

KEEP IT CLEAN

Biofilm is the leading cause of drip-tube clogs in NFT systems; it can also harbor pathogens and host algae development.

How can you manage sanitation for CEA crops?

BY TAMI VAN GAAL

For controlled environment agriculture (CEA) growers and ornamental growers, the sanitation needs are the same: Preventing the introduction of pests (pathogens, insects and mites) from new plant material entering the greenhouse, preventing the spread of pests that become established during production, controlling algae in the production space and preventing carryover of pests between crops. The catch for CEA growers is that their crops and/or their production spaces can limit product-use options.

Fortunately, several effective products are labeled for use with edibles and for use in typical CEA production spaces. Combine those products with simple and smart practices to reduce your risk and rest a bit easier.

BEST PRACTICES FOR HARD SURFACES

Surface sanitation between crops is beneficial on three fronts: It drastically limits pest carryover to future crops, it hinders development of algae and it greatly minimizes biofilm growth in irrigation lines. Surfaces to be treated include benching, floors, walls, irrigation lines and any containers or crop supports that will be reused.

Regardless of the surface treated, end-of-crop sanitation is always a three-step process:

1. physical cleaning
2. chemical cleaning/rinse
3. sanitizing

First, physically remove as much debris as possible from benching and floors. When reusing pots, brush or scrub the pots to remove any remaining media and plant material. Next, chemically clean to ensure that the surface is truly ready for sanitizing. You wouldn't skip the soap when washing your hands, so don't skip the cleaner when washing your benches!

Here are two options CEA growers may want to consider for chemical cleaning. Strip-It is an acidic cleaner, suitable for use in greenhouse structures where spaces are large and air exchange is good. Horti-Klor is an alkaline cleaner, used to clean warehouse production spaces and produce packing rooms. Horti-Klor can also be used in a greenhouse, but Strip-It should not be used for surface sanitation in smaller, enclosed spaces commonly found in warehouse settings. Either product can be applied to benching, concrete floors, evaporative cooling pads, greenhouse glazings, gravel floors and other non-porous surfaces, including most structural insulated panels. Use either product at a rate of 5 ounces/gallon, allowing a wet treatment time of 3 to 5 minutes, followed by a rinse.



Recurring algae problems can often be traced back to incomplete end-of-crop sanitation.



Pair chemical cleaners with a foamer to increase wet contact time and ensure all areas have been treated.

Application with a foamer provides ideal contact. Foam increases wet contact time and makes it easier to see that all surfaces have been treated.

BEST PRACTICES FOR POTS, TROUGHS AND FLOATS

Cleaning plastic pots is a simple process with Strip-It. Once the debris is removed from the pot, simply soak pots in a solution of Strip-It (2.5 ounces/gallon) in a large tub or container, such as a 55-gallon container. After 3 to 5 minutes, transfer the pots to a different tub for a clear water rinse.

Recurring and increasing algae problems in NFT troughs and pond floats can often be traced back to incomplete end-of-crop sanitation. Since the hydroponic environment is very conducive to algae growth, any algae that makes it through the sanitation process will have a head start once it gets back into the production space. Floats can be foamed with Strip-It or Horti-Klor at 2.5 ounces/gallon. Two-part troughs can be opened and foamed in the same way as floats. For one-piece troughs, use a traditional backpack sprayer to spray both the interior and exterior of the troughs. Remember to rinse with clear water after a 3- to 5-minute soak with the cleaner.

BEST PRACTICES FOR IRRIGATION LINES

Biofilm is a layered, mostly bacterial colonization of irrigation lines. While biofilm development is a normal, natural occurrence, it presents several problems for horticultural production. First, biofilm can harbor pathogens. Second, biofilm hosts algae, so keeping it at bay is critical in hydroponic systems. Third, biofilm clogs drip tubes. The root cause of most drip tube clogs in NFT systems is biofilm.

Treating irrigation lines with Strip-It will eliminate biofilm build-up in irrigation systems. To treat irrigation lines and drip tubes, direct inject the lines with Strip-It at 1:50 (equivalent to 2.5 ounces/gallon). Allow the cleaner to sit in the lines overnight. The next morning, flush the lines until foaming ceases. Avoid use of Strip-It when the crop is present or could be exposed to the solution draining from the lines. *Note: Using*



Strip-It for cleaning irrigation lines in a warehouse setting is acceptable due to the relatively small amount of cleaner used, and limited exposure since it's contained in the lines instead of open to the room.

SANITATION AND ONGOING TREATMENT OF IRRIGATION LINES

Once surfaces, pots or irrigation lines are chemically cleaned and rinsed, they're ready for sanitizing. ZeroTol 2.0 or SaniDate 5.0 can be used on all surfaces associated with edible crops produced in greenhouses and warehouses. Both products are stabilized peroxygens and oxidize to leave water and oxygen (no chemical residue). Use ZeroTol 2.0 at a rate of 2.5 ounces/gallon and use SaniDate 5.0 at a rate of 0.5 ounces/gallon for hard surfaces, pots, troughs and irrigation lines. For best results, spray or foam onto surfaces and do not rinse.

KleenGrow is an advanced quaternary ammonium product, also used for hard surface sanitation. KleenGrow can be used in two ways with edible crops. For surfaces without crop contact, apply KleenGrow at a rate of 0.5 ounce/gallon without rinsing. This application method will provide residual control. For surfaces that do come in contact with the crop, residual presence should be avoided. For effective use of KleenGrow in this situation, increase the rate to 1 ounce/gallon, treat the surface, allow the product to dry and then rinse or wipe with clean water to remove the residue.

For maximum biofilm and algae prevention, treat irrigation systems continuously with EcoClean or ZeroTol 2.0. EcoClean is a biocatalyst that prevents formation of biofilm and is safe to use with food crops; use at a constant rate of 0.25 ounce/100 gallons. The constant injection rate for ZeroTol 2.0 is 1.28 ounces/100 gallons. EcoClean can be added to fertilizer stock tanks. Constant injection of ZeroTol 2.0 is best managed through a separate injection head.

If organic fertilizers are in use, modify the constant injection protocol. Instead of constant

injection, follow fertilizer use with a clear water rinse of the lines. Next, charge the lines with ZeroTol 2.0 (2.5 ounces/100 gallons). To charge the lines, inject the ZeroTol 2.0, then hold the solution in the lines without flushing. There's no need to rinse

before the next irrigation event.

Introducing some simple cleaning and sanitation activities to your production protocol will greatly reduce the risk of pest carryover between crops. Choose the right product for the right space, clean before you sanitize,

and sleep a little better at night knowing that you're taking sound actions to keep your production spaces clean. [gpn](#)

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