Growing Knowledge

Protecting container-grown plants

With proper care and handling of media and containers, growers can reduce threats posed by diseases, pests and weeds.

By Jennifer L. Parke and Carrie Lewis

Pests and pathogens are a threat for growers that produce containerized nursery stock. Growers can reduce these threats by considering the type of containers and growing media they use, where they are sourced, how they are handled, and how they are stored.

Bagged commercial potting media and bark used in the nursery industry are generally free from plant pathogens, insect pests, and weed seeds, as are perlite, horticultural vermiculite, and sphagnum peat moss, but “river-washed sand” is often contaminated with water molds. Make sure that sand is obtained from at least 2 meters deep and is not exposed to surface runoff water. Some types of peat can harbor soilborne pathogens (Mathre & Grey, 2002) and should be disinfested before use.

Properly composted plant material and animal manures may safely be used in potting media. Compost temperatures greater than 55°C (131°F) for 15-21 days are necessary for destroying most plant pathogens except for resistant viruses (Washington Organic Recycling Council, 2009). Certain composts have disease suppressive characteristics (Scheuerell et al., 2005). Request written assurance that the compost is free of contamination and/or that claims for disease suppression can be verified.

Heritage Seedlings has modified this insulated shipping container to use it as a chamber for pasteurizing used containers and propagation flats.
Disinfectants for Pots, Tools and Equipment

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Trade Names</th>
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<tbody>
<tr>
<td>peroxide</td>
<td>ZeroTo1, OxiDate, TerraCyte</td>
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<tr>
<td>quaternary ammonium</td>
<td>Physan 20, Green-Shield CA</td>
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<tr>
<td>sodium hypochlorite (bleach)</td>
<td>Clorox, Agelar</td>
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Disinfect containers before re-use

Re-using containers is a good idea for reducing costs, saving energy, and reducing waste, but it is very important to not recycle pathogens and weeds. Always disinfect containers before re-use.

Some nurseries submerge used containers in large vats of hot water. Treatment for 30 min at a minimum temperature of 180° F (Baker, 1957) is needed to kill most pathogens.

Chemical disinfectants can also be used to sanitize containers before re-use (see Table 1, above). Pots must first be washed to remove media and debris before soaking them in a disinfectant because these products are quickly inactivated by organic matter. The effectiveness of disinfectants is also influenced by exposure time, concentration, and the type of substrate being treated (Copes, 2004).

Some growers are experimenting with solarization to disinfect pots. Pallets of pots are covered with clear plastic and either left in the sun for several weeks or placed inside empty, closed greenhouses during a few weeks during the summer. Although this method has potential, the specific requirements for effective solarization are not known.

Most plant pathogens are killed by exposure to aerated steam at 140° F for a minimum of 30 minutes (See Fig. 1, at right). Higher temperatures are required to kill weed seeds (Baker, 1957). Steam can be supplied by a steam generator or a steam boiler. There are a few models of each available commercially.

Growers can set up their own steaming operation by building or modifying a container or room that can be used to house the pots during the steaming process. It is important that it be insulated, of an appropriate size, and be easy to load and unload.

It is important to achieve sufficiently high temperatures, even in the center of the stack of pots. Monitor the temperature with a digital probe thermometer or a “button” datalogger; a barbeque thermometer with the probe inserted inside the stack also works well and provides an instantaneous readout. Begin timing the 30-minute exposure time once the temperature reaches 140° F.

Most containers are composed of blends of different plastics, and not all nurseries have the same type of pots. Therefore, each grower will need to tailor their steam operation to their pots. Some systems offer ways to monitor and control the temperature to prevent pots from melting (see below).
If you aren’t set up to steam-treat pots yourself, there are commercial enterprises that will come to your site and do it for you (see photo on Page 44). Most growers who steam treat their pots do so to get rid of soilborne pathogens, but many growers report substantial cost savings for labor and herbicides because of the excellent weed control achieved with steam treatment of pots.

Disinfest media before re-use

Pasteurization of used media can be accomplished by a cart system or a conveyor belt system. Commercially available soil carts can hold from 1/2 to 2 cubic yards, or a grower can fabricate their own. Each load is filled with media, covered with a tarp and pasteurized.

A conveyor belt system can treat up to 1 cubic yard of soil in an hour. Because the conveyor belt system can run continuously, it is ideal for processing large volumes of media.

There are many benefits of using aerated steam for pasteurizing media or soil. Air mixed with the steam is the most effective way of controlling the temperature (Baker, 1957), which is more critical than when steaming pots.

Aerated steam can be produced with an in-line aerator, or with a blower attached separately to the cart. Before pasteurization, media should be at a moisture content desirable for planting.

Fill the cart with the medium, or fill trays or pots with the medium to be pasteurized and place them in the chamber. Place a temperature probe in the coldest part of the pile. Close the chamber and begin the 30 minute timing once the temperature has achieved 140° F.

It is not desirable to sterilize the medium, because beneficial microorganisms are also eliminated (Baker and Cook, 1974). Potting medium chemical properties can also be negatively affected.
Blueberry varieties come in early, mid and late fruiting seasons from June through September. Make sure your nursery carries selections for a full season of ripening for your customers. They’ll appreciate the extended fruit harvest and you’ll appreciate the extended profit potential. Blueberries are in high demand. Let us show you how to maximize your blueberry program and profits.

Safer storage and handling
Now that your containers and media are clean, you need to keep them that way! Potting media components and new or disinfested containers must be stored and handled in such a way that they do not become contaminated before use.

Ensure that media components are mixed and stored on a cement slab, not on soil. Thoroughly clean the slab or media bay between lots. Prevent runoff water from cull piles, roads, and growing areas from contaminating the stored media.

Regularly clean vehicles, tools, and mixing equipment to prevent contamination of media. Avoid using vehicles and equipment used in the field operation for handling media. Keep all pots off the ground, away from soil and contaminated water, and covered to prevent dust accumulation.

Putting these practices into use at your nursery will help reduce disease, pest, and weed problems and they will reduce your risk of passing on problems from one crop to the next.

Disclaimer
Chemical names and trade names are included as a convenience to the reader. Their use in this publication does not imply endorsement, nor discrimination against similar products or services not mentioned.

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REFERENCES


