

CONTINUOUS PROTECTION WITH PLANTS PRESENT

Site security

To ensure continuous protection during production with plants, risks for introducing pathogens into the greenhouse must be identified. Measures must be taken to reduce the risk of disease being brought onto the site by vehicles and people, and to minimize the movement of infective material and equipment from greenhouse to greenhouse.

Traffic control

The following guidelines will help you to avoid introducing pathogens to your greenhouse or the spreading of disease from one house to another.

- Access to your greenhouses should be limited to authorized personnel.
- All personnel should respect biosecurity measures when moving on the greenhouse grounds and administrative areas.
- All vehicles should be cleaned and disinfected upon arrival and/or on departure, especially if they have access to critical points on the greenhouse grounds.
- Require that all visitors wear clean or disposable clothes: coveralls, hats, gloves, and boots.

Foot baths and transport cart wheel disinfection

- Use signage in all appropriate and critical locations.
- Ensure footwear disinfection devices are placed at the entrance to each greenhouse and that they cannot be bypassed.
- Ensure wheel dips are placed where access and traffic flow ensures optimal use.
- Fill devices and dips with an appropriate disinfectant at the proper dilution rate and replenish or replace when solution is soiled or no longer effective.

Pruning

Prune with a disinfected knife. Use an appropriate disinfectant at the recommended dilution rate and disinfect by dipping (not soaking) the pruning knife at the end of each row. Alternatively a sponge soaked with a disinfectant solution can be used.

Transport carts

Cleaning and disinfection after carts are returned to the greenhouse from another location is necessary to prevent the introduction of new pathogens. For automatic cart washers ensure the proper detergent solution is used as well as the disinfectant solution. For manual cleaning and disinfection of carts follow Steps 1, 4, 5 and 6.

Insect control

Monitoring as well as insect control is important in the greenhouse setting. Yellow sticky traps attract every type of insect. Use the gridded traps to monitor and count insect populations. It is also suggested to use non-toxic glue and biodegradable paper which can be composted after use.

Paths, roadways and areas around greenhouses

Keep paths and areas around greenhouses clear of trash piles, as these are a potent source of infection. Spores are carried back into greenhouses on feet and tires or are blown in by the wind.

Rodent control

Rats and mice are responsible for the spread of many diseases and can also damage your crops. A rodent control program is extremely important.

- Make all the necessary repairs around the buildings. Plug all holes and burrows.
- Check garage doors to prevent rodents and wild birds from entering the greenhouses.
- Keep the building surroundings clean: avoid weeds, bushes, and litter heaps. Compost should be kept away from the greenhouse.
- Use approved bait stations.
- Check and stock the bait stations regularly.
- For a complete and comprehensive rodent control program, contact your Vétoquinol Biosecurity Technician.



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BIOSECURITY PROGRAM FOR GREENHOUSES



TERMINAL CLEANING AND DISINFECTING WITHOUT PLANTS

Step

1

DRY CLEANING OR GROSS ORGANIC REMOVAL

The removal of all gross organic matter is essential because refuse contains high levels of contamination and is a major source of infection. High levels of soiling will also reduce the efficacy of the cleaning and disinfection process.

- Remove all crop debris, clips, "nutrient base or culture media", strings, etc.
- Caked soiling should be brushed, scraped, or power-washed if necessary to aid removal.

- Remove trays, pots, containers, and equipment from the area to be cleaned and disinfected, and put to one side for cleaning and disinfecting.
- Remove any trash piles in the greenhouse.
- Make all necessary repairs and upkeep.
- If water is used in this step ensure that the room or building is reasonably dry (eliminate excess water on floor, walls, equipment) before moving on to Step 3.

Step

2

CLEANING WATER SYSTEM

All water systems contain some contaminants, especially the header tanks where dust and dirt can accumulate. This may allow micro-organisms such as Pythium, Fusarium and Phytophthora to pass on from one crop to the next. Cleaning with an appropriate cleaner targeting the challenges present in the closed or open water system followed by an appropriate disinfectant will ensure that the water system carries only what you want to the plants.

- Ensure that treated waterline is not supplying water to plants in another room or building during the cleaning process.
- Choose an appropriate detergent (depending on waterline issues: organic matter or mineral deposits).

- Prepare stock solution to ensure proper dilution rate and quantity to be used.
- Inject solution into waterline or fill header tank.
- Circulate to ensure product is present everywhere in the waterline.
- Let stand (soaking time depends on condition of the waterline).
- Flush waterline thoroughly.
- If required, repeat these steps using an appropriate disinfectant.

Step

3

CLEANING AND DISINFECTING OF MOVEABLE EQUIPMENT

Equipment removed from the greenhouse can carry heavy pathogenic contamination and if not thoroughly cleaned it can lead to carry over to the new crop.

- Wash or dip trays, pots, containers and other equipment using an appropriate detergent.

- Rinse and allow to dry.
- Apply a disinfectant solution.
- Ensure proper dilution rates are respected.

Step

4

DETERGENT APPLICATION

Following any dry cleaning or gross organic removal process (Step 1), high levels of contaminated material will still remain. Cleaning using an appropriate detergent will help remove soiling and biofilms (organic and mineral) from the surfaces. You also want to remove proteins as well as fatty acids and ensure that no greasy deposits (biofilms) remain on porous surfaces. Detergents help reduce the contaminant load on a surface and will also reduce the required time for the cleaning process, and minimize spread of disease in washing water.

- Use a power-washer set at a low pressure and a large opening tip to apply detergents.

- The dilution and application rates should be in accordance with the detergent's label in order to apply enough detergent solution per square meter of surface area. If you are using an injection system, ensure to prepare stock according to ratio of injection.
- Start at the apex of the roof and work down the walls to the floor.
- Pay particular attention to corners and other areas where algae and scale accumulates.
- Leave detergent solution soak for 10-15 minutes
- Detergent solution should be removed by rinsing before it dries.

Step

5

WASHING AND RINSING

- Before detergent solution dries...
 - Thoroughly rinse with water to remove detergent and any remaining organic or mineral deposits using a pressure washer or by scrubbing and rinsing.

- Let dry (eliminate excess water on walls, floor or equipment) before moving on to Step 6.

Step

6

DISINFECTION

Although cleaning will eliminate over 90% of contaminants, what is left will be more than enough to be dangerously harmful to your next crop. Using a proven disinfectant effective against your challenges is essential.

- Ensure there is no excess water on floor, walls and equipment before moving on.
- Choose an appropriate product according to ambient temperature, presence of specific pathogens and contamination level.
- Using a portable sprayer or a pressure washer or other equipment (at a low pressure setting), apply the appropriate disinfectant to all surfaces.

- The dilution and application rates should be in accordance to the disinfectant's label in order to apply enough disinfectant solution per square meter of surface area.
- Pay particular attention to corners, cracks, seams and porous surfaces.
- As with the detergent application, start from the apex of the roof and work down the walls to the floors.
- Make sure all equipment is disinfected before returning it to the greenhouse.
- When finished leave the area and allow to dry.

Step

7

FOGGING AND AERIAL DISINFECTION

When the greenhouse has been thoroughly cleaned and disinfected, all moveable equipment should be returned. To disinfect inaccessible areas of the greenhouse that might have been overlooked, the greenhouse can be fogged. It is particularly important to fog the reception and storage areas.

- Using an appropriate disinfectant solution, disinfect by using a mechanical fogger or a thermal fogger.

- Use disinfectant according to manufacturer's label recommendations and application rates.
- Ensure that adequate downtime is respected before entering the greenhouse.

ATTENTION: Cleaners and disinfectants should never be used directly on plants, seeds or soil. Allow surfaces to dry before bringing new plants into the greenhouse.

