

SAMPLING AND MANAGING **WHITEFLIES** in Georgia Cotton

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Whiteflies are common and recurrent insect pests of cotton in Georgia. The severity of whitefly damage varies from year to year based on the size of the pest population. The most abundant species of whitefly found infesting cotton in Georgia is *Bemisia tabaci*, commonly known as the silverleaf whitefly (SLWF) or sweet potato whitefly. Another species, bandedwinged whitefly (*Trialeurodes abutiloneus*), may also be present in Georgia cotton (Figure 1).

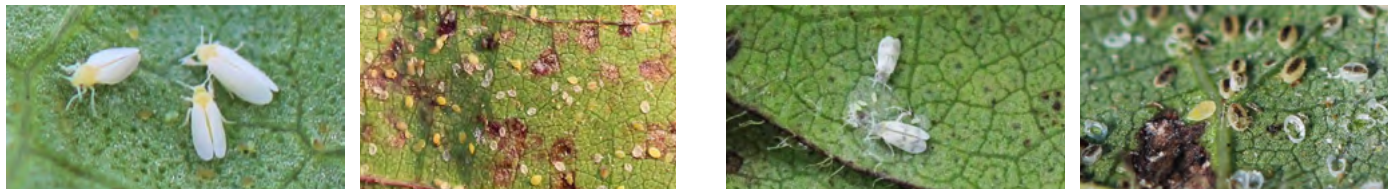


Figure 1. Adult and immature silverleaf whiteflies (left) and adult and immature bandedwinged whiteflies (right).

Whitefly biology

Adult whiteflies are moth-like and covered with a white, waxy powder. Adults are about 1/20 inch in length. A single female can deposit from 50 to 300 eggs, depending on the temperature and host conditions, and she lays them on the underside of leaves in small groups. Whitefly eggs are whitish to light beige in color when freshly laid but turn dark before hatching. After hatching, there are four distinct immature stages, and body size gradually increases with each successive molt. Newly hatched immature whiteflies are called “crawlers” because they move around on the leaf for a few hours before settling. All subsequent immature stages are sessile, meaning that they attach to the plant and remain in the same place. The last (fourth) immature stage is characterized by visible red eyes, and this stage is also known as the pupal stage. In cotton, the immature stages can be completed in as little as 12 days at 30° C (86° F). Adults live up to two weeks, and females lay eggs starting almost immediately upon emergence from the pupa and continue for seven days.

Whitefly damage

Whiteflies have needle-like mouthparts and both immature and adult whiteflies feed on the underside of the leaves. Feeding results in reduced plant vigor, wilting and cumulative plant stresses that substantially reduce yields. Further, whiteflies excrete a sugary substance called “honeydew.” Leaves with copious honeydew accumulations support the development of sooty mold, which can lead to declining leaf health and premature defoliation (Figure 2). When cotton bolls are open, honeydew production is especially detrimental to fiber quality because honeydew can make the cotton sticky and affect spinning efficiency. Long-term changes in market value can arise when ginner or spinner associate fiber quality issues with localized, heavy whitefly infestations. In Georgia, whiteflies do not transmit any pathogens that cause plant diseases in cotton, but they are a serious vector of several viral diseases in vegetable crops. For more information, see [UGA Cooperative Extension Bulletin 1507](#), “Whitefly-Transmitted Plant Viruses in South Georgia.”



Figure 2. Symptoms of whitefly infestation in cotton include shiny leaves, sooty mold on leaves, premature defoliation, and sooty mold on lint.

Whitefly sampling

As populations of whiteflies can build up quickly, it's critical to regularly scout cotton fields during the summer months. Cotton should only be treated with insecticides when the Extension-recommended threshold for immature whiteflies has been exceeded. It's also important to scout for whiteflies after applying insecticides to evaluate the treatment's efficacy on that population. Whiteflies can infest cotton at any growth stage, but are primarily a late summer pest in Georgia.

When scouting, focus on the fifth main stem leaf below the plant terminal and follow these steps:

1. To make sampling easier, become familiar with the location or position of the fifth mainstem leaf below the terminal.
2. Avoid walking past or bumping the plant that will be sampled because whitefly adults readily fly when disturbed.
3. Slowly turn the fifth leaf over by holding the tip or petiole (stalk that joins the leaf to the stem) between the thumb and forefinger. By not shaking the leaf, you will be able to count the number of adult whiteflies present on that leaf, including those that fly off.
4. Now, detach that leaf from the mainstem by pulling the petiole straight down. If the leaf fails to snap off easily, it is likely that you selected a younger leaf.
5. Examine the underside of the detached leaf for the presence of immature whiteflies. Early stage immature whiteflies are very difficult to see without magnification, but later (third to fourth) instars are noticeable without a hand lens. Small aphids, which are also pear-shaped and light in color, can be confused with immature whiteflies. If you are not sure, use a hand lens or a loupe and look for legs (aphids) or eye spots (whiteflies) (Figure 3).
6. Classify the leaf as infested if it has five or more immature whiteflies. Sample at least 30 random plants from across the field.
7. Calculate the percentage of leaves infested with adults (three or more) and immatures (five or more) separately.
8. Insecticide treatment is recommended when 50% of the leaves are infested with immature whiteflies.
9. Although the treatment threshold is based on immature counts, adults provide an estimate of population pressure and potential risk, which directs the choice of appropriate insecticide.
10. Rain events can compromise the accuracy of whitefly scouting, especially for adults. It is best to scout when plants are completely dry.
11. Because whitefly infestations can be severe in field margins, start sampling at least eight to 10 rows into the field to get an accurate assessment.



Figure 3. A cotton aphid (top) and late stage immature whitefly (bottom). Note that aphids have six legs, black cornicles, and short antennae, while silverleaf whitefly nymphs are attached to the plant and fourth instars have eye spots.

Managing risk

Although whiteflies can infest cotton at any time, key risk factors heavily affect infestation potential and should be included when predicting future activity.

| Low | Risk Factor | High |
|------------------|--|------------------------|
| Very cold | Winter weather | Mild |
| Smooth | Variety selection | Hairy |
| April | Planting date | June |
| Isolated | Location <i>(proximity to SLWF infested crops)</i> | Adjacent |
| Abundant | Beneficial insects | None |
| Rainy | Weather | Hot and dry |
| On time | Insecticide applications | Late |
| Irrigated | Irrigation | Dryland or stressed |
| May through July | Month | August through October |
| Clean | Weed control | Weedy |

Control methods

Silverleaf whitefly populations build up on many agronomic and non-agronomic hosts across the landscape. Populations must be managed in all crops to minimize infestation and damage potential in successive crops. For example, cole crops and cucurbits provide excellent spring hosts that support populations that will likely infest cotton. Close proximity of a cotton field to an infested vegetable field can explain rapid population increases. Further, populations that develop in cotton will disperse to tomato, snap bean, and other vegetable crops later in the season. Defoliation, timely harvest, and the destruction of crop residues are important steps to mitigate subsequent population increases. For more information, see [UGA Extension Circular 1141](#), “Cross-Commodity Management of Silverleaf Whitefly in Georgia.”

Biological control:

A number of beneficial organisms in cotton fields are effective in reducing whitefly populations. For example, spiders prey upon whitefly adults, and beneficial insects like bigeyed bugs, lacewing larvae, minute pirate bugs, and lady beetles are common predators of whitefly eggs and immatures. Several species of tiny wasps, including those in the genera *Encarsia* and *Eretmocerus*, parasitize immature silverleaf whiteflies. Naturally occurring insect pathogens, including *Isaria* and *Beauveria*, can suppress populations of whiteflies when environmental conditions are optimal. In order to conserve natural enemies, insecticides should not be applied when insect populations (whiteflies or any other species) are below the recommended treatment thresholds. Low-level whitefly populations can be suppressed by natural enemies to the point that no insecticide application is required. Using organophosphate or pyrethroid insecticides will eliminate natural enemies and flare whitefly populations.

Insecticide control:

Populations of whiteflies can build up rapidly and require insecticide treatments to prevent yield loss. It is critical to make timely applications, as failing to control populations at the initial stage can make it more expensive and difficult to bring the population to below threshold level. There are a number of insecticide options available to manage whiteflies, but most are active on immatures only and do not prevent adults from moving within and across fields.

Insecticides labeled for cotton

Insecticide selection depends on the whitefly species, desired speed of kill, crop growth stage, intensity of the insect pressure, target life stage, selectivity of the product and economic potential of the crop. For example, bandedwinged whiteflies are relatively easy to manage using insecticides such as acephate and neonicotinoids. Conversely, insecticide resistance to imidacloprid (a neonicotinoid insecticide) is present in populations of silverleaf whitefly in Georgia. Growers should always rotate modes of action to reduce resistance pressure. Contact your local Extension agent for a list of insecticides currently labeled for control of whitefly.



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