



FROM THE
MISSOURI DEPARTMENT
OF CONSERVATION
FOREST HEALTH LAB

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Emerald Ash Borer

Emerald Ash Borer (EAB), the invasive wood-boring beetle that is killing millions of ash trees across eastern North America, has so far been detected in 22 US states stretching from Colorado to the East Coast and in Ontario and Quebec, Canada. In Missouri, it has been detected in 9 counties (see map). Due to the locations of these counties in widely separate parts of the state, the Missouri Dept. of Agriculture and US Dept. of Agriculture expanded existing EAB quarantines statewide in 2013. See the December 2013 issue of this newsletter for more details (<http://mdc.mo.gov/node/12746>).

Expanded quarantines are needed, because it is difficult to completely detect EAB's spread, especially recently established infestations. But EAB has not yet spread everywhere in Missouri, and there are several things we all can do to respond to this pest threat. First, don't move firewood. Get your wood near where you are going to burn it. EAB and many other invasive insects and diseases hitchhike to new locations in firewood.

Second, watch for signs of an EAB infestation and report it. Familiarize yourself with how to identify an ash tree

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Emerald ash borer adult.



Emerald Ash Borer *continued*

and signs of an EAB infested ash at this site: <http://eab.missouri.edu>. Also at that site, consult the latest map of known EAB infestations. If you see evidence of EAB in one of the counties where EAB has not yet been detected, please report. There is no need to report for counties where EAB is already known to be present. Photos of suspect ash trees (images of the whole tree, leaves, and close-ups of damage) may be sent to your local Conservation Department forester (see Local Contact at <http://mdc.mo.gov/>) or to Forest.Health@mdc.mo.gov.

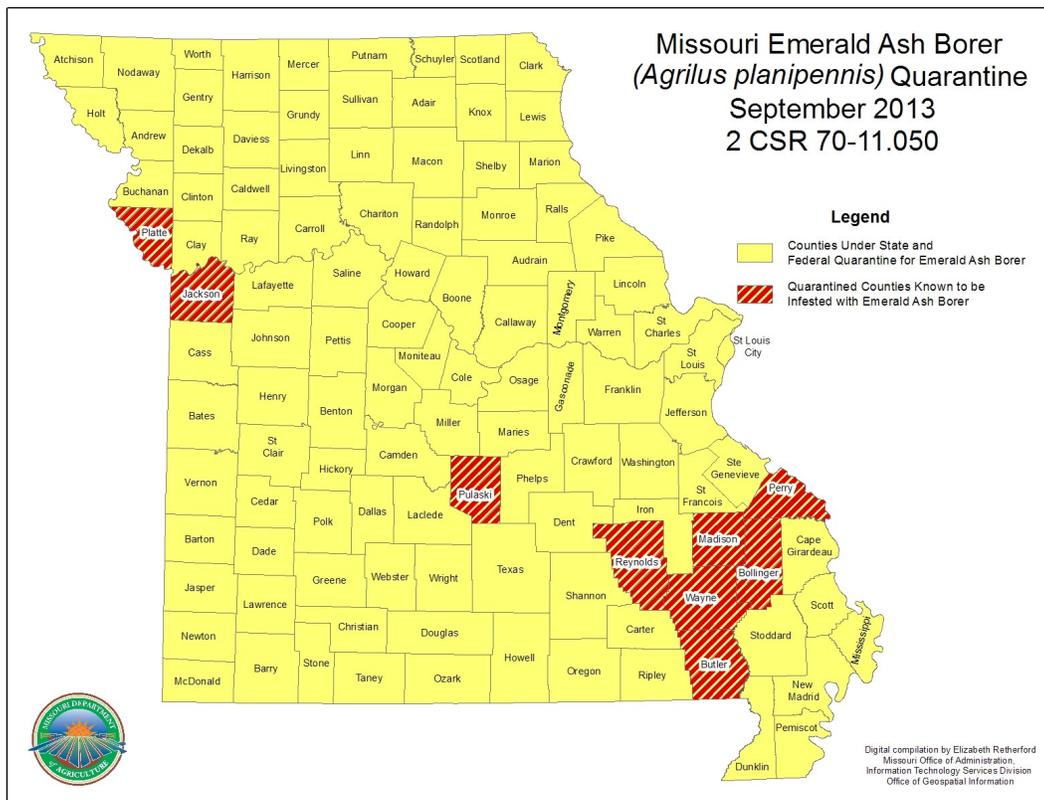
Reports and questions may also be submitted by calling toll-free to 866-716-9974.

In 2014, EAB traps are being moni-

tored by the Missouri Dept. of Agriculture in central Missouri and the St. Louis area to detect if infestations are present. Traps are a helpful tool, but many EAB infestations are found by people knowing what to look for. The EAB infestation in Kansas City was first detected by an alert arborist. A good opportunity to examine ash trees closely is whenever branches are pruned or a tree is cut down during routine tree care activities. This article describes a branch sampling technique: <http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/32127.pdf>.

Communities and homeowners should start now to plan for EAB's arrival. If no action is taken, large numbers of ash trees will eventually

be killed in a few years' time after EAB arrives. How many ash trees are there in your community or on your property? Some high-value trees that provide shade, energy savings, or aesthetics can be kept alive with the appropriate use of systemic insecticides. But because of environmental and cost concerns, insecticides should not be applied until an EAB infestation has been found within your county. Ash trees that are already in poor health or bad locations, such as under power lines, are not worth treating and could be removed now. Treatment and eventual removal of other trees could be spaced out over a period of years. When planting replacement trees, a variety of species should be used. The important thing is to start evaluating your trees and have a plan of action.



Missouri counties where EAB infestations have been detected (red stripe).

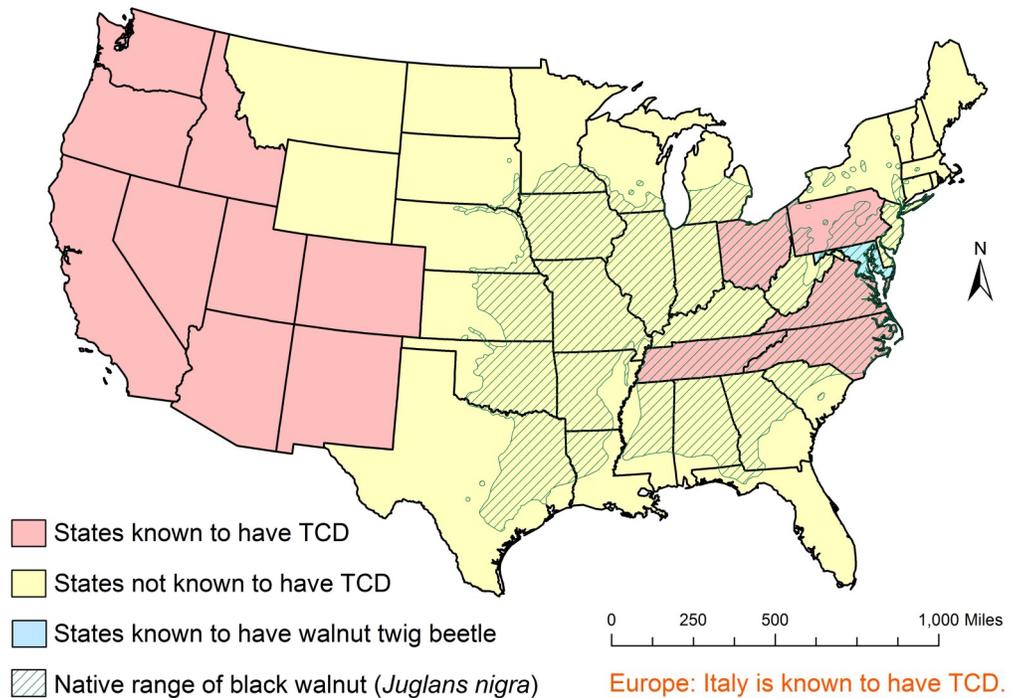
Thousand Cankers Disease of Walnut

TCD has not been detected in Missouri, however there is concern that undetected TCD infestations could be present or that spread may occur from other states where detections have occurred. In the past year TCD detections have been confirmed in Ohio and Italy, as well as additional areas in states previously known to be infested. The walnut twig beetle, which spreads the fungal disease, has also been found in Maryland. Currently, the list of TCD-positive states includes 5 eastern and 9 western states. The risk of spread of TCD to Missouri on infested walnut wood from these areas of known infestation is high. It is important to follow the Missouri state quarantine rule restricting the movement of all species of walnut and all hardwood firewood from states where TCD has been detected. More information can be found at <http://mda.missouri.gov/plants/pests/TCDEmergencyRule.pdf>

Existing TCD detection technology is not very sensitive, and TCD is unlikely to be detected until several years after introduction. Consequently, it is important to watch for pockets of walnut trees displaying possible symptoms of TCD. More information on symptoms to look for and how to report suspect trees can be found at <http://mdc.mo.gov/thousand-cankers>.

TCD detection surveys are conducted annually by both the Department of Conservation and the Department of Agriculture. In 2014, survey efforts will include pheromone-baited walnut twig beetle traps placed at high-risk locations with declining walnut trees and visual surveys to look for trees displaying symptoms consistent with TCD. Surveys will focus on the Columbia, Rolla, Springfield/Branson, and St Louis metro areas and surrounding counties.

Native Range of Black Walnut & States Known to Have Thousand Cankers Disease (TCD)



Hanging a walnut twig beetle trap.

Rapid White Oak Mortality (RWOM)

Reports of white oak dieback and mortality continue from east central and southeast Missouri. A complete description of the phenomenon can be found in the December 2013 Missouri Forest Health Update (see article titled “White Oak Decline”).

http://mdc.mo.gov/sites/default/files/resources/2014/01/mo_fh_update_dec13.pdf

A USDA Forest Service Evaluation Monitoring grant with additional funding from the Missouri Department of Conservation will support a RWOM research project this year. The goal of the work is to better understand the mortality and begin to predict where and when it is likely to occur. Investigations will look in greater detail at associated insects and fungal pathogens and site characteristics. Reports of locations with significant numbers of dying white oaks will help with research efforts by indicating where the issue is common and what damage patterns are present. **Please consider filling out the reporting form on the opposite page.**



Simeon Wright, Missouri Dept. of Conservation

University of Missouri researchers evaluating roots near a dying white oak tree.



Simeon Wright, Missouri Dept. of Conservation

Rapid White Oak Mortality

Rapid White Oak Mortality Survey

OBSERVER NAME AND PHONE / EMAIL

DATE

LOCATION OF DECLINING AND DEAD TREES

Location Name

ADDRESS OF LOCATION OR NEAREST INTERSECTION

MO CITY OR TOWN

Mo COUNTY

DESCRIBE DECLINING AND DEAD TREES

TYPE OF TREES DECLINING AND DYING (ALL THAT APPLY): WHITE OAKS RED OAKS OTHER SPECIES(see <http://forestkeepers.org/wp-content/uploads/2013/05/Missouris-Oaks-and-Hickories.pdf>)NUMBER OF WHITE OAK TREES DECLINING AND DEAD: FEW MANY ALLNUMBER OF OTHER TREES DECLINING AND DEAD: FEW MANY ALL

DESCRIBE THE SYMPTOMS YOU ARE SEEING (CHECK ALL THAT APPLY):

- NUMEROUS DEAD BRANCHES IN TOP OF TREE CROWN SMOOTH SLICK GREY OR BLACK PATCHES ON THE TRUNK
 PATCHES/SPOTS WHERE BARK HAS FALLEN FROM THE TREE OR BARK AT TREE BASE
 MOST DEAD LEAVES ON TREE MOST DEAD LEAVES FALLEN BLEEDING OR WET AREAS ON TRUNK

DESCRIBE LOCATION

SITE DESCRIPTION (CHECK ALL THAT APPLY): STEEP HILLS GENTLY ROLLING HILLS FLAT BOTTOMLAND UPLAND PLATEAU NEAR STREAM URBAN RURALWHERE ARE MOST DECLINING AND DEAD TREES (ALL THAT APPLY): TOP HALF OF HILL BOTTOM HALF OF HILL EVERYWHERE NEAR STREAM OTHER, DESCRIBE: _____AFFECTED AREA SIZE: SMALLER THAN FOOTBALL FIELD LARGER THAN FOOTBALL FIELDRECENT SITE DISTURBANCE (CHECK ALL THAT APPLY): CONSTRUCTION WIND DAMAGE TREE HARVEST OTHER MANAGEMENT, DESCRIBE: _____

COMMENTS:

MAIL COMPLETED FORM TO:

DR. REED
 UNIVERSITY OF MISSOURI
 PLANT SCIENCES DIVISION
 110 WATERS HALL
 COLUMBIA, MO 65211

OR EMAIL FORM TO REEDSH@MISSOURI.EDU

Weather Impacts on Insects

There have been many conflicting news stories around the country in recent weeks about whether the unusually cold weather this past winter will have a silver lining and kill many insect pests. Our general take on it is that for the emerald ash borer and many other insects, the cold will probably have little effect. But the story is complex and not very predictable. Like many temperate climate insects, EAB produce a type of “anti-freeze” that helps them withstand very cold temperatures. EAB larvae overwinter under ash tree bark, which provides insulation, raising temperatures a bit further for the insects.



Overwintering EAB larva within ash bark.

Rob Lawrence, Missouri Dept. of Conservation

A few EAB larvae might be killed if temperatures fall below minus 10 degrees and remained there for a few days. But temperatures would need to remain below minus 20 or colder for an extended period for significant EAB mortality to occur. Air temperatures in most Missouri locations did not go below minus 15 during the polar vortex event this winter, and even then those lowest temperatures only existed for a few hours.

Many insects overwinter in the soil, under leaves and organic matter, or other sheltered places close to the ground. They are well-insulated from the cold. Snow cover provides additional insulation for insects overwintering beneath. Temperatures two inches deep in soil remained close to 30 degrees on the coldest nights and for most of the winter, according to University of Missouri weather data (Sanborn

Field, Columbia, MO). We might expect insects that overwinter in more exposed locations, such as bagworms on tree branches, would be more at risk for winter mortality. But even then, the old bags provide insulation for bagworm eggs overwintering within.

There can be a greater impact on insect survival when we have a warm spell lasting for a few days in late winter followed by severe cold temperatures again. An extended warm spell may cause some insects to lose their cold hardiness. In much of Missouri, we did have daily high temperatures ranging from the 50s to low 70s during February 17-22, followed by sub-zero lows in early March. It's a guessing game when trying to predict how much that pattern might affect spring pest populations. We will just have to wait until later this spring to see what develops.

Weather Impacts on Trees

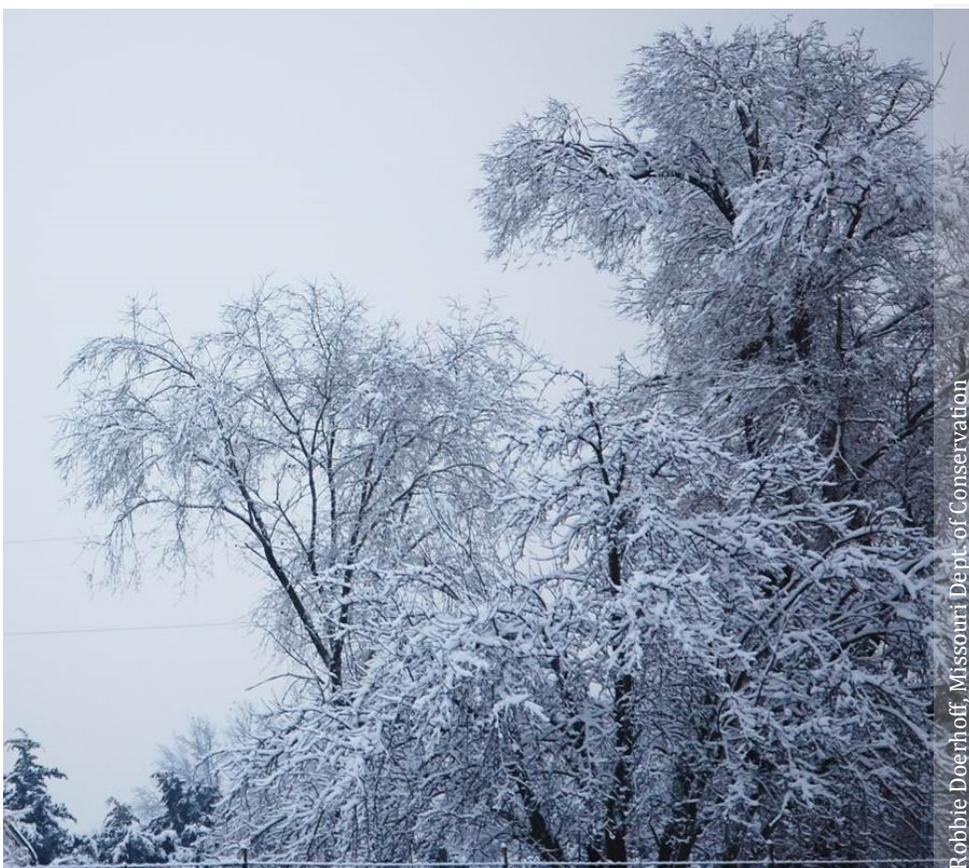
Preliminary data suggests this past winter may have been the coldest in 35 years and 9th coldest on record in Missouri (Pat Guinan, State Climatologist, www.climate.missouri.edu). However, most native plants on appropriate sites may not have been affected significantly. Because cold temperatures were fairly constant for several weeks prior to extreme low temperatures in January and February, most plants were near their maximum cold hardiness when the extremes occurred. Had temperatures fluctuated more widely, with several days of above normal temperatures prior to periods of extreme cold, we would expect more extensive damage. It is still possible that fluctuating temperatures this spring could cause damage.

Some non-native ornamental and fruit trees may have experienced low temperature damage to floral buds or even dieback of twigs and branches. Flowering may be poor this spring or growth may begin and then collapse due to tissue damage. Disease-causing fungi may infect winter-damaged tissues and lead to an increase in cankers (infections that can girdle and kill plant stems) resulting in more dieback later on.

Browning of evergreens may become apparent due to desiccation injury. Desiccation injury occurs on sunny, windy days when foliage continues to lose moisture but roots are unable to absorb moisture from dry or frozen soils. Evergreens in northern areas of the state where drought conditions were present during 2013 may be more susceptible to injury. However, desiccation injury is also

more severe with rapidly fluctuating temperatures that occur in some years.

The bottom line is that the extreme winter cold is another stressor for species that are not well adapted to these temperatures. Across Missouri, trees are beginning 2014 severely stressed due to past weather extremes. As reported in the December 2013 Forest Health Update, some recent extremes include excessively wet weather in 2008-2009, the exceptionally severe drought in 2012, excessively wet weather in southern Missouri and drought in northern Missouri during 2013. Other events in recent years include multiple storm events, and spring frost damage. We anticipate the impacts of the past weather-related stresses to continue in 2014 and for the next several years. Damage from wood boring insects, canker diseases, root diseases, and general tree dieback and mortality may be apparent.



Robbie Doerhoff, Missouri Dept. of Conservation

Most Missouri trees are well adapted to cold temperatures.

Diagnosing Tree Diseases

As the trees begin to grow, the diseases are not far behind. The warm weather also brings homeowners and landowners outside where tree problems begin to be noticed.

When diagnosing tree disease problems, the smallest clues and background information can make all the difference in obtaining a quality diagnosis. The following website has some useful pointers and great photos:

<http://www.extension.iastate.edu/Publications/SUL3.pdf>

When a decision is made to submit a sample to a plant diagnostic lab, it is critical that the lab receive the proper sample fully representing the problem. An old dead branch tells no stories! Remember to:

- ⇒ Completely fill out lab submission forms with detailed background information.
- ⇒ When possible, take some digital photos showing the tree, surrounding landscape and close-up photos of the symptoms observed.
- ⇒ When you are unsure about what sample to send, you can call or email photos to the diagnostic lab and staff can provide more specific submission instructions.
- ⇒ Keep your sample cool and send early in the week to ensure your sample arrives at the lab in good condition.

The University of Missouri Plant Diagnostic Clinic is a resource providing a wide variety of services anyone can use. Services provided by the MU lab include tree health diagnosis, diagnosis of issues affecting other plant species, as well as identification of insects, arachnids, and plants. Additional information about the MU lab including fees, submission instructions and forms can be obtained at <http://plantclinic.missouri.edu/>, by contacting the lab at plantclinic@missouri.edu or by calling (573) 882-3019.

Forest Health News— sign up today!

The MDC Forest Health Lab periodically sends email updates on insects, diseases, phenology, weather, and much more. Emails are also sent when new forest health alerts and *Forest Health Update* newsletters are available. To receive these emails, please subscribe to the MO Forest Health electronic mailing list at:

http://mdc.mo.gov/user_mailman_register

Questions? Contact your local Resource Forester or Urban Forester with the Missouri Department of Conservation.

Find contact information for your county at:

www.mdc.mo.gov

An electronic copy of this document can be found at:

<http://mdc.mo.gov/node/12746>

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