendly pest control practices which ensure minimum hazards to the environment and natural resources without affecting production, productivity of tomato cultivation.

Table 3 Extent of contribution of personal, socio-psychological and communication characteristics of tomato growing farmers to their knowledge level of IPM practices in tomato cultivation (n=180)

Variables	Regression coefficient (b)	Standard error of regression coefficient (SE_b)	't' value
Education	0.176	0.462	2.620*
Tomato Farming experience	0.149	0.391	2.611*
Family size	0.290	0.291	1.001 NS
Land holding	0.184	0.129	0.968 NS
Material possession	0.876	0.613	0.699 NS
Annual income	0.383	0.713	1.867 NS
Social participation	0.501	0.812	1.628 NS
Cosmopoliteness	0.590	0.921	1.569 NS
Management orientation	0.355	0.821	2.311*
Attitude towards IPM practices	0.025	0.069	2.680**
Deferred gratification	0.065	0.081	1.233 NS
Economic orientation	0.555	0.816	1.468 NS
Achievement motivation	0.261	0.444	1.699 NS
Innovativeness	0.244	0.681	2.799**
Scientific orientation	0.557	0.561	1.006 NS
Aspiration	0.396	0.488	1.237 NS
Risk orientation	0.206	0.281	1.361 NS
Training programmes undergone	0.081	0.292	3.611**
Extension participation	0.196	0.921	4.681**
Farm scientist contact	0.224	0.891	3.968**
Extension agency contact	0.158	0.469	2.961**
Mass media participation	0.211	0.569	2.688*

R^2 = 0.810, F =16.78**

NS: Non-Significant; *Significant at 5% level; **Significant at 1% level

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