GREENHOUSE WHITEFLY CONTROL

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Perhaps one of the most common and difficult to control insect pests that greenhouse growers face are whiteflies. The greenhouse whitefly (Trialeurodes vaporariorum), sweet potato whitefly (Bemisia argentifolia), or banded winged whitefly (Trialeurodes abutilonia) can be potential problems on a wide range of greenhouse crops including bedding plants, poinsettias, hibiscus, geraniums, chrysanthemum, hydrangeas, cineraria, fuchsia, gardenia, begonia, ferns, vegetables, and many foliage plants.

One key to the success of whiteflies as a pest is its versatile feed habit, and they may enter the greenhouse and infest crops from many sources. Whiteflies may be brought into the greenhouse from other locations on finished or pre-finished plant material. The immature stages of the whitefly are small and easily overlooked on shipped-in material. A residual population of whiteflies can be maintained on weeds and plant debris inside and immediately outside the greenhouse to re-infest successive crops. They may even enter the greenhouse on human clothes or the fur of animals.

Once inside the greenhouse, whiteflies can breed and spread rapidly from crop to crop. With an initial infestation, they mostly stay close together, concentrating in a particular location. However, once the population becomes sufficiently large, the insects often spread quickly throughout the greenhouse to the same or different hosts. Once an infestation reaches this level, control can be very difficult. Chemical control procedures are limited by the fact that two of the immature stages, the egg and pupa, are relatively resistant to many pesticides and the insects cling to the underside of foliage where chemical sprays may not reach.

Control Strategies

Control of whiteflies in the greenhouse requires a group of strategies implemented together to be effective. Gone are the days of applying one powerful insecticide for one-time knock-down and eradication. Greenhouse management must make the decision to implement a multi-phase approach to control. Employees should be trained to heighten their awareness of the presence of possible infestations and how their actions may encourage spread of the insects.

Ideally, control should begin before susceptible crops arrive at the greenhouse. This usually involves exclusion and sanitation procedures with the goal of eliminating any pests which are present and preventing entry from outside sources.

Sanitation

The goal of sanitation is to eliminate any residual whitefly infestation that may be present in the greenhouse and remove any possible future habitats for whiteflies. On the first point, eliminate all weeds and plant debris inside the greenhouse. Collect the waste in covered or sealed containers and remove the waste from the greenhouse. In severe cases, it may be desirable to disinfect areas of the greenhouse close to the crop with a greenhouse disinfectant such as bench tops. On the second point, consider improvements to areas which have a history of persistent weeds and/or whitefly problems. Exposed dirt areas along walks or under tables, especially those that remain wet, can be graveled or paved over.

Where possible in the production cycle, allow the greenhouse to stand empty for a week or so with little or no ventilation. This will raise the temperature and force any eggs present to hatch quickly. As long as no host plants are present, the adults will starve and the life cycle will be broken.

Another sanitation strategy is to remove all vegetation from a strip eight to ten feet wide all the way around the greenhouse. The exposed strip is then covered with four to six inches of gravel and kept weed free with herbicides. This eliminates host plants and thus whiteflies close to the greenhouse that may enter from the outside through the ventilation system or other entry points in the structure.

Exclusion

Growers should inspect the greenhouse periodically to look for possible points of entry for whiteflies. These include cracks in the sidewall, broken, cracked, or loose glazing, and vents and doors that do not close completely. Doors that close automatically and double doors are helpful.

An effort should be made to prevent carrying whiteflies into the greenhouse by wearing clothes that are dark in color, i.e., brown, red, or black. Do not wear white, yellow, or green which are attractive to whiteflies. Exclude all animals from the greenhouse where possible.

Grower experience and numerous studies have shown the value of installing insect screening over vents to prevent entry of whiteflies. However, the grower should do some homework before undertaking a screening installation. A number of screen types are available on the market that vary in construction material, durability, and mesh size. Keep in mind that when designing a new greenhouse with screening or retrofitting an existing greenhouse that fine mesh screens restrict air flow. Therefore, the ventilation system must be designed properly. Once installed, check the screening periodically to check for loose or torn material.

Inspection and Quarantine

Another kind of exclusion is to inspect all incoming plant material before it is moved into the greenhouse. Unpack the pots of flats in a receiving area away from the production area and have an experienced employee inspect the plants for all whitefly stages. One or more responsible individuals may be trained and given responsibility for this task. In the case of highly susceptible crops, it may be desirable to quarantine incoming plant materials for a week or

two in a section away from the main production area to determine if whiteflies are present.

Biological Controls

Naturally occurring whitefly predators such as Encarsia formosa and Delphastus pusillus are available commercially and have been tried in commercial greenhouses. However, reliable programs based solely on biologicals have not been developed and eradication to a commercially acceptable level, if possible at all, requires a great deal of skill. Further, whitefly predators are usually not compatible with insecticide applications.

Chemical Controls

A large number of chemical insecticides for whiteflies are available, and it is often confusing trying to decide which one to apply. The first step is to identify the whitefly species, its distribution, and the most prevalent life stage present. I have discussed these issues previously ('Whitefly identification and monitoring', Kessler and Cobb, Southeastern Floriculture 7(3): 32-33). Next, choose an insecticide that is effective against the most prevalent life stage. To prevent development of resistance in the population, rotate insecticide products among different chemical groups. Generally, avoid applying the same chemical two or more times consecutively.

One concern that many entomologists quietly share is for a trend toward heavy reliance on Imidacloprid (Marathon) by the greenhouse industry. While Marathon is an excellent product for whitefly control when used correctly, prudence and past experience would dictate caution. Marathon should be combined with other strategies in a total program of whitefly control.

In the case of a heavy whitefly infestation of mixed stages, several applications of insecticide may be necessary per week to bring the problem under control. However, if the infestation is very heavy and out of control, it may be worth considering the economics of a 'prolonged battle.' With the rising costs of newer insecticides, it may be more economical in the long run to eliminate the crop and start over.