



Major Basil Pests in Hawai'i: Three Economically Important Basil Pests as of 2012

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This publication serves as abbreviated Best Management Program Guidelines for clientele of the CTAHR Local and Immigrant Farmer Education Program (LIFE). It also supplements other educational presentation materials utilized in LIFE's extension-related workshops.

Introduction

Basil (*Ocimum basilicum*) is a popular herb native to Central Asia and Northwest India. It is a member of the mint family, and its aromatic leaves are used as a spice or flavoring. In Hawai'i the two most commonly grown types are sweet basil (Italian type) and Thai basil. Basil production in Hawai'i is about 3.2 million pounds, with an estimated farm-gate value of \$5.5 million. Many pests and diseases plague basil production in Hawai'i. Three of the more important pests include *Tomato spotted wilt virus* (TSWV), downy mildew, and the Madeira mealybug.

Tomato Spotted Wilt

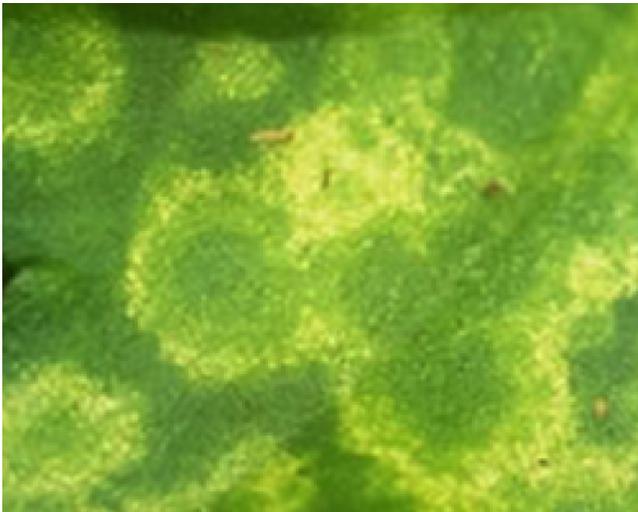
Tomato spotted wilt of basil is caused by *Tomato spotted wilt virus* (TSWV). This virus has a broad host range in Hawai'i, infecting at least 44 plant species across 16 different families. Some of these plants include tomato, potato, pepper, and lettuce, as well as basil. Several strains of TSWV have been reported that may cause different symptoms such as wilting, spots, concentric ring spots, and necrosis. The virus is vectored by several species of thrips, which acquire the virus by feeding on infected plants during their first two larval stages. The virus is then transmitted to other susceptible hosts during adult feeding. More detailed information can be found in the CTAHR extension publication "Tomato Spotted Wilt" (Melzer et al.), March 2012, PD-81.



Above: *Tomato spotted wilt virus* (TSWV) on younger basil leaves. Below: TSWV close-up.

Management Strategies for TSWV

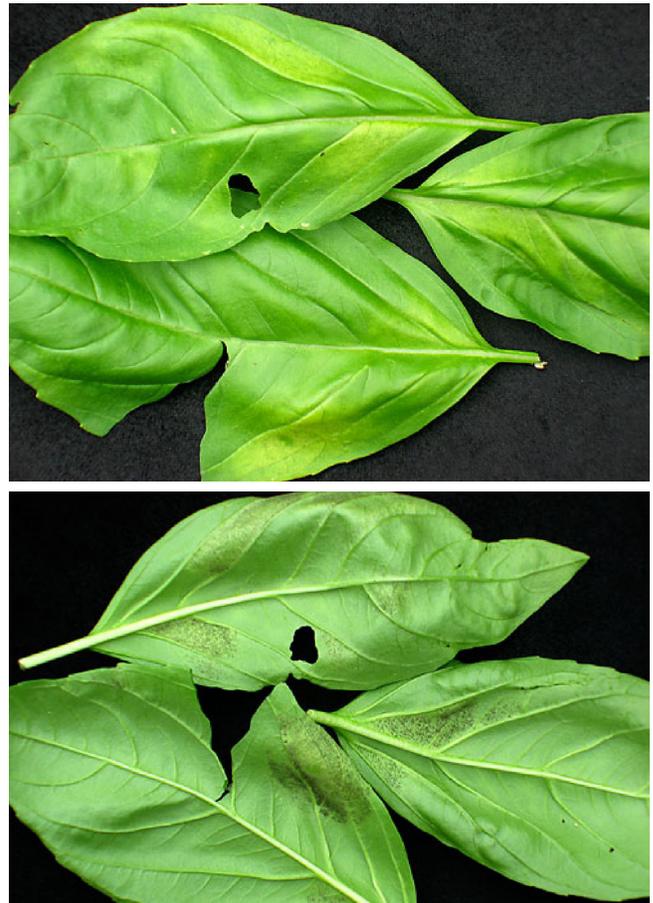
- Plant resistant or tolerant cultivars, which may be ascertained by consulting your seed supplier.
- Propagate cuttings from disease-free plants.
- Only transplant seedlings that are verified to be virus free and healthy.
- Remove infected plants early and regularly. Once infected, the plant will be a reservoir of the virus throughout its lifespan.
- Control thrips with the following strategies:
 - Remove alternate hosts of thrips from entire field (see Melzner et al. in References section for a discussion of these hosts).
 - Reflective mulches, sheets of metallic plastic film, can help to repel thrips.
 - Refer to PESTICIDES REGISTERED FOR USE ON BASIL IN HAWAI'I when considering insecticides for thrips control. These are available online at <http://pesticides.hawaii.edu/index.html>
 - Rotate insecticides used to control thrips to minimize resistance build-up.
 - Apply insecticides using sprayers that provide complete spray coverage of basil plant. Read and always follow the insecticide label instructions.



Chlorotic spots, symptoms of TSWV.

Downy Mildew

Basil downy mildew (*Peronospora belbahrii*) was first reported in Hawai'i in early 2011. This disease is normally more intense during a cold and wet winter season and less pervasive during hot and dry weather. Infected plants will turn yellow, with symptoms closely resembling some types of nutrient deficiency. Eventually brownish spots will form, resulting in an unmarketable crop. Black or purple-gray mildew can be seen on the underside of leaves with a hand lens. Fungal spores are usually dispersed by wind onto young shoots. Alternatively, downy mildew can also be spread by infected basil seeds. More detailed information can be found in CTAHR extension fact sheet "Basil Downy Mildew" (Uchida et al.), February 2011.



Above: Downy mildew symptoms, upper leaf surface. Below: Underside of leaf surface. Photos courtesy of Margaret McGrath, Cornell University.

Management Strategies for Downy Mildew

- Always plant certified disease-free seeds.
- Select resistant or tolerant varieties if available; consult your seed supplier.
- Disinfect seedling/propagation supplies and yourself before working in the nursery.
- Discard planting substrates that are potentially contaminated with downy mildew.
- During wet and cool periods, allow more airflow between plants to reduce mildew incidence. This may involve selective early harvest, pruning the plants, adjusting plant spacing or row orientation, etc.
- Sanitize your hands prior to harvest to avoid spreading the pathogens. At the end of each workday, clean working tables, containers, and tools.
- Maintain field sanitation by trimming diseased branches and removing them from the field. This could reduce the source of pathogens.
- Remove diseased branches *prior to* applying pesticide.
- Refer to PESTICIDES REGISTERED FOR USE ON BASIL IN HAWAI'I when considering fungicides for managing downy mildew. These are available online at <http://pesticides.hawaii.edu/index.html>
- Rotate fungicides used for control of downy mildew to minimize resistance build-up.
- It is important to mist the under-surface of leaves for best control of downy mildew. Apply fungicide using spray methods that allow for complete spray coverage on the underside of leaves. This is important because most fungicides work via contact and need to be applied where mildew develops. Always read and follow fungicide label instructions.



Downy mildew close-up, underside of leaf surface. Photo courtesy of Margaret McGrath, Cornell University.

Madeira Mealybug

Madeira mealybug (*Phenacoccus madeirensis*) is a soft-bodied insect that can live on many plant families. Mealybugs have a white, waxy coating on their bodies, which gives them their “mealy” appearance. The waxy coating protects the soft body underneath. In Hawai'i it is estimated that the Madeira mealybug female can live up to 1½ to 2 months and produce approximately 300 eggs. Female mealybugs are usually introduced into fields by humans, animals, ants, or the wind, while most males have wings and actively disperse throughout the field and into neighboring plots. Mealybugs suck basil plant sap, causing wilting, stunting, and deformed leaves. They produce honeydew exudates on leaf or stem tissues. The presence of the nymph, or immature stage of the mealybug, on basil during quarantine inspection could result in rejection of the whole shipment for export.



Madeira mealybug. Photos courtesy of Lance Osborne, University of Florida Institute of Food and Agricultural Science.

Management Strategies for Madeira Mealybug

- Prevention is the most important element of mealybug control.
- Careful selection of clean cutting materials before propagation is critical. If needed, treat the cutting materials with pesticides before rooting. Do not take planting material from infested fields.
- Make sure transplants are clean and healthy before introducing into fields.
- Sanitation is the second most important element of control. Scout fields regularly, checking entire plants, paying attention to ants and other crawling insects that move mealybugs. Implement an aggressive control program immediately if they are present.
- Sanitation in greenhouses and shadehouses is critical. The female can live up to 6 weeks and can continue to reproduce after crop harvest.
- Consider severe pruning of infected plants to allow for better spray coverage, followed by an aggressive control program.
- When using pesticides, nymphs are easier to control than mature mealybugs.
- Refer to PESTICIDES REGISTERED FOR USE ON BASIL IN HAWAI'I when considering insecticides to control mealybugs. They are available online at <http://pesticides.hawaii.edu/index.html>
- Rotate insecticide used for mealybug control to minimize resistance build-up.
- Apply insecticides using a sprayer that provides complete spray coverage of plant. Particularly for mealybugs, it is important to totally wet the entire plant, including the basal portion. Always read and follow all pesticide labels.

References

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