EB1349

insect answers

GREENHOUSE WHITEFLY: BIOLOGY AND CONTROL

The Greenhouse Whitefly, *Trialeurodes vaporariorum*, causes serious problems in greenhouses, home gardens, and cultivated crops. These pests are most frequently encountered in greenhouses because of ideal environmental conditions. There are at least 200 known species of whiteflies but only a few are significant pests.

Appearance

Adult whiteflies (Figure 1) are about $^{1}/_{10}$ to $^{1}/_{16}$ inch in length and resemble tiny moths. The body and wings are covered with a white, powdery wax. When at rest the wings are held slightly rooflike over the body. All stages have sucking mouth parts.

The eggs (Figure 2) are very small, oval, and attached to host plants by a stalk. They are often covered with powdery material from the female's body. Newly hatched nymphs are flat, nearly transparent, and mobile; they are referred to as "crawlers." After the first nymphal change, the legs and antennae are lost and the next intermediate stages assume a fixed position. These intermediate nymphs are oval and flat (Figure 3). The nymphs of the greenhouse whitefly are semitransparent or pale green, but color in other species varies considerably. The final stage prior to the adult is referred to as the "pupa" (Figure 4). It is dark, more elevated, somewhat segmented, and frequently shows parts of the developing insect. The adult emerges from this pupal case.

Life Cycle

Under ideal conditions (warm climates and greenhouses), whiteflies will reproduce throughout the year, with many overlapping generations. Adults feed and mate soon after leaving their pupal case. Females can lay up to 400 eggs in their lifetime, at a rate of about 25 per day, and often in a circular

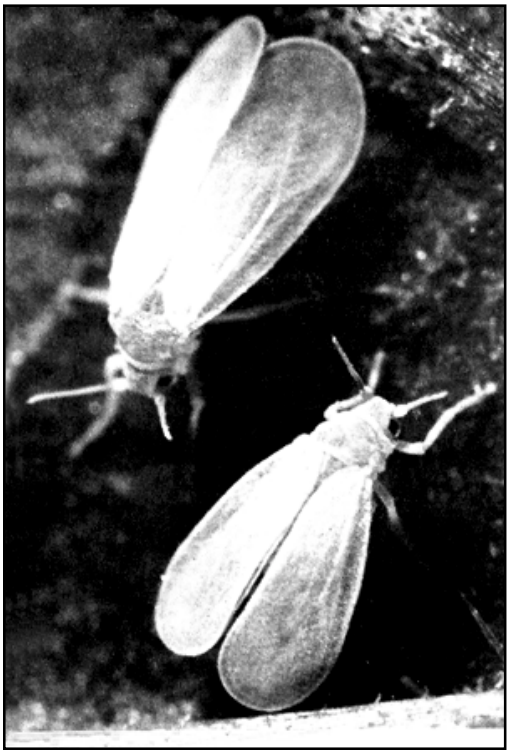

Figure 1. Adult whiteflies.

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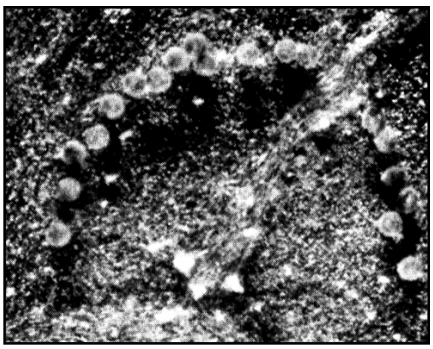

Figure 2.
Whitefly eggs.

Figure 3.
Crawlers and nymphs.

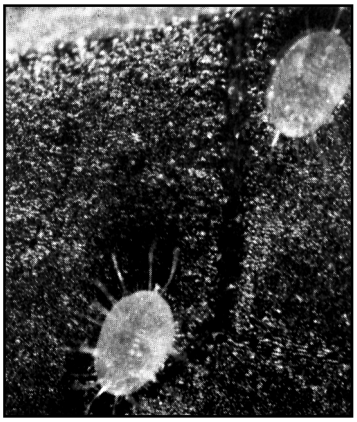

Figure 4.
Whitefly "pupae."

fashion on the undersides of leaves. Eggs hatch in about a week, nymphs feed for about a month, and adults may live for a month and a half.

Damage

Whiteflies suck plant juices from leaves. Severe feeding may reduce photosynthesis. During feeding these insects exude a sticky substance, called honeydew, that makes plants unsightly when in excess, and also serves as a development site for a black, sooty mold. Feeding by large numbers of whiteflies may stunt whole plants or plant parts.

Control

Chemical Control. Whiteflies are hard to control. However, with the proper materials and conscientious application, control can be achieved. A serious problem in adequate chemical control, particularly in the greenhouse, is that whiteflies develop resistance to specific insecticides. Resistance may be delayed by alternating types of chemicals. Unfortunately, there is no way to known when this should be done. Individuals must be on guard and act when any appearance of resistance arises. Adequate control using most chemicals for moderate infestations may require several applications of a pesticide at five-to seven-day intervals. For best results, direct spray towards undersides of leaves. Apply a control as soon as whiteflies are detected. Do not wait until populations become heavy.

A number of chemicals are suggested for use in the control of whiteflies. Many of the materials are very toxic and should not be used except by commercial greenhouse operators or licensed applicators. Some may even be *toxic to certain plants and for this reason it is extremely important to check label instructions before use. When chemicals are to be applied to edible plants, be sure to check the label and wait the correct time from last application to harvest. Also, be certain that the formulation of the pesticide you use is registered for greenhouse use. Wear an appropriate gas mask during and shortly after treatment in greenhouse.*

Chemical controls for this pest are not included here because products in the marketplace and registration status change too frequently. Chemical recommendations can be obtained from the *Pacific Northwest Insect Control Handbook* which is revised annually.

Information from this book is available from field representatives, County Extension Agents, and your regional Plant Diagnostic clinics (located in some counties and WSU Puyallup). Washington State University is not engaged in extensive whitefly research at the present time; thus, most recommendations are from other states and agencies.

Cultural Control. New plant introductions are often the source of whitefly infestation. Inspect new plants thoroughly and treat if necessary. Isolate plants for a few days to be sure that insects

are not present before placing them with other plants. Do not ignore small numbers of whiteflies and other insect and mite pests. Remember also that the reverse is true. When transferring bedding plants or transplants to the field from the greenhouse, carefully inspect them to make sure you do not create a field or garden problem.

Warm summers may increase the chances of establishing whiteflies on plants grown outdoors. This may become a source of greenhouse infestation when whiteflies move in as fall begins. Adult whiteflies cannot survive for much more than a week without food plants. Clearing a greenhouse of all plants, including weeds (if physically and economically feasible), for this period can greatly reduce or eliminate whiteflies.

Mechanical Control. There are many situations where 100 percent control of whiteflies is not necessary; most plants can tolerate a low level of whiteflies. Hobby greenhouses are a good example. Yellow cards or boards hung every few feet among plants in the greenhouse with Tack Trap® or Tanglefoot® applied over the surface are quite effective in keeping whitefly populations to a tolerable level. The whiteflies seem to be attracted to the yellow card and become stuck on the board. Heavy motor oil (SAE 90) is also an effective trapping material and is easier to wash off the boards.

Biological or Natural Control. A number of natural enemies prey on whiteflies. Among the better known are ladybeetles and spiders. There are also reports of insect-killing fungi being used for control. None of these natural controls have been particularly useful in the control of whiteflies in greenhouses. The Canada Department of Agriculture has developed a control program for whiteflies using a small parasitic wasp, *Encarsia formosa*. By proper use of their program, they have obtained quite good results in keeping whitefly populations tolerable. This parasite is available from many companies that sell biocontrol organisms.

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Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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