Greenhouse Basil Downy Mildew

Cultural Practices and Preventative Measures

Basil Downy Mildew has developed into a very difficult disease to control in greenhouse, high tunnel and field production environments in recent years. It is caused by the pathogen *Peronospora belbahrii*, a fungus-like microorganism belonging to the water molds (Oomycetes). Sustainable and organic growers are especially challenged when trying to manage this disease because of their low use or non-reliance on chemical fungicides.

In order to manage this disease effectively, growers must use a proactive approach:

- Use resistant plant varieties (when available)
- Exclude the pathogen on incoming plant material and other inputs
- Practice good sanitation when working with plants and in the growing environment
- Alter environmental and cultural conditions to inhibit pathogen growth and spread
- Prevent attack of the plant by the pathogen

Cultural Practices Recommendations:

Goal: Minimize disease pressure by reducing/excluding pathogen in crop

- Select seed sources with low contamination
- Select DM-tolerant varieties
- Sanitize fixed greenhouse components at least 1x per year (floors, walls, glass, structural supports, fans, etc.), more if possible, especially if disease pressure is moderate to high
    - Remove plant residues/debris from the greenhouse
    - Clean surfaces with disinfestants such as Kleengrow™ (preferred), Sanidate® 5.0 plus a good surfactant, Uptake, and/or chlorine to kill pathogens and algae
- Scout crops daily for plants with DM symptoms and remove diseased plants from premises

Environmental Conditions Recommendations:

Goal: Inhibit or disrupt growth and sporulation of the pathogen

- Maintain < 85% relative humidity in the canopy of the crop
- Maintain air temperatures of 59-81 °F (15-27 °C) in the canopy of the crop
- Assure constant air flow through the canopy of the crop: upward/vertical air movement is preferred to avoid recirculating spores and can be achieved by heating from below and venting out of the top of the greenhouse
- Keep dark periods to less than 7 hours – combine with night interruption lighting of canopy before or during dark period for ½ to 1 hour (beamflickers, high-intensity strobes, or LED arrays providing 4-10 µmoles / m^2 of light can be used).

Plant Protection Recommendations:

Goal: Protect unaffected plants from attachment, establishment, and activity of pathogen

- At seeding: drench or dip trays in RootShield *PLUS* WP suspension (8 oz./100 gal). This provides protection against seed and root pathogens that can make young plants weak and more susceptible to DM infections.
    - For problematic seed sources, apply systemic products like Subdue Maxx or K-Phite at seeding (for conventional, or sustainable production allowing chemical treatments). RootShield *PLUS* WP can be tank-mixed with Subdue MAXX or applied 1 day after drenching with K-Phite.
- During production of the crop: from emergence of cotyledons through harvest, spray or fog a tank mix of CEASE + MilStop at 3-5 day intervals, making sure to obtain complete coverage on the undersides of leaves. Suggested rates:
    - Conventional sprayer: 4-6 qt CEASE + 1.25-1.5 lbs MilStop/ 100 gal spray volume
    - Low-volume fogger: 26-38.4 fl oz CEASE + 4-5 oz MilStop / 3-4 L fogger tank volume per 10,000 ft^2
- During transport, temperature should be kept around 60 °F (sporulation has been known to occur at 55 °F during transport).

Acknowledgement: Much of the above information was obtained from speakers who presented at the USDA Specialty Crop Research Initiative Basil Workshop at Rutgers University February 5 – 6, 2015.