Best Management Practices Workshop for Nurseries: Steam Sanitation and Disease Identification

Sanitation for nurseries

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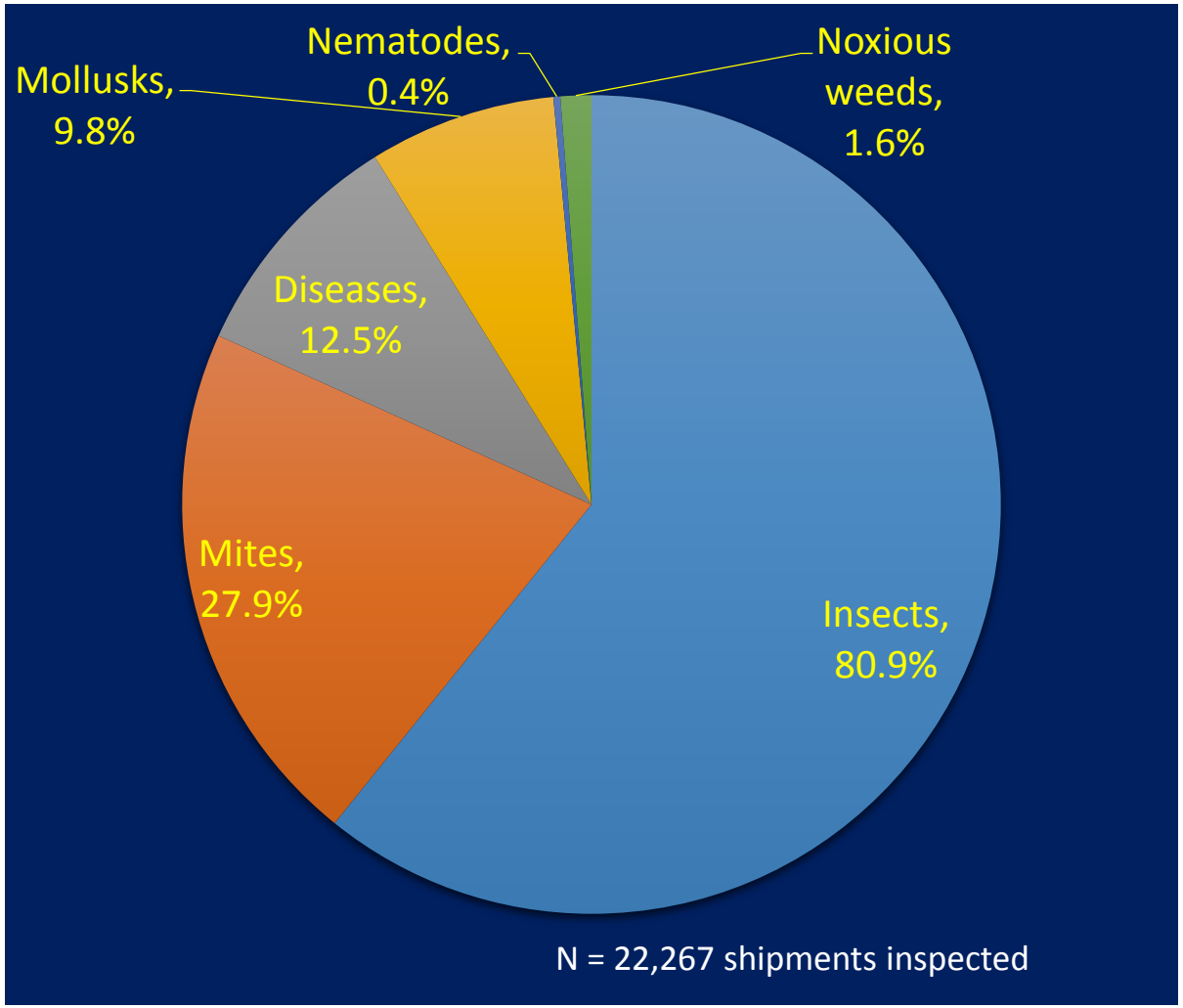
Why is Sanitation Important?

Maintaining a clean nursery operation prevents unwanted pests and diseases from entering the nursery.

It is much easier to prevent than to eradicate.

Detections of invasive species on plants, cuttings, and seeds



Percent of shipments with "reportable" pest species during FY 2003-2010

Represents 2.6% of total incoming shipments at US ports of entry

Estimated 72% of infested shipments go undetected

Liebhold AM, Brockerhoff EG, Garrett LJ, Parke JL, Britton KO (2012) Live plant imports: the major pathway for forest insect and pathogen invasions of the US. Front Ecol Environ 10: 135–143. doi: 10.1111/j.1365-2664.2007.01442.x.

Critical Control Points

Concept originally developed for food safety to prevent hazards rather than destroy contaminated foods at the end of the production cycle.

It has been adapted for ornamental nurseries in response to *P. ramorum* but will prevent outbreaks of any pathogen or pest.

Nursery Critical Control Points

Incoming plant material

Placement of host and non-host plants

Soil

- Used containers
- Leaf debris
- Cull pile
- Potting media
- Substrate

Water

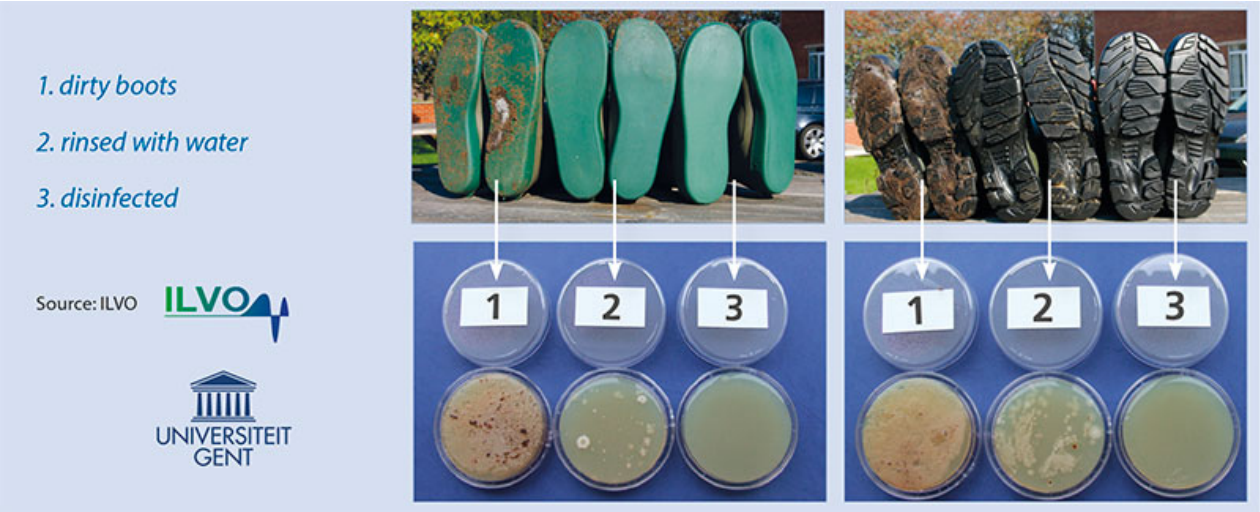
- Runoff
- Irrigation water

Parke, Jennifer L.; Grünwald, Niklaus; Lewis, Carrie; Fieland, Val 2010. A systems approach for detecting sources of Phytophthora contamination in nurseries. In: Frankel, Susan J.; Kliejunas, John T.; Palmieri, Katharine M. 2010. Proceedings of the Sudden Oak Death Fourth Science Symposium. Gen. Tech. Rep. PSW-GTR-229. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. pp. 67-68.

Sources of inoculum

- People and their vehicles
- Plants
- Dirty pots, tools, and equipment
- Soil
- Water
- Plant debris and cull piles
- Weeds, algae, and associated insects (shoreflies and fungus gnats)

Footwear



Remove soil and mud from shoes before using disinfectant footbaths.

Substrate

Pots should not be in contact with soil

More prevention BMPs for soil

Use pallets or benches underneath pots

Gravel layer of 4-6” will provide drainage and separate plants from soil surface

Prevention BMPs for soil:

Cull piles are a breeding ground for diseases. Keep them separate and downhill from production areas.

Soil and media piles should be covered to prevent infestation by weeds and pathogens

Store media piles on an impervious surface with good drainage to prevent contamination, and uphill from production areas.

Weeds are a source of pests and diseases

Algae – an indicator of disease

Good drainage is important

You might have contaminated soil if

- In-ground plants are symptomatic in an area
- Batches of potted plants from a media pile are symptomatic
- There is standing water indicating a drainage problem
- The soil tests positive for *Phytophthora*

Photo: Jay W. Pscheidt.

What are some Worst Management Practices?

Soil steaming

An alternative to fumigation

Destruction of *P. ramorum*-infested plants prior to soil steaming at a landscape site

Soil steaming

Contaminated hoophouse at a nursery

Pots

- Soil and plant material clinging to used pots and trays are a source of pests, diseases, and weeds
- Pots can be treated with disinfectant, steaming, or hot water dip

Hot water dip tank for 4” pots

Submerge for 30 min at 85C (180F)

Steam cabinet

Potting mix

Re-using media is risky

Composting may not kill everything

Loads of media can be treated with aerated steam at the rate of ~1 cu yd/hr using a cart or conveyor belt system.

Prevent re-contamination of treated soil

Before treating the soil, ensure that the problem doesn't happen again by

- Relocating any nearby cull piles
- Place media on impervious surface with good drainage
- Improve drainage to route water away from plants