

PLANT DISEASE FACTS

By the Department of
PLANT PATHOLOGY & CROP PHYSIOLOGY



Monitoring, Identification, and Management of Sweet Basil Downy Mildew in the Gulf Coast United States

Downy mildew of basil, caused by *Peronospora belbahrii*, is a relatively new disease in the United States. It was first reported in 2007 in southern Florida and travelled rapidly up the east coast causing considerable economic losses. In 2009, basil downy mildew was confirmed in Louisiana. Disease can occur on field and greenhouse grown basil. The pathogen moves long distances on seed, transplants or moist air currents and shorter distances on harvested leaves headed to market. During periods of high humidity, warm temperatures (68-80 °F), and extended leaf wetness (>6 hours) the disease can cause significant crop losses. The disease can be easily overlooked because initial yellowing symptoms (**Figure 1**) resemble nitrogen or other nutritional deficiencies.

Disease Identification and Confirmation

Field Identification Field identification is based on disease symptoms and signs of the pathogen. Basil downy mildew affects all parts of the shoot tissue including stems, leaves and flower bracts. Leaves first turn yellow in the areas between major veins (**Figure 1**) and within a few days entire leaves turn yellow and begin to drop off of the plant. Irregular shaped black specks appear on the upper surface of leaves and purplish-gray mold (spores) can be seen on the underside of leaves (**Figure 2A and B**). Using a 10X or 20X hand lens enhances spore observation (**Figure 2C**).

Disease Confirmation Observation of the pathogen by microscopy is required for disease confirmation. When observed with a compound light microscope basil downy mildew spores (sporangia) are light brown with well defined dark brown edges. Sporangia are oval to circular in shape (**Figure 3**) and may or may not be attached to short stubby fungal-like strands called sporangiophores.



Figure 1. Basil downy mildew symptoms on cv. Genovese



Figure 2. Purplish-gray sporulation on the underside of basil leaves

Disease Monitoring

Basil downy mildew is a high-risk plant disease that has the potential to threaten interstate and international trade of plants. Early detection is key to decreasing crop losses and preventing further dissemination of the disease.

Monitoring and early detection is also an integral part of an integrated disease management program and can reduce unnecessary fungicide treatments. At a minimum, growers should assess the crop weekly for early symptoms of basil downy mildew. Daily monitoring is recommended during extended periods of warm temperatures and high humidity.

When monitoring for basil downy mildew assess the overall appearance of the plants, then examine specific plants including the upper and lower side of the leaves and the stem for symptoms and signs of the pathogen. Contact a county or parish

Extension agent if basil downy mildew is suspected. County agents can provide instructions on how to submit a sample for disease confirmation in your state as well as provide strategies to manage the disease.



Figure 3. Basil downy mildew sporangiophores (black arrow) and sporangia (spores)

Management

Resistant Varieties: All popular culinary sweet basil (*Ocimum basilicum*) varieties are highly susceptible to basil downy mildew. The least susceptible varieties tend to be the spice-type such as 'Blue Spice', 'Spice' and 'Blue Spice Fil' (**Figure 4**). However, consumers tend to reject these varieties because they have a darker leaf color, rougher texture and less appealing flavor compared to the culinary varieties. For non-culinary (ornamental) purposes resistant or tolerant varieties are recommended in order to reduce the amount of pathogen available for dispersal to sweet basil production areas.

Cultural Practices: Practices that reduce high humidity and leaf wetness are the most effective for managing basil downy mildew.

Greenhouse Production

- Heat and vent the greenhouse in the evenings, especially in the winter when warm days are followed by cool nights.
- Improve horizontal airflow by using continuous fans.
- Provide adequate spacing between plants or flats to improve airflow and reduce leaf wetness.

Field Production

- Plant on raised beds covered with plastic mulch to promote good water drainage.
- Plant in fields with good drainage and orient rows with prevailing winds.
- Space plants at least 18 inches apart to improve airflow and reduce leaf wetness.
- Sanitize pruning shears or knives after each plant with a disinfecting agent. Use two pruning shears or knives alternatively; this will provide sufficient time to disinfect each pruning shear or knife. Wash pruning shears or knives at the end of each day with soap and hot water. Disinfect washed pruning shears or knives and dry completely.

Disinfectants available for pruning shears or knives:

- Rubbing alcohol (70% ethanol or isopropanol)
- KleenGrow®
- GreenShield
- StorOx
- Lysol

Tools should be disinfected for 1-2 minutes.

Homegrown Plants

- Plant resistant or less susceptible varieties.
- Space plants at least 18 inches apart to improve airflow and reduce leaf wetness.
- Water in the mornings.
- If symptoms appear, top and destroy the topped plant material. For less susceptible varieties new growth may not be infected allowing for additional harvests. If symptoms appear on new growth remove and destroy the plant. Do not compost diseased plants.

Fungicides: Few fungicides are labeled for basil and there are differences in registrations between states and for commercial field, greenhouse, and homegrown plants (**Table 1**).

Growers are responsible for reading the label and following label instructions. The label is the law and the label supersedes any recommendations provided in this document.



Figure 4. Foliage and flowers of a blue spice basil plant

Table 1. Fungicides labeled for basil downy mildew management

Fungicide*		Cropping Systems		
Product Name	Active Ingredient	Conventional	Organic	Greenhouse
Actinovate AG	<i>Streptomyces lydicus</i>	✓	✓	✓
Quadris	Azoxystrobin	✓		
Ranman	Cyazofamid	✓		✓
Double Nickel 55	<i>Bacillus amyloliquefaciens</i>	✓	✓	✓
Revus	Mandipropamid	✓		✓
Milstop	Potassium carbonate	✓	✓	
Fosphite or ProPhyt	Phosphorous acid	✓		✓
Regalia	Extract of <i>Reynoutria sachalinensis</i> (Giant knotweed)	✓	✓	✓

* Consult a county or parish Extension agent for additional fungicides that can be used in select states under Section 18 or 24(c) registrations. Reference to commercial or trade names is made with the understanding that no discrimination is intended nor is endorsement of a particular product by the LSU AgCenter or LSU implied.

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Figure 2C image courtesy of Sandra Jensen, Cornell University, Bugwood.org.
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