

VDACS Plant Pathology Updates
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--*Phytophthora ramorum* Survey

VDACS completed the first half of the 2010 *Phytophthora ramorum* nursery survey. VDACS inspectors collected 670 samples from 95 nursery sites across Virginia. Approximately 70% of the plants sampled were from retail sites and 30% were from production sites. Samples were collected from plants which displayed symptomatic leaf tissue. Of the 670 samples, there were no positive samples for *P. ramorum*, however 11% tested positive for a *Phytophthora* species other than *P. ramorum*. The most common morphologies isolated were consistent with that of *P. cactorum* and *P. citricola*, which are known to cause leaf blight on a wide range of hosts in nursery settings. The proportion of samples testing positive for a species of *Phytophthora* did not vary significantly between retail and production sites. The most frequently sampled hosts were rhododendron and camellia at 35% and 20%, respectively. Other hosts included kalmia, viburnum, lilac and other known and associated hosts. Viburnum and rhododendron had the highest percentage of samples testing positive for *Phytophthora* at 25% and 22%, respectively. Other hosts tested positive for *Phytophthora* at or below levels of 7%. VDACS' *Phytophthora ramorum* survey will continue this fall.

--Featured Disease: Verticillium Wilt

Verticillium wilt (caused by *Verticillium albo-atrum* and *Verticillium dahliae*) is an important disease of field grown nursery stock in Virginia and throughout the world. The host range is over 300 species of plants and includes agricultural crops such as tomatoes and potatoes, horticultural crops such as chrysanthemums and various woody plants of importance to the nursery industry. Some of the most susceptible species include maple, redbud and elm (see complete list at: http://depts.washington.edu/hortlib/resources/ucdavis_verticillium.pdf).

Infected trees and shrubs are often first infected earlier in life, as seedlings or pole-size trees. Infected trees will often wilt on hot days or during dry spells. Other symptoms include interveinal and marginal leaf browning, branch flagging, loss of crown foliage, slow growth and occasionally stem cankering. Branches that die as a result of Verticillium Wilt are often infected by opportunistic pathogens such as *Botryosphaeria* which can lead to further decline of nursery stock. The sapwood (secondary xylem) of infected shrubs and trees is often discolored. Sapwood discoloration is a classic symptom of Verticillium Wilt but confirmation should be conducted by a diagnostic laboratory.

Verticillium resides in the soil and infects plants through new, succulent root growth. The pathogen then grows through the roots and into the stem by way of the xylem. Eventually the water conducting cells of the xylem become clogged with mycelium. Woody plants

can sometimes survive infection for years until drought or other stress occurs. Once the plant dies, the fungus populates the soil with darkened thick-walled masses of mycelium called microsclerotia. These structures are formed in infected foliage and roots and incorporate into the soil as plant material decomposes after death. Verticillium microsclerotia are the main propagule that infects future crops and they can lie dormant in soil for many years.

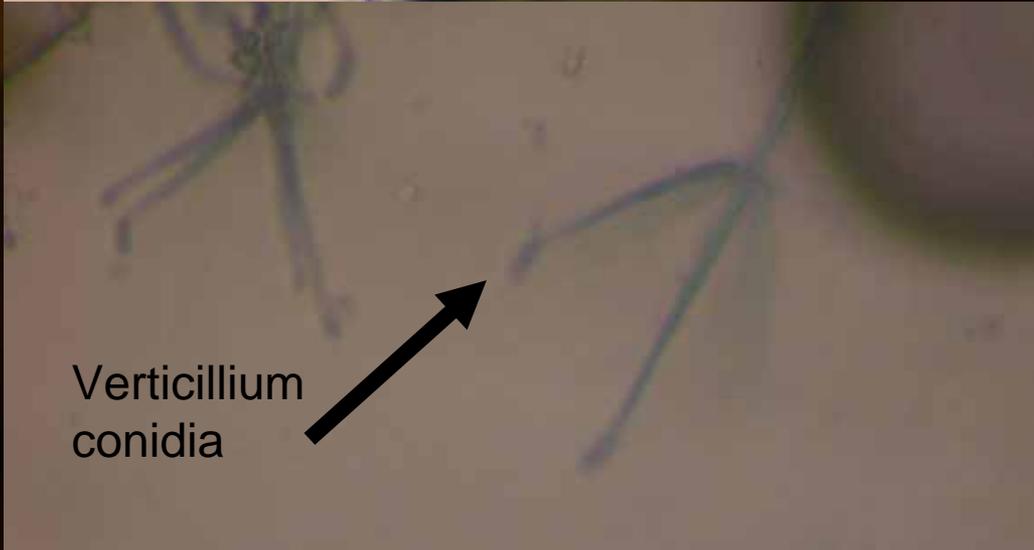
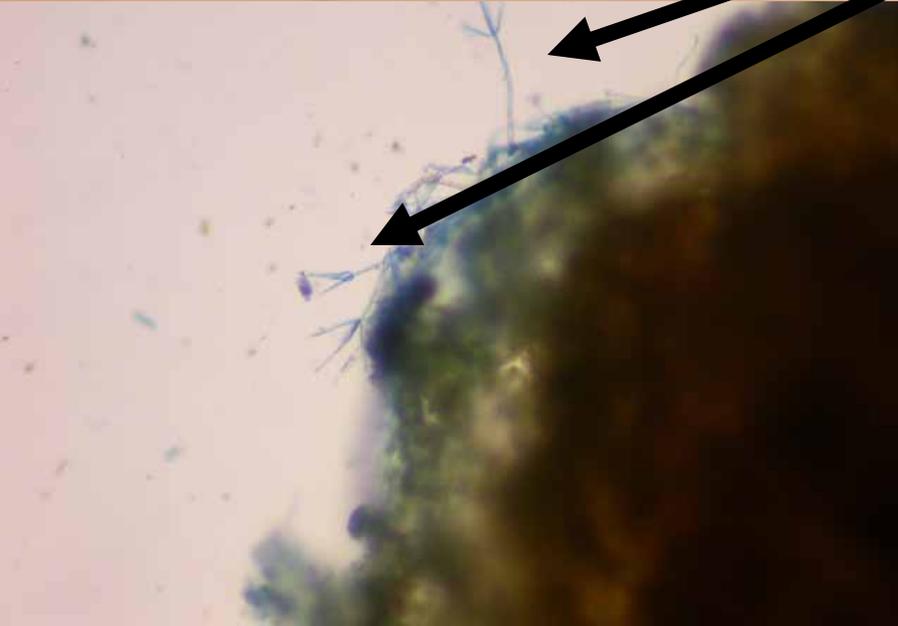
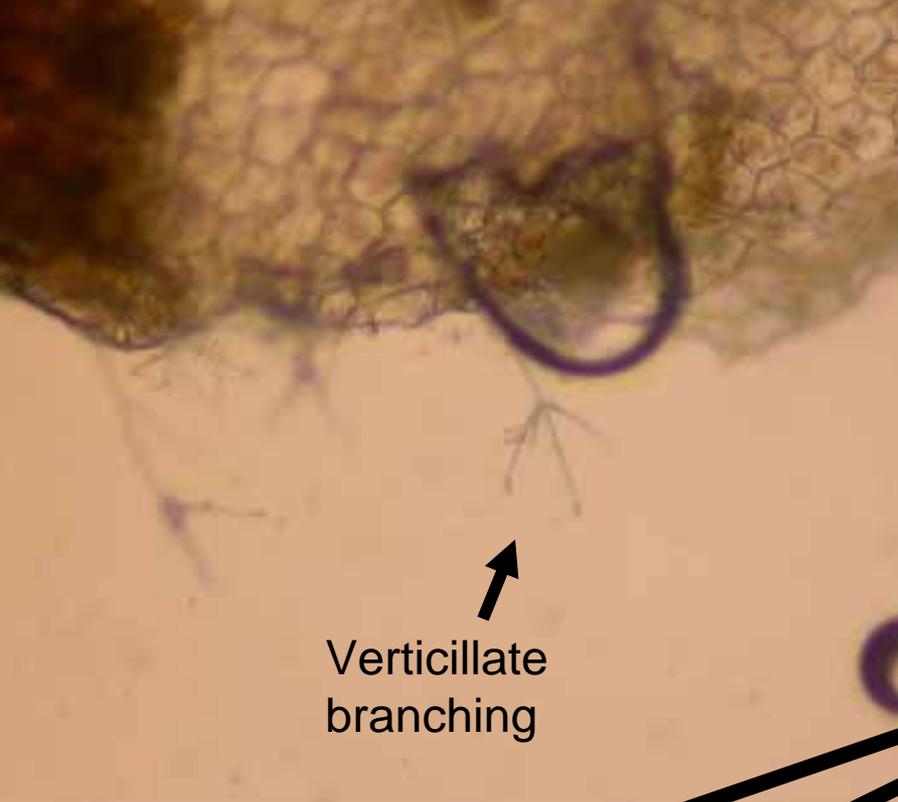
Nurseries that grow trees/shrubs directly in field soil are most at risk. It is important for nurseries to identify Verticillium when it is present so steps can be made to avoid its impact in the future. To accomplish this, plants with potential Verticillium Wilt symptoms should be sampled and sent in for diagnosis or work with your VDACS nursery inspector to coordinate sample submission. Once you determine Verticillium is present and causing disease in a field it is usually most practical to plant resistant or immune hosts in the field for several rotations. Conifers such as pines, spruce and larch are a few examples of immune plants. Some plant species have varying degrees of resistance based on region and cultivar. Boxwoods, for example, are listed in some literature as resistant and others as susceptible. This discrepancy is likely caused by variation in cultivar resistance and effects of local climate. In Virginia symptomatic/declining boxwoods do sometimes have Verticillium associated with their roots and stems. (See list of resistant and immune hosts at: http://depts.washington.edu/hortlib/resources/ucdavis_verticillium.pdf.)

Producers of containerized stock are not immune to Verticillium Wilt, although its effects can be more readily mitigated in these systems. Growers of containerized nursery stock can avoid Verticillium Wilt by purchasing disease free seedlings and using soilless potting media. When containerized stock develops Verticillium Wilt it is most often because the plants were grown from infected field seedlings. It is important to buy stock from trusted suppliers that assure their stock is free of disease. If you see suspect symptoms on your stock get the plants tested and alert your supplier of any positive test results.

For questions, comments, more information about testing email:
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Fig. 1: Tree with verticillium wilt disease, the tree's leaves emerged only to wilt and die after the spring heat set in.





Marginal leaf necrosis

