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INSECTS' PEST DYNAMICS OF TOMATO IN RELATION WITH WEATHER FACTORS AND POPULATION ESTIMATIONS

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Tomato (*Lycopersicon esculentum* Mill.) belongs to the family Solanaceae and is considered as one of the most important vegetables grown in the world. It is a warm season crop widely grown in both tropical and sub tropical regions of the world (Govindappa *et al.*, 2013). It has its origin in Central and South America and extends all over the world after the Spanish occupied the Americas. It is grown extensively for both fresh marketing and processing industries. It is rich in vitamin C and adds variety of colours and flavors to the foods. Tomatoes in large quantities are using in preparing soups, juices, ketchups, purees, pickles, pastes and powders (Choudhary, 2002). The chief tomato producing countries are China, USA, Italy, Turkey, India and Egypt etc. among which China occupied the first place followed by India. In India, productivity of tomato is very when compared to its production potential of the developed countries.

Even if the total cultivated area of tomato in India is steadily increasing over years, yields continue to be low due to several production constraints such as insects, diseases and other abiotic factors. Among them, the problem posed by insects is very critical and if imperative measures are not taken in time, the entire yield may turn down. Mostly tomato crop is more prone to insect pests and diseases due to their tenderness and softness compared to other crops (Sajjad *et al.* 2011). All parts of the tomato plants offers food, shelter and reproduction site for insects, which are able to cause unthrifty growth or death of the plants and damage of fruits in the form of scarring, tissue destruction and abreaction of shape and colour fade (Lange, and Bronson 1981). The incidence of insects may vary according to season and different stages of growth. The population fluctuation of the insects is mostly governed by various weather factors prevail during the crop growing period. Nearly 16 insect species are reported in India feeding on tomato starting from germination to harvesting stage which reduces the yield and also degrades the fruit quality (Butani DK, 1997).

The major insects of tomato which can cause immense economic damage include Aphid (*Aphis gossypii*), Jassid (*Amrasca devastans*), White fly (*Bemisia tabaci*), Cutworm (*Agrotis segetum*), Leaf miner (*Liriomyza trifolii*), Thrips (*Scirtothrips dorsalis*) Pinworm (*Tuta absoluta*) and Fruit borer (*Helicoverpa armigera*) (Sam *et al.*, 2014) among which sucking pest complex viz., aphid, whiteflies and thrips acts as vectors causing severe damage to crop by transmitting viruses rather than direct feeding.

Population dynamics and pest estimation

The abiotic parameters are identified as direct impact on population dynamics of insects. The estimation of pest population is a basic necessity for measuring the intensity of pest population for assessing the crop losses, monitoring the appearance of the pest and making decisions on the methods of control to be used. Existing relationships between time of appearance of insects and the duration for which they are likely to cause damage to the crop at an important crop growing stage and the subsequent losses in yield by them are critical in estimation of the economic threshold. Population fluctuation of the crop pest largely depends on whether parameters. Pest

management programme requires the use of monitoring practices for effective control. Before developing insect pest management programme it is necessary to have basic information on abundance and distribution of pest in relation to weather parameters, as it helps in shaping proper time of action and appropriate successful control methods. According to Mathur *et al.* (2012) pest appearance and their distribution varies with abiotic factors, hence meteorological parameters plays an essential role in the abundance of any insects species. Relative humidity, rainfall, wind speed and temperature are the chief weather parameters that largely influence the activity of insect. The interaction between activity of insects and abiotic factors helps in deriving at foretelling models that helps in predicting incidence of insects' activity. As abiotic factors play important roles in population development of the insect species, studies on correlation of the weather parameters with pest incidence is also gaining importance.

Conclusion

Farmers should follow crop protecting actions in time when the pest appeared as controlling the insect pests has become a major problem. Therefore, development of IMP techniques to manage the pests becomes very important. Pest control mostly relies on chemical control only, which leads to problems like resistance of pests towards pesticides, resurgence and environmental hazards (Dhaliwal GS, 2010). Pest control approach should be holistic using alternative strategies of integrated pest management (IPM). As the meteorological parameters play a vital role in the biology of any pest, the interaction between pest activity and abiotic factors will help in deriving at predictive models that aids in forecast of pest incidence. Currently available cultivars lack sufficient plant resistance to provide protection against insects. So, resistance technology occupies an important place in the present day rational pest management strategies. Mixed or inter cropping of crops or cultivation of other plant species (non-crops) along with main crops is a common cultural practice in many countries.

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