

Basil Downy Mildew

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Growing fresh herbs in home gardens is increasingly popular. Basil, in its many varieties, is grown and consumed more than any other fresh herb. Commercial basil production has also increased significantly; California, North Carolina, New Jersey and Florida are the top basil producers. In 2007, 2,053 U.S. farms produced herbs for the fresh market on 13,573 acres of land—up almost 25 percent from 2002. The increase in home-garden production is similar and reflects the trend toward growing edible plants.

There are many types of basil. The genus *Ocimum* has 35 species of annuals and perennials from tropical and subtropical areas. There are approximately 100 cultivars of sweet basil (*O. basilicum*), which is the most common species grown for culinary and ornamental uses. Certain cultivars are regional favorites, hence ‘Italian basil’, ‘Greek basil’, and ‘Thai basil’. These are not particular basil varieties, rather they are a collective name for basil cultivars commonly used in their respective regions. ‘Genovese’ is probably the most popular basil cultivar for home gardens and commercial production.

Along with the increase in commercial and home production, the spread of a disease called basil downy mildew has become a major concern. Basil downy mildew is caused by *Peronospora belbahrii* and can lead to 100 percent crop loss. This disease has spread to about 40 states since first being reported in South Florida in 2007. In Texas, basil downy mildew was first reported in 2010. Many herb growers are unaware of the disease and are not taking measures to protect their plants.

Symptoms and transmission

Symptoms of basil downy mildew can mimic nutrient deficiency. Affected plants may show chlorosis (yellowing) on lower leaves, which is common in plants with nitrogen deficiency. Chlorosis caused by nutrient deficiency is not vein-bound, but chlorosis caused by downy mildew is. This is especially true when the plant disease is more advanced. In very humid conditions, the yellowed areas can quickly become necrotic.

Spore formation (sporulation) on the underside of the affected basil leaves is fuzzy and gray (Fig. 1). Sporangia are the structures in which spores are produced—they emerge through stomata of infected leaves and can be detected easily under a microscope. The sporangia and staghorn-shaped sporangiophores are key diagnostic signs of this pathogen (Fig. 2). The disease likes mild temperatures and humid conditions, and can be spread by wind, infested seeds and infested plants.



Figure 1. Typical symptoms on the top (left) and underside (right) of infected basil leaves.



Figure 2. Sporangia of basil downy mildew.

Management

There are a limited number of resistant cultivars for commercial sweet basil producers. Most popular sweet basil cultivars are very susceptible to downy mildew, including ‘Amethyst Improved’, ‘Aroma 2’, ‘Gecofure’, ‘Genovese’, ‘Genovese Martina’, ‘Italian Large Leaf’, ‘Magical Michael’, ‘Mariden’, ‘Nufar’, ‘Opal Purple Variegated’, ‘Poppy Joe’s’, ‘Queentette’, ‘Red Rubin’, and ‘Superbo’.

Symptoms and sporulation of basil downy mildew occur, to a lesser extent, on lemon basil *O. citriodorum* (standard, ‘Mrs. Burns’, and ‘Lemona’), and *O. americanum* cultivars (‘Blue Spice’, ‘Spice’ and ‘Lime’). The cultivars ‘Spice’, ‘Blue Spice’, and ‘Blue Spice F 1’ are the least susceptible to basil downy mildew. The market for more resistant species and cultivars is very limited; however, these could be good alternatives for home gardeners.

Since basil downy mildew can be spread through the air, regular scouting should be a priority, especially in areas where the pathogen has been identified. Removing infested plants early in the disease cycle is the best way to avoid losing an entire crop. A good way to prevent basil downy mildew in green houses is to reduce humidity and leaf wetness by ensuring adequate plant spacing and ventilation.

For chemicals to suppress the pathogen and control basil downy mildew effectively, they must be applied before the first symptoms appear. Current management products have limited efficacy once symptoms become visible. Chemicals labeled for downy mildew on basil or other herbs are listed below. Some are limited use or require special permissions. Proper use instructions and product rates found on the disease management product label should be followed.

| Trade name | Active ingredient | Location | OMRI |
|---|--|----------|------|
| Actinovate AG | <i>Streptomyces lydicus</i> | NA | Y |
| Double Nickel 55 | <i>Bacillus amyloliquefaciens</i> | NA | Y |
| MilStop | Potassium bicarbonate | I/O | Y |
| OxiDate | Hydrogen dioxide | I/O | Y |
| Regalia | Extract of <i>Reynoutria sachalinensis</i> | I/O | Y |
| Trilogy | Neem oil | NA | Y |
| Armicarb | Potassium bicarbonate | I/O | N |
| ProPhyt, Fosphite, Fungi-Phite, Rampart, and K-Phite | Phosphorous acid | I/O | N |
| Quadris/ Heritage | Azoxystrobin | O | N |
| Ranman | Cyazofamid | I/O | N |
| Subdue MAXX | Mefenoxam | I/O | N |
| NOTE: This is not intended to be a complete list of chemicals for basil downy mildew control, nor an endorsement. "I" = greenhouse; "O"=open field. | | | |

Extension Plant Pathology
<http://plantclinic.tamu.edu>

Extension Horticulture
<http://aggie-horticulture.tamu.edu>

Read the full research report of Wyenandt et al. 2010.
Susceptibility of Basil Cultivars and Breeding Lines to Downy Mildew
(*Peronospora belbahrii*). HORTSCIENCE 45(9):1416–1419.

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