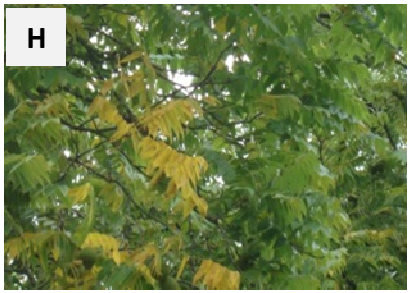
What are *SYMPTOMS* of DISEASED TREES?

Symptoms of thousand cankers disease resemble drought stress, which may cause this disease to go undetected. One of the early symptoms of this disease is flagging – one or more branches with yellow foliage (H). Flagging is followed by a thinning of the upper canopy. Other symptoms include wilting, clinging foliage (I), limb and/or canopy dieback (J), and epicormic shoots (i.e., water sprouts) along the branches and tree trunk (J).



Infected trees usually die within 3 to 5 years after symptoms become apparent. However, it is important to note, trees may have been infested/infected for 10 to 15 years before symptoms develop. Thus, trapping of walnut twig beetles is important as an initial step to determine the presence of thousand cankers disease in your area.

Do *YOUR* Part – *DON'T SPREAD IT!*

The fungus and the beetle can spread through transportation of infected/infested wood. Thousand cankers disease is not known to be spread by nuts or nutmeat. The following guidelines will limit the spread of thousand cankers disease:

- **Don't transport firewood! If camping, purchase firewood at your destination. Don't bring wood with you or return home with unused wood.**
- **Buy firewood or wood for woodworking from a local source.**
- **Look for declining black walnut trees; if found, contact your county agent, state forester, or state department of agriculture.**

Scan this symbol with your smart phone or other mobile device for more information or visit: www.tcdgroundzero.com

THE UNIVERSITY of TENNESSEE INSTITUTE of AGRICULTURE

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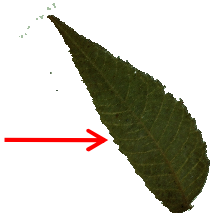
BLACK WALNUTS ARE DYING!

What Is *BLACK WALNUT* and Why Should *YOU* Be Concerned?

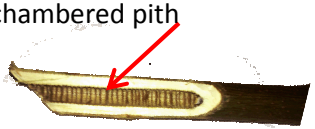
Black walnut is ***native*** to much of the eastern U.S., where it is found in many rural and urban areas. It is an important economic tree (valued for wood [lumber and veneers]) and food resource (valued for nutmeat). Standing black walnut in the U.S. is valued at $569 billion.

HOW TO IDENTIFY BLACK WALNUT:

Leaf: 13-20 leaflets with toothed edges



Twig: leaf scars on twigs resemble smiling monkey faces; twigs have a dark chambered pith



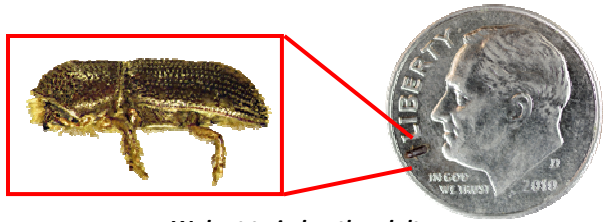
Bark: rough surface; scraping reveals brown color

Immature nuts are surrounded by green husks.

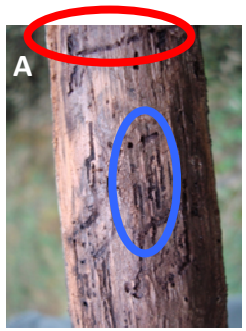
Mature nuts are brownish black with a hard, ridged shell.

What Is *THOUSAND CANKERS DISEASE*?

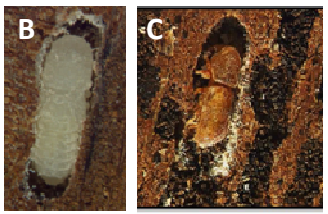
Black walnut trees in urban areas in the western U.S. have been dying for more than 10 years. Mortality has been attributed to a disease named ***thousand cankers disease***. This disease is caused by a fungal pathogen (*Geosmithia morbida*) which is vectored by the walnut twig beetle (*Pityophthorus juglandis*).



Walnut twig beetle adult

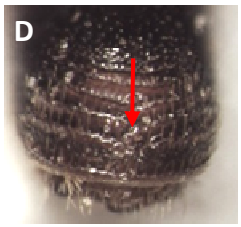


A) Beetle galleries: **horizontal (against the grain) – adults; vertical (with the grain) – larvae**



Walnut twig beetle pupa (B) and adult (C) in gallery; note white fungal growth of *G. morbida*

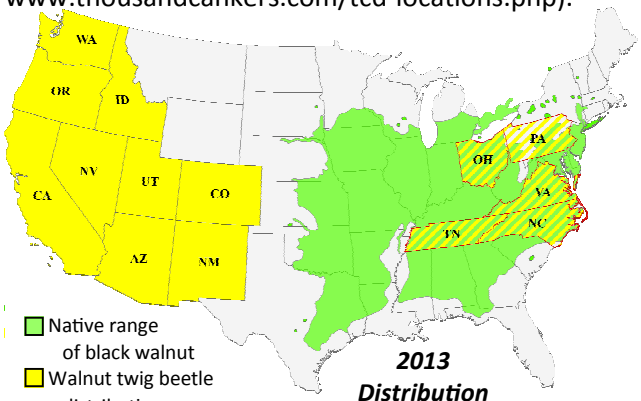
E) Conidia of *G. morbida*



D) Note broken ridge on head of beetle

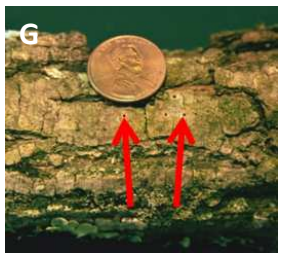
Where Is It *FOUND* and What Does It *DO*?

In 2010, this deadly disease was found on black walnut in its native range in the eastern U.S. (Tennessee). Thousand cankers disease continues to be found in new areas (for current distribution, visit www.thousandcankers.com/tcd-locations.php).



Adult beetles carry the fungus on their bodies. The fungus is introduced into the tree when beetles feed or bore into the bark. Females lay eggs and larvae form galleries, where they spread the fungus. The fungus forms small cankers (areas of dead tissue [F]), which coalesce to disrupt cambial and phloem function (i.e., nutrient and water flow) within the tree. Over several years and after thousands of cankers, the infected tree dies.

F) Cankers on black walnut



G) Exit holes made by walnut twig beetles