Thrips & Botrytis Newsletter 2019
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Research Update:
A Pre-season Checklist for Botrytis Management
As the Valentine’s Day season approaches, the following checklist highlights some of the most important considerations to manage Botrytis blight from the greenhouse production stage through the postharvest and retail environment.

Production stage
Soil, growth substrate, plant debris, and dying stems, leaves and flowers in the canopy are important inoculum sources of Botrytis in greenhouses. While evaluating Botrytis spore density in rose greenhouses, we found that greenhouse activities associated with handling of free-water and large amounts of plant debris are most closely related to spore dispersal and potential disease infection. For that reason, we suggest the following strategies:

Greenhouse practices
• Rapidly remove plant debris from the greenhouses. Do not allow plant tissue removed from the canopy to sit and decay inside the greenhouse.
• Minimize sources of free-water in the greenhouse, such as overhead irrigation, dumping refreshing solutions on the greenhouse floor, and leakage from hydroponic beds. This reduces spore dispersal and greenhouse humidity which minimizes the risk of spore germination.

Figure 1: Sporulated rose flower on the greenhouse floor (left) and decaying stem in the plant canopy(right).
• Time fungicide applications to occur immediately before the activities that lead to high spore movement, e.g., removal of plant debris from the canopy and sweeping the floors.

• One month before the roses are ready for harvest, suspend high spore-dispersal activities. For example, do not use blowers to clean the canopy and floors!

• Based on our experience, the most accurate way to assess *Botrytis* incidence is to place five flowers from each greenhouse in sealed humid chambers for 7 days at 22 °C. We observed that canopy scouting was not a useful predictor for *Botrytis* incidence.

• Ample water and high nitrogen (particularly nitrogen in the ammonium form) are useful for boosting growth and productivity in the rose canopy; however, these conditions also make the roses more susceptible to *Botrytis* infection. Once high stem numbers are achieved in the canopy, consider using more moderate rates of water and nitrogen in the last weeks leading up to the peak in order to produce flowers that are more resistant to disease infection.

• Increasing the calcium nutrition to achieve levels up to 2% of the dry matter in leaves and >0.2% of the dry matter in the flower petals has great potential as part of the integrated disease management program. Weekly calcium spray applications are likely necessary to achieve these tissue levels. Experiments will be conducted in 2019 to identify the best practices in terms of calcium foliar sprays.

• Reduce the humidity within the rose canopy with the use of horizontal air-flow fans.
Figure 3: Free water on the greenhouse floor from dumping refreshing solutions and excessive irrigation should be avoided.

**Fungicide resistance management**

- Hopefully your *Botrytis* management program over the last several months of 2018 has focused on the use of biological controls and multi-site fungicides that exhibit a low probability of creating fungicide-resistant spore populations. So now as the peak season approaches and good disease control is essential, it is time to utilize the more effective but also more vulnerable single-site fungicides. They will be more effective if you have not been using them in the months leading up to the peak season.

**Post-harvest treatment**

The process of harvesting, processing, and packing provides an opportunity to treat flowers one last time prior to shipping. The products and the application methods that are used can make a significant difference in the results achieved.

**Product options:**

- **Disinfectants**

  Our data suggest that certain disinfectants, such as hydrogen peroxide, are not effective at controlling *Botrytis* infection in the postharvest and retail environment.
• **Fungicides**
  When fungicides are applied in the postharvest environment, the risk of resistant spores spreading in the production facility is low. Thus, the post-harvest environment is especially suitable for the use of resistance-prone, single-site fungicides. Growers should consider reserving one fungicide class to be exclusively used during post-harvest processing, e.g., never apply a FRAC 12 fungicide in the greenhouse so that no resistance occurs on site, and then this class will be highly effective as a postharvest treatment.

• **Calcium**
  As discussed in our last newsletter, calcium in rose tissues is effective at delaying *Botrytis* infection. Calcium can be sprayed or used in dips in the postharvest environment. We have observed benefits from dipping roses into 1000 to 2000 ppm Ca solution (using calcium chloride and Silwet) immediately prior to packing and shipping. No phytotoxicity has been observed.
observed in our trials with Freedom and Orange Crush, but in-house trials are recommended to identify potential phytotoxicity issues.

**Application methods:**

- **Spray**
  Roses stay wet for a shorter period of time; however, the coverage is limited to the exposed petals. Sprays often do not adequately cover the receptacle and sepals that are also susceptible to *Botrytis* infection.

- **Dip**
  Dips provide thorough coverage of petals, sepals and receptacle, but the tissues may stay wet for a longer period of time and the process adds an additional step to postharvest handling.

- **Shower**
  A shower is a heavy spray that allows for coverage that is comparable to a dip, but the application can be more easily automated than dipping.

**Postharvest & retail environment**

Temperatures from 2.5 to 5 ºC, relative humidity below 80%, and avoidance of prolonged tissue wetness are recommended to reduce *Botrytis* spore germination and infection during postharvest shipping and in the retail environment.