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The GM PRO Tina Smith on Growing Trends

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Control *Botrytis* to stop production problem in spring

Botrytis is one problem that commonly appears during April and has the potential to be very damaging. This fungal pathogen is often referred to as gray mold because it produces gray, fuzzy-looking spores on the surface of infected tissues.

Several days of cool, cloudy or rainy weather creates an ideal environment for *Botrytis* infection especially when greenhouses are full. Combine Botrytis-infected flower petals dropping from hanging baskets onto benches or on the ground and you have a recipe for disaster. Although *Botrytis* attacks plants at any stage, new tender growth and aging or dead tissues are preferred. Flower petals provide an excellent food source for spore production.

Ideal conditions

Like other fungi, *Botrytis* has necessary temperature and relative humidity ranges for spore germination, infection and disease development. Spore germination and infection depend on a film of moisture for eight to 12 hours, a relative humidity of 93 percent or greater and temperatures between 55°F-65°F with colonization of plant tissues occurring at temperatures up to 70°F. *Botrytis* is mostly a problem in spring and fall, because warm days followed by cool evenings result in condensation on plant surfaces.

Common symptoms of *Botrytis* are spotting and blight on flower petals, and leaves and stems that eventually develop into soft, fuzzy tissue. Sometimes, less obvious symptoms appear as tan cankers on stems that can cause plant branches to wilt, while the rest of the plant appears healthy.

Key is to reduce humidity

Once *Botrytis* develops, it cannot be effectively controlled with fungicides alone. The key to suppressing *Botrytis* is to keep the plant canopy dry, especially from dusk until dawn. One way is to reduce the humidity in the entire greenhouse as well as in the microclimates around plants.

Try not to use overhead irrigation when the canopy is tight. Keeping plants spaced as far apart as possible for as long as possible, watering just enough to prevent excess water on the floor and watering early in the day to allow plant surfaces to dry before evening also reduce humidity and will help manage *Botrytis*.

If *Botrytis* is an ongoing problem, consider open-mesh benching, which greatly improves air circulation around plants.

Venting and heating

Another technique to reduce humidity is to use a combination of ventilation and heating.

Ventilation allows the exchange of moist greenhouse air with drier air from outdoors. Heating is necessary to raise the outdoor air temperature to the optimum growing temperature and increases the capacity of the air to carry moisture, thus avoiding condensation.

Neither practice alone is as efficient as the two combined.

According to John Bartok Jr., University of Connecticut extension professor emeritus, the method and time it takes for heating and venting will vary according to the heating and ventilation system in the greenhouse.

In greenhouses with vents, Bartok advises to turn the heat on and to crack the vents open an inch or so. The warmed air holds more moisture and escapes from the greenhouse through the vents, which is replaced with outside air with a lower relative humidity. This natural rising of the air results in a greenhouse with a lower relative humidity.

In greenhouses equipped with *fans, operate the fans for a few* minutes and then turn on the heater to raise the air temperature. Then, shut off the fans. A clock can be set to activate the fans. A relay may be needed to lock out the furnace or boiler until the fans shut off so that the fans and heating system do not operate at the same time, which could draw flue gases into the greenhouse.

The venting and heating cycle should be done two or three times per hour during the evening after the sun goes down and early in the morning at sunrise. The time it takes to exchange one volume of air depends on several factors, including whether or not fans are used and the size of the fans and vents. For some greenhouses it may take as little as two to three minutes per air exchange. For greenhouses using natural ventilation, it may take 30 minutes or longer.

Heating and venting can be effective even if it is cool and raining outside. Air at 50°F and 100-percent relative humidity (rain) contains only half as much moisture as greenhouse air at 70°F and 95-percent relative humidity.

Air movement, even in a closed greenhouse, helps reduce moisture on plant surfaces and in the microclimates around plants. A Fan-Jet or horizontal-airflow system produces uniform temperatures and reduces the cool spots that can lead to condensation problems. Moving air is continually mixed, resulting in very small temperature differences. Moisture doesn't condense on the leaf surfaces because the mixing action caused by air movement prevents the air along the surface from cooling and causing condensation. This results in less *Botrytis.*

Reduce Botrytis sources

In addition to reducing humidity, the source of *Botrytis* infection needs to be reduced. *Botrytis* spores are produced in abundance on senescing flowers, lesions and plant debris left on benches, the greenhouse floor and in trash cans. Controlling weeds and removing plant debris during production helps to eliminate *Botrytis.*

Clean plants by removing spent flowers and leaves and shaking hanging baskets over trash cans to remove loose flo^rvers. Dispose of debris in plastic trash bags and avoid spreading spores by keeping the bag closed while moving it through the greenhouse. Although this is labor intensive, it will help reduce spreading spores. Make sure trash cans are sealed tight in the greenhouse as open trash cans are a source of infection.

Chemical controls

When applying fungicides, direct them down into the plant canopy. Bombs and low-volume sprays are not effective late in the season when canopies are dense.

Many fungicides are labeled for use against *Botrytis* on ornamentals. When disease pressure is high, growers often rely on fenhexamid (Decree), which is a nonsystemic fungicide with both protective and curative activity, chlorothalonil (Daconil) or iprodione (Sextant, 26 GT).

Botrytis strains have reportedly shown resistance to Sextant and 26 Gi; so rotate these with other products to delay resistance. There are also reports of widespread resistance to benzimidazole fungicides (Cleary's 3336 and Fungo Flo).

Cultural and environmental management is especially crucial for *Botrytis* blight on greenhouse-grown herbs or vegetables. Many fungicides labeled for ornamentals are not labeled for these crops. GMPiIJ