1000 Canker Disease: A Serious New Problem on Black Walnut

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This story begins in the summer of 2005. A landowner in Emmett, ID reported black walnut (*Juglans nigra*) trees dying. The tree would look fine until the hot weather hit, and then the foliage would quickly wilt and the tree would die. The symptoms progressed rapidly, with some trees dying in as little as one month. Another call came in that same year from Meridan, ID – same thing. The next year, the same patterns of symptoms began to be reported in Boise. Initially, the common thought was that trees had suffered many years of drought stress and had finally succumbed to the lack of sufficient moisture. But as landowners and resource managers began to look more closely at the affected trees they found that there were large numbers of very small holes in the bark, which were initially thought to be ambrosia beetles.

Figure 1(photo at left). Foliage rapidly wilting and dying on mature black walnut. (Photo courtesy of Whitney Cranshaw from forestryimages.org)

Samples were collected and brought back to the University of Idaho for identification of the insect involved. Dr. Stephen Cook, University of Idaho Insect Ecologist, and Frank Merikel, Manager of the University of Idaho William Barr Insect Museum, concurred that the insect involved was NOT ambrosia beetles, but instead was the walnut twig beetle (*Pityophthorus juglandis*), a native bark beetle on black walnut in New Mexico and Arizona.

While searching for information on this beetle, I came across an article describing a problem on black walnut from Boulder, CO, and the description and photos matched what we were seeing here exactly. I contacted Dr. Ned Tisserat Plant Pathologist at Colorado State University, and the story he told me was the same as ours.

In March of 2008 I went to Boise to meet with the folks at Boise Park and Recreation and Jim Hoffman, Forest Pathologist, USDA Forest Service. Samples were collected and sent to Ned in Colorado. We were all pretty sure by now that there was a fungal associate that produced the wilt-like symptoms and rapid death. By June, 2008 Ned had our results – thousand cankers disease of black walnut.

The insect - walnut twig beetle. Native to North America, the walnut twig beetle's (*Pityophthorus juglandis*) primary range is New Mexico, Arizona, and Chihuahua, Mexico, and coincides with the natural distribution of Arizona walnut (*Juglans major*), a likely native host.

Attacks by adult walnut twig beetles primarily occur on branches greater than 2 cm diameter. Very large branches and even the trunk can be colonized during advanced stages of thousand cankers disease. Adults lay eggs in the summer and larvae tunnel under the bark feeding on the phloem as they grow. Larvae feed for 4-6 weeks in meandering tunnels that run perpendicular to the egg gallery and pupate at the end of the tunnel. The life cycle is complete by late fall and adults (mostly) spend the winter under the bark in the galleries made by the larvae. The following spring (late-April), the first adults emerge and fly to near-by branches to mate and lay eggs. More adults emerge to produce a second generation in early summer. Peak flight activity of adults occurs from mid-July through late August and declines by early fall as the beetles enter hibernation sites. A small number of beetles produced from eggs laid late in the season may not complete development until November.

Figure 2. Meandering galleries under the bark of a large branch. (Photo courtesy of Whitney Cranshaw from forestryimages.org)

The pathogens – *Geosmithia morbid and Fusarium solani.* Ned Tisserat and Whitney Cranshaw of Colorado State University have observed two different types of cankers on dying black walnut trees. The first pathogen identified is an unnamed fungus in the genus *Geosmithia* (a currently proposed species name for this fungus is *Geosmithia morbid)*. This fungus is introduced to the tree as beetles are tunneling and grows in advance of the bark beetle. The branch cankers are not visible until the bark is peeled back – only then does one see the small, dark brown cankers. It is not the size of the canker that kills, it's the sheer numbers of cankers per limb that cause the rapid wilt and death of the effected tree – hence the name thousand cankers.

Figure 3. Walnut twig beetles with the associated canker caused by *Geosmithia.* (Photo courtesy of Whitney Cranshaw from forestryimages.org)

The second pathogen associated with this disease is the fungus *Fusarium solani*. In association with the walnut twig beetle and *Geosmithia* fungus, these cankers can commonly be two meters or more in length and can wrap around more than half the circumference of the trunk. These *Fusarium* cankers are subtle and can be identified by cracks in the bark or dark brown to black stains. When the bark is peeled back, the cankered area (the inner bark and cambium) is water-soaked and dark-brown to black. The importance of the *Fusarium* fungus in the development of these large cankers is still being studied.

Diagnosis and management. We have a name and know what it is, but unfortunately we have not identified any effective controls for thousand canker disease. Because of this, stopping the spread of the disease is vital. In Idaho, black walnut is the only reported susceptible species of tree. The disease currently ranges from Emmett east to the Boise area and up into the Boise foothills. Bark beetles are traditionally not very strong flyers, and so the spread of the insects, and the associated fungi, is partially dependent on prevailing winds.

Thousand cankers disease most likely spreads through the transportation of infested wood material (logs) and perhaps thorough nursery stock. Logs should not be moved from infested areas unless they have been dried for at least three years, kiln-dried or all of the bark has been removed from the log.

For more information, or if you think you have black walnut that has been infected with thousand cankers disease, please contact Yvonne Barkley at the UI Extension Forestry office by phone (208) 885-7718 or e-mail yvonnec@uidaho.edu.

Parts of this article have been excerpted from "Walnut Twig Beetle and Thousand Cankers Disease of Black Walnut" by Ned Tisserat and Whitney Cranshaw, Colorado State University, Boulder, CO.