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Gray Mold Prevention Starts with Air Movement

Air movement is critical in greenhouse environments to limit diseases like gray mold. Good air movement and proper ventilation are key practices that should not be ignored.

Each spring, I am called by growers to visit their production facilities to look at specific cropping issues that they are observing. When I visit an operation, I like to spend 20-30 minutes on my own wandering through their greenhouse ranges taking mental notes on everything that I see and experience as I walk through. On one visit to a PA greenhouse, I noted that every Horizontal Air Flow (HAF) fan in the operation was unplugged. As I meandered up and down the aisles, I noticed *Botrytis*



Figure 1: Botrytis lesions on geranium leaves. Image by Tom Ford, Penn State Extension

cinerea infections on a variety of crops. When I met with the grower, I asked him about what problems he was seeing, and he indicated that botrytis was his biggest concern at that moment. When I asked him about his HAF fans and why they were not operating he told me that he only plugs them in in late spring when the greenhouse “seems full”. This grower did not realize that HAF fans were vital to reducing the humidity in the plant canopy and that they were critical to preventing botrytis in his operation.

Botrytis or gray mold (*Botrytis cinerea*) is commonly observed in greenhouse and outdoor environments on a wide range of ornamental and vegetable crops. Many bedding plants

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are very susceptible to botrytis so growers should aggressively scout for signs of infection and be proactive in managing this common disease.

Botrytis cinerea can survive as a saprophyte on leaves and plant debris that have accumulated under the benches in the greenhouse. Fungal spores produced on these decaying tissues can be spread by splashing water and/or on the air currents in the growing environment. Botrytis infection is encouraged by the presence of free moisture on plant tissues for 8-12 continuous hours, high relative humidity >93% (in the canopy), and cool temperatures (55^o to 65^o F).

Condensation can form on the greenhouse glazing as it cools and then drip onto the foliage and flowers below. This source of free moisture coupled with elevated relative humidity levels in the growing environment can create the perfect conditions for gray mold infection and development.

Most floriculture crops are susceptible to botrytis infection throughout the production cycle. Scouting for botrytis starts when the first box of cuttings or plugs is opened and continues until the finished crops are being loaded up for delivery and/or are sold to the end consumer.

Growers unfamiliar with scouting for botrytis infection in the greenhouse should consider the following tips:

- Examine all cuttings for blighted leaves and/or decaying tissues upon their receipt from the propagator.
- Examine mature plants weekly and look for brown lesions on the leaves or for the presence of blighted foliage. Also examine the stems and look for



Figure 2: Botrytis sporulation on petunia foliage. Image by Tom Ford, Penn State Extension



Figure 3: Botrytis lesion on Non-stop begonia leaves. Image by Tom Ford, Penn State Extension



Figure 4: Botrytis lesions on tulip flowers in an outdoor display. Image by Tom Ford, Penn State Extension



Figure 5: Botrytis on geranium flowers in an outdoor display. Image by Tom Ford, Penn State Extension



Figure 6: Botrytis sporulation on greenhouse tomatoes grown under natural ventilation (No HAF fans). Image by Tom Ford, Penn State Extension

- brown, sunken cankers (especially where blighted leaves have been observed). Scout for signs of *Botrytis cinerea* infection in areas of the greenhouse where plants are overcrowded, where air circulation is poor, or where condensation appears to accumulate and drip.
- If you cannot confirm botrytis infection through visual inspection, consider placing the blighted plant parts in a sealed plastic bag with a damp paper towel. Light gray to tan cobweb-like mold will develop on the infected plants parts if *Botrytis cinerea* is present. If you still are unsure, please consider submitting a sample to the Plant Disease or Diagnostic Clinic located in your state. Sample submission guidelines and forms can vary state-to-state so please work through your local Cooperative Extension Office when needing assistance.

Modification of the greenhouse environment coupled with good sanitation practices to remove blighted plant tissues are critical to the prevention of botrytis infection in the greenhouse. While fungicides can be successfully utilized to manage this disease, fungicide resistant strains of *Botrytis cinerea* are known to exist which can make fungicide selection and use more difficult. Growers utilizing fungicides to prevent/manage gray mold in the greenhouse should rotate FRAC (Fungicide Resistance Action Committee) codes or modes of action to limit the development of resistant strains or biotypes.

Resistant strains of *Botrytis cinerea* to fungicides containing fenhexamid, thiophanate methyl, and iprodione are well documented. The threat of resistance to FRAC Group 11 materials (strobilurins) by strains of *Botrytis cinerea* is recognized so growers should not apply Group 11 fungicides successively.

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