GROWERTALKS

Features

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A Guide to Sanitation Products

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Good greenhouse sanitation reduces the potential for insect and disease problems to establish within crops. Sanitation covers many activities, including isolating incoming plant material, scouting, glove and apron changes and use of sanitation products. Use of sanitation products is critically important to prevent spread of some diseases and fully eradicate some pathogens. Griffin offers many sanitation products, including cleaners/detergents and true sanitizers.

Pictured: Remove algae with chemical cleaners before treating with a sanitizer.

Before exploring the sanitation products available, let's understand how the pathogens enter greenhouses and differences in potential persistence. Some fungal pathogens, such as Botrytis, downy mildew and powdery mildew, can enter greenhouses via airborne spores and/or hitchhike on incoming plant material. Given the proper environmental conditions, active disease may develop. Removing debris lessens disease pressure, but the main path to control and eradication is through culture and use of plant protection products.

For other pathogens, the initial entry into the greenhouse is almost always tied to incoming plant material. Some of these pathogens can be very persistent in crops and potentially infect subsequent crops. Post-crop sanitation products must be part of the overall control plan to eradicate these pathogens. Short descriptions of the most common, persistent greenhouse pathogens follow:

- Viruses—Viruses are tiny, microscopic, non-cellular parasites that cause disease by reproducing within plant cells. Viruses enter plants with assistance. Some viruses are vectored by insects (e.g., INSV and TSWV), while others enter via slight or severe mechanical injury (e.g., TMV). ToMV and TMV can easily persist for months or even years in a greenhouse. Crops infected by virus cannot be cured.
- Bacteria—Bacteria are microscopic, single-celled organisms (e.g., Pseudomonas and Xanthomonas). Prolific reproduction within plants results in disease. Bacteria enter plants through natural openings or

through production activities (pruning, propagation, etc). Some bacteria, including Xanthomonas, can persist in plant debris, on hard surfaces and in water. Bacteria often respond to treatment, but some infections cannot be cured.

- Persistent fungi—Fusarium and Thielaviopsis are problematic in greenhouses. Fusarium infects vascular systems, and Thielaviopsis infects roots. No cure exists for either disease; treat to prevent spread. Both pathogens produce persistent resting structures with potential to persist in media, soil and on hard surfaces for months to years.
- Water molds—Pythium and Phytophthora are oomycetes, not true fungi. Pythium infects roots and stems, while Phytophthora infects roots, crowns, foliage and fruit and causes blight. Some Phytophthora infections are not treatable (e.g., late blight in tomato). Oomycetes produce swimming zoospores that can persist in recirculating water systems and resting oospores that are known to persist in soil for months to years.

Preventing Disease Spread

The first step in sanitation for a persistent disease is to remove all plant and media debris. Next, chemically clean all hard surfaces and ground cloths with a chemical cleaner/detergent, such as Strip-It, followed by a clear water rinse. Finally, treat with a sanitation product to kill the pathogens. Sanitizer efficacy against specific pathogens varies; use the following charts to select the right product for your needs. Remember: Plants can be infected with these pathogens without expressing symptoms. Therefore, GGSPro strongly encourages complete sanitation between all crops. The product cost and labor required for proper post-crop sanitation are small compared to the potential impact that a persistent pathogen can have on a crop.

Chemical cleaners/detergents available from Griffin include Strip-It and Horti-Klor. These products are used to remove tightly bound organic material prior to sanitation. By removing all organic material, pathogens are exposed to the sanitizers. Strip-It is an acidic product, while Horti-Klor is alkaline. Rely on Strip-It for greenhouse cleaning needs, including use in irrigation lines. Choose Horti-Klor for enclosed areas, including warehouse production, and for food-handling areas.

Some sanitizers are effective against a wide range of pathogens, while other products are more specialized. If a disease caused by a persistent pathogen has been diagnosed, choose a product that will eradicate that pathogen. For general between-crop sanitation, choose from the products that control both bacteria and fungi.

Make plans now to strengthen your sanitation program and move into spring with confidence knowing that you've taken a proactive approach to preventing disease.

The product information presented in this article is believed to be correct at the time of publication. However, it is the responsibility of the applicator to read and follow all label instructions. Labels do change without notice. Not all products mentioned are registered for use in all states. Some products are restricted in some states and not in others. Other products may also be safe and effective.

> **Standard protocol for treating irrigation lines when no plants are present.**
> 1. Direct inject Strip-It at 1:50 or 1:64.
> 2. Allow Strip-It to sit in the lines overnight (12 hours).

3. Flush the lines with clear water until foaming ceases.
4. Inject Kleengrow, SaniDate 5.0 or ZeroTol 2.0 into the line. Maintain contact for at least 10 minutes.

Standard procedure for treating hard surfaces.
1. Remove all debris, plant tissue and media. Discard off-site.
2. Chemically clean with Strip-It or Horti-Klor.

> 2.a. If using Strip-It, allow surfaces to remain wet for 3 to 5 minutes without drying.
> 2.b. If using Horti-Klor, allow the surfaces to remain wet for 5 to 10 minutes (rinse shortly after application for treatment of soft metals).

3. Thoroughly rinse the cleaner from the surfaces with clear water.
4. Apply Green-Shield, KleenGrow, SaniDate 5.0 or ZeroTol 2.0. Allow the surface to remain wet for at least 10 minutes. Do not rinse.

Standard procedure for cleaning pots.
(GGSPro recommends using new pots to avoid risk of disease transmission for persistent diseases and sensitive crops.)
1. Remove all debris, plant tissue and media. Discard off-site.
2. Soak pots in the cleaner/detergent for 3 to 5 minutes. Refresh when the solution appears dirty or does not loosen material.
3. Rinse pots in clear water.
4. Dip pots in Green-Shield, KleenGrow, SaniDate 5.0 or ZeroTol 2.0. Remove pots from solution and allow to dry slowly so that the surfaces remain wet for at least 10 minutes. Do not rinse. **GT**

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