PRESIDIO TRUST®

Preventing Soil-borne *Phytophthora* Introductions by Testing of Nursery-Grown Plants Compliance Guidelines for Project Managers and Contractors

1. Contact Presidio Trust Integrated Pest Management Specialist with a map of your project site boundaries, and we will analyze storm water movement to determine if the site drains directly (over land or through storm drains) to the Native Plant Community Zone (NPCZ). If any area of project site drains directly**Preventing Soil-borne Phytophthora Introductions by Testing of Nursery-Grown Plants - Compliance Guidelines for Project Managers and Contractors**

2. to the NPCZ, the following guidelines apply in that area. If project site does not drain directly to the NPCZ, these guidelines do not apply.

3. All plants grown by GGNRA nurseries can be used without testing for *Phytophthora*. These nurseries already incorporate testing in their production BMPs.

4. All plants grown under a contract-grow for which the nursery has been inspected and meets Presidio Trust Qualified Nursery BMPs (Appendix A) *and* is growing the project's plants to order *and* the Presidio Trust Integrated Pest Management Specialist can document that the project grow is in a distinct part of the nursery where there are sufficient controls in place to keep from becoming contaminated by areas containing brokered plants, can be used without testing for *Phytophthora*.

5. The Presidio Trust maintains a list of High-Risk *Phytophthora* host genera, based on research done by Presidio Trust and groups referenced by the Phytophthoras in Native Habitats Work Group, CA Department of Food and Agriculture's Nurseries Services Program, or the Royal Horticultural Society.
   This list is updated as new data becomes available. Appendix B contains the March 2021 list. The list governing any project will be the version of the list in use at the time the project receives documentation from the Presidio Trust's National Environmental Policy Act (NEPA) review process. For projects where NEPA review is not required, the Presidio Trust Integrated Pest Management (IPM) specialist will provide a current list when plant procurement begins, which will govern the project.

6. Plant genera that are **not** included on the High-Risk *Phytophthora* host list can be used without *Phytophthora* testing. Where feasible, the Presidio Trust does maintain the right to sample and test such plants for *Phytophthora,* for data gathering purposes only: no plant rejections will occur of genera that are not on the High-Risk *Phytophthora* host list.

7. Plant genera that **are** included on the High-Risk *Phytophthora* host list, that are not allowed by Sections 2 or 3 above, can be used, but must first be tested according to the Presidio Trust Testing for *Phytophthora* in Nursery Plants guidelines (Appendix C), and must be documented as non-detect for all *Phytophthora* species.

APPENDIX A

Phytophthora introduction prevention

Nursery BMPs for Contract Grows

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1. Site selection, preparation, and maintenance

- All production and holding areas are well drained: no standing water or puddles even after a long rain.
- Roads and pathways are paved, graveled or rocked.

2. Water management

- Irrigation water comes from a municipal source or deep well, or you disinfest irrigation water using a proven and effective method.
- Plants with similar irrigation needs are grouped together.

3. Plant procurement

- All incoming stock is visually inspected for pest and disease symptoms prior to introducing them into the nursery facility.
- All shipments that contain plants with pest or disease symptoms are refused.

4. Plant propagation

- Propagation area is isolated from the rest of production facility.
- All sorting areas, cutting benches, cutting surfaces, production and holding benches are disinfested between crops to minimize the introduction or spread of pathogens.

5. Greenhouses

- Greenhouses are thoroughly cleaned and disinfested between crops.
- Containers are only placed on clean, well-draining surfaces, such as raised benches or gravel beds, to prevent splash contamination from soil.

6. Field production areas

- Soil used for in-field or pot-in-pot propagation is free of pests, pathogens and plant-parasitic nematodes. If yes, what is your method for documenting this?

7. Potting media and containers

- Growing media is free of pests and pathogens. If yes, what is your method for documenting this?
- Used containers and trays are disinfested before re-use, or new containers and trays are used.

8. Container yards

- Potential for dispersal of pests and pathogens is reduced by creating breaks between blocks of plants.
- A barrier is maintained between the soil and containers, so that potential pathogens on the ground can't be splashed into containers. Sufficient barriers include raised beds, gravel, a layer of rock, or mesh cleaned on a regular schedule. If mesh, what is the cleaning frequency?

9. Symptomatic plants

- Infested or diseased plants that are found in any production or holding area are treated to remove the pest, or plants are removed to a cull area, or plants are destroyed.

10. Training and Certification

- Employees undergo sufficient training to be able to implement BMPs and recognize and report common *and* quarantine pests and pathogens.
- Nursery participates in disease management certification program or programs. If yes, please list.

11. Scouting

- Plants in propagation areas and greenhouses are inspected at least once per week.
- All other production and holding areas are inspected for pests and diseases at scheduled intervals frequent enough to prevent or manage outbreaks. If yes, what is the frequency?

12. Biosecurity

- All employees who may have visited areas with pest and disease problems are required to wash or sanitize their shoes, tools and vehicles before re-entering the nursery.
- Before entering production areas, shoes are cleaned or sanitized, or shoe covers are used.

13. Recordkeeping

- All plants processed or produced can be traced back and forward through the process.
- Records are kept of all treatments that are undertaken as a result of finding infested or diseased plants in container production areas.

APPENDIX B

Phytophthora host genera considered highest risk of infection

based on data compiled from:

California Department of Food and Agriculture
Golden Gate National Recreation Area field and nursery testing
Phytosphere Research
Presidio Trust commercial nursery testing
United States Department of Agriculture, Agricultural Research Service, Fungal Database
University of CA Berkeley Forest Pathology and Mycology Lab
Royal Horticultural Society
last updated: 2021-03-18

update by: C. Conforti, Presidio Trust IPM Specialist

Genus			
Acer	*Camelia*	*Hardenbergia*	*Quercus*
Aesculus	*Ceanothus* ('Anchor Bay' & 'Emily Brown')	*Juniperus*	*Rhododendron*
Agonis	*Cistus*	*Lantana*	*Rosmarinus*
Arbutus	*Correa*	*Leucadendron*	*Sarcococca*
Aucuba	*Cupressus*	*Pinus*	*Taxus*
Azalea	*Fremontodendron*	*Prunus*	*Viburnum*
Baccharis	*Grivillea*	*Pseudotsuga*	

Note: this list has been abridged to comply with Presidio Trust Landscape Plant Selection List, which applies to all designed landscapes. If a project is not subject to the Plant Selection List, contact the Presidio Trust IPM Specialist for the complete high-risk *Phytophthora* host list in the Presidio Trust Phytophthora Management Guidelines.

APPENDIX C

Testing for Root-borne *Phytophthora* in Nursery Plants: Rapid Tests & Pear Baiting

Definitions

Plant lot*:* Plants of one species that were propagated at the same time at the same nursery.

Phytophthora* symptoms:* Whole plant or leaf blight, leaf tip dieback, root rot, serious stem necrosis, bleeding lesions, root collar canker, wilting or the appearance of water stress, water soaked lesions on roots and/or necrotic flecking. Advanced symptoms include whole plant blight or dieback, root rot, serious stem necrosis, bleeding lesions, root collar canker, serious wilting with adequate watering, dead water soaked root mass or necrotic roots.

Guidelines

1. **Inspection**
   - **a.** Confirm no fungicide applications on the plant lot within the past 45 days. Fungicides can mask *Phytophthora* symptoms, and will reduce pathogen levels making detection difficult, while not eliminating the pathogen.
   - **b.** Perform a visual inspection of each plant lot. Plant lots with obvious *Phytophthora* symptoms should be rejected. Plant lots that do not exhibit obvious symptoms can be sampled.
   - **c.** Plants must have fully developed root system and soil must be moist.

2. **Sampling**
   - **a. Sample Size**

     Collect roots plus soil from 20% of the plant pots in each lot, to create one composite sample per lot. Minimum number of pots to be sampled per lot is two, maximum is thirty.

   - **b. Sampling Procedure**

     Wear gloves that can be sterilized (e.g. Latex gloves).

     Sterilize gloves and sampling tools between each lot. Brush any large chunks of soil off tools and gloves, then spray-drench parts of tool that have come in contact with soil, and spray-drench gloves, with 70% isopropyl alcohol or Lysol ™. Wipe with clean cloth, or let air-dry.

     Place samples in a clean sealable container. Close and carefully label each sample bag so that the sample can be identified to date, nursery, and plant species.

     Pots up to one gallon: Remove plant from pot. Inspect root system. Take approximately two tablespoons of root. Capture any discolored root in the sample. If no discolored root is found, take sample from bottom of pot and lower half of root zone.

     Pots larger than one gallon: Remove plant from pot. Inspect root system. Take approximately ½ cup of root. Capture any discolored root in the sample. If no discolored root is found, take sample from bottom of pot and lower half of root zone.

     If unable to remove plant from pot, expand drainage holes in bottom of pot using a utility knife. Take approximately 1/4 cup of root. Do this at two drainage holes per pot.

If unable to expand drainage holes at bottom of pot, use a trowel or soil probe to expose roots at least half way down the edge of the pot, and take approximately ¼ cup of root. Do this in two places per pot.

3. Testing

Test roots from each plant lot using rapid tests such as Agdia-brand *Phytophthora* ImmunoStrip® tests or Pocket Diagnostic-brand *Phytophthora* tests. Rapid tests can result in false positives in the presence of some *Pythium* species, so if any rapid tests are positive for a plant lot, do an additional test by pear baiting the entire remaining composite sample.

a. Rapid testing

i. For each lot, run a number of tests equal to 15% of the number of plants in the lot. For example, if a lot contains 100 plants, run 15 tests. However, the minimum number of tests to be run per lot is two, and the maximum is twenty.
ii. Ensure test kits are at room temperature.
iii. Wear Latex gloves.
iv. Examine roots in each sample. Using the worst looking roots in the sample, use 0.15g to 0.3g of root to run each test.
v. Sterilize gloves and tools between each plant lot.
vi. Record results of Pocket Diagnostic test at 10 minutes after initial processing, or each ImmunoStrip® test at 30 minutes after initial processing.

b. Pear bait testing

i. Submit each composite sample to a commercial lab to:
    1. run pear bait test, and
    2. PARP or VARP plate cultures obtained from pear baiting, and
    3. run PCR to identify *Phytophthora* to species

4. Accepting or rejecting plant lots based on test results

If *Phytophthora* is not detected through rapid tests, that plant lot is cleared for planting in the Presidio.

If rapid test(s) are positive, but *Phytophthora* is not detected through pear baiting, that plant lot is cleared for planting in the Presidio.

Plant lots that test positive for *Phytophthora* through pear baiting, or positive through rapid test but not pear baited, shall be rejected for use in areas that drain to the Presidio Native Plant Community Zone.