

# Thousand Cankers Disease



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# Introduction



Healthy Tree (left) and declining tree (right)



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Image credits:

Healthy tree – wikimedia commons; Dying tree - Karen Snover-Clift, Cornell University, [ww.bugwood.org](http://ww.bugwood.org), #5458329;



# Thousand Cankers Disease (TCD)



Cankers caused by thousand cankers disease

Image credits:

Right - Curtis Utley, CSUE, [www.bugwood.org](http://www.bugwood.org), #5406077 and left - Whitney Cranshaw, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5406066

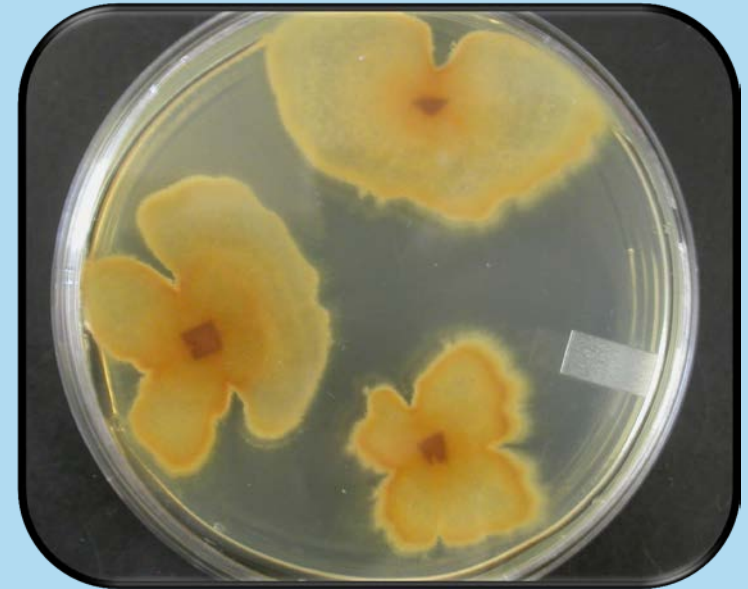


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# The fungal pathogen



Fungus in culture – dorsal view  
(top left) .

Fungus in culture – ventral view  
(right).

Conidiophores (bottom left).

Image credits:

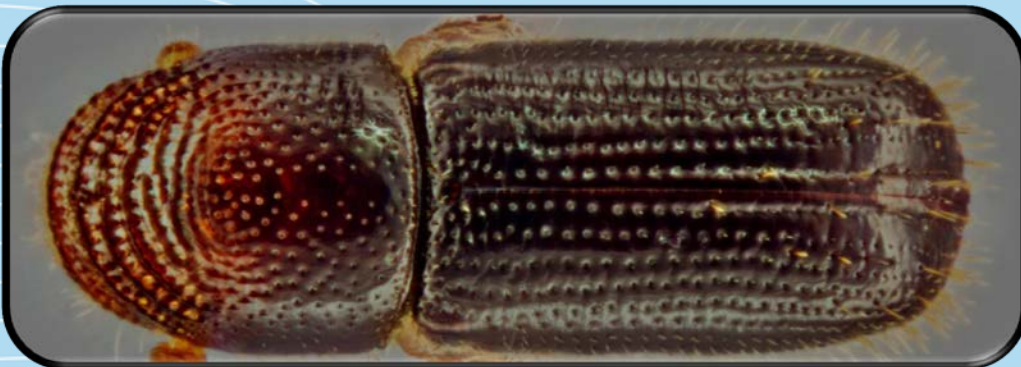
Fungus in culture - Ned Tisserat, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5406098 and #54060997; asexual spores - Alan Windham, University of Tennessee.



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# The vector of TCD



Walnut twig beetle (left)  
and twig beetle size (right)

Image credits:

Side view of beetle - Steven Valley, Oregon Department of Agriculture, [www.bugwood.org](http://www.bugwood.org), #5445394; dorsal view of beetle - Steven Valley, Oregon Department of Agriculture, [www.bugwood.org](http://www.bugwood.org), #5482202; beetles on penny - Whitney Cranshaw, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5445294



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# Life History of Walnut Twig Beetle and the Spread of TCD

- Adult beetles colonize branches in mid-spring, introducing fungus.
- The length of time it takes for larval beetle development to complete and for adults to disperse to infect other trees depends on the temperature.
  - 8 weeks in Colorado, 5 weeks in Tennessee
- Multiple generations occur from spring through late summer.
- Late summer generations emerge as adults which then overwinter under bark.



Adult female galleries go across the grain

Larval galleries go with the grain



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# Life History of Walnut Twig Beetle and the Spread of TCD



Fungus lining  
the galleries  
made by the  
beetle.



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# Other Hosts



California walnut  
(pictured above)

Hinds walnut  
(top right)

Arizona walnut  
(bottom right)



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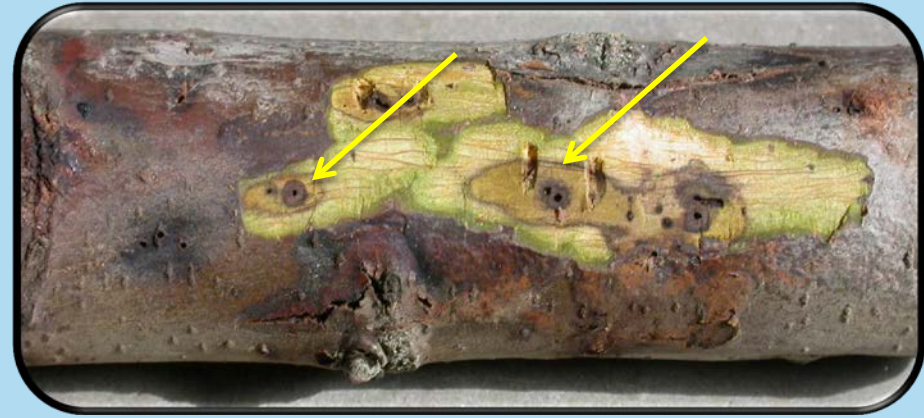
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# Symptoms of TCD



Trees with yellowing and thinning of the foliage



Small circular to oblong cankers found after bark is removed

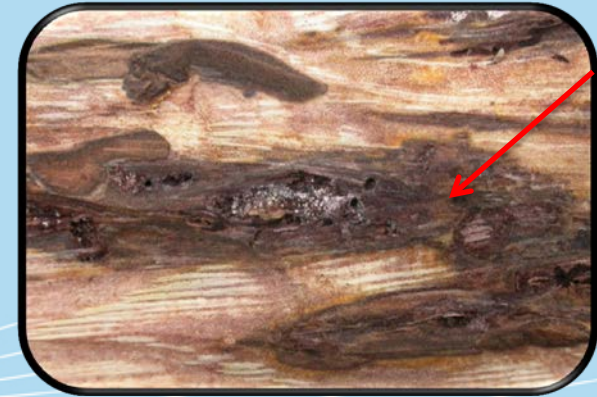


Image credits:  
Trees with yellowing fringe: Whitney Cranshaw, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5406054 and Ned Tisserat, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5406085; cankers - Ned Tisserat, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5406091 and #5406089



# Symptoms of TCD



Image credits:

Right - Curtis Utley, CSUE, [www.bugwood.org](http://www.bugwood.org), #5406077 and left - Ned Tisserat, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5406104



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# Signs of the beetle



Image credits:

Holes left by beetles - Whitney Cranshaw, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5406073; walnut twig beetle galleries - Whitney Cranshaw, Colorado State University, [www.bugwood.org](http://www.bugwood.org), #5382183; frass caps – Katheryne Nix, Entomology and Plant Pathology Department, University of Tennessee



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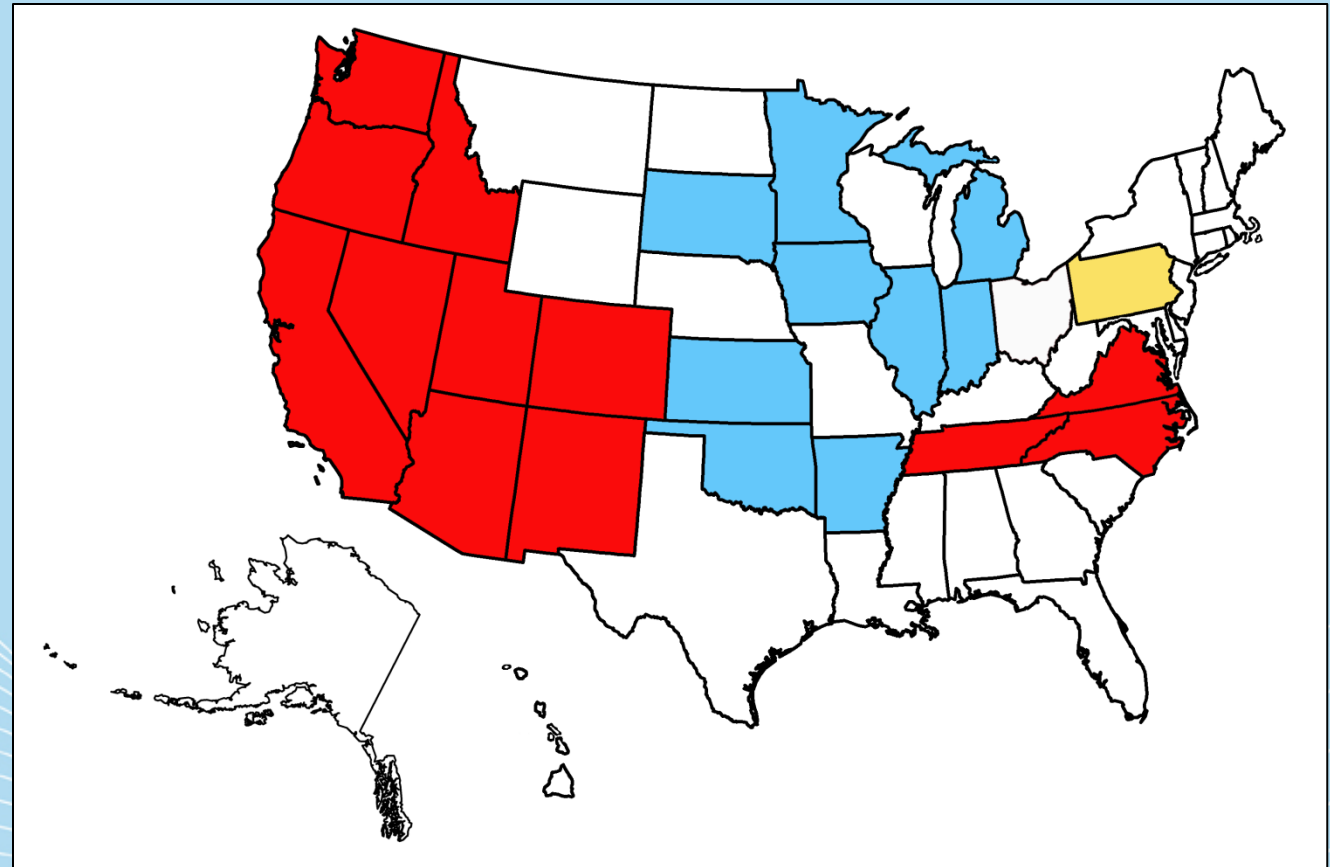


# Distribution of TCD

Red indicates TCD being established in parts of the state

Yellow indicates where TCD has been found, but is not considered established

Blue indicates places where people have surveyed for TCD, but not found it




Map based on pest tracker information accessed on March 27, 2013 and the revised pest alert on thousand cankers disease.



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# If TCD is a native disease, why has it become an issue recently?

- Association between the beetle and the fungus may be a recent development
- The twig beetle has expanded its host preference with the introduction of other walnut species within its range
- Expansion of the range of the walnut twig beetle into the eastern U.S.
- What could be the impact?



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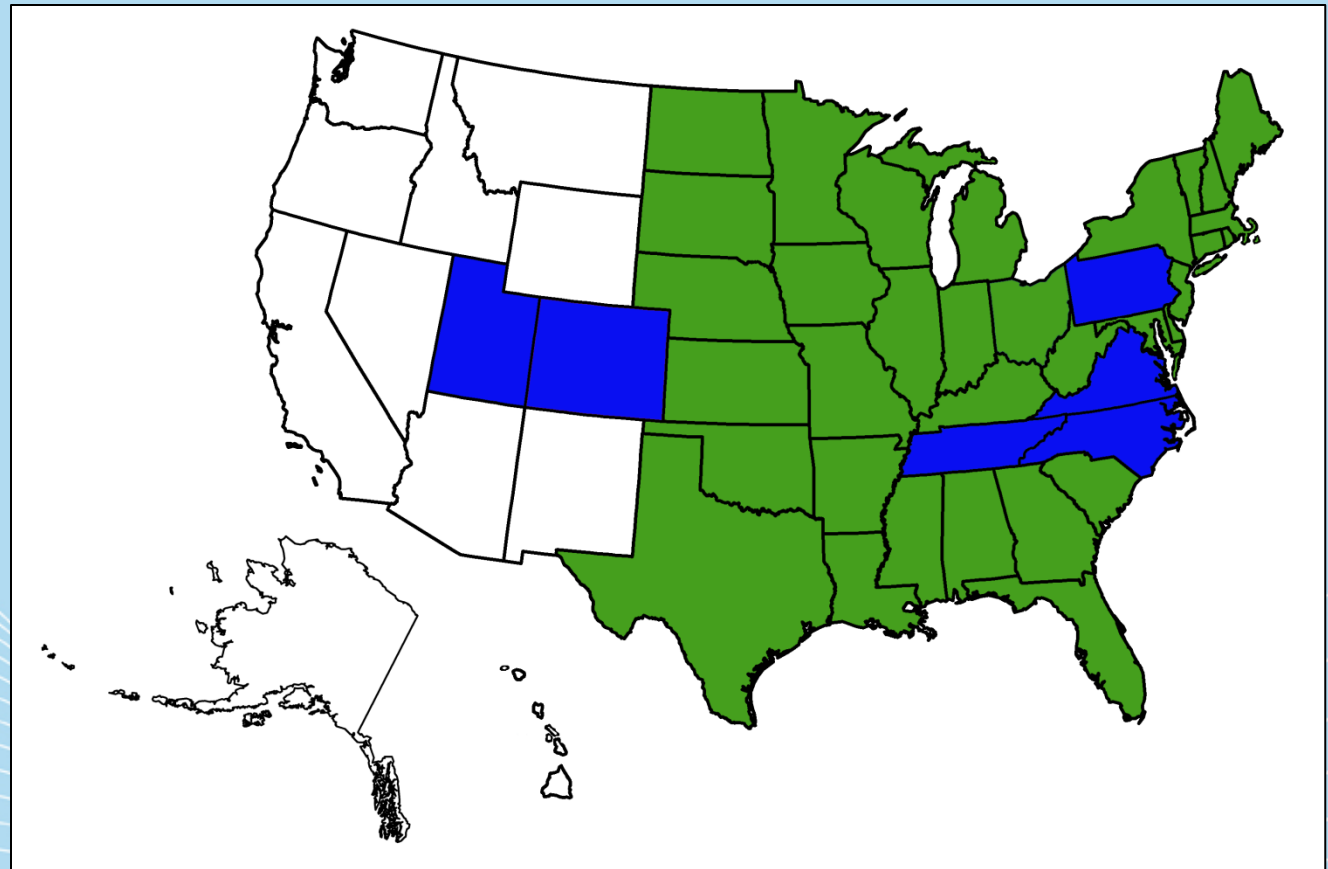
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# Distribution of TCD and black walnut

Green indicates the current range of Black Walnut in the U.S.

Blue indicates those states that lie within the current range of black walnut and where TCD has either become established or has been found.



Map based on pest tracker information, revised national pest alert on thousand cankers disease, and USDA Plant Database accessed on May 27, 2013.



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# How is TCD spreading?

- Commercial trade
  - Infected and infested timber that is harvested and sent to an area that does not have TCD is a key pathway
    - Raw lumber, sawlogs, burls, stumps used for furniture making, cabinetry, gun stocks, bowls, etc.
- Travel
  - People traveling from one campground to another have a tendency to bring firewood from one area to another
  - **DO NOT MOVE FIREWOOD!**



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# Important economic consequences

- Walnut harvest is a high-dollar industry in some states.
  - 407 million pounds of walnuts were produced in the U.S. in 2011/2012
    - Up to 70% of all walnuts produced in the U.S. are exported
    - California alone has 280,000 acres of walnut trees planted (2011/2012)
      - English walnut grown in California was valued at over \$1.3 billion in 2010.
    - Missouri estimates that over \$35 million could be lost annually in nut harvest due to TCD





# Important economic consequences

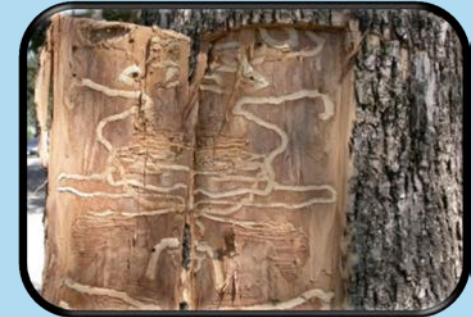
- Timber harvest for walnut wood products is a high-dollar industry in some states.
  - Georgia, Kentucky, Michigan, Ohio, Mississippi, North Carolina, New York, and Tennessee provide the bulk of the walnut timber harvest in the U.S.
  - Prices run from \$300 to \$2000 per thousand board feet for sawtimber
  - Missouri estimates that over \$36 million could be lost annually in wood product losses due to TCD





# Important ecological consequences

- 30 states with naturally-occurring black walnut trees.
- 99% of black walnut trees occur in natural stands.
- Potential for ecological disaster in eastern states as seen with pests like the emerald ash borer and diseases such as chestnut blight and Dutch elm disease..



Emerald ash borer and its effects on ash trees



Image credits:

Beetle - David Cappaert, Michigan State University, [www.bugwood.org](http://www.bugwood.org), #9000019; damage - Leah Bauer, USDA Forest Service Northern Research Station, [www.bugwood.org](http://www.bugwood.org), #5449384; galleries - Edward Czerwinski, Ontario Ministry of Natural Resources, [www.bugwood.org](http://www.bugwood.org), #1439009



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# Management of TCD

- Not preventable, beetles can attack and infect healthy trees.
- Must limit movement of the beetle
  - Inspect dying walnuts and report suspected TCD to county agent or state forester.
  - Do not transport dead/dying wood off-site.
  - Prompt and proper disposal of infected wood by burying or burning.
  - Do not transport walnut for firewood.





# What to do if you suspect TCD

- Collect a sample and submit it for verification
  - Collect a branch 2 to 4 inches in diameter and 6 to 12 inches long showing the diseased wood
  - Wrap the sample in paper towels or newspaper
  - Double bag your sample in zippered plastic bags
  - Fill out a sample submission form for your state NPDN diagnostic lab and tape it to the bag
    - [www.npdn.org](http://www.npdn.org)
  - Mail the sample to your lab or give it to your local county agent for them to mail it in
    - Don't delay! A good sample is essential for diagnosis
    - [Video on submitting plant samples](#)



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# Be sure to recognize the symptoms



Trees with yellowing and thinning of the foliage



Small circular to oblong cankers found after bark is removed



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# Questions?

- For more information, check out [www.protectingusnow.org](http://www.protectingusnow.org)
- You can also contact:
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