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The Practical Aspects of *Botrytis* Control – An Update

Introduction

Botrytis or gray mold is the most devastating postharvest disease facing the floral industry worldwide. The disease is present during production and may be on petals and leaves following harvest and continuing through shipping and retail outlets. Small brown spots or lesions may be seen on petals or leaves resulting in a browning and softness (Figure 1). Spores germinate, grow into the leaves and petals and inject a toxic material that kills the infected area resulting in the brown spots. Damaged areas will grow and expand when conditions are good.

Flowers with *Botrytis* have reduced vase life or may be unmarketable. Research has shown that *Botrytis* infection may result in the production of ethylene within the flowers. Most importantly, *Botrytis* results in significant losses and reduced profits. *Botrytis* infections are irreversible so prevention of infection and control of spread of the disease are the only ways to minimize economic losses.

For practical purposes, *Botrytis* spores are always present and will germinate and cause damage when temperature and humidity conditions exists. The spores will germinate in 4 hours in the presence of water and 8 hours if the humidity is 93% or higher. Growth of the spores is increased at warmer temperatures but the spores will germinate at temperatures from 35 – 90 F. *Botrytis* is very difficult to control and requires an integrated approach. What are the best approaches for reduced *Botrytis* problems for each segment of the industry?

Grower

The most critical factors for effective control during production are sanitation, cultural practices and use of varieties that are resistant to *Botrytis* infection.

BE VIGILANT: Periodically scout and monitor disease pressure in the field, particularly during the rainy season – applying a preventive fungicide when necessary.

BE CLEAN: *Botrytis* spores will survive on decaying leaves, petals and stems in greenhouses and production facilities for a year. Removal of debris from the production area and adjacent areas removes the primary source of contamination. The presence of debris provides a source of inoculation that will result in *Botrytis* infection. Careful scouting of the production area will help to identify the early stages of infection.



Reduce Fertilizer – Research has shown that plants receiving too much fertilizer and water are more prone to be



University of Florida's Envi Horticulture Department

And

Garry Legnani, Ph.D. Manager Horiculture Research and Development Smithers-Oasis, Kent, OH





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infected. In some cases, use of too much ammoniacal nitrogen in relation to nitrate nitrogen results in `soff' growth that is more sensitive to invasion by *Botrytis* spores.

Increase Calcium – Calcium is a fertilizer component that strengthens the cells in petals and leaves thus making the sensitive tissues more resistant to damage. Unfortunately, calcium is absorbed and transported poorly into petals so it is necessary to spray calcium onto plants weekly but the benefits are worth it.

CAREFUL WITH THE WATER: Plants should be watered to achieve good growth and flowering. But, too much water causes rapid growth of leaves and petals and contributes to the 'soft' growth common with use of too much fertilizer. Also, to assure that water dries off leaves and petals and to prevent him humidity at night, it is best to avoid watering after 2 pm each day. Plants should not be sprayed late in the afternoon. Spraying of insecticides in the afternoon may help to control insects but places water on the leaves and petals during the night.

Packing, Storage and Shipping

Proper preparation of flowers prior to packing is a critical element in reducing *Botrytis*. Apply a preventive postharvest treatment – Floradip-R may be used as a dip or spray treatment on flowers to reduce *Botrytis* infection and severity.

AVOID WATER IN THE BOX – Flowers should be removed from hydration solutions for about 30 - 45 minutes prior to boxing so that the water on the base of the stems and leaves dries before placing flowers into a box. Removing flowers directly from the hydration solution and placing them into the box places water in the box what will likely raise the humidity above 93% during shipping and storage.



PACK FLOWERS COLD – Temperature fluctuations following packing of flowers will result in condensation within the box. For instance, if flowers are packed warm, including room temperature, then placed into the cooler, condensation will form inside the sleeves and *botrytis* spores are likely to germinate.

KEEP FLOWERS COLD – Once packed cold, the flowers should be kept cold. Consistently cold temperatures will increase vase life while reducing condensation so common with flowers experiencing warm and cold cycles.

USE TRANSPORT PAPER – Floralife® Transport Paper is a specially designed postharvest waxed tissue to be used in the transport of fresh cut flowers and potted plants. Floralife® Transport Paper is impregnated with compounds that react when exposed to relative humidity above 40%. Floralife® Transport Paper is a simple and easy product to utilize in flower and plant shipping cartons; it helps to reduce costly scrap and credit.

CONTROL ETHYLENE – Controlling ethylene damage by the use of EthylBloc[™] during shipping reduces *Botrytis* infection. Research with fruits and vegetables has shown that preventing the production of ethylene during shipping and storage limits the problems with *Botrytis*. It appears that this principle is similar on *Botrytis* sensitive flower varieties.

BE CLEAN, ALWAYS – The walls, floors and shelves in coolers should be cleaned periodically using a proper floral cleaner like Floralife[®] D.C.D.[®] Just as in the production area, debris in the cooler is a source of spores. These spores are airborne and can enter boxes during packing. Also, spores can be on the hands of employees packing flowers, on flowers cutters and on clothing. Sanitary conditions really help to reduce *Botrytis*.



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Wholesale and Retail Handling

INSPECT FLOWERS UPON ARRIVAL

- Careful inspection upon receipt will identify any potential Botrytis problems
- Remove and dispose of any infected flowers to prevent spreading infection to healthy flowers

PROCESS QUICKLY

When storing flowers dry it is important the newly arrived shipments go directly into the cooler and boxes are not allowed to



warm up as this will promote condensation. When storing flowers wet it is best to remove the flowers from the closed conditions of the shipping box soon after arrival. In most cases, the humidity in the cooler will be less than in the shipping box. Placing flowers into a flower food will rehydrate the flower so they recover from shipping more rapidly. Remove sleeves – Sleeves retain moisture on petals and increases humidity around the flowers. If practical, remove sleeves so flowers are exposed to greater air flow and reduced humidity.

BE CLEAN

The importance of sanitation cannot be overemphasized. Removing the sources of *Botrytis* contamination (cooler walls, fans, design tables, cooler shelves, flower cutters, etc.) by using a proper floral cleaner like Floralife[®] D.C.D.[®] will minimize *Botrytis* infection.

Conclusion

Losses from *Botrytis* infection plague the entire floral industry and special attention to prevent the infection and spread of *Botrytis* requires the action of all segments of the industry. Sanitation, preventing condensation during storage and shipping and use of *Botrytis*-resistant varieties are the key elements for reducing losses from this disease. The actions of everyone who touches flowers from grower to retailer will provide better flowers with less disease for consumers.