



# WALNUT COUNCIL

November 13, 2009

Dear Tree Growers:

Today you are receiving a special mailing to alert you and bring you up-to-date on a problem that is killing black walnut trees in the western United States. The problem is called "**Thousand Cankers Disease.**" At this time it has impacted only black walnut trees growing west of the Great Plains. Enclosed are two interesting articles concerning the disease by two of our board members. These articles share with you the latest information and make you aware of the issue as you manage your woods.

Early settlers from 1840 on took black walnut nuts with them and planted them primarily for their nuts. Thus, black walnuts grow from Arizona to Oregon, Colorado to California. They have lived and thrived for over 160 years. Recently, they have started to die by the thousands. The cause is a very tiny beetle which carries a fungus, and the end result which kills the tree is called Thousand Cankers Disease. Small cankers girdle the limbs, and the tree dies.

What does this mean to you who live and grow black walnut east of the Great Plains? I hope absolutely nothing. At this time the disease is in the West only. We do not know if it will grow in the East. We hope the disease is not another Chestnut Blight that will kill all black walnuts as it is doing now out west where those trees are truly out of their native range. However, those western trees lived nicely for the last 160 years, why are they dying now?

To be proactive, a meeting on the Thousand Cankers Disease was held November 3rd and 4th in St. Louis. The attendance was beyond expectations and included federal, state and university researchers, regulators, landowners, etc., all concerned with the potential of the disease reaching the eastern United States. More information concerning this disease is needed, and research and data collection has already begun. As you might imagine, the Walnut Council is a major player, and we are putting our money and time where our mouth is. We will continue to do so until the problem is solved. In fact, I hope this alert is much to do about nothing; but we cannot take that chance. The Chestnut Blight killed every chestnut tree.

We hope you members will do exactly what I will do--continue to manage my thousands of black walnuts to the best of my ability, pay my upcoming dues, plus some extra to help with research, and hopefully sign up more friends and neighbors as members. Let us hope and pray I am crying wolf and that our researchers or Mother Nature will stop the problem.

We will continue to keep you abreast of the current status of this disease through regular bulletin articles and mailings, or go to the Walnut Council website at [www.walnutcouncil.org](http://www.walnutcouncil.org) and click on Thousand Cankers Disease.

Very truly yours,

R. Scott Brundage, Walnut Council President  
Certified Forester #1443  
Tree Farmer, Columbia, Missouri

*John S. Wright Forestry Center*  
1007 N 725 W, West Lafayette, IN 47906-9431  
765-583-3501 Fax: 765-583-3512  
[www.walnutcouncil.org](http://www.walnutcouncil.org)

## Thousand Cankers Disease (TCD or 1KC) and Black Walnut in the Western US

Black Walnut (*Juglans nigra*) has been planted in the western US since the 1840's and has been cultivated as a nut tree, shade tree, and also for timber products due to its resilience in difficult growing conditions and potential for good growth on more hospitable sites. Four species of walnut are native to various areas of the western US, and some hybrids between black walnut and these western walnuts have been developed. In addition, Persian or English walnut, *Juglans regia*, is also planted extensively on hybrid rootstock in California for nut production.

In the 1990's and early 2000's significant mortality was noted in black walnut in several western states. The mortality was initially attributed to drought or other environmental stress. Mortality continued and further investigation revealed that black walnuts were actually being killed by the combined actions of a minute walnut twig beetle (*Pityophthorus juglandis*) and a fungus (*Geosmithia sp.*) carried by the beetle that formed cankers in the bark and phloem. The massive number of attacking beetles combined with the formation of cankers where the beetles excavate gradually kills the tree. The beetle appears to be a native of the southwestern US and is a minor pest of Arizona walnut (*Juglans major*) infesting small, weak twigs, but not causing mortality or major damage. The fungus is suspected to be a native based on early genetic evaluations, but has not been previously described. The beetle acts as a very effective vector, introducing the fungus to the nutrient conducting phloem of the tree, where numerous cankers form and merge, essentially starving the tree. Death of the tree is the result of continuous and sustained attack by the beetles and infection and canker formation by the fungus, and may take 10 years or more to result in mortality. The disease is very difficult to detect in its early stages. Sampling limbs 1 inch or larger in diameter for beetles and cankers could provide an early detection method. Visual symptoms include upper branches with yellowing or wilting foliage and dieback of upper limbs. The disease is usually advanced by this time and tree death occurs within one to four years.

Initial screenings indicate black walnut is highly susceptible to attack by the beetles and subsequent fungal infection and spread of the disease. Butternut also appears to be very susceptible. California walnuts (*J. californica* and *J. hindsii*) have shown some damage and mortality from the disease as well, but *J. hindsii* has demonstrated resistance in some cases. Texas walnut, (*J. microcarpa*) has shown some resistance to the disease and has not been found infested with the beetle. English walnut has been attacked by the beetle, but demonstrates some resistance to the disease, although *J. hindsii* rootstock may be susceptible. Several walnut hybrids are also present in the western US and demonstrate variable resistance, but generally better resistance than pure black walnut. Pecan and other hickory species screened for infection susceptibility were resistant to the disease.

There is currently no effective treatment for this disease. Sanitation is the main form of control treatment, but is difficult due to the fact that the beetle and fungus can survive chipping of limbs and trunk wood and can survive in cut limbs and trunk until the bark and wood have dried significantly – perhaps 2 or 3 years. Debarking has yielded mixed results: incomplete debarking did not eliminate all life cycles of the beetle. Completely debarked logs still attracted beetles, but the rapid drying of the wood prevented effective infestation of the logs. Drying, heating, or fumigation appear to be the most promising means of killing the beetles and fungus, but additional tests need to be made to confirm the effectiveness of these techniques. The beetle can endure temperatures of at least 107 degrees F, which is to be expected in a

native of the southwestern US, and can survive in USDA plant hardiness zones 4 through 10, which would include most of the native range of eastern black walnut.

The disease is now widespread in the western US and black walnut is rapidly disappearing in infested areas. The most easterly known infection is in on the western edge of the Plains of Colorado. Efforts have already begun to document the location and extent of black walnut trees and likely points of disease movement (campgrounds, wood processing facilities, firewood processors or vendors) in eastern Colorado and neighboring areas. Disease movement could occur through several methods:

- Raw logs, stumps, or burls being shipped east for manufacturing
- Firewood carried east for resale or personal use
- Untreated wood pallets and crating
- Craft-wood sold or carried east by vendors or hobbyists
- Nursery stock or grafting wood
- Natural spread across the range of native and planted walnuts.
- Debarked and dried wood and nuts provide no risk of infection, but infested wood with bark attached and un-dried or otherwise untreated is highly infective.

Although the thousand cankers disease has been deadly to black walnut planted in the western US, a few points should be remembered:

- A trade in western walnut burls, stump-wood, and logs to eastern veneer and lumber processors has been going on for several decades.
- The evidence suggests that both the insect and fungus are natives of the southwestern US and Mexico and have had the opportunity to move east through the range of Arizona and Texas walnut into the range of eastern black walnut, but apparently have not done so.
- Black walnut is essentially an exotic species in the western US.

A meeting of people interested in the thousand canker disease problem was held in St. Louis, MO on November 3 and 4, 2009 to provide updated information on the disease and provide input for future research, monitoring, and policy activity. This summary is based on the information from that meeting.

The lead organization in the effort to control thousand cankers disease will be the USDA Forest Service Forest Health Protection section.

Federal regulatory action related to thousand cankers disease would be the responsibility of USDA APHIS and under the best of circumstances would take up to 6 months if actions began today. It is unlikely that any emergency declarations will be made, since the pests appear to be native to the US and the disease has been active for more than 10 years. States have the authority to enact exclusion quarantines for black walnut from the west. Industry is being made aware of the potential to move the beetle and fungus on long wood and stumps and can assist in preventing this movement by insisting on treatment at the source. What treatments might be effective is not completely certain at this point.

## **Thousand Cankers Disease (TCD or 1KC) and Black Walnut in the Western US, con't.**

Persons and entities interested in black walnut and thousand cankers disease were encouraged to contact the head of the US Department of Agriculture and the Chief of the Forest Service to express their support for action on this issue due to the significance of the eastern black walnut resource .

The general consensus was to do what could be done to prevent introduction of the beetle and fungus into the native range of black walnut, to develop effective sanitation techniques that would allow marketing or disposal of western walnut without spreading the disease, and to continue researching approaches to manage the disease and host trees. People should not despair and stop managing their walnuts because of this disease. We don't know if this beetle or fungus can become established or cause disease in the native range of black walnut.

Submitted by:

Manfred Mielke  
Plant Pathologist, Northeastern Area, USDA Forest Service  
St. Paul, MN

Lenny Farlee  
Extension Forester, Hardwood Tree Improvement and Regeneration Center, Purdue University  
West Lafayette, IN

## Will Thousand Canker Disease (1KC) Eliminate Black Walnut in its Native Range?

Editorial by Manfred Mielke

Since the retreat of the glaciers, and for much longer in the southern part of the range, the elements, and people, have been moving plants, animals, insects and micro-organisms around North America to the point where natural ecosystems have achieved a high level of efficiency: there are no spare parts nor is there extra room. North America evolved an east/west divide in its forested ecosystems. There are few tree species with a transcontinental distribution, they are exclusively northern or boreal species: aspen, paper birch, white and black spruce, and balsam fir, and they have pests that correspondingly follow their distribution. The remaining complement of tree species is different either side of the divide. Likewise, most of their associated insects, pathogens and other micro-organisms are unique to their respective half of the continent. Eastern black walnut has been widely planted in the west since the pioneer days beginning in the late 1840's.

There are insect pest species that have evolved to exist in both the east and west on different hosts, *Ips pini* for example; and a few root disease organisms that have continental and even worldwide distribution, but for the most part what occurs naturally in either the east or west, stays in the east or west. North America has reached a native "pest equilibrium" over 10,000 years of human habitation and the movement of plants, animals, and microorganisms.

It is extremely difficult for newcomers to find an available niche to exploit; this is especially true for organisms that have already been through the sorting out process, and even for exotic pests that have never been here before. However, some exotic pests do wrangle their way into some ecosystems, because there has never before been any exposure to them, and when they get established they completely disrupt those ecosystems. There has been ample opportunity for native insects and pathogens to have been moved between east and west yet there has never been a corresponding outbreak of such a pest. Never has there been southern pine beetle in pinyon, lodgepole or ponderosa pine, nor has there ever been an outbreak of mountain pine beetle in jack or red pine, for example.

**Hypothesis: In native forests, there are no native pests in the east or west that ever have become epidemic in the other.**

However, exotic pests have found room either by exploiting a weakly occupied niche or by displacing a weaker native competitor, and they have overcome the east/west barrier of the Great Plains: white pine blister rust, gypsy moth, *Diplodia pinea*, hemlock wooly adelgid, balsam wooly adelgid, before long the emerald ash borer, and others.

**Corollary to the hypothesis: If there is a pest in native forests exclusive to either the east or west, which appears on another host in the other, then it is an exotic.**

Therefore the answer to the question of whether 1KC will eliminate black walnut depends on whether the walnut twig beetle, the *Geosmithia* fungus, or both, are exotic, or if their association is new. The weight of the evidence suggests at least the twig beetle is a native insect. It has been reported from museum collections since the 1920's in southern walnut species, *J. major*, and for a long time in *J. californica* and *J. hindsii*. Bark beetles on obscure *Juglans* species have never elicited much interest among entomologists, nor has the stain associated with their galleries. *Geosmithia "morbida"* is certainly a "new" fungus in that it has never before been described, but whether it is a newly introduced fungus, or if the 100% association between the beetle and the fungus is new, is unknown. At the very least on *J. major*, the walnut twig beetle and fungus appear to operate as one might expect, it is a weak pest complex on shaded or senescing branches. At the very least, this offers the glimmer of hope that it may be a native pest complex.

So why is knowing whether the 1KC complex or its components are indigenous at all important? It gets back to the hypothesis. The only way to conduct the experiment of looking at the potential impact to native eastern black walnut is *in situ*, and this is, of course, not desirable. If we knew ahead of time what the residency status of 1KC was, then we might be able to predict the outcome of its introduction into the east. If 1KC is native, then we could take a boxcar load of infested firewood and dump it into black walnut forests of the east, and this weak beetle that takes 8-10 years of continuous, sustained attack to deliver enough fungus to kill a black walnut, will be overwhelmed by the forces that maintain the native pest equilibrium. If 1KC is exotic, then "Katy bar the door", Hammons Nut Company will have many fine veneer logs, but they will have to develop another business model. I maintain that there has been ample opportunity for the insect to have been introduced into the east, and by extension, the fungus which is always associated with the beetle, yet there is no evidence that it has ever successfully survived the introduction.

So you might ask, how can a supposed native pest complex kill eastern black walnut in the west? The eastern black walnut is exotic there, and 160 years is not 10,000 years. It's as simple as that.

Of course, the hypothesis might not be as robust as I think history suggests it is. Therefore, we must prepare for the worst and try to answer all the open questions. We must also maintain a balance between indifference and panic. People should not stop managing their walnuts because of this disease. There's a likelihood this disease will never manifest itself in the native range of black walnut. If eastern black walnut is threatened with extirpation then the best we can ever hope to do is slow its ultimate demise. The other thing we have learned from introductions of exotics is that eradication is extremely improbable except under extraordinary circumstances. Bark beetles and fungi are not candidates for eradication. So, let's hope that the eastern black walnut in its native range is as tough and impervious to pests in the future as it has been in the past.

Submitted by: Manfred Mielke, Plant Pathologist, Northeastern Area, USDA Forest Service  
St. Paul, MN