



# *Diagnosing Phytophthora Diseases in Landscape Ornamentals*

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## **Phytophthora**

*Phytophthora* spp. is an aggressive plant pathogen that affects many landscape ornamental plants. In fact the word *Phytophthora* is derived from the Greek, meaning “plant destroyer”. Root rot, root collar rot, and stem cankers are the most common diseases caused by this fungus however, leaves, leaf petioles, and fruit can also be affected on certain ornamental hosts.

*Phytophthora* is a water mold that infects plant tissue under high moisture conditions. Ornamentals planted in poorly drained, water logged soils are most susceptible to infection. *Phytophthora* is primarily a soil-borne pathogen that spreads through water-logged soils via motile zoospores. In some cases these zoospores can splash onto above ground plant parts causing stem cankers, shoot blights, and leaf spots. When zoospores come in contact with susceptible plant tissue, they germinate to allow invasion of host tissue by the fungus. Disease symptoms can take days, weeks, or months to develop under favorable environmental conditions. Symptoms may include dieback, decline, bleeding

cankers, stunting, leaf chlorosis, and/or plant death depending on the host and severity of the infection.

*Phytophthora* spp. has a wide host range. Since *Phytophthora* is mainly a root decay pathogen, many of the hosts prone to infection are intolerant of saturated soils. Even in cases of *Phytophthora* canker, high moisture from frequent rainfall events encourages disease development. Although root rot and canker are caused by *Phytophthora* spp., the two are different diseases caused by different species of *Phytophthora* and occur on different host plants. The following list distinguishes between hosts that are commonly associated with root rot from those associated with canker:

<b>Hosts Susceptible to Root Rot</b>	<b>Hosts Susceptible to Canker</b>
Azalea	American/European Beech
Rhododendron	Sweet Birch
Japanese Holly	Flowering/Pacific Dogwoods
Boxwood	Sweet Gum
Hemlock	Horse-Chestnut
Mountain Laurel	Linden
Dogwood	Madrone

Andromeda	Black, Norway, Red, Silver, Sugar, and Sycamore Maples
Fir (Abies)	California Live Oak
Camellia	Southern Live, Pin, and Red Oaks
White Pine	Tulip Tree
Taxus (Yew)	Weeping Willow
Butterfly Bush	Avocado Apple Citrus Other Fruit Trees Zelkova

### Diagnosis

Accurate diagnosis of *Phytophthora* diseases is crucial for proper treatment and long term plant health. An initial diagnosis can be made by observing visible symptoms of the disease. Further analysis of host tissue by microscopic identification of spores and/or Enzyme Linked Immunoabsorbant Assay (ELISA) is necessary to accurately confirm *Phytophthora*. ELISA is the diagnostic tool used by the Bartlett Plant Diagnostic Laboratory.

The ELISA test is designed to detect proteins that belong to specific microbes. ELISA was initially used by the medical community to detect human pathogens such as HIV, anthrax, and small pox virus. Later the test was adopted by plant pathologists for diagnosis of plant pathogens such as *Phytophthora*. ELISA works by having specific antibodies that can recognize proteins that are unique to specific pathogens. When these proteins are present a bond forms between the protein and antibody resulting in a positive ELISA test.

Recently the Bartlett Plant Diagnostic Lab has adopted the Neogen ALERT LF device for in field detection of

*Phytophthora* spp. by Bartlett Arborists. The Neogen ALERT LF devices are not designed to replace laboratory ELISA, but to assist an arborist in making an initial diagnosis. The Neogen devices, which look very similar to a home pregnancy test, are based on ELISA technology. The device works by placing a sample in the test well. If *Phytophthora* is present its proteins will bind to the antibody coated latex bead present in the release pad. As the sample solution wicks up the absorbent pad the antibody coated latex beads will bind to the target antibody (Figure 1). A blue test line indicates a positive reaction. Since these devices are not as sensitive as laboratory ELISA tests, false negatives are possible in some cases. When a negative result occurs, plant samples should be submitted to the Bartlett Plant Diagnostic Clinic for further ELISA testing.

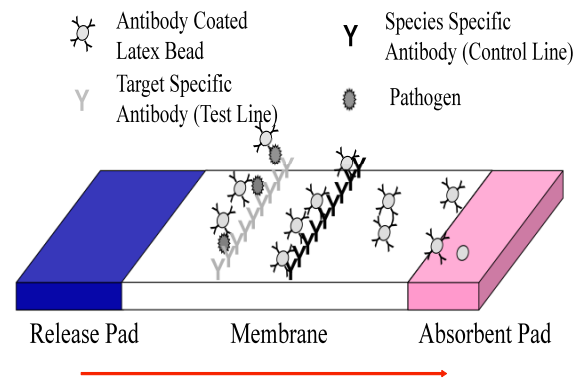


Figure 1

Diagram courtesy of Neogen Europe Ltd.

