

Thousand Cankers Disease of Walnuts Spreads in California

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S ometime in the last decade, walnut trees in California began dying from a mysterious new disease now known as thousand cankers. The branches of infected trees were covered with hundreds or thousands of small, dark, wet cankers. Although the identity of the causal agent was not confirmed in California until 2008 in a tree in Yolo County, the disease had probably been in the state for many years as evidenced by widespread decline of black walnuts along roadsides, in park lands, and in some very remote wild areas in the National Forest system. While early detections suggested that the disease might be limited to black walnut, recent finds indicate that the disease may pose a threat to California's commercial English walnut industry as well. We are part of a team of researchers at the University of California and USDA Forest Service tracking its spread in the state.

The causal agent of thousand cankers disease is a newly described fungus, *Geosmithia* sp. (proposed name *Geosmithia morbida*), spread by the tiny walnut twig beetle, *Pityophthorus juglandis*. Scientists believe that the disease only occurs on walnut. The fungus apparently enters the tree as the beetle tunnels into the bark to prepare egg galleries, probably carried as conidia on the beetle's elytra or wing covers. Once in the tree, the fungus grows into the tree's phloem, cambium, and surface of the xylem, killing tissue and causing lesions or cankers beneath the bark. Without further aid of the beetle, damage by the fungus is localized. A tree can survive the stress produced by a few cankers. However, myriad inoculations by many beetles result in numerous small cankers that coalesce, eventually girdling twigs and branches. Thus, the walnut twig beetle is believed to be critical to the spread of the disease and the level of damage incurred. Death of trees is probably associated with high populations of the beetle. When the trees are sufficiently weakened, this minute beetle will even colonize the main stem of a tree down to the soil line.

Limited information is available regarding the biol-



Figure 1. Flagging and yellowing caused by thousand cankers disease. (Photo by Steve Seybold)

ogy of the walnut twig beetle and the *Geosmithia* fungus. The walnut twig beetle is believed to be native to Arizona, California, New Mexico, and Mexico; it was first collected in Los Angeles Co. over 50 years ago. Until its recent association with the thousand cankers disease pathogen, it was not known to significantly damage trees and was not considered a pest.

Although certainly the cause of the decline, the *Geosmithia* fungus was not associated with the disease until 2006. Little is known of the origin or the biology of the fungus. Fungi in this group are typically not considered to be important plant pathogens, but many members of the genus are just being recognized worldwide as associates of phloem- and wood-boring insects.

Thousand cankers disease cases are now scattered across the western half of the U.S. Decline of black walnuts was first noticed in Utah and Oregon in the early 1990s, but at that time damage was attributed to environmental stress, although cankers were present. The disease was subsequently recorded in New Mexico in 2001 and Colorado in 2003. The disease has also been found in Arizona, Idaho, Oregon, and Washington. The eastern extent of the distribution of the disease is now believed to be the Front Range in Colorado. There are many black walnut trees grown for fine lumber products in the central and eastern U.S. that are threatened by the potential eastward spread of the disease. Movement of infested/infected raw wood from



Figure 2. Walnut twig beetle entrance holes on bark and staining. (Photo by Larry Strand)



Figure 3. Staining and beetle galleries beneath the bark. (Photo by Larry Strand)



Figure 4. Sap staining on bark of English walnut. (Photo by Andy Graves)

California and Oregon to points east for woodworking and veneer production is the pathway of highest concern. No less important as a pathway is the movement of black walnut firewood along the corridor between eastern Colorado, Kansas, and Missouri, as well as the natural flight dispersal of the walnut twig beetle among walnut trees planted in communities along this corridor.

Within California, thousand cankers disease has been found in 15 counties stretching from Sutter County in the north to Los Angeles in the south; it appears to be very abundant in Los Angeles, Solano, Sutter, Tulare, Ventura, and Yolo Counties. It has not been detected north of Sutter County, but we believe the disease is still spreading in the state. As of April 1, 2010, it had not been confirmed in many other northern California and Central Valley counties including Shasta, Tehama, Glenn, Butte, Colusa, Yuba, Stanislaus, Merced, Madera, Fresno, and Kern. This summer we will be initiating a study to track the pathogen and

the beetle throughout the state, particularly in commercial orchards.

Although it has been recorded on 10 species of walnuts or their hybrids in California, most positive identifications of *Geosmithia* have come from native black walnuts, *J. californica* and *J. hindsii*, growing in riparian areas, germplasm collections, near commercial orchards, or in urban landscapes where mortality is high. The sensitivity of black walnut varieties to the disease is a serious threat to nursery growers who rely on black walnut rootstocks. However, as the awareness of growers, farm advisors, and pest control advisers has increased, there have been a growing number of recent detections of the disease in commercial English walnut, *J. regia*, and in Paradox (*J. hindsii* x *regia*) rootstocks in several areas of the state, causing concern for the walnut production industry. Growers and pest control advisers should keep a look out for symptoms as they monitor their orchards, paying particular attention to aboveground por-

tions of rootstocks as well as trunks and especially small branches down to about 1.5 cm in diameter.

At present, management options for thousand cankers disease are limited. No pesticides or control methods are currently tested and available to prevent infection of thousand cankers disease or to save infected trees. We are developing an aggregation pheromone for walnut twig beetle to aid in future detection and monitoring. For the time being, to prevent spread, infected trees should be removed and material destroyed by grinding or burning immediately to insure that beetles are destroyed. Do not move infested walnut for chips, firewood, or woodworking to new areas, even among the counties of California. Please report any possible detections on English walnut to your agricultural commissioner's office or to your local University of California Cooperative Extension office.

What To Look For

Often the first symptoms of the disease to be noticed are flagging and yellowing leaves and branch dieback (Figure 1). If you look more closely at affected branches, you may see sap staining and pinhole-sized walnut twig beetle entrance or emergence holes (Figure 2). If you peel or cut back the outer surface of the bark around the holes, you will likely see the dark staining of the wood caused by the fungus (Figure 3). Heavily infested trees will have many beetle entrance and exit holes and fungal lesions that coalesce to girdle the branch. These multiple lesions are the source of the name "thousand cankers disease." Because of its light-colored bark, sap staining is very obvious from a distance on English walnut trees (Figure 4).

Walnut twig beetles (Figure 5) are tiny, about 1.5 mm in length, and difficult to see. Their entrance and exit holes are more likely to be spotted than the beetles. Look around the leaf scars for the holes in twigs or branches more than 1.5 cm in diameter. Beetles are believed to be active nearly year round in California, but have been observed in flight or on the bark surface from March through November. The walnut twig beetle probably has 2 to 3 generations a year.

A printable, illustrated Field Identification Guide and more photos and information are available on the University of California web site at <http://www.ipm.ucdavis.edu/EXTIC/thousandcankers.html>. 🐞



Figure 5. Walnut twig beetle. (Photo by Larry Strand).

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