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Destructive Insect Pest White Fly For Horticultural Crop in India

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Introduction

White fly is one of the most important insect pests of horticultural crops that damage a wide range of economically important crop plants such as tomato, chilli, okra, capsicum, cucumber, watermelon, etc. White fly play an important role in transmission of virus in horticultural crops. Viral diseases may reduce the yield drastically. The whitefly has association with almost 600 different species of plants which comprise large number of cultivated and non-cultivated, annuals and perennials. The whitefly *Bemisia tabaci* (Gennadius) it can be simply adapt to the new host plants in the new area because of its distinctive biological and behavioural characteristics. The synthetic chemical insecticides in the 1950s, pest control has been mostly relied on that; however, it soon became noticeable that there were problems associated with the use of insecticides. At present, the management of insect pests in agricultural systems still relies primarily on the use of chemicals, and consequently, many insect pests became resistant to chemical insecticides, including the whitefly *B. Tabaci*. In addition, the extensive use of insecticides adversely affected non-target organisms and caused secondary pest resurgence with environmental and health concerns. Establish a long lasting integrated pest management system using efficient natural enemies is an encouraging decision. Parasitoids have drawn significant attention because of their importance in biological control of insect pests through parasitoids and host feeding. The host feeding mostly involves in consumption of host fluids, secreted during oviposition which has reported in at least 140species belonging 17 families of hymenoptera. About 10,000 wasp species feed their host that supplies nutrients to the parasitoids assisting egg development and

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consequently increases parasitoids egg production. In view of that consideration, host feeding activities believed an encouraging attribute of parasitoids as selecting a candidate for biological control agent. Whiteflies show multivoltine characters, they have no diapauses or dormant stages. Therefore, whiteflies are constant through the frequent utilization of numerous plant host resources over the annual cycle. Movement from one plant host species to another is consequently an essential element of the whitefly ecology which facilitates finding host plants and colonization in a frequently variable ecosystem.

Hosts and Damage symptoms

B. tabaci has been recorded from more than 600 different plant species and its polyphagous nature has been documented worldwide. A large number of cultivated and non cultivated annual and perennial plant species are recognized as acceptable feeding. Whiteflies feed on plant phloem by injecting enzymes and removing the sap, reducing the vigour of the plant, or, in cases of severe infestation, killing the host. Honeydew secretions from the whitefly feeding promote the growth of sooty mould, which also significantly reduces plant quality. The most obvious whitefly feeding damage symptoms are stem blanching, chlorotic spots, leaf yellowing, and shedding. In many crops, the damage caused by *B. tabaci* indirect, i.e., by transmitting disease-causing viruses.

White fly photograph

Whitefly photograph

Close up photograph of whitefly

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Economic importance

Reliable estimates of the economic importance of the *B. tabaci* species complex on worldwide agriculture have been difficult to obtain because of the extensive areas affected, the numbers of crops and ornamentals involved, and different monetary systems. Over the last three decades, *B. tabaci* has caused excessive annual crop losses. The impact of direct feeding and honeydew excreta that favours sooty mold production is factors that affect crop yield in both quantitative and qualitative terms. Increased control costs and reduced product marketability and profitability are also important factors. *B. tabaci* was first reported to be a serious pest of cotton in the late 1920s and early 1930s in northern India (now part of Pakistan). *B. tabaci* damage the crop by sucking the sap and reduce the crop yield about 50%. To control the whitefly used insecticides which increased input cost and create pest resistance. Although recognized as pests for at least 100 years, they attained major pest status only in the last two decades, possibly through the indiscriminate use of pesticides. The whiteflies have risen in notoriety as important plant pest species particularly of horticultural crops subsequently; severe infestations on cotton were recorded in the Sudan and Iran, Mexico, Brazil, Turkey, Israel, Thailand, Arizona and California, USA, and Ethiopia. Historically, heavy infestations in cotton fields often resulted in significant dispersal to other field crops and vegetables following termination of the cotton crop. Insecticide use in many cases resulted in the development of resistance and a general failure of control efforts. Attributed part of the problem to the ability of insecticide resistant *B. tabaci* individuals to increase their oviposition rates when under insecticidal stress (hormoligosis). *B. tabaci* situation and offered a more complex explanation for the outbreaks. His counter argument to the pesticide-induced *B. tabaci* problem involved the influence of agricultural intensification of cotton acreage, increased fertilizer use and other production technology, later planting dates and managerial over use of insecticides it is likely that all of these factors have affected *B. tabaci* population out breaks.

Management options

Sanitation

Remove sources of infestation (weeds, old plant debris, and growing medium) from within and around the fields, greenhouse or nursery that might carry over populations from one season to the next. While disposing affected plant materials, place debris into a sealed

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bag or container, and discard it in a safe place immediately. Because pests are often dispersed via transport of infested materials, be careful not to carry infested plant material or debris unsealed in an open truck/vehicle.

Exclusion

To prevent whiteflies from entering the greenhouse, seal or screen openings with appropriate screening material. Whiteflies are small, so screens with a whole size of 0.27 x 0.82 mm are required to exclude them. If possible, construct the facility so that workers enter through an anteroom.

Cultural Control

Grow plants so as to facilitate good pesticide coverage. If possible, try to have a crop-free period to break any cycling within the nursery, and install trap crops for diverting incoming whitefly populations.

Biological Control

Several biological agents are available for managing *B. Tabaci* including predators (the mite *Mblyseius swirskii*, or the insects *Delphastus catalinae*, *lacewing larvae*), parasit-oids (*Eretmocerus eremicus*, *Encarsia spp.*) or entomopatho-genic fungi (*Beauveria bassiana*). Before applying any bio-control agents it is important to check their compatibility with chemicals and environmental requirements such as temperature, humidity, and day length. Bio-control agent may not control an existing high population of whiteflies before significant crop damage occurs, so early application of agents before high pest build up is recommended. Use of generalist predators can provide control of *B. tabaci* along with other pests of ornamentals. *Swirskii* and parasitic wasp *E. Eremicus* to be very efficient in managing this pest.

Traps

In vegetables, gardens, yellow sticky traps can be posted around the fields, gardens to trap adults. Whiteflies do not fly very far; so many traps may be needed. Place the cards in a vertical orientation, so that the card is level with the new plant growth at the top of the crop. About 1-4 cards should be placed every 1000ft^2 of green houses, with extra cards placed near doors and vents where whitefly might enter the greenhouse. Traps are most useful for monitoring and detecting whiteflies rather than controlling them.

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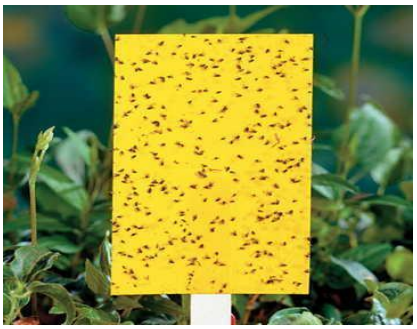

Close up photograph of yellow sticky trap in field

Photograph of yellow sticky trap in green house

Chemical Control

Alternate uses of chemical group for avoid of resistance problems .Spray of Imidaclorprid @ 0.5ml/L,Buprofezin@0.5g-ml/L,Acephate@0.5g/L,Cyantraniliprole @0.5g/L,and Fipronil @1.0 ml/L spray at 10 days intervals.

IPM Practices for whitefly management

Integrated pest management is the careful consideration of all available pest control techniques and appropriate measures to discourage the development of pest population and keep pesticides and other interventions to levels that are economically justified and reduce risks to human health and the environment.

Proper clean cultivation of crop should be maintained weed free area surrounding of the fields, Summer deep ploughing, Soil application of neem cake @ 3.0 tonnes/ha, use regular irrigation to crop and avoid water stress condition, avoid excess use of nitrogenous fertilizer, spray of Acetamiprid@0.4g/L, spray of neem oil 3.0 ml/L, spray of cynatraniliprole@0.30ml/L ,spray of *B. bassiana* @ 5.0 g/L, spray of profenofos @ 2.0 ml/L ,spray was found better for white fly management.

Whitefly Resistance Management

There are multiple factors which can affect resistance development in a pest against a selected insecticide. The greater the number of whiteflies present when an insecticide application is made, the greater the chance that at least one individual might possess the ability to survive the treatment. The more frequently a given pesticide or mode of action is used, the greater the potential that a resistance problem will develop. In other words, selection for resistance in whiteflies against an insecticide can occur when their applications

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are made to successive generations of the pest. In addition, the longer the residual activity, the greater the selection pressure on a resident whitefly population.

Therefore, limiting applications of products with similar modes of action will decrease the potential for resistance development. If the insecticide is properly applied and is not providing control, change to another material with a different mode of action because whitefly populations have the propensity to develop resistance. Scouting every week is critical to success by catching populations early and evaluating insecticide performance during production.

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