

Tips for Managing Basil Downy Mildew in Greenhouse and Field

Margaret Tuttle McGrath
Plant Pathology and Plant-Microbe Biology Section, SIPS, Cornell University
Long Island Horticultural Research and Extension Center
3059 Sound Avenue, Riverhead, NY 11901; mtm3@cornell.edu

Downy mildew is expected to affect basil growing in greenhouses, open fields, and gardens on Long Island in 2016 as it has every year since 2008. Left unmanaged this disease can quickly render a crop unmarketable. Cultural practices can be implemented in greenhouses to create conditions unfavorable for disease development. Fungicides are important for achieving effective control. Downy mildew has been effectively managed in field-grown basil in fungicide evaluations conducted at LIHREC when applications were started several days before symptoms were found and a weekly spray interval was maintained. Only conventional fungicides have been effective. The organic products tested have been ineffective at least partly because of the difficulty obtaining thorough coverage on the underside of leaves. Experimental resistant varieties being developed at Rutgers University and by some seed companies have exhibited good suppression and will be an important component of management programs in the future. Please report occurrences to Meg McGrath (mtm3@cornell.edu).

Managing Downy Mildew in Greenhouse Basil

- 1. Start with pathogen-free seed.** This is important for winter – early spring plantings. Eurofins STA Laboratories in Colorado tests basil seed for *Peronospora* spp (<http://www.eurofinsus.com/stalabs/products-services-seed-health.html>). Enza is one seed company that steam treats their basil seed.
- 2. Select less susceptible varieties.** Eleonora is the first commercially-available variety with moderate resistance, a level not sufficient to achieve acceptable control without additional management practices, in particular applying fungicides. Symptom appearance has been observed to be delayed several days. Exotic, spice, and ornamental basil varieties are less susceptible than the more popular sweet basil.
- 3. Avoid favorable conditions for disease development.** The basil downy mildew pathogen needs humidity of at least 85% in the plant canopy to be able to infect. This disease can be controlled effectively by keeping humidity low. Practices to achieve this include base watering, wide plant spacing, circulating fans directed at plants, lights, and elevated temperature. Base heating is an especially effective method to reduce humidity. Set up sensors in the plant canopy to monitor humidity to ensure implemented practices are sufficient.
- 4. Turn lights on during night.** Spore production is inhibited on leaves exposed to light at night; leaves shaded by others are not protected. The first 6 hours of night are most important. The pathogen needs at least 7 hours of darkness. Red light is most inhibitory.

5. Apply fungicides. A preventive program with conventional fungicides is considered necessary to achieve effective control based on results from replicated fungicide evaluations. Ranman (cyazofamid; FRAC code 21) and Micora or Revus (mandipropamid; FRAC 40) have targeted activity for downy mildew and other oomycete pathogens. Their use is permitted in greenhouses. Micora label has rates for greenhouse use. It can only be used in enclosed greenhouses with permanent flooring. Maximum is two applications. Use directions on the Micora and Revus labels state that they cannot be used in transplant production (which means for field crop production); they can only be used on plants for resale to consumers. A spreading/penetrating type adjuvant such as a non-ionic based surfactant is recommended. An organosilicone surfactant is recommended with Ranman. There are several phosphorous acid (phosphonate) fungicides labeled for this disease, including ProPhyt, Fosphite, Fungi-Phite, Rampart, pHorsepHite, and K-Phite. These are suggested used at low label rate tank-mixed with Ranman and Micora or Revus, which are recommended used in alternation for resistance management.

6. Monitor plants for symptoms. Photographs are posted at: <http://blogs.cornell.edu/livepath/gallery/basil/downy-mildew/>

7. Promptly destroy affected plants. Affected plants should be carefully bagged (after turning off fans) and thrown out immediately when seen.

8. Heat can stop downy mildew. If symptoms are very limited and found early, it might be possible to save some plants by subjecting the symptom-free plants to heat and then taking steps to improve the management program. High temperature is detrimental to the pathogen. Maximum temperatures for infection, colonization, and spore production are 80 – 88 F. Spores were found to be killed on plants exposed to 113 F for 2 days through research. Solar heating to 95-111 F during 3 consecutive days has been used in Israel to manage downy mildew in affected plants. It is expected to be most effective implemented at the start of an outbreak.

Managing Downy Mildew in Field-grown Basil

1. Growing basil in spring to early summer when downy mildew is less likely to develop is potentially very effective, but does not correspond to when customer demand is highest.

2. Select less susceptible varieties. See item 2 in section above.

3. Apply fungicides on a preventive, weekly schedule. Products labeled for downy mildew in basil include Ranman, Revus, Quadris, Ridomil Gold SL (soil drench at planting), and phosphorous acid fungicides (recommended tank-mixed with the other foliar fungicides). Pre-harvest intervals are 0, 1, 0 and 21 days, respectively. Quadris and Ridomil have a FIFRA 2(ee) for this use. Quadris can be applied 6 to 15 times (depending on rate used) with no more than 2 consecutive applications before switching to another fungicide. Ranman can be applied up to 9 times with no more than 3

consecutive applications and must be alternated with other fungicides for the same number of applications. Revus can be applied up to 4 times with no more than 2 consecutive applications. Example fungicide programs include Ranman and Revus applied in a simple alternation or in blocks of 2 consecutive applications. More information about fungicides is in item 5 above.

For more information about managing basil downy mildew go to:
<http://vegetablemdonline.ppath.cornell.edu/NewsArticles/BasilDowny.html>

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Check labels for use restrictions. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

Figures. Plants in moderately high humidity can be infected with few symptoms (little leaf yellowing and no spores) as was the case with the plant in the following photographs until it was put in a plastic bag with a wet sponge over night, which provided favorable conditions for spores to be formed.



