Special Research Report #101: Disease Management

Downy Mildew on Snapdragons: Environmental Monitoring and Cultivar Evaluation

J.M. Byrne, Graduate Student, and M.K. Hausbeck, Associate Professor and Extension Specialist
Department of Plant Pathology, Michigan State University, East Lansing 48824

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Phone: 618/692-0045
Fax: 618/692-4045
E-mail: afe@endowment.org
Website: www.endowment.org

M.K. Hausbeck
hausbec1@msu.edu

BACKGROUND

Managing downy mildew (*Peronospora antirrhini*) in commercial snapdragon production is largely based on fungicide use. Fungicides labeled for control of this pathogen are limited and costly, and fungicide resistance is a real threat. This research was initiated to gain a better understanding of the relationships between the environment, snapdragon variety, and disease severity.

MATERIALS & METHODS

Downy mildew was monitored in commercial fields in Florida for two growing seasons (1998-99, 1999-00). During the 2000-01 growing season, fungicidal trials will be conducted in commercial production fields to evaluate efficacy of current and unlabeled fungicides for use on snapdragons.

Weather monitoring equipment (above) was used to record rainfall, relative humidity, temperature, leaf wetness, wind velocity and direction. Data was recorded hourly, based on the average of measurements taken every 15 minutes. Burkard spore traps were used to quantify the number of downy mildew spores in the atmosphere on an hourly basis.

Leaf wetness plays a significant role in the ability of this pathogen to reproduce and infect foliage. A sensor was placed in the canopy (above) to record the time and duration of leaf wetness.

Symptoms of infection differ depending on the cultivar. Purple spots (above) were typically found on darker colored cultivars, while chlorotic spots are formed on lighter colored cultivars.

Sporulation: The pathogen infects foliage and produces spores on the underside of foliage, where relative humidity is high. This gives a gray fuzzy look on the underside of the leaf (above).
Significance of Disease: When plants are infected in the seedling stage, leaves are cupped and distorted (below). Severe disease pressure may cause plants to split and

produce multiple flower stalks. These are significantly lower in value. The dense canopy on mature plants (below) is difficult to penetrate with

fungicidal sprays; more product is required, adding significant cost to production. Infection in this stage reduces photosynthetic tissue, and can cause unsightly foliage that must be removed before sale.

CONCLUSIONS

Significant spore releases occurred on five of the seven days (see graph, below left). These significant releases were preceded by 6-10 hours of continuous leaf wetness. On April 9-10, less than four hours of leaf wetness occurred; spore releases on these days were very small. Estimates of the percentage of infected plants were made six times during 2000. The graph, below right, shows results of the ratings taken on April 15, following the environmental conditions of April 9-10. Over 40% of the 'Potomac Early Pink' plants were infected at this time. Other cultivars with higher than average amounts of disease include Attraction Pink, Attraction Rose, Attraction White, and Rocket White.

IMPACT TO INDUSTRY

1. The times most favorable for the application of downy mildew fungicides are:

- When leaves are wet for more than 6 hours.
- Prior to disease development or at the earliest disease symptom.
- Late afternoon or early evening prior to morning spore release.

2. Scouting of susceptible cultivars should indicate the presence and severity of downy mildew.

- Focusing on susceptible varieties can save scouting time while providing an early indicator of disease pressure.
- Maintaining scouting records can help to identify the most susceptible cultivars. Management strategies should be concentrated on the susceptible cultivars.

3. Look for:

- Purple spots on leaves of dark-colored cultivars.
- Yellow spots on leaves of light-colored cultivars.
- Gray, purplish "fuzz" under these spots.

4. Growers can now:

Use several approaches to manage downy mildew, including an awareness of the environmental conditions favorable for the disease, the cultivars most susceptible to downy mildew, and effective fungicides.

5. Retailers can now:

Be assured of a consistent, high quality, disease-free snapdragon.

6. Wholesalers can now:

Be assured of a consistent supply of snapdragons.