Pest Alert

United States
Department of Agriculture
Forest Service
Northeastern Area
State and Private Forestry
NA–PR–02–10
May 2010

Thousand Cankers Disease

Dieback and mortality of eastern black walnut (*Juglans nigra*) in several Western States have become more common and severe during the last decade. A tiny bark beetle is creating numerous galleries beneath the bark of affected branches, resulting in fungal infection and canker formation. The large numbers of cankers associated with dead branches suggest the disease's name—*thousand cankers disease*.

The principal agents involved in this disease are a newly identified fungus (*Geosmithia* sp. with a proposed name of *Geosmithia morbida*) and the walnut twig beetle (*Pityophthorus juglandis*). Both the fungus and the beetle only occur on walnut species. An infested tree usually dies within 3 years of initial symptoms.

Thousand cankers disease has been found in many Western States (figure 1). The fungus and the beetle have not been found east of the Great Plains. However, a number of factors suggest that this disease could establish in eastern forests: the widespread distribution of eastern black walnut, the susceptibility of this tree species to the disease, and the capacity of the fungus and beetle to invade new areas and survive under a wide range of climatic conditions in the West.

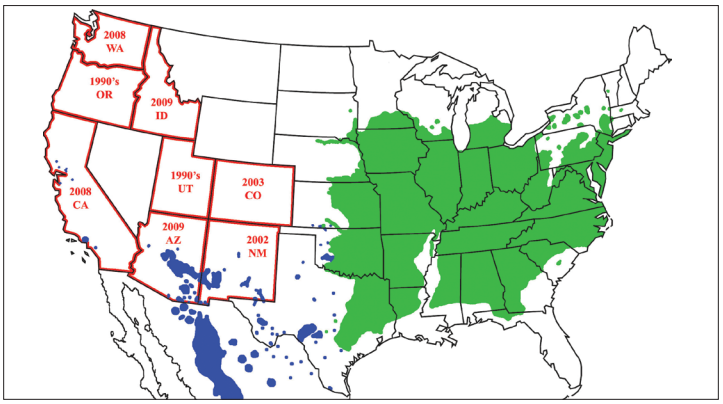

Figure 1. Thousand cankers disease has been confirmed in eight western states (outlined in red) as of April 2010. The year when symptoms were first noted is given. Native distributions of four species of western walnuts (blue) and eastern black walnut (green) are also shown. Eastern black walnut is widely planted in the West, but not depicted on this map.

Disease Symptoms

The three major symptoms of this disease are branch mortality, numerous small cankers on branches and the bole, and evidence of tiny bark beetles. The earliest symptom is yellowing foliage that progresses rapidly to brown wilted foliage, then finally branch mortality (figure 2). The fungus causes distinctive circular to oblong cankers in the phloem under the bark, which eventually kill the cambium (figure 3). The bark surface may have no symptoms, or a dark amber stain or cracking of the bark may occur directly above a canker. Numerous tiny bark beetle entrance and exit holes are visible on dead and dying branches (figure 4), and bark beetle galleries are often found within the cankers. In the final stages of disease, even the main stem has beetle attacks and cankers.

Figure 2. Wilting black walnut in the last stages of thousand cankers disease.

Figure 3. Small branch cankers caused by *Geosmithia morbida*.

Geosmithia sp.

Members of the genus *Geosmithia* have not been considered to be important plant pathogens, but *Geosmithia morbida* appears to be more virulent than

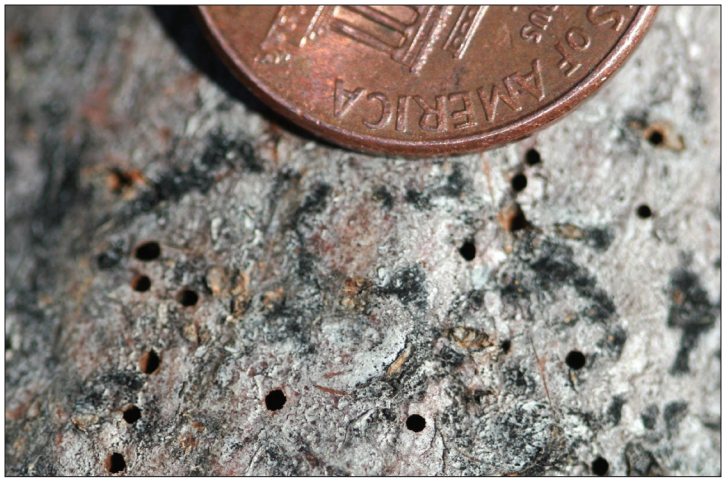

Figure 4. Exit holes made by adult walnut twig beetles.

Figure 5. Walnut twig beetle: top view (A) and side view (B).

related species. Aside from causing cankers, the fungus is inconspicuous. Culturing on agar media is required to confirm its identity. Adult bark beetles carry fungal spores that are then introduced into the phloem when they construct galleries. Small cankers develop around the galleries; these cankers may enlarge and coalesce to completely girdle the branch. Trees die as a result of these canker infections at each of the thousands of beetle attack sites.

Walnut Twig Beetle

The walnut twig beetle is native to Arizona, California, and New Mexico. It has invaded Colorado, Idaho, Oregon, Utah, and Washington where walnuts have been widely planted. The beetle has not caused significant branch mortality by itself. Through its association with this newly identified fungus, it appears to have greatly increased in abundance. Adult beetles are very small (1.5 to 2.0 mm long or about 1/16 in) and are reddish brown in color (figure 5). This species is a typical-looking bark beetle that is characterized by its very small size and four to six concentric ridges on the upper surface of the pronotum (the shield-like cover behind and over the head) (figure 5A). Like most bark beetles, the larvae are white, C shaped, and found in the phloem. For this species, the egg galleries created by the adults are horizontal (across the grain) and the larval galleries tend to be vertical (along the grain) (figure 6).

Survey and Samples

Visually inspecting walnut trees for dieback is currently the best survey tool for the Eastern United States. Look for declining trees with the symptoms described above. If you suspect that your walnut trees have thousand cankers disease, collect a branch 2 to 4 inches

Figure 6. Walnut twig beetle galleries under the bark of a large branch.

in diameter and 6 to 12 inches long that has visible symptoms. Please submit branch samples to your State's plant diagnostic clinic. Each State has a clinic that is part of the National Plant Diagnostic Network (NPDN). They can be found at the NPDN Web site (www.npdn.org). You may also contact your State Department of Agriculture, State Forester, or Cooperative Extension Office for assistance.

Prepared by:
Steven Seybold, Research Entomologist, U.S. Forest Service, Pacific Southwest Research Station

Dennis Haugen, Forest Entomologist, and Joseph O'Brien, Plant Pathologist, U.S. Forest Service, Northeastern Area State and Private Forestry

Andrew Graves, Postdoctoral Research Associate, UC-Davis, Department of Plant Pathology

Photographs:
Figure 1: Andrew Graves
Figure 2: Manfred Mielke, U.S. Forest Service
Figures 3, 4, 6: Whitney Cranshaw, Colorado State University, www.forestryimages.org
Figure 5: Steve Valley, Oregon Department of Agriculture

USDA is an equal opportunity provider and employer.

Federal Recycling Program
Printed on recycled paper.

Published by:
USDA Forest Service
Northeastern Area
State and Private Forestry
11 Campus Boulevard
Newtown Square, PA 19073
www.na.fs.fed.us