Walnut Twig Beetle and Thousand Cankers Disease of Walnut

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Forest health personnel with the West Virginia Department of Agriculture (WVDA) are concerned about a new disease complex that is affecting black walnut trees in several western states and could potentially become a problem in our eastern forests. Within the past decade there has been a significant amount of decline in black walnut growing in Oregon, Idaho, Utah, Colorado, Arizona, New Mexico, and parts of California. Affected walnut trees display a yellowing and thinning of the upper crown, which then progresses on down the tree to include the death of larger branches. In the final stage, large areas of the infected walnut rapidly wilt. Death of the entire tree occurs within three years after initial symptoms are noted.

The catalysts for this mortality are the walnut twig beetle (*Pityophthorus juglandis*) and subsequent canker development around beetle galleries caused by a fungal associate (*Geosmithia sp.*) of the beetle. The proposed name for this disease complex is "thousand cankers." The reason for this name is that eventually multiple cankers coalesce and girdle twigs and branches, resulting in branch dieback. The number of cankers that can form on branches and the trunk of infected walnut trees is tremendous.

The walnut twig beetle is a tiny (1.5-1.9 mm) yellowish-brown bark beetle, about three times long as it is wide **(see photo above)**. There are eight species of *Pityophthorus* known to occur in West Virginia, but the walnut twig beetle is primarily a southwestern species and thus far there is no record of it having been collected in West Virginia. Despite its name, attacks by adult walnut twig beetles in black walnut are not confined to twigs. The beetle is most commonly found tunneling in branches greater than two centimeters in diameter and sometimes even occurs in the trunks of walnut trees. Winter is spent primarily and possibly exclusively, in the adult stage. Adults initiate tunneling by early May, entering through bark crevices. It is during the tunneling that the *Geosmithia* fungus is introduced and subsequently grows in advance of the bark beetle. Ultimately a nuptial chamber is produced from which one or more radiating egg galleries are excavated. The larvae develop just under the bark and then enter the bark to pupate. A single generation has been observed to be completed in less than two months.

Two different types of cankers have been observed on the declining walnut trees. As mentioned in the paragraph above, *Geosmithia* is found in association with the walnut twig beetle. Symptoms of *Geosmithia* infection include small, diffuse, dark brown to black cankers **(see photo below)**. They initially develop around the nuptial chambers of the walnut twig beetle in small twigs, branches and the trunk. These branch cankers may not be visible until the outer bark is shaved from the entrance to the nuptial chamber, but a dark amber stain may form on the bark surface in association with the cankers. The cankers expand rapidly and develop more expansively in length rather than around the stem. Eventually, multiple cankers coalesce and girdle twigs and branches, resulting in branch dieback. The origin of the *Geosmithia* fungus associated with thousand cankers disease is unknown, and this particular fungus is not known to occur in West Virginia. Studies continue on both the host range and possible origin of the fungus. *Geosmithia* spp. are associates of bark beetles of hardwood trees but have not previously been reported as pathogens of black walnut or an associate of the walnut twig beetle.

There is a second fungus (*Fusarium solani*) which is also associated with canker formation on the trunk and scaffold branches. This occurs when walnut trees are in advanced stages of decline. These cankers are much larger than those caused by *Geosmithia* and often exceed two meters in length, extending from the ground into the scaffold branches, and may encompass more than half of the circumference of the trunk. Trunk cankers are not readily visible without removal of the outer bark, but a dark brown-to-black stain on the bark surface, or in bark cracks, often indicates the presence of a canker. The inner bark and cambium below the bark surface on the canker face is water-soaked and stained dark brown to black. Unlike *Geosmithia*, *F. solani* has not been isolated from cankers surrounding walnut twig beetle galleries or directly from bark beetles. *F. solani* is a somewhat common pathogen with a wide host range. It occurs in West Virginia and can be a serious disease of tomatoes, potatoes and other crops.

Controls for thousand cankers disease have not yet been identified and their development will require better understanding of the biology of the walnut twig beetle and the canker-producing *Geosmithia*.

Recognizing Hazardous Trees

Part 2, continued from October Market Bulletin

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EXAMINE THE TRUNK

Watch for forked trunks. Forked trunks are signals of potential weakness, especially if one side of the fork has grown outward instead of upward like the other. Narrow-angled forks are also prone to infection, often indicated by sap or pitch being exuded. Early pruning of one side of the fork can prevent these problems; cables or braces are corrective actions taken by tree experts to strengthen the fork in trees of higher value.

Look for tree balance. Leaning or lopsided trees present more of a hazard than those growing vertically, but if a tree has always grown off center, generally it is not a risk. However, any sudden lean indicates breakage or weakening of support roots and should be cause for alarm and immediate action.

Look for signs of decay. Clues to internal decay of the trunk or large branches are cavities, cankers and the fruiting bodies of fungal conks. Sometimes there are no outward indications.

Don't forget the roots. Root decay is often subtle and difficult to detect. Sometimes the decay fungi's work in weakening support roots goes completely unnoticed because the smaller feeder roots may go right on absorbing water and lawn fertilizer. Then, suddenly, one day the tree falls over. To detect root decay, look carefully for mushrooms on or near the base of the tree. If found, or if root trouble is suspected, have a tree expert dig up some roots to sample for decay organisms.

Trenching or construction within the root zone is a major cause of hazard trees. First severed roots lose their ability to support the trunk and crown, especially if located on the windward side of the tree. Second, severed roots are open wounds that invite decay organisms.

Evaluating and treating high-risk trees can be a complicated process, requiring certain level knowledge and expertise. When in doubt about how much risk a defective tree poses, or how best to treat it, consult a tree expert such as a forester, arborist or plant pathologist. Remember, trees do not live forever. Design and follow a backyard landscape plan that includes proper tree selection, and a cycle of tree maintenance and replacement.