GROWERTALKS

Pest Management

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Good Greenhouse Hygiene

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There's a lot of advice given on this subject and I'd like to share mine based on my experiences in greenhouse and nursery production—especially in the Pacific North-west and British Columbia. These are two particularly difficult areas to grow in given the dark, wet climate, so sanitation is essential.

Why clean and sanitize?

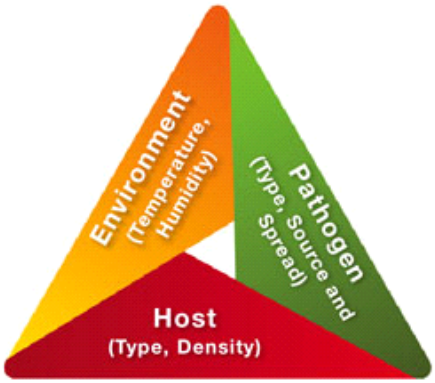
Cleaning is the first step towards removing hard-to-control pathogens, such as powdery and downy mildews, botrytis, fusarium, algae, moss and liverwort. These issues will begin to occur once they have a host or the environment supports their growth. Soil dust can harbor spores and is hard to remove without cleaning.

Watering frequently with a liquid fertilizer feeds algae and can create an impenetrable layer on soil surfaces, walkways, plastic, end walls, benches and on the inside of irrigation/mist lines. These conditions can be hazardous for workers and have an effect on crop quality and yield. Incorporating sanitation is an essential step in removing pathogen spores, including resting/dormant and interrupting reproduction. Cleaning eliminates the host and sanitizing disrupts the life cycle of greenhouse pests and disease.

How to go about it

It's beneficial to set up a sanitation plan that can be followed between crops and at the end of the season. A written program can be instrumental by pointing out the steps to follow, the process and listing the tools that will be required. Designating a person or crew to clean up in between crops can help extend the life of more thorough, end-of-season cleaning and sanitation.

Depending on your operation and crop rotation you may choose to sanitize between crops or annually. Review the program with employees and expect accountability. Have workers read the labels and manuals of the products/tools you decide to use so they're familiar with the proper instructions and understand what PPE (personal protective equipment) is required. Remember that PPE is more than just long sleeves, pants, socks and shoes, but also includes skin protection like gloves, hearing and eye protection. Good planning, direction and the right equipment are key elements in a cleanup program.



Clean first then sanitize

Cleaning is a recommended practice that gives you better control than sanitizing alone because it goes a long way toward increasing the sanitizer's efficacy. It will eliminate all organic matter, which plays host to a variety of pathogens and insects. Your program should include how you want your growing areas cleaned. It's good to sweep up plant debris and soil residues; it's better to follow up sweeping with a leaf blower or power washer to remove the finest particles of organic matter that a broom may miss.

At this point, the sanitizing agents you choose will have the highest possible efficiency. This may sound extreme and costly, but if you've had a recent disease outbreak, skipping cleaning or sanitizing leaves you at risk of re-infection, which will potentially cost more in the end. Being thorough also reduces risks of on-the-job injuries by eliminating slippery algae growth that can lead to slipping or falling. This will take time and money, but in the end will pay for itself in many ways, such as decreasing disease pressure and higher crop quality.

The disease triangle shows the three major conditions required for pathogens to thrive. Eliminate one condition and you take a big step in reducing the likelihood of infection.

Critical points of control

It's important that your program identifies all of the potential points of re-infection from within your growing areas, including non-crop areas, edges, under benches and access points to your greenhouses or nursery fields. Using crop history can help determine the extent of your program. I've had to step through many footbaths on my way into operations that take sanitation very seriously.

High traffic areas provide transportation for a number of pathogens. Be aware of how disease can spread and avoid promoting these conditions. Keeping a footbath in front of critical areas will decrease the amount of infection spread in your facility. As part of your regular maintenance, keep the bath's chemicals active and know the half-life of the sanitizer you use. Some growers have implemented an automatic or manual foam spray across entryways, which increases contact time. Depending on your operation, choose a method that will not create a hazard to workers and will be easy to use and maintain. Pay close attention to these areas and make sure they're addressed in your plan.

Consider additional measures for highly susceptible growing areas such as propagation. This is a good spot to implement water treatments. Keeping your water lines and mist nozzles clean is much easier when you treat the water before the build-up of algae and biofilm begins. This also helps to keep your propagation area disease free. Standardize practices, such as spraying racks, empty benches, walkways and sanitizing pots and trays, will maintain a clean environment during the production cycle. Be sure to check labels and make sure the sanitizing agent can be used while a crop is in production and doesn't have to be rinsed.

Irrigation lines also can transport pathogens into your operation. Injecting a labeled chemistry into your irrigation lines will strip away deposits of algae and biofilm and eradicate other pathogens such as pythium and phytophthora. Not all chemistries are the same, so select them carefully. Consider the safety around plant tissue and employees.

There are two types of biofilm that frequently cause disease and build-up. Using an acid cleaner first will eliminate mineral biofilm, which is a combination of aerobic bacteria and fertilizer. It will strip off the bacteria's cell membrane and dissolve fertilizer minerals left behind. Follow the acid cleaner with a sanitizing agent that has the ability to pick up where the acid left off and liquefy the remaining bacteria and resting spores. This will keep your growing areas clean and reduce irrigation nozzle clogging. Factors that can influence the presence of biofilm, algae and other diseases are water source and quality, the age of irrigation lines, how often they're shocked, and whether or not liquid feed is used.

For the ultimate disease, algae and biofilm control, consider a water-treatment system for your entire facility. Choose a system that pairs well with your irrigation system, water pressure and desired dilution rate. Possible associated expenses include injection equipment and operational costs. Test your irrigation water at the source, at mid-point and the end of the lines to sample pathogenic elements. Recognizing and counting the number of bacteria colonies forming units can forewarn of a prospective problem. It's important to understand what challenges you face and determine a threshold.

You have a plan, time to implement it

Now that you've assessed your risk areas and developed a plan, it's time to dedicate yourself and your employees to a cleaner way of growing. Choose products and equipment based on your operation and planned level of sanitization. If you participate in a certified program such as organic, you'll want to check labels on the products so you maintain compliance. Start with the most critical points of control and branch out from there. Clean, sanitize and grow.

Implement something simple; starting is always the hardest part. Once your strategy is in place, execute and evaluate. Adopt a flexible approach. Make regular observations and improve your plan based on results or lack thereof. Talk to other growers and exchange challenges and solutions. A solid sanitation program results in a strong foundation for your next production cycle. Does your greenhouse have good hygiene? **GT**

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