

Protecting container-grown plants

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



CARRIE LEWIS

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

**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.

42 ►

A & R Spada Farms.....	45
Alpha Nursery Inc.	37
Anderson Die & Mfg. Co. Inc.	9
B-West Hills Nursery	43
Biringer Nursery.....	26
Broadmead Nursery	32
C & H Nursery	45
Carlton Plants.....	29
Cascade Trees.....	45
Cash Flow Management Inc.	3
Crop Production Services	37
D Stake Mill.....	10
Discount Nursery Supplies.....	22
Earth Science Products Corp.	44
Eby Nursery Inc.....	13
F & L Lumber Inc.	13
Fall Creek Farm & Nursery Inc.	44
French Prairie Shade Trees Inc.	45
GK Machine	14
Hostetler Farm Drainage.....	45
Kaufman Nursery.....	43
Kubota	24
Lane Forest Products.....	32
Leonard Adams Insurance.....	19
Marion Ag Service Inc.....	31
Marr Bros.	10
McConkey Co.	23, 45
McPheeters Turf Inc.	45
Motz & Son Nursery	45
Northwest Farm Credit Services.....	5
OBC Northwest	48
Obersinner Nursery.....	43
OHP.....	27
Oregon Association of Nurseries.....	11, 20
Oregon Blueberry Farm.....	22
Oregon Valley Greenhouses	12
OVS.....	34
Pleasant Hill Nursery	32
Reardon Nursery.....	29
Rexius	13
Rickel's Tree Farm.....	43
RootMaker Products Company	6
Schurter Nursery	43
Scotts Company	47
Sevenoaks Native Nursery LLC	43
Sun Gro Horticulture	2, 18
T & R Company	30
Weeks Berry Nursery.....	31
Western Tag & Label.....	26
Wilbur-Ellis.....	16
Wilco.....	33
Willamette Nurseries Inc.	33

▲ CONTAINER-GROWN PLANTS

Table 1.
Disinfectants for Pots, Tools and Equipment

Chemical Name	Trade Names
peroxide	ZeroTol, OxiDate, TerraCyte
quaternary ammonium	Physan 20, Green-Shield CA
sodium hypochlorite (bleach)	Clorox, Agelor

Disinfest 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).

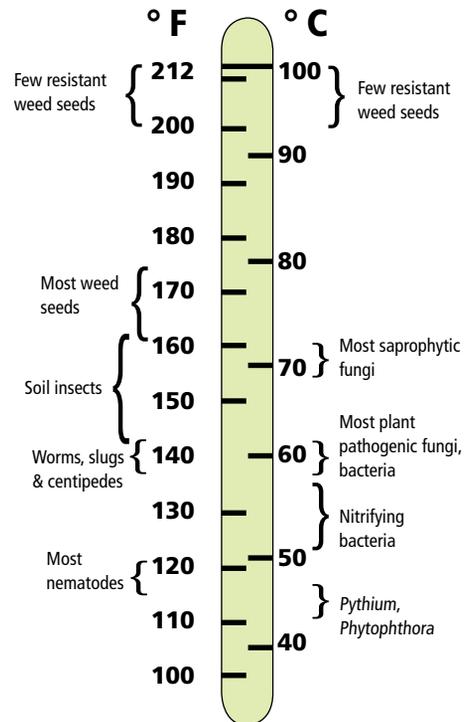


Fig. 1 Temperatures required to kill various kinds of soil microorganisms based on a 30-minute exposure to moist heat. Modified from Baker, K. F. & Cook, R. J. (1974).



DIGGER Marketplace

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.

Schurter
Nursery

**Arborvitae—Emerald green
Virescens
Boxwood
Japanese Maples
Otto Luyken
Skip Laurel**

Various sizes & Varieties
503-932-8006

B-WEST HILLS
NURSERY, INC.

**Japanese Maples • Spruces
Pines • Cedars • Firs
Grafted Field Grown
Ornamentals**

503-651-1217 • FAX 503-651-1218
bwesthillsnursery@gmail.com

Field Grown • B&B • Potted
Container Grown • Pol-in-Pot

OBERSINNER
NURSERY, Inc.

Quality Rhododendrons
Japanese Maples • Boxwood • Grafted Ornamentals
Assorted Broadleaves • Azaleas • Schipkaensis
Otto Luyken • Pieris • Daphne • Kalmia and More!

7886 N. Howell Rd NE • Silverton, OR
(503) 873-4004 • FAX (503) 873-2507
www.oberinnernursery.com

B&B Spruce - Fir - Pine
Chameacyparis - Poodle Pine
Japanese Maple

Cut Christmas
Trees

Rickels'
Tree Farm LLC
(503) 630-4349
fax (503) 630-7542
PO Box 598 - Estacada, OR 97023

Kaufman Nursery

**4'-10' grafted Blue Spruce
3'-8' upright Jap Maple
24"-42" wpg Jap Maple
1 1/2"-4" cal. Shade Trees
4'-7' Emerald Green Arbs
3'-6' Schip Laurel
18"-36" Otto Luyken
18"-36" Boxwoods & more**

Silverton OR 503-873-3501

SEVEN OAKS
NATIVE NURSERY LLC

- OVER 300 SPECIES GROWN FROM SEED
- HARD TO FIND NATIVES
- DROUGHT-TOLERANT, HIGH ELEVATION
- QUAKING ASPEN SPECIALISTS
- HIGHEST QUALITY BAREROOT SEEDLINGS
- CONTAINERS FROM 4" - 25 GALLON

'Roots to grow on'

PHONE: 541-757-6520 FAX: 541-738-2607
WWW.SEVENOAKSNATIVENURSERY.COM

DIGGER Marketplace



Extend Their Season. Extend Your Profits.

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.

50 Varieties

Includes some just-released varieties!

Liners • 3 1/2" Pots • Liter Pots
Advantage™ Cell Grown Transplants
#1 Containers • Grower Support



1.800.538.3001
www.fallcreeknursery.com

▲ CONTAINER-GROWN PLANTS



Mobile steam pasteurization units offer an economical method for small volume growers to disinfest their containers that are used in production.

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. ©

Dr. Jennifer L. Parke is an Associate Professor (Senior Research) in the Department of Crop and Soil Science at Oregon State University. She can be



Wood's

ROOTING COMPOUND

Soluble Concentrate

Continued excellence from our family owned company for over 30 years

WOOD'S ROOTING COMPOUND

Our unique formula uses only the highest quality ingredients which results in instant absorption of both IBA & NAA to your cuttings.

3 Convenient Sizes:
4 oz. / Pint / Gallon

Call Today For A Distributor Near You
503-678-1216



P.O. Box 327
Wilsonville, OR 97070
www.earthscienceproducts.com



reached at jennifer.parke@oregonstate.edu. Carrie Lewis is a faculty research assistant in the Department of Crop and Soil Science at OSU.

REFERENCES

Baker, K. F., ed., 1957. *The U.C. system for producing healthy container-grown plants*. Manual 23. Calif. Agri. Expt. Sta. Ext. Service. 332 pp.

Baker, K. F. & Cook, R. J., 1974. *Biological control of plant pathogens*. W. H. Freeman and Co., San Francisco. 433 pp.

Copes, W.E., 2004. Dose curves of disinfectants applied to plant production surfaces to control *Botrytis cinerea*. *Plant Dis.* 88:509-515.

Mathre, D.E. & Grey, B., 2002. *Naughty peat: a case study in plant pathology, with emphasis on Koch's Postulates and disease etiology*. <http://www.apsnet.org/edcenter/instcomm/TeachingArticles/Pages/NaughtyPeat.aspx>

Scheuerell, S.J., Sullivan, D.M. & Mahaffee, W.F., 2005. Suppression of seedling damping-off caused by *Pythium ultimum*, *P. irregulare*, and *Rhizoctonia solani* in container media amended with a diverse range of Pacific Northwest compost sources. *Phytopathology* 95:3,06-315.

Washington Organic Recycling Council, R., 2009. Best management practices: guidelines for pathogen control at organic material processing facilities. www.compostwashington.org.

Baby Blue Spruce
blue is COOL
 A&R SPADA FARMS
www.spadafarms.com

Specimen Trees
 Flowering & Shade Trees
 Specializing in Quaking Aspen & Wind-Breaking Poplars.

McPheeters Turf, Inc.

2019 SW Park Lane
 Culver, Oregon 97734
541-546-9081
www.mcpheetersturf.com

FRENCH PRAIRIE SHADE TREES, INC.

Wholesale Growers of Quality
B&B Specimen Trees

(503) 792-4487 • FAX (503) 792-3667
SALES@FPSHADETREES.COM
 13744 Manning Rd. NE • Gervais, Oregon 97026

HOSTETLER FARM DRAINAGE
503-266-3584

- Plastic Tubing 3"-24"
- Laser Grade Control
- Open Ditch for Buried Irrigation
- Plows and Trenches
- Pot-n-Pot Drainage
- Oldest Drainage Firm in Oregon
- Newest Subsurface Irrigation Techniques

Materials and Technical Assistance Available

Canby, OR

C&H Nursery

"Arborvitae"
 "Arborvitae"
 "Arborvitae"

Container and B & B
503.390.8486
 Email: CHNursery@aol.com

Motz & Son Nursery
 Wholesale Growers of
 SHADE & FLOWERING TREES
 FRUIT TREES

Dwarf, Semi-Dwarf & Standard
 COMBINATION FRUIT TREES (4 in 1)
 Semi-Dwarf & Standard
 ESPALIER APPLES
 Semi-Dwarf, Combination & One Variety
 WALNUTS & FILBERTS
 DECIDUOUS SHRUBS

Write for our stock and price
 11445 N.W. Skyline Blvd.
 Portland, Oregon 97231
 Phone 503-645-1342
 FAX 503-645-6856

Cascade Trees

SPECIALIZING IN QUALITY
DECIDUOUS SPECIMEN TREES
 & FRASER FIR CHRISTMAS TREES

17728 Butteville Rd. NE
 Woodburn, OR 97071
503.982.4225 Fax **503.982.1534**
 email: sales@cascadetrees.com

McCONKEY
 Legendary Service • Legendary Value
 Formerly known as IFS-Irrigation Systems

Want EASY?
 Want PROFITS?
Quantum is HERE!

AS LOW AS **\$195.00** mo AS

The Easiest BOOM To Use
Saves You Money. **866-868-1238**
www.quantumbooms.com