

UNDERCOVER BIOSECURITY

Introduction

It has been estimated that plant diseases are responsible for up to a 15% loss in potential farm income (FarmCareGB, 2013¹). Decreasing the level or presence of pathogenic organisms will reduce the incidence of disease, increasing both output and quality.

The greenhouse environment has unique challenges where there is no natural weathering process to reduce the debris and dust from previous crops. The high cropping density of plants greatly increases the risk of disease. Many plant diseases survive in plant debris or dust for months or years in a dry state on the floor, the structural framework, tools, implements, grading and packing lines and clothing. Greenhouse hygiene is a fundamental requirement for pest and disease control.

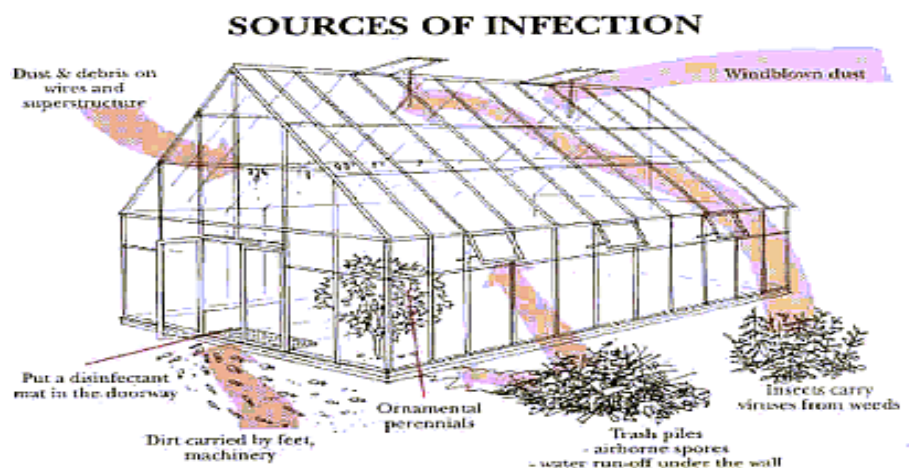
Hygiene of the greenhouse and its surroundings, weeds, algae, dirty machinery, rubbish piles of prunings and un-saleable produce can all impact on plant health. Adjacent field crops of the same plants can also present a risk to the greenhouse crops.

Many diseases are transmitted by vectors. Controlling vectors is the key to successful disease control. Some of the potential sources of disease are listed below:

Boots	Trolley tyres	Overhead ornamentals
Commercial peat	Seed	Transplants
Debris on wires	Insects	Internal trash piles
Dirty seed trays	Tools/Knives	Overalls
Dust on structure	Fruit crates	Grading & packing lines
External trash piles	Weeds	Well, dam and creek water
Soil	Visitors	

¹ <http://www.farmcaregb.com/about-us/index.html>

The following procedures should be followed for each greenhouse to be disinfected.



Stage 1: Removal of Equipment and Dry Cleaning

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

- Remove trays, pots, containers and equipment from the area to be disinfected and put to one side for cleaning and sanitising.
- Remove all crop debris, strings etc.
- Do not leave trash piles near the greenhouse as they may contain spores which are carried back into houses on feet and tyres or are blown in by the wind.

Stage 2: Pre-cleaning and Sanitizing

Following any drycleaning process high levels of infective material will still remain. Cleaning and sanitising using products with detergent capacity and biocidal activity to remove soiling from the surfaces ensures greasy deposits do not remain on rough surfaces e.g. concrete and wood. Detergent-sanitisers also reduce the time taken to clean by up to 60% and reduce the spread of disease in washing water.

- Start at the apex of the roof and work down the walls to the floor paying particular attention to corners and other areas where dirt accumulates. Caked soiling should be brushed if necessary to aid removal.
- Allow surfaces to dry where possible before disinfection (follow label instructions).

Stage 3: Water System & Equipment Sanitising

Irrigation water and irrigation lines

All water systems contain some contamination, especially the header tanks where dust and dirt can accumulate. This may allow disease such as Pythium, Fusarium and Phytophthora to pass on from one crop to the next.

Flush irrigation lines with clean water after any treatment.

Moveable Equipment

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

- Where there is a high risk of carry-over of infectious organisms on trays, pots, containers wash or dip them in a sanitiser solution.
- Where there is a low risk of infective material either soak and scrub equipment in a tank or pressure wash with sanitiser.
- Store equipment where it will not be re-contaminated.

Stage 4: Disinfection

The level of disease organisms, particularly viruses, present after cleaning and sanitising is still high enough to offer a serious challenge to young or recently introduced plants. The use of a broad spectrum disinfectant active against viruses, bacteria, yeasts, moulds and other pathogenic organisms is essential to complete an effective disease control programme. It is of prime importance to ensure all surfaces are thoroughly wet with disinfectant to break the chain of infection. Dirt floors harbour millions of spores. Laying smooth concrete floors improves hygiene and assists the disinfection process.

Stage 5: 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 house that might have been overlooked, the house should be fogged according to label directions. It is particularly important to fog any reception and storage area.

- Spray into the eaves using a very fine mist from a pressure washer or using a fogger.

Site Security

Between applications of the sanitiser there are many opportunities for introduction of infection to the greenhouse. Measures must be taken to reduce the risk of disease being brought onto the site with visiting vehicles and personnel and minimizing the movement of infective material from house to house.

Visitor Control

The following will help you to avoid pathogens being introduced into your greenhouse or spreading disease from one house to another.

- Access to your greenhouse should be limited
- Transport vehicles should be cleaned and disinfected upon arrival and on departure.
- Require that all visitors wear clean or disposable clothes, overalls, hats, gloves and boots.

Pruning

Prune with a sterilized knife. Use sanitiser to sterilize by dipping (not soaking) at the end of each row.

Foot dips / Disinfectant Soaked Mats

Ensure foot dips or foam mats are placed at the entrance to each greenhouse.

Fill foot dips with a solution of sanitiser and replenish twice a week or more often if heavily soiled. Ensure that soaked mats remain wet.

Hand Hygiene

Dirty or unwashed hands transfer infection. All visitors to the site should be required to wash their hands before entering the site using a germicidal hand soap. All staff should wash their hands before starting work, after breaks and when changing work activities.

Wheel dips

Fill with a solution of sanitiser and replenish twice a week or more often if heavily soiled.

Disinfection of Paths, Roadways and Areas around Houses

Keep paths and areas around houses clear of trash piles as these are a potent source of infection. Spores are carried back into houses on feet and tyres or are blown in on the wind. Spray these areas regularly with a sanitiser.

Clothing

Wash clothing weekly and hang out to dry. Some viruses can persist for years in unwashed overalls stored in the dark.

No Smoking

Tobacco products may contain Tobacco Mosaic Virus (TMV)

Ornamentals in Vegetable Greenhouses

Ornamentals such as grapevines, figs, oleanders, and hanging baskets harbour whitefly, thrips, nematodes and disease organisms. Do not grow these plants in a vegetable greenhouse.