Thousand Cankers Disease

Recognizing TCD-Affected Trees

General Overview

Thousand cankers disease (TCD) is a recently recognized disease that affects trees in the genus *Juglans* (walnuts, butternut). It has been particularly devastating to black walnut (*Juglans nigra*) and for over a decade has devastated walnut plantings in several western states. Since 2010 thousand cankers disease has been found in the native range of black walnut in the eastern US, and is currently known from sites in Tennessee, Virginia, and Pennsylvania. It is likely that additional locations are infested and it is very important to identify known areas of the disease so that it can be better contained.

Thousand cankers disease is produced through the combined activities of two organisms. The **walnut twig beetle** (*Pityophthorus juglandis*) is a minute bark beetle that tunnels into limbs and trunks of walnut. The immature stages (grubs) develop under the bark. Carried on the body of the walnut twig beetle is the fungus ***Geosmithia morbida***, which is deposited in wounds made during walnut twig beetle tunneling. The fungus grows in the bark, killing tissues and producing a dead area (canker). Thousand cankers disease results from the cumulative effects of large numbers of cankers, each initiated by a walnut twig beetle entry wound, which ultimately destroys bark function.

Figure 1. Black walnut killed by thousand cankers disease.

Figure 2. Cankers produced in the bark by the fungus *Geosmithia morbida*.

Importance of Wood Movement

TCD has not been confirmed in Illinois. Much like Emerald Ash Borer, Gypsy Moth, and other destructive tree pests, walnut twig beetles and TCD can very easily be artificially transported in firewood and untreated walnut wood. Most insects and diseases cannot move far on their own, but can move hundreds of miles with the aid of human transport.

General Symptoms of TCD-Affected Trees

Several symptoms visible during street tree surveys may be useful to identify trees affected by thousand cankers disease. Often there is a general thinning of the crown. Scattered small branches may show leaf yellowing (flagging) and foliage may suddenly wilt. Progressive limb dieback typically occurs during the course of the disease and bushy foliage growth often develops below the areas of the tree that have been killed.

Figure 3. Yellow flagging of scattered limbs is a symptom of trees affected by thousand cankers disease.

Figure 4. Leaf wilting associated with thousand cankers disease.

Figure 5. Trees may have a bushy appearance in areas beneath limbs killed by thousand cankers disease.

Acknowledgments

USDA – NIFA Critical Issues
USDA Western IPM Emerging Pests
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Sampling Limbs to Detect Thousand Cankers

If a tree is suspected of having thousand cankers disease, further sampling is needed. To detect if thousand cankers is present, limbs showing recent leaf flagging or wilting are most useful in diagnosis. Small diameter branches (ca. 1-2 inches diameter) with smooth bark are best to observe the pinhole-sized entry and exit holes made by walnut twig beetles. Careful shaving of the bark from these TCD-affected limbs can expose the cankers and twig beetle tunnels.

Figure 6. Sampling limbs showing symptoms of thousand cankers disease may show evidence of walnut twig beetle exit and entry holes. These are most easily seen in smaller diameter limbs with smoother bark.

Figure 7. Walnut twig beetle galleries and discoloration produced from canker development is usually easily seen by shaving the bark from areas where twig beetle exit holes are evident.

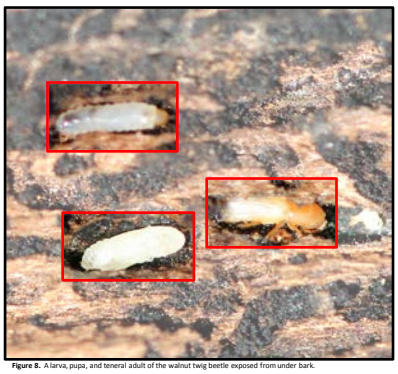

Figure 8. A larva, pupa, and teneral adult of the walnut twig beetle exposed from under bark.

Use of Walnut Twig Beetle Traps

Traps can be used to detect the presence of walnut twig beetles. These contain a lure that is attractive to adult walnut twig beetles over a limited range of a couple dozen feet. Such traps are best used by placing them on trees where TCD is suspected but sampling of limbs is difficult.

Figure 9. A Lindgren funnel trap with a lure to attract the walnut twig beetle. The insects impact the funnels when flying to the trap and are collected in the cup at the bottom.

Figure 10. Walnut twig beetle adults on a penny for scale.

Figure 11. Walnut twig beetle. Photograph courtesy of Jim LaBonte/Oregon Department of Agriculture.

Culture of *Geosmithia morbida*

Confirmation of thousand cankers can be made by culturing *Geosmithia morbida*. Often the fungus can be observed as it sporulates in beetle galleries. However, it can also be cultured from samples of wood taken from areas of cankers and even from beetle frass.

Figure 12. Cankers exposed under the bark. Tunnels of the walnut twig beetle are present in the center of each. The whitish growth in the canker on the lower right is sporulating *Geosmithia morbida*.

Figure 13. *Geosmithia morbida* colonies growing on 1/4 strength PDA media.

If You Suspect TCD

In Illinois, if you have questions or suspect TCD in your area, please contact:
Illinois Department of Agriculture (815-787-5476)
Illinois Cooperative Agricultural Pest Survey (217-333-1005)
University of Illinois Plant Clinic (217-333-0519)