WHITEFLY IN GREENHOUSE CONDITIONS

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Khyali Ram
CCS Haryana Agricultural University, Hisar
Dalip Kumar
CCS Haryana Agricultural University, Hisar

INTRODUCTION

A greenhouse is a structure with walls and roof which is constructed by using transparent material, such as glass or plastic sheet. These structures are used on large scale for cultivating the plants requiring regulated climatic conditions. Greenhouses have been turned as boon for cultivation of off-season crops however they are not free from attack of insect-pests due to which the huge loss is found in quality and quantity of harvested products. Greenhouse whitefly, *Trialeurodes vaporariorum* and silver leaf whitefly, *Bemisia tabaci* are common species of whitefly occurring in greenhouse crops. Attack of whiteflies can become a major problem in the summer months or under dry warm conditions of greenhouse as the temperature suits their breeding cycle.

Morphological characters

Whitefly have three distinct phases in its life cycle *i.e.* egg, pupa and adult. Eggs are small and yellowish at time of laying. At maturity it get darken to greyish-purple colour. They are laid on the underside of leaves, usually in circular pattern. The eggs generally remain unnoticed as they are very small (maybe less than 1 mm) in length. Nymphs emerge from eggs after seven days. It looks scale like and looks white to greenish-yellow having flattened and oval shape. Around 14-35 days later the nymph develops into a pupa. The pupa has a fringe of very short hairs around the upper edge. After 9-23 days pupae burst and fully grown winged adult emerges. The entire lifecycle completes in 30-65 days, depending on environmental conditions.

Symptoms of damage

Whiteflies suck the sap from plants due to which the plants get wilted, turn yellow, shed leaves and shows decreased growth rates. It produces honeydew and encourages sooty mould growth reducing photosynthesis and plant vigour. Feeding by whiteflies can cause deformation and discoloration of fruits. These are vectors of some plant viruses also *e.g.* tomato leaf-curl virus (TYLCV) infesting capsicum, tomatoes and chillies.

Management of Whitefly

Monitoring - The crop should be regularly inspected at random for the presence of whitefly infestation, using an x10 hand lens. Trapping whiteflies using yellow sticky cards, both inside and outside the greenhouse, can be used as a fundamental tool for a monitoring the whiteflies' population abundance. The sticky cards should be placed strategically throughout the greenhouse at one trap per every 100 m^2.

Cultural control - Remove old and abandoned crops that shelter whitefly infestations. Completely clean the production area at the endof the crop, if at all practicable. Remove all weeds, at least

once a week. Inspect new plant material before introducing it to the production area. Grow plant resistant varieties wherever possible. In the greenhouse install physical barriers such as screens (whitefly grade mesh) with pore size of 400 microns or less to prevent adult whiteflies moving from infested areas or to prevent them from entering the greenhouse at all.

Biological control – Natural enemies, which are agents of biological control can be used successfully to manage the population of whiteflies in greenhouse conditions. A parasitoid wasp called *Encarsia* spp. or predatory mite, *Typhlodromips montdorensis* Monty and Green lacewing, *Mallada signata* can be used successfully for biological control of whitefly. Residual pesticides should be ceased for four weeks prior to introducing bio-control agents.

Chemical control – Systemic insecticides can be used for elimination of whitefly infestation. Insecticides should be used selectively and alternate classes of insecticides should be sprayed for to avoid chemical resistance development. Spray solution should have thorough coverage on leaf surfaces, particularly the undersides of leaves for effective control.