Disease and Pest Avoidance and Control in Cutting Production©

Gail Shafer
Ball FloraPlant, 725 Zenon Way, Arroyo Grande, California 93420

INTRODUCTION

Viruses, bacteria, fungi, and insect pests adversely affect cutting production, and it pays to avoid and/or control them. Why are we concerned with diseases in cutting production? Aesthetics is one reason. We deal in ornamental products, and our customers would have a hard time selling virus-infected, symptomatic plants. We ship to many countries around the world and have to meet each country's phytosanitary requirements prior to shipping. The presence of disease may affect a plant's ability to root, grow, and flower in a satisfactory manner. In the worst case these infections can lead to plant death.

Why are we concerned with insect pests? Again, aesthetics is important to our customers. Thrips-riddled flowers and foliage is a hard sell. Shipping to other countries we have to meet their import requirements. Insects can transmit some diseases very efficiently.

DISEASE AVOIDANCE AND CONTROL

Disease avoidance and control can be summed up with the mantra "start clean, stay clean." The important points to discuss for virus and bacteria are starting clean, testing, handling logistics, and rouging. Fungi points will include starting clean, growing environment/culture, and fungicides.

Virus and Bacteria. To start clean, all elite (parent) stock originates from tissue culture and is renewed annually. Taxa are introduced to tissue culture through heat treatment and meristem culture. Heat treatment consists of growing plants in a growth chamber at elevated temperatures (90–100 °F), and the meristem is harvested and put into culture. The concept is the plant meristem outgrows the virus and is clean. This works very well for most viruses. Constant monitoring of elite stock ensures quality. Testing for virus currently consists of enzyme-linked immunosorbant assay (ELISA) and polymerase chain reaction (PCR) methods. Enzyme-linked immunosorbant assay is very useful to detect many major viruses but is titer dependant. A virus may be latent with low titer and ELISA testing might not detect it. The PCR is nucleic acid based testing that detects sequences occurring in specific viruses, replicates the sequences, and makes them visible on a gel. There are various other methods to detect bacteria and fungi. Here is an example of harvesting material for an ELISA or PCR test. First the harvest tool is sterilized with alcohol and flaming. Second, leaf material is harvested using the sterilized tool and gloves. Gloves are changed between each taxon. Finally, we have the leaf sample in an Eppendorf tube. Many viruses are mechanically transmitted. One potential route is plant-to-plant contact. Cutting stock plants must be maintained so they are not touching variety to variety. In the case of petunia and tobacco mosaic virus (TMV) we go to the extreme of isolating each variety with plastic curtains: a very inefficient use of bench space, but effective at keeping the individual plant clean.

Another route is tools to plant. There are various ways to sterilize tools between varieties, but that is time consuming and not 100% effective. A viable method is to have individual harvest tools for each variety. Note the plants have ample space between them and separate knife or scissors and the harvester is wearing a lab coat and gloves. This leads us to the potential of people-to-plant contamination. To minimize this, lab coats are worn and kept in the same greenhouse to prevent contamination greenhouse to greenhouse. Footbaths are used upon entering and exiting a stock greenhouse. Workflow from cleanest to dirty is followed daily. Gloves are used whenever handling cutting stock plant material, harvesting, sticking, transplanting, and moving. Some viruses are very difficult to eliminate even using heat treatment/meristem culture. The most effective way to control these viruses is to discard symptomatic plants immediately.

Fungi. To avoid fungal infection the initial step is the same as that for virus and bacteria: start clean. Unlike virus and bacteria, fungi can generally be controlled with the growing environment. For example a common method to control powdery mildew is to heat the greenhouse and vent when the humidity reaches 80%. The best prevention method is to provide the best growing culture for the plant. This includes proper irrigation frequency, pH, and nutrient ratios in the media. If you are not able to control fungus with environment and culture there are many preventative and curative fungicides available.

PEST AVOIDANCE AND CONTROL

Pest avoidance has the same beginning as disease avoidance. Start clean with material that is renewed annually. A very effective method of avoidance is exclusion. This can be accomplished with insect screening installed over vents or sidewalls. Exclusion can also be provided using positive pressure cooling. Positive pressure fans draw outside air across an evaporative cooling pad and distribute this cool air through the house via a convection tube. Hot air is released through the ridge vent. Opening a door results in air moving out of the greenhouse and prevents insects from migrating inside. Not all insects are excluded so scouting and detection are an integral part of a successful program. Along with scouting there are many effective insecticides that can prevent or bring insect populations to a tolerable threshold. These insecticides can be applied as high-volume hydraulic, low-volume, and granular systemics.

CONCLUSION

Diseases. Start clean, use routine testing, understand handling logistics, rogue symptomatic plants, control with growing environment and culture, or apply pesticides when necessary.

Insect Pests. Start clean, exclude, detect, and treat with insecticides when necessary.