Special Research Report #120: Disease Management

Downy Mildew on Snapdragons: Update on Environmental Monitoring

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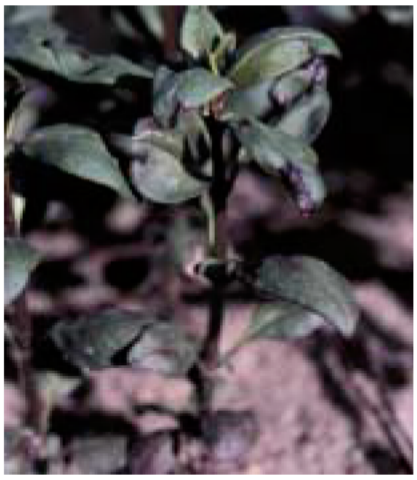
BACKGROUND

Downy mildew of snapdragon is caused by the fungus, *Peronospora antirrhini*. Depending on the climate and weather, crop losses caused by this disease can vary greatly between years and seasons. The disease causes spotting, cupping and distortion of foliage, shortening of internodes, and terminal bud death of seedlings which results in multiple flower stalks. Knowing how the environment affects downy mildew may help cut flower growers recognize when the weather favors disease development and take preventive measures.



Snapdragon seedling infected with downy mildew.

Downy mildew spores on underside of snapdragon leaf.

MATERIALS NEEDED

The concentration of downy mildew conidia (spores) in the air over a commercial snapdragon field in Florida was monitored over three growing seasons using a Burkard volumetric spore sampler. Temperature, rainfall, relative humidity, and the duration that leaves were wet were also monitored.

Conidium of the downy mildew pathogen.

RESULTS

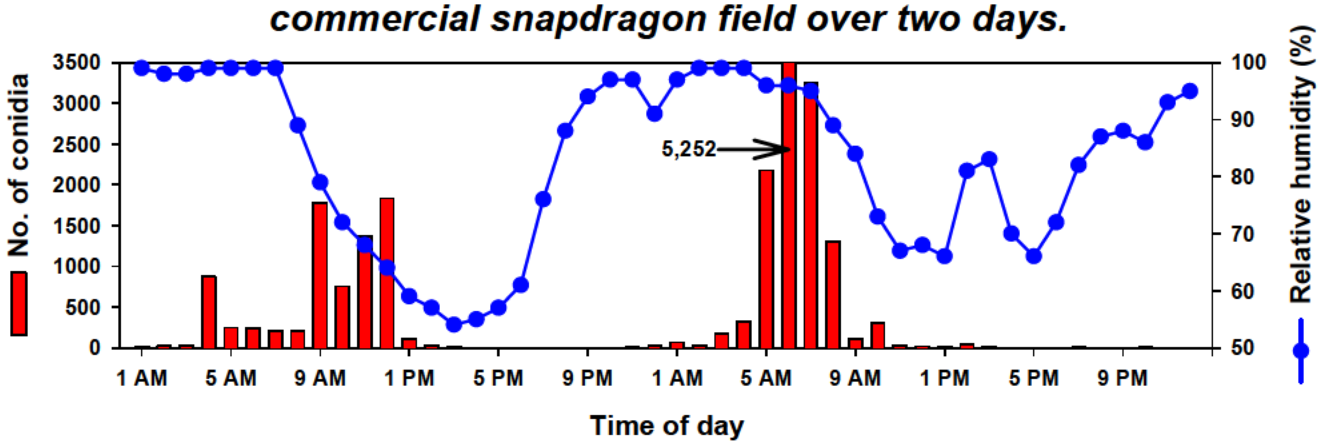
Downy mildew conidia were detected in the air between 5:00 A.M. and 12:00 P.M. with the highest spore numbers occurring between 7:00 A.M. and 9:00 A.M. (see graphs on next page). Downy mildew conidia were released into the air in the morning as the relative humidity decreased and the temperature increased.

Rain or irrigation did not have a direct effect on the number of conidia, but long dew or wetness periods (more than 6 hours) prompted the release of large numbers of conidia. When the number of conidia trapped per day was high (more than 100), the average length of leaf wetness duration prior to these releases was 11 hours. When there were several days with only short leaf wetness periods, the

Burkard volumetric spore sampler in commercial snapdragon field.

Leaf wetness sensor in commercial snapdragon field.

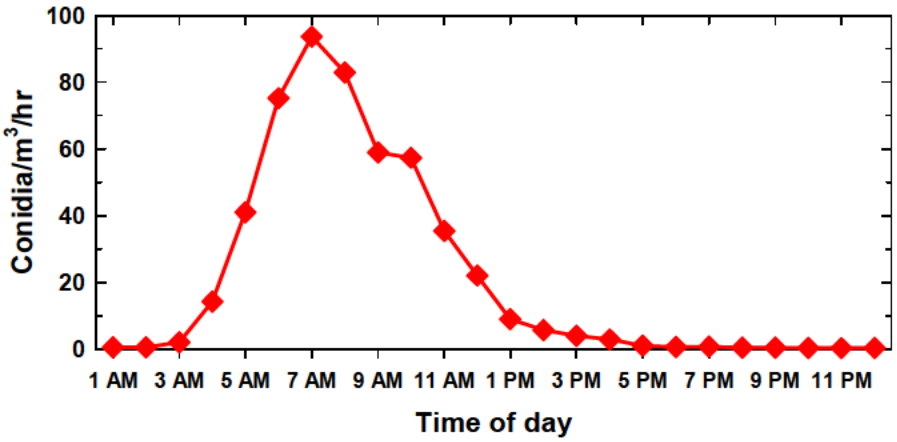
Hourly amounts of downy mildew conidia in the air of a commercial snapdragon field over two days.



development and release of conidia was suppressed.

Temperature also affected the numbers of downy mildew conidia in the air. Temperatures below 50˚F (10˚C) appeared to decrease the numbers of downy mildew conidia in the air, while temperatures below 43˚F (6˚C) had more severe limiting effects. Temperatures higher than 86˚F (30˚C) also limited concentrations of airborne conidia, and the longer temperatures were higher than 86˚F (30˚C), the greater the negative effect on the conidia.

Hourly numbers of airborne downy mildew conidia sampled over the 2000 growing season.



CONCLUSIONS

Release of downy mildew conidia is favored by:

- Temperatures between 50˚F (10˚C) and 86˚F (30˚C).
- Dew periods longer than 6 hours.

Production of downy mildew conidia is decreased by:

- Temperatures below 50˚F (10˚C), and especially below 43˚F (6˚C).
- Temperatures above 86˚F (30˚C).
- Several days with only short leaf wetness periods.

IMPACT TO THE INDUSTRY

While temperature, relative humidity, and leaf wetness are important factors in spore release and subsequent disease development, a favorable level of one factor may compensate for a marginal level in the other. This, and the difference in disease susceptibility among cultivars, complicates development of a disease predictive model that could be used to initiate fungicide applications. However, in the three years of this research, the disease pressure during 2000 was more severe than in 1999 and 2001. Efforts are currently underway to fully characterize weather patterns responsible for the 2000 epidemic and develop a predictive forecasting program.

In the meantime, limiting the time that foliage is wet by irrigating at a time of day when it can dry rapidly may be of assistance. Also, recognizing that warm, wet weather favors downy mildew can help growers to apply timely preventive fungicide applications.

Research cooperators included: Margery Daughtrey, Cornell University; and Larry Barnes, Texas A&M University.