Best Cultural Practices (BCPs)

Oregon Department of Agriculture
Grower Assisted Inspection Program (GAIP)

Disease Exclusion

Preventing the introduction of unwanted pests in a nursery is the first line of defense for control. By utilizing some of the following practices for disease prevention, distribution may be decreased.
The following are voluntary recommendations of procedures to follow when receiving Host and Associated Plants (HAP) from a source outside of the nursery site.

1. ***Any plant material purchased from off-site locations should be from nurseries that are licensed or certified under all phytosanitary laws and applicable federal and state regulations.***

    - ◊ In-house propagation ensures the history of crop
    - ◊ Buying from a certified source lowers the risk of becoming contaminated from non-regulated material.
    - ◊ Keep in mind that not all states are regulated for *Phytophthora ramorum*. To comply with regulations, additional steps need to be followed to receive plant material from a non-regulated state.

2. ***Require delivery trucks to properly clean and sanitize truck bed, undercarriage, and tires in-between deliveries.***

    - ◊ Plant debris or mud from other nurseries is a potential source of disease contamination.

3. ***Unload incoming deliveries onto an area that is clean, and free of any debris. Collect all debris from plants and delivery truck. Properly dispose of refuse by burning, double bagging, deep burial, or steam sterilization. Do not compost this material.***

    - ◊ Unclean areas provide great conditions for disease growth. Good sanitation practices can lessen the chance of disease establishment.

4. ***Train nursery staff to recognize the signs and symptoms of Phytophthoras. Do not accept any buy-ins, transfers, or returns that are suspect.***

    - ◊ Knowledgeable staff is a good line of defense for disease control.
    - ◊ Training staff to decline diseased plant material is a good critical control point.

5. ***Do not mix existing crops with incoming HAP material.***

    - ◊ In the event a disease has been found, the chance of cross-contamination occurring throughout the nursery will be reduced.

6. ***On all HAPs do not use any fungicides labeled for Phytophthora on 100 or 10% of plants for a 60-day period.***

    - ◊ If a fungicide was used prior to shipping, any signs and symptoms suppressed will begin to show disease expression.
    - ◊ Monitoring plants for this time period also keeps plants in an orderly fashion. It can be helpful for inventory control in the event a positive plant has been found.

7. ***Avoid accepting returned plant material to the nursery site. If it is necessary to accept a return, place the plant material in a quarantined area, and inspect for any symptoms of disease.***

    - ◊ Plant material may have been contaminated with disease since it left the property.
    - ◊ Keep in separate area until it can be determined that the plants are free of disease.
    - ◊ If any disease symptoms appear, contact appropriate officials.

Inspections and Staff education

Nursery staff that handle HAP frequently should attend one or more Phytophthora training session annually.

1. ***Train all staff working with HAP to scout and report any disease or pests.***

2. ***Regularly scout nursery HAP bedding areas. Look for any symptoms of disease on plants.***

3. ***Regularly scout nursery and surrounding areas for HAP. Remove plant material and dispose of properly, or monitor regularly for Phytophthora ramorum.***

    - ◊ HAP landscape plantings in or near the nursery can potentially introduce the pathogen to the site.
    - ◊ If possible, grow non-host material in these locations.

Nursery Sanitation Practices

Keeping the nursery area clean of all debris can reduce incidents of disease outbreak. Old plant material lying throughout the nursery increases the chances of spore survival. Sanitizing bedding areas, tools, and machinery can minimize the spread of pathogens. It is important to train staff to use good personal sanitation practices when handling HAP material.

1. ***Remove and properly dispose of all plant debris in nursery area.***

    - ◊ Good sanitation reduces the chance of disease or insect outbreaks.

2. ***Keep the cull pile in a location away from soil pile, mixing areas, and growing beds. Ensure all run-off flows away from these areas.***

3. ***Only use new pots, flats, and trays on high-risk plant material. If containers are recycled, they need to be cleaned of all debris and properly sanitized with Phytophthora specific chemicals before re-use. Store potting containers in a clean sanitized area.***

    - ◊ Dirty containers may contain pathogens that could contaminate new plant material.

4. ***Bedding areas that house HAP material should be disinfected in-between crop rotations. Cutting benches, sorting areas, machinery, tools, cutting knives, heavy equipment, footwear, and hands also need to be appropriately sanitized before propagation or production procedures begin.***

    - ◊ If the pathogen is present on any of these items, the disease can be spread throughout the crop.

5. ***Ensure that growing media is cut from an area known to be Phytophthora ramorum free. Keep all debris away from this storage site to avoid contamination.***

    - ◊ Keeping the soil media free of disease is an important critical control point. Make sure staff is properly trained on proper sanitation practices.
    - ◊ A cement pad is best location to store media as standing water and splashing can be avoided.
    - ◊ Do not allow staff to walk or drive in soil media storage area unless boots and equipment have been sterilized.

6. ***If a location infested with Phytophthora ramorum has been visited, clean all vehicles, tools, and footwear before traveling to disease-free areas.***

    - ◊ It is a good sanitation practice to clean vehicles, tools and footwear in-between nursery/farm visits.

7. ***Place a barrier between native soil and containers in bedding areas.***

    - ◊ The ground could potentially be contaminated with pathogens.
    - ◊ Placing containers on a barrier such as gravel avoids water pooling and allows better drainage.
    - ◊ Splash dispersal is also reduced.

8. ***High-risk plant material to be used for cuttings should be treated with appropriate chemicals before use. Look over plants to make sure they are healthy. Once cuttings have been taken, soak them in an approved disinfectant solution before sticking.***

9. ***Follow a program to adequately control weeds throughout the nursery site.***

    - ◊ Weed control is very important in a nursery as they can harbor pathogens and pests.

Nursery Layout

Nursery layout is very important in the event a plant has been found positive for *Phytophthora ramorum*. Keeping nursery maps current can aid with quarantines, sprays, watering schedules, and inventory control.

1. ***Adjust nursery layout to reduce the number of spores that may spread to other high-risk plant material.***

    - ◊ Plant spacing is very important. Allow enough room around each plant for adequate airflow. Proper spacing allows leaves to dry faster.
    - ◊ Use raised beds and benches whenever possible. Raising beds or benches allows water to drain properly. The possibility of plants sitting in excess water is also avoided.
    - ◊ Develop a preventative spray program.
        - Use appropriate fungicides labeled for *Phytophthora*. Follow all laws and regulations when applying chemicals.

2. ***Review field layout plan. Plan nursery layout to minimize the impact of the USDA Confirmed Nursery Protocol should a positive plant be found.***

    - ◊ Use physical barriers between high-risk plant material. The barrier must be tall enough to prevent splash over the top.
    - ◊ Use 2-meter (6.5') breaks between large sections of HAP material.
        - Non-host plants can be used as breaks.

3. ***Maintain a separate dump pile for HAP material. Do not reuse this soil in future plantings. Keep the cull pile in a location away from soil pile, mixing areas, and growing beds. Any positive material placed in the cull pile should be disposed of as required under the USDA Confirmed Nursery Protocol.***

Water Management

Water management is a very important critical control point for disease control. Over watering, standing water, and recycled irrigation are all potential pathways for disease introduction.

1. ***Avoid overhead irrigation of HAP. If possible have these plants on a drip irrigation system.***
   - ◊ Water according to weather conditions.
   - ◊ Water early in the day to allow leaves time to dry off.
   - ◊ Group plants with similar water needs to avoid over watering of crops.

2. ***Water sources that are not from a well or municipal source should be treated with appropriate chemicals labeled for Phytophthora before use. If the water source is not treated, the water needs to be tested to ensure it is free of pathogen.***
   - ◊ If water originally comes from a well or municipal source and is re-directed to a recycling pond; appropriate treatment or testing should be done.

3. ***Scout perimeter of nursery and look for any HAP in the landscape or surrounding area. Ensure any run-off that may occur is diverted away from the nursery.***

4. ***Avoid accumulating areas of standing water throughout nursery.***
   - ◊ Do not place HAP in areas known to hold excess water.
   - ◊ Standing water promotes disease conditions.
   - ◊ Chances of splash dispersal are increased.
   - ◊ Use gravel, drains, and re-grade property. Raised beds and benches may also be used if standing water occurs frequently.

References

Phytophthora Online Course: Training for Nursery Growers
http://www.ecampus.oregonstate.edu/phytophthora