



International Cooperators' Guide



Integrated Pest Management (IPM) practices for whitefly in tomato, pepper, chili and eggplant crops in Africa

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Crop damage

Whitefly causes problems in many crops in sub-Saharan Africa (Fig.1 & 3). There are two major species of whitefly: *Bemisia tabaci* and *Trialeurodes vaporariorum* (Fig. 2). Both damage crops, but *B. tabaci* is more important as a virus vector while *T. vaporariorum* is a common problem in greenhouses and higher altitude areas. The viruses spread by whiteflies can severely reduce yields and in extreme cases even kill the crops. If infection occurs at seedling or vegetative stages, farmers can experience up to 100% crop loss.

How to identify whitefly

The adult whitefly is a soft-bodied, moth-like insect with wings covered with powdery wax. The body is light yellow in color. Immature whiteflies are yellowish-white and normally found on the undersides of leaves; they look like, and are sometimes called "scales". Whitefly secretions encourage growth of sooty mould, which slows plant growth when it occurs on leaves, and marks fruits. It is therefore important to prevent whitefly infestation until crops are past the fruit-set stage.



Figure 1. Tomato crop severely damaged by whitefly



Figure 2. *Bemisia tabaci* (left) and *Trialeurodes vaporariorum* (right)

Management

Integrated Pest Management (IPM) uses a combination of different strategies to control pests. In tomato, pepper, chill, and eggplant crops there are a variety of practices a farmer can apply to control whitefly, as detailed below.

Crop health

Healthy and strong plants can withstand whitefly attack better than those weakened by diseases, infertile soils, and other constraints. Healthy soil, an adequate water supply, appropriate plant spacing, mulching to manage weeds, and fertilizing are all essential for a healthy crop. However, too much nitrogen fertilizer can encourage whitefly to feed on the crop. Seedlings should be protected with a fine 50-60 mesh net to prevent early attack of whitefly and subsequent virus infection before transplanting. Rotating tomato, pepper, chili, and eggplant crops with plants that do not attract whitefly, such as maize, can reduce the buildup of whitefly throughout the year. Maize also can be grown as a barrier crop along the borders of the field, thus preventing the entry of whitefly.

Farmers should plant resistant cultivars if available. Tomato cultivars resistant or tolerant to the viruses that cause Tomato Yellow Leaf Curl Disease are available in some regions. Farmers also can choose to let the land lie fallow for a season without planting vegetables to reduce whitefly population in their farms.



Figure 3. Early attack from whitefly may cause total crop failure.

Field hygiene

It is very important to keep the area in and around the crop free of broadleaf weeds that can attract whitefly. If these weeds establish in the field, whitefly will move in and infect a nearby crop in large numbers. Careful clean-up of old crops is important, especially if they are infested with whitefly. If possible, whitefly-infested plants should be bagged and removed, or buried away from new or planned plantings. Trap (windbreak) crops established before transplanting tomatoes, pepper, chili and eggplant are strongly recommended during anticipated periods of whitefly activity. However, these trap crops should be sprayed with systemic pesticides to kill whitefly; otherwise they could serve as a source for whitefly infestation.



Figure 4. Yellow sticky traps.

Frequent monitoring

Monitoring the crop for whitefly should begin at an early stage of growth when the plants have about 5 leaves. Gently brush the top of the plants to see if you disturb adult whitefly.

If whitefly are present, look at the underside of the lower leaves for juvenile whitefly "scales". Any weeds around the crop should be monitored for whitefly; these weeds should be removed if any whitefly adults or "scales" are found on them.

Yellow sticky traps (Fig. 4) measuring 1 m by 30 cm can be used to monitor and trap whitefly in vegetable crops. Traps need to be placed just above the crop so that they trap adult whitefly but do not touch the plants. Traps should be spaced within the crop about 20 m apart, and can be replaced when they get too dirty.

MAKE YOUR OWN STICKY TRAPS

Spread petroleum jelly or used motor oil on pieces of yellow painted plywood or cardboard, 6 cm x 15 cm.

Yellow plastic can also be used.

Beneficial insects and spiders

Natural enemies including parasitic wasps, predatory mites, predatory thrips, lacewings, spiders, rove beetles and ladybird beetles attack whitefly (Fig. 5 & 6) If you find black scales on the undersides of leaves, it's a good sign that whitefly natural enemies are active (Fig. 7). The black scales are parasitized white scales. You can encourage natural enemy populations by minimizing broad-spectrum pesticide use and conserving flowering plants near your crop.



Figures 5 & 6. Natural enemies like ladybird beetles (above) and rove beetles (below) can help keep whitefly populations in check.



Figure 7. Black scales are parasitized white scales – a sign that natural enemies are at work.

Spray interventions

If whitefly numbers are low (less than 10 adults or scales per plant) use a soap spray or petroleum oil for control. Aim the spray underneath the leaves. These sprays work by smothering whitefly scale and damaging the insect's cuticle, so direct contact of the spray on the whiteflies is essential. Spray in the early morning or late afternoon and repeat after 4 days to catch any missed or new scales. These sprays can burn the plants if used too frequently or at high concentrations, so don't be tempted to increase the concentration. Good coverage is more important when using a soap spray.

If whitefly adult or scale numbers are greater than 10 per plant, an imidacloprid pesticide can be applied as a drench to the roots of the plants, either from a watering can or through irrigation drippers. This pesticide must be taken up by the plant roots to be effective. If sprayed over the plants it will not work as well, and will kill beneficial insects that can help control whitefly.

Always follow the label instructions when using a pesticide.



Figure 8. Whitefly on the underside of leaves.

References

Srinivasan R. 2009. Insect and mite pests on eggplant – a field guide for identification and management. AVRDC-The World Vegetable Center, Shanhua, Taiwan. AVRDC Publication No. 09-729.64 p.

Stansly PA, et al. 2015. Management of Whiteflies, Whitefly Vectors, Plant Virus, and Insecticide Resistance for Vegetable Production in Southern Florida Publication of the Entomology and Nematology Department, UF/IFAS Extension.

Jelinek S. 2010. Whitefly Management in Greenhouse Vegetable Crops. Primefact 1007, NSW DPI.

MAKE YOUR OWN SOAP SPRAY

Use a mild potash-based soap.

Mix 3 tablespoons of soap flakes with 4 liters of water.

Spray on a test plant to see if burning occurs (signs of burning may take 2 days to appear).

If burning occurs, add more water to the mix.

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