



FOREST INSECT & DISEASE NEWSLETTER

<http://www.dnr.state.mn.us/fid/index.html>

June 29, 2009

Emerald Ash Borer Found in Minnesota

Play-by-play

By Michael Schommer, MDA Communications, 651-260-2956

Thursday, May 14, 2009

Minnesota officials find emerald ash borer infestation in St. Paul neighborhood

Plans underway to quarantine firewood and certain ash material for Ramsey and Hennepin counties

The Minnesota Department of Agriculture (MDA) today announced the discovery of an emerald ash borer infestation (EAB) in St. Paul just northeast of the intersection of Interstate 94 and Highway 280. This is the first detection of the destructive tree pest in Minnesota. The infestation was initially reported to MDA by Rainbow Tree Care Company on Wednesday. After receiving the report and conducting an initial inspection, MDA submitted larvae from the infested trees to the U.S. Department of Agriculture (USDA) for confirmation as EAB. USDA made that preliminary confirmation this morning.

In response to this finding, MDA plans to issue a quarantine prohibiting the movement of firewood, ash nursery stock, ash timber or any other article that could spread EAB in Ramsey and Hennepin counties. This quarantine is expected to be followed by a federal quarantine within days. MDA staff will now conduct a thorough survey of trees in the surrounding area to assess the extent of the infestation. Information from this survey will help determine the response strategy implemented by state and local officials. The Minnesota Department of Natural Resources (DNR) and the USDA Animal and Plant Health Inspection Service (APHIS) are working closely with MDA in the response.

EAB is an invasive beetle that attacks and kills ash trees. Its larvae kill ash trees by tunneling into the wood and feeding on the tree's nutrients. Since its accidental introduction into North America, EAB has killed millions of ash trees in 10 eastern states. With an estimated 900 million ash trees, Minnesota is a prime target for EAB. Earlier this year, MDA issued a quarantine for Houston County in response to an EAB infestation across the border in Wisconsin.

Officials urge Minnesotans to take steps to keep EAB from spreading:

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- Don't transport firewood, even within Minnesota. Don't bring firewood along on a camping trip. Buy the wood you need locally from an approved vendor. Don't bring extra wood home with you.
- Don't buy or move firewood from outside your area. If someone comes to your door selling firewood, ask them about the source of the wood.

Watch for signs of infestation in your ash trees. If you suspect your ash tree could be infested by EAB, visit www.mda.state.mn.us/invasives/eab and use the "Do I Have Emerald Ash Borer?" checklist.

Friday, May 15, 2009

Quarantine implemented on firewood, ash products in Hennepin and Ramsey counties

MDA action designed to stop shipments of potentially infested products to other parts of state

Following yesterday's discovery of emerald ash borer (EAB) in a St. Paul neighborhood, the Minnesota Department of Agriculture (MDA) today issued a state quarantine on firewood, ash trees, and ash tree products in Hennepin and Ramsey counties. The measure is designed to slow the spread of EAB, a highly destructive tree pest, to other parts of the state.

The quarantine prohibits the movement of the following items out of Ramsey and Hennepin counties:

- Firewood from hardwood (non-coniferous) species;
- Entire ash trees;
- Ash limbs and branches;
- Ash logs or untreated ash lumber with bark attached; and
- Uncomposted ash chips and uncomposted ash bark chips larger than 2 inches in diameter.

Last month, MDA issued a similar quarantine for Houston County, in Minnesota's southeast corner, in response to an EAB infestation just across the Mississippi River in Wisconsin. MDA will work with nurseries and other impacted businesses in the coming days to explain the quarantine and help minimize business disruption.

"The number one way EAB moves to new areas is when people accidentally help it spread by moving infested firewood and other products," MDA Plant Protection Director Geir Friisoe said. "This quarantine will help slow the spread of the pest and give Minnesota the best chance to protect our 900 million ash trees." Even in counties not covered by these quarantines, officials urge all Minnesotans to follow common-sense steps to keep EAB from spreading:

- Don't transport firewood. Don't bring firewood along on a camping trip, and buy it where you use it.
- Don't buy or move firewood from outside your area for use in your home.
- Watch for signs of infestation in your ash trees. If you suspect an infestation, use the "Do I Have

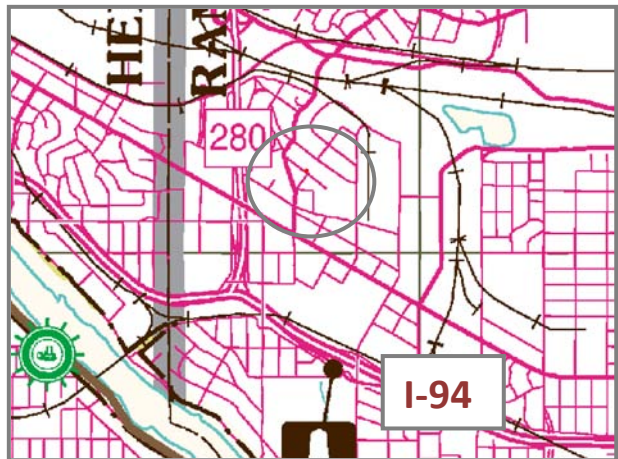
Emerald Ash Borer?" checklist on the MDA's EAB web page at <http://www.mda.state.mn.us>. You can also contact your local extension service office or a tree care company with a certified arborist on staff.

Monday, June 1, 2009

MDA survey finds 59 St. Paul trees infested with emerald ash borer

Next steps are to remove infested trees and closely monitor for any additional infestations

The Minnesota Department of Agriculture (MDA) reported today that a multi-agency survey found 59 trees infested with emerald ash borer in and around the St. Anthony Park neighborhood where the pest was first discovered in May. All 59 trees are within a half mile of



the first infestation site. Twenty-nine of the infested trees are on public property such as city parkland or rights of way. The remaining 30 are on private property. The City of St. Paul will begin removing the infested trees on public property this week. At the same time, city and state officials will contact affected property owners to coordinate the removal of infested trees on private property.

Given the limited number of infested trees, MDA and St. Paul officials believe the best approach in this case is to quickly remove all infested trees and carefully monitor

nearby ash trees for possible signs of infestation. “Our goal is to make it as tough as possible for this pest to become a Minnesota resident,” MDA Plant Protection Division Director Geir Friisoe said. “We know from other states how difficult it can be to eradicate emerald ash borer, but we are encouraged that infested trees have only been found within a half mile radius.”

While removal of infested trees is the most visible part of the EAB battle, the monitoring effort is just as important. This monitoring takes several forms:

- MDA is placing purple cardboard traps in ash trees around the city. These mailbox-sized traps contain lures that attract adult ash borers in the immediate area. The insects land on the trap and become stuck to its sticky surface. Workers remove the traps in autumn to see if any borers have been caught.
- Workers will select unhealthy ash trees on public property for use as “trap trees.” Injured trees are a strong attraction for borers in the immediate area. Bark along a section of the trunk will be removed and, ultimately, the trap tree will need to be removed.
- Homeowners are asked to join the effort by watching their trees for signs of infestation. These signs include dieback of leaves in the upper third of the tree's branches, heavy woodpecker activity, D-shaped exit holes in the bark, S-shaped tunnels under the bark or water shoots up the trunk. Homeowners who notice these signs should contact their city forester or a local tree care company with a certified arborist on staff. More details can be found on MDA's website at www.mda.state.mn.us.

MDA reminds homeowners that it is not necessary to remove healthy ash trees. Homeowners with questions about disposing of ash tree material should contact their city forester for guidance. Improper disposal of infested ash material could accelerate the spread of EAB.

Updated firewood restrictions in effect on state land

By DNR Information and Education

The recent discovery of emerald ash borer (EAB) in a St. Paul neighborhood means that people should no longer pack firewood when making summer camping plans. Minnesota Department of Natural Resources (DNR) Commissioner Mark Holsten on May 20 issued a revised order dealing with use of firewood on state land. It will be published in the State Register from June 15-28. Under the new order, only firewood purchased at a state park or from a DNR-approved vendor may be brought onto state land.

A list of approved firewood vendors is available online at http://www.dnr.state.mn.us/firewood_vendors/vendors/list.html. The receipt supplied by the approved vendor should be retained as proof of purchase. Unapproved firewood brought to a state-administered campground will be confiscated and the transporter is subject to a \$100 fine.

People camping on state forest lands outside of a



designated campground may gather dead wood on the ground for campfire use onsite. In state parks and designated campgrounds in state forests, people are prohibited from scavenging dead wood.

The new order specifies that firewood originating from a quarantined county in Minnesota will be approved only for use in that county. Firewood from counties contiguous to quarantined counties in Minnesota will be approved only for use in those counties. Currently, there is a quarantine on firewood, ash trees and ash products in Hennepin, Houston and Ramsey counties. To slow the spread of EAB, the quarantine prohibits the movement of the following items out of Hennepin, Houston and Ramsey counties:

- Firewood from hardwood (non-coniferous) species. Entire ash trees.
- Ash limbs and branches.
- Ash logs or untreated ash lumber with bark attached.
- Uncomposted ash chips and uncomposted ash bark chips greater than one inch in two of the three dimensions.

While EAB spreads slowly on its own, it can hitch a ride to new areas when people transport firewood or other wood products infested with the larvae. Officials urge Minnesotans to take these steps to keep EAB from spreading:

- Don't transport firewood, even within Minnesota.
- Don't bring firewood along on a camping trip.
- Buy the wood you need locally from an approved vendor.
- Don't bring extra wood home with you.
- Don't buy or move firewood that came from outside of Minnesota.

Since its accidental introduction into North America, EAB has killed millions of ash trees in 12 states and Ontario, Canada. With more than 900 million ash trees, Minnesota is a prime target for EAB.

Another Cool and Protracted Spring

Winter injury of Colorado blue spruces ubiquitous

If you have a young Colorado blue spruce and it's growing in the northern half of the state, it's likely to have suffered winter injury this year. Winter injury can take many forms including damage from cold temperatures, drought (yes, this happens even during winter) or a combination of both. The predominant symptoms were purple-brown needles on last year's twigs and bud death, especially of lateral buds. Needles and twigs that were below the snow-line were green and healthy. By now, the living buds have broken and have "greened-up" the appearance of the trees. Winter-killed needles will continue to fall off all season, leaving twigs quite bare behind this year's new shoots.



Winter damage of spruce. Photo courtesy of Sinclair and Lyon.

Winter damage from cold temperatures can occur if the tree is genetically adapted to begin its acclimation too late or to come out of dormancy too early in the spring. Species that call the Rocky Mountains home are adapted to being covered by a deep blanket of snow which keeps them much warmer than if exposed to the otherwise frigid mountain air. However, it is important to note that unseasonably warm or cold temperatures can cause similar problems to the leaves and buds regardless of its provenance.

What to do? If possible, keep soil moist by watering affected spruces all season and mulching them before winter. If your tree is too unsightly for your tastes, you could replace it with a hardier tree.

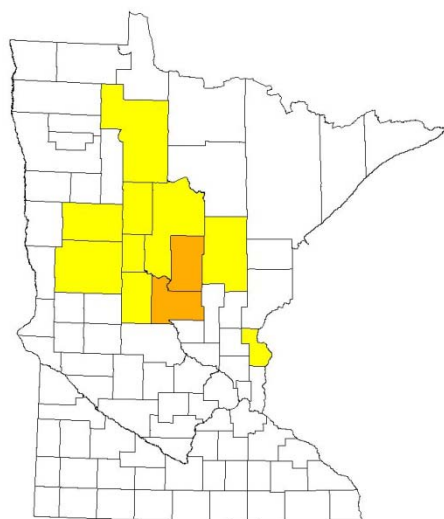
Two-lined chestnut borers

Last year's topkill and branch mortality due to two-lined chestnut borer infestation are readily visible now that the new oak leaves have emerged. Look for the effects of TLCB in locations where oaks are growing on sandier soils and along ridge-tops. Thousands of trees were

symptomatic last year, continuing the upward population swing that began in 2006. The hardest hit counties in 2008 were Morrison and Crow Wing (orange). The worst case observed last year was a privately owned, 40-acre tract of pure oak forest in south west Crow Wing County that was completely killed over a two-year period. Several additional counties had pockets of TLCB mortality (yellow).

Oak stands that have been stressed by drought and defoliation are vulnerable to damage and mortality caused by two-lined chestnut borers and Armillaria root disease. Management options for these stressed stands should be limited to (1) postponement of any activities in the stand or (2) salvage of high-value, damaged trees to reduce economic impact. The choice of option to use depends on the potential for continuation of stress due to drought, defoliation or pest infestation and the volume and quality of oak wood in the stand.

Management activities should cease when oaks are under severe stress from drought and/or defoliation since any stand disturbance will further open up the stand and cause additional stress on the trees. Management activities could begin during the winter after a growing season with more normal precipitation patterns. However, oaks would be vulnerable to TLCB for a few years after the drought and defoliation ended as the trees slowly regain their vigor.



Salvaging does not control borers in outbreak situations, but it does reduce the economic impact by recovering timber while it still has its greater value. Salvaging is an option if the dead oak and the oak with at least 50% dieback have a great enough volume to make a merchantable sale and the quality is high enough to produce veneer and grade lumber. Salvage the stand during

the winter. Trees should be marked for salvaging during the leaf-on period since dead trees and trees with severe dieback will be impossible to identify during the dormant season. When salvaging, do not extend the harvest into areas of the stand untouched or lightly damaged by TLCB.



If the main product is firewood, delay any salvaging for at least a year after the oaks have died. Firewood quality will not deteriorate during this delayed period. This gives the borer larvae time to become adults and leave the tree and dead firewood will not be reinfested. If infested firewood is moved into a backyard with oaks, the TLCB population will spread into the backyard oak trees.

Thinning will not control TLCB during an outbreak situation. In fact, thinning should be avoided during a TLCB outbreak, particularly if the outbreak has been triggered by drought. Thinning will open up the stand to drying winds that will increase the drought stress on the residual oaks. Thinning can also mechanically wound trees and cause serious damage to the tree roots. Even if thinning reduces stocking to optimum levels, the trees will not benefit from the reduced competition for a number of years until the roots and crowns are able to occupy the spaces created during thinning.

Thinning will also produce additional food supply for the Armillaria root disease fungus. Fresh stumps and roots of cut trees will provide an additional food base for this fungal pathogen. It would be best to delay thinning for a few years until the oaks are more vigorous. Even at that time, thinning should be kept light; do not remove more than 30% of the basal area.

Sanitation will not be effective in controlling damage during an outbreak. A sanitation harvest simply cannot remove enough of the insect population to prevent future damage to the residual oak trees. During an outbreak, there are vast numbers of low vigor, vulnerable oaks that will perpetuate the outbreak. The best practice is to postpone all management activities until the conditions that caused stress have ended.

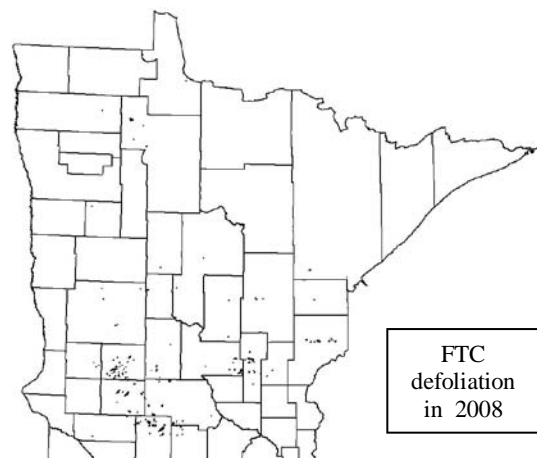
Remember, **stump sprouting will be virtually non-existent in heavily borer-infested stands.** In effect, the low vigor that created the TLCB problem will also decrease sprouting and enhance vulnerability to Armillaria root disease. To ensure future oak regeneration, count on advanced regeneration or oak planting stock, not stump sprouts. Armillaria root disease, caused by an opportunistic soil borne fungus, attacks the root systems of weakened trees and will often lead to tree mortality. If Armillaria root disease is involved in damaging the root system, a white mat of fungal tissue growing between the bark and wood of the roots and root collar can be found. These white mats, however, may not be found until after the tree is completely dead.

For more information, see http://www.dnr.state.mn.us/treecare/forest_health/tlcb/index.html.

Forest tent caterpillars are at it again

Two forest tent caterpillars were observed heading north in the Grand Rapids area during the week of June 14th. Scattered reports of sightings in other northern locations were also received. It's believed these individuals are looking to take up permanent residence in the northland and were not just on a sight-seeing trip. Widespread forest tent caterpillar defoliation is not expected north of Mille Lacs Lake this summer but these sightings do not bode well for the future. So, if you have been thinking of an outdoor wedding, family reunion, anniversary or graduation party and don't want thousands of uninvited guests showing up, better have it this summer or next.

Last year, FTC populations caused mappable defoliation in twelve counties, particularly along lakeshores and riparian areas. See map of 2008 defoliation. Although aerial detection survey results for 2009 won't be ready for a few weeks, expect FTC defoliation to intensify in counties that were mapped last year and to find a smattering of FTC defoliation across the northern counties.



The Metro area is experiencing tree defoliation from two voracious eaters this spring: forest tent caterpillar and fall cankerworm. Scattered pockets of moderate to severe defoliation of boxelder, basswood, oaks, elm and other species have been reported throughout the Twin Cities metro area. A very visible site is Swede Hollow which is the valley located between Metropolitan State University and downtown St. Paul. Approximately 50% of boxelder trees, the predominant species in Swede Hollow, have been almost completely defoliated by fall cankerworm. Basswood trees along the Mississippi River bluffs in the metro area are being defoliated by FTC—affected trees are 90 to 100% defoliated. The FTC are moving to oak and elm as they eat their way through the basswood.



In addition to the sites in the Twin Cities, populations of FTC can easily be found in central and west-central counties as far north as Hubbard County where they were defoliating basswoods and oaks. There are also sightings of individual caterpillars all across the northern counties on aspen, oak and basswood trees. Like many other insects, the cool spring delayed their development so that pupation is likely to be two weeks later than during the most recent outbreaks. In the southernmost locations, FTC are already spinning down and moving away from the trees they defoliated in order to seek nearby host trees. Expect moth flight to occur on July 4th this year or later in the more northerly locations.

There are several parasites which help keep these defoliators under control and even though there are high numbers in several areas of the state. Defoliation for one season seldom kills healthy trees and even though many trees in central Minnesota are experiencing drought stress which may add to overall mortality, most defoliated trees will survive.

If you would like some guidance in dealing with these critters or just want to know more about them, see this website:
http://www.dnr.state.mn.us/treecare/forest_health/ftc/index.html

Oak anthracnose

Oak anthracnose is a common leaf disease caused by the fungus *Apiognomonia quercinia*. White oaks are the most susceptible, although all species of oaks found in Minnesota can be infected. Oaks, as well as other hardwood trees, often suffer from anthracnose during wet weather in the spring and early summer. Symptoms range from tiny dead spots to large dead blotches on leaves. Symptoms are usually most severe in the lower crown.

Early spring infections of immature leaves cause necrotic (brown/dead), deformed margins on the leaf tissue as well as necrotic, irregularly shaped spots. These spots and lesions tend to form along the veins or be confined by them. Usually, a distinct margin develops between the dead and healthy leaf tissue. Heavily infected leaves may appear misshapen and curled. The heaviest infections tend to be located in the lower portion of the tree crowns where the humidity is highest and leaves remain moist and cool during the spring. Heavily infected leaves are shed in June; many have green, healthy tissues still present. As the weather conditions become drier in the summer months, infected trees produce new leaves that are generally free of disease symptoms.

This disease is not fatal so we generally do not recommend fungicidal sprays unless the trees are very young or if they are high value trees already under some other form of stress. Trees typically produce many more leaves than they need to survive, so they can afford to lose quite a few. Fungicides would have to be applied before the leaves were infected; during budbreak and leaf expansion.

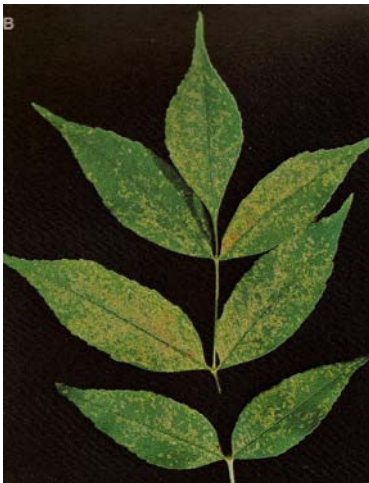
Raking up and disposing of shed leaves and twigs are usually the only control measures recommended. Raking up leaves now is a good idea. Do a thorough job in the fall and again as the snow melts next spring. This helps get rid of the causal fungus inside the leaves and twigs that would mature to produce spores next spring.



Ash plant bug and ash anthracnose

Emerald ash borer is not the only thing going on with ash trees. In communities in northeastern Minnesota, green ash are shedding lots of green leaves. The shed leaves have symptoms of both ash anthracnose and ash plant bug.

Ash plant bugs feed by piercing host tissues and sucking liquid from the plant cells. The bug's saliva is toxic to the plant cell causing discoloration of the cells. Affected leaves have a yellowish or white stippling visible on the upper surface. These may eventually coalesce into larger chlorotic areas. Heavy feeding damage can cause leaves to drop off the tree. Small black specks can be found on the underside of the leaves. These are excrement of the plant bugs. Damage from ash plant bugs is mostly cosmetic and usually does not cause any serious damage to the trees.



Ash plant bug damage is called stippling. Photo courtesy of Johnson and Lyon.

Ash anthracnose is caused by a fungus infection of the leaf. It is most severe during cool moist springs. Infections appear in the spring on expanding leaves as



Ash anthracnose. Photo courtesy of Sinclair and Lyon.

water-soaked spots that enlarge and coalesce becoming a greenish-brown. Leaflets may become distorted. During springs with prolonged wet weather the entire first flush of leaves may be affected. Severe defoliation for several years may lead to some twig dieback. The fungus overwinters on infected leaves and twigs. Raking up leaves and disposing of them is recommended to reduce infection. Chemical control is usually not necessary. However, in cases where it is necessary, multiple applications with thorough coverage of the leaves are necessary. The fungicides are protectants that need to be applied before the leaves are infected. They will not cure leaves already infected. The first application should be done at bud-break, followed by two additional applications spaced about 10 to 14 days apart.

Bumper crop of seeds

Abundant seed crops are obvious on a number of species of trees this spring, most noticeably red maple but also silver maple, and elms. Many of the trees look tan due to the abundance of seeds and sparse leaf production. Once the seeds fall from the tree they will look quite bare because they produced many more flower buds than leaf buds this year. So, remember this in a few weeks when people start asking why the trees look so bare and the crowns so thin. The leaves have not been eaten off these trees; they just never produced many leaves.

Bumper crops of seeds and cones are often associated with some type of stress on trees such as drought and are often referred to as a "distress crop" of seeds. They can also be a symptom of tree decline. However, in this case with so many species of trees involved over so large an area, it isn't likely to be a tree decline problem. It more likely related to a widespread environmental factor that triggered the response to set lots of flower buds in these trees.

One effect of this heavy seed production will be reduced growth of the trees. The trees have fewer leaves for photosynthesis than normal and seed production apparently monopolized substances needed for growth. Reproductive growth and vegetative growth compete for carbohydrates and this year, vegetative growth lost out. So the trees will grow less in diameter and have narrower growth rings. Ring width may be reduced for two years after a heavy seed year.

Another effect of the heavy seed production of course will be plugged up rain gutters on your house. According to the Silvics of North America, Agriculture Handbook 654, a 12 inch diameter red maple can produce up to a million seeds.

Summer shorts for the week of June 14th

- Spruce budworm larvae in central St Louis County were 5/8 to 3/4 inches long.
- Larch casebearer is starting to be visible in southern St Louis and Itasca counties. Casebearer larvae mine the needles of tamarack early in the season causing the tips of the needles to turn yellow to tan.

- Balsam twig aphid is abundant on new growth of balsam fir trees. The aphids feed on sap of the new growth causing them to twist and distort and also stunt the new growth. Woolly wax and the aphids can be seen among the distorted needles.
- Jack pine budworm were still feeding in the pollen cone clusters on June 17th near Esquagama Lake in central St Louis county. Most of the pollen has been shed and the clusters are now crispy dry. The larvae are only 3/16 to 1/4 inch long. Larvae were more abundant than expected but significant defoliation is not expected.

Heads-up

Approved firewood vendor applications now need to be renewed

Due to new changes in the Commissioner's Order that defines approved firewood, all DNR-approved firewood vendors must renew their applications by August 1st. This includes vendors that were approved in 2009.

The biggest change is that *ash firewood will no longer be approved for use on state lands*. Approved firewood is:

1. Non-ash firewood originating on lands within Minnesota AND within 100 miles of the Minnesota DNR land on which it is to be used, OR
2. Firewood originating from Minnesota that has been heat-treated in a kiln certified by the Minnesota Department of Agriculture, OR
3. Split firewood from Minnesota that is 100 percent debarked according to federal guidelines (removal of bark and outer 1/2-inch of sapwood), OR
4. Kiln-dried, untreated (unpainted/stained construction/dimensional) lumber that is free of any metal or foreign substance. Pallet boards are not included in this category.

Vendors must renew their approvals at this time, indicating the type of approved firewood that they will sell. Forms are available at <http://files.dnr.state.mn.us/forestry/firewood/vendorapplication.pdf>. The due date is *August 1, 2009*. If we do not receive the renewals by that date, their firewood vendor information will be removed from the approved firewood vendor listing and from our Web site.

Also important for you to know is that three counties in Minnesota—**Houston, Hennepin, and Ramsey**—are **under state emergency quarantine for emerald ash borer**. Firewood originating from a quarantined county in Minnesota will be approved only for use in that county. Firewood from counties contiguous to the quarantined

county in Minnesota will be approved only for use in those counties. Contact the Minnesota Department of Agriculture or <http://www.mda.state.mn.us/index.htm> for further information on the state quarantine.

Tick-borne diseases in Minnesota

Approximately one-third of blacklegged ticks (also called deer ticks) tested during recent years in Minnesota were positive for disease-causing organisms, say state health officials from the MN Department of Health. Blacklegged ticks carry Lyme disease, human anaplasmosis, and babesiosis, three illnesses which can lead to serious complications. In 2008 there were approximately 1046 confirmed cases of Lyme disease, 278 cases of anaplasmosis, and 29 cases of babesiosis. The risk of exposure to tick-borne diseases was highest in east central and southeastern Minnesota.

Blacklegged ticks need to be attached for 24 to 48 hours to transmit Lyme disease bacteria and 12 to 24 hours to transmit human anaplasmosis bacteria. People who develop signs or symptoms of a tick-related illness after spending time in blacklegged tick habitat should see a physician right away, even if they don't remember getting a tick bite. Lyme disease, human anaplasmosis and babesiosis are treatable. Early diagnosis and treatment are important in preventing severe illness. Some people develop two or more of these diseases from the same tick bite.

May and June are months when people can be infected by bacteria or protozoa carried by deer ticks. To prevent picking up ticks while outdoors, tuck your pants leg into your socks and spray a repellent with DEET or permethrin on your clothing. Wear light-colored clothes so ticks are visible, and check and recheck your skin for ticks. If you find a tick that has attached to your skin, use tweezers to grasp the tick close to its mouth, and gently and slowly pull the tick outwards. Apply antiseptic to the bite area of the skin, and save the tick so that a doctor or technician

can identify it as a deer or other tick.

Not all people bitten by a deer tick will get a disease, but if you have one or more of the following signs and symptoms within 3 to 30 days after a deer tick bite, see your doctor: a skin rash with a bull's eye appearance (a red ring with a central clearing), although not everyone gets a rash, and not every rash has a central clear area; fevers and chills; muscle and joint pain; fatigue; and headaches. If a person is not treated early for Lyme disease, the following signs and symptoms may develop weeks, months, or years after the tick bites; multiple rashes; facial paralysis on one side; weakness, numbness, or pain in one or more joints; or chronic arthritis in one or more joints, usually in the knees, which may be swollen and painful. Antibiotics are used to treat Lyme disease, but the disease is easiest to treat when diagnosed during the early stages.

Two diseases which appear to be less common than Lyme disease but can be life-threatening, human anaplasmosis and babesiosis, can also be transmitted to humans by the deer tick and can be treated with antibiotics by your doctor. These symptoms appear approximately one to three weeks after the tick bite for human anaplasmosis and one to six weeks or more after the tick bite for babesiosis.

Although people of all ages can get human anaplasmosis and babesiosis, they are most severe in people who are elderly or immune compromised. The signs and symptoms of these two diseases are sudden and severe, and they can include high fever, muscle aches, chills and shaking, and severe headache.

Deer ticks are the only kind of tick known to carry and transmit these disease organisms to humans. The immature deer tick (nymph) is freckle or speck of dirt size, but its adult size is larger and easier to see and remove. After feeding on deer the female adult lays eggs that hatch into speck-size larvae in May through June. The adult female deer tick has a reddish-orange back. Adult wood ticks (also called dog ticks) are larger than deer ticks, have white markings on their backs, and they do not transmit any of the three described diseases.

More information about Minnesota's tick-borne diseases is available on the MDH Web site or by calling MDH at 651-201-5414 or 1-888-345-0823. The Department can also send you a very informative 2006 pamphlet titled *Lyme Disease* which has information on the other two tick diseases described in it.

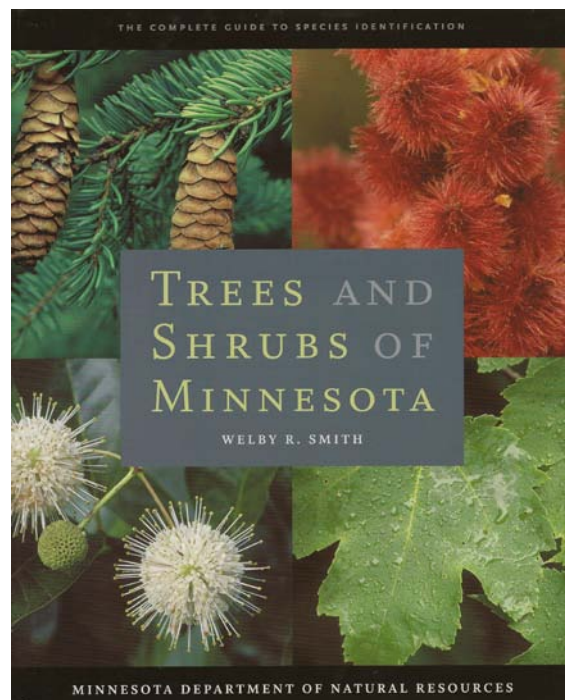
Publications

Trees and Shrubs of Minnesota

Welby R. Smith, the author, is a botanist for the Division of Ecological Resources at the Minnesota Department of Natural Resources. This wonderful book is written for everyone from scientists and environmentalists to teachers and people interested in horticulture and gardening. In this new identification resource, the state's foremost botanist and endangered species expert provides authoritative, accessible, and up-to-date information on the state's native and naturalized woody plant species. This fully illustrated resource features:

- Easy identification: more than one thousand color photographs of fruit, flowers, bark, and leaves for every species, as well as more than one hundred illustrations by botanical artist Vera Ming Wong,
- Distribution maps: more than five hundred maps, including state and North American range maps,
- Descriptions of each species habitat, natural history, and ecology, which provide context to the entries ,
- Comprehensive coverage of all native and naturalized trees, shrubs, and woody vines in Minnesota from *Abies balsamea* to *Zanthoxylum americanum*,
- 2008 | 640 pages | 1027 color photos, 154 tables, 506 maps | 8 x 10.

It can be purchased for \$59.95 from the University of Minnesota Press,
http://www.upress.umn.edu/Books/S/smith_trees.html.



Apple IPM Guide

In the September issue, we erroneously stated that the Home Fruit Spray Guide (FO-OO675) was revised in 2008. This publication was replaced in 2008 by Integrated Pest Management for Home Apple Growers by Jill MacKenzie, Jeff Hahn, and Michelle Grabowski, University of Minnesota.

Minnesotans who grow apples at home have to combat many insect pests and diseases to produce a good crop. Many apple growers reduce their use of pesticides, while

still harvesting quality fruit, through a set of practices known as Integrated Pest Management (IPM). IPM includes a combination of pest management techniques including monitoring for pest problems, removing diseased or infested plant material from the area, and many other cultural control techniques. Pesticide sprays are used in IPM only when necessary, and gardeners may choose from conventional or organic sprays. You can download this document from

<http://www.extension.umn.edu/distribution/horticulture/M1235.html>

Error in March 2009 issue

The image included accompanying the article on Annosum root disease in Wisconsin was actually an image of red pine pocket mortality. Thanks to Dr. Ken Raffa, Univ. of Wisconsin, for catching my error.



Red pine pocket mortality. Photo courtesy of WI DNR.

Feature Article

WOLVES IN SHEEP'S CLOTHING: Outbreaks of Previously Obscure Native Forest Insects

By John J. Riggins and Andrew J. Londo

Well-known native epidemic pests such as the southern pine beetle (*Dendroctonus frontalis*) have exhibited outbreak behavior throughout recorded history. Although unpredictable, their outbreaks are expected to occur. Recently, changes in the frequency, severity, and range of certain well-known native forest pests such as the mountain pine beetle (*Dendroctonus ponderosae*), among others, have been investigated because of linkages to climate change.

The advent of a “global society” has subjected our forests to exotic insect species such as the gypsy moth (*Lymantria dispar*), emerald ash borer (*Agrilus planipennis*), and Asian longhorned beetle (*Anoplophora glabripennis*). These alien invaders are prone to spectacular outbreaks because they have been liberated from their natural regulatory influences, such as parasites, predators, and diseases. Not surprisingly, these invaders have attracted the attention of forest health specialists. However, almost no consideration has been given to understanding the effects of direct and indirect anthropogenic disturbance on obscure forest insects with no track record as agents of forest mortality. Outbreaks of previously innocuous native forest insects are rare in their native ranges and on their native hosts, but several examples do exist. In 1999, an outbreak of the red oak borer (*Enaphalodes rufulus*) occurred in the Arkansas Ozarks. More than 400,000 hectares were affected, and more than 60 percent of the mature red oak component died, drastically altering the dominant forest type (oak-hickory) in the Ozark-Ouachita Highlands. While no previous reports of outbreaks or association with tree mortality existed, in this outbreak the red oak borer was a major contributor to the mass death of thousands of trees.



Adult male red oak borer.

Population densities of fewer than one adult beetle emerging per tree were once considered severe infestations, but densities of up to 175 emerging adults per tree were estimated during this outbreak. Despite over 50 oak decline events within the home range of the red oak borer during the last 100 years, the red oak borer had never before been associated with oak decline. Evidence suggests that logging activities at the beginning of the 1900s and fire suppression coincided to bring about densely stocked, over-mature stands of northern red oak (*Quercus rubra*) on relatively poor sites (xeric ridges and southern slopes) where the highest populations of red oak borer were acute short-term drought in the 10-20 years previous to the outbreak may have served as the inciting factor for this event.



Aerial view of landscape-scale tree mortality in Ozark National Forest in 1999 during red oak borer outbreak. Northern red oak in final stages of decline.

Another obscure forest insect, the pine looper (*Phaeoura mexicanaria*) defoliated approximately 25,500 hectares of ponderosa pine (*Pinus ponderosa*), its native host, in southeastern Montana in 1969 and 1970. When the outbreak was discovered, it represented the first time the pine looper had been collected in Montana. In fact, there had been no previous reports of high population densities or tree damage anywhere. As in the case of the red oak borer, very little was known about *P. mexicanaria* before the outbreak. The larval host tree was not even identified until 1962. *P. mexicanaria* has a rather large range (in suitable habitat throughout western Canada and the United States), but had previously been found only in very low numbers. This

outbreak remains unexplained but did follow the outbreak of another well-known pest species, the pine tussock moth (*Dasychira grisefacta*), that took place in a densely stocked forest, which provided an overabundance of host material.

Beginning with an outbreak in 1996, three species of native geometrid defoliators were implicated in major tree mortality events in the southeastern U.S. *Nepytia janetae* was identified as the causal agent of a major spruce and fir defoliation event (more than 4,000 hectares) in eastern Arizona in 1996. *N. janetae* is another “looper” moth and was not described by science until 1966. The defoliation attracted a secondary attack from bark beetles, ultimately causing extensive tree mortality. Similar to the red oak borer, the population suddenly crashed in 1999. Subsequently, *N. janetae* and two other species of native geometrids (*Enypia griseata* and *Galenara consimilis*) have had outbreaks in the southwestern U.S. (Personal communication, Bobbe Fitzgibbon, USDA Forest Service, 2008).

The pale-winged gray moth (*Iridopsis ephyraria*) is another relatively rare species that normally exists at low population levels and has a rather large range (Alberta to Nova Scotia in Canada, and south as far as Texas). In 2002, in southwestern Nova Scotia, it was found in very high numbers, causing significant damage to eastern hemlock (*Tsuga canadensis*). Causes of this outbreak are not clear, but evidence suggests that an increase in host suitability due to drought-induced tree stress or airborne pollutants may have contributed to this event (Personal communication, Dr. Graham Thurston, Canadian Forest Service, 2008).

Three major types of anthropogenic disturbances (climate change, fire suppression, and even-aged stand management) may be causing a worldwide increase of insect outbreak severity, frequency, and distribution, as well as allowing normally harmless insects to reach epidemic populations. Climate change is being increasingly indicted for changes in forest pest systems. Some well-known outbreak species are potentially being influenced by climate change (e.g., bark beetles, eastern larch beetle, western pine beetle, and mountain pine beetle), and these changes are expected by some to worsen if global warming continues. In addition, fire suppression and even-aged stand management during the last century have created conditions more akin to agroforestry (low diversity, high stem density, even age) than to natural forests. Therefore, we are now beginning to see agroforestry- like problems: destructive outbreaks of secondary or formerly inconsequential pests. In the case of red oak borer and some of the other “new” severe pest species, we may have witnessed the beginnings of new pest dynamics brought about by anthropogenic disturbances. Indeed, the Ozark National Forest may be a prime example of what is to come for future forest decline and insect outbreaks. A common thread among the previous examples may be an unnatural overabundance of susceptible host material in combination with severe climatic conditions serving as the igniter.

Due to a general lack of information regarding most forest insect species of little or no economic concern, forest health practitioners are forced into a reactive stance when an outbreak occurs. By the time enough information is gathered to pinpoint the causes of the outbreak, management options are extremely limited. Years can be lost to describing basic insect ecology and life history. Our only defenses against the unpredictable outbreak of an obscure forest pest are twofold: to expand scientific knowledge of obscure forest insects over the long term and to optimize forest health conditions through proper management practices before hints of problems arise.

John J. Riggins is an assistant professor of forest entomology in the Department of Entomology and Plant Pathology at Mississippi State University (MSU).

Andrew J. Londo is a professor and Extension Forestry Coordinator in the Department of Forestry at MSU.

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Forest Wisdom is a national periodical published by the Forest Guild.
www.forestguild.org/publications/forest_wisdom/wisdom13.pdf

Handy and Helpful Resources for Forest Health Information

Back yard tree care <http://www.dnr.state.mn.us/treecare/index.html>

MN DNR Forest Insect and Disease Newsletter http://www.dnr.state.mn.us/treecare/forest_health/index.html or
<http://www.dnr.state.mn.us/treecare/index.html>

MN DNR Forest Health Website Address Book- access through Backyard tree care link or
Forest Insect and Disease Newsletter site shown above. Has many links to web sites with I&D
information by many agencies and universities.

MN DNR Forest Health Annual Reports
http://www.dnr.state.mn.us/treecare/forest_health/index.html

Insect and disease problem diagnosis (self-service computer diagnosis)
<http://www.extension.umn.edu/projects/yardandgarden/diagnostics>
www.entomology.umn.edu/cues/dx/diagnostic.htm

Insect and disease publications
<http://na.fs.fed.us/pubs/> Forest Insect and Disease Leaflets, How to etc.
<http://www.extension.umn.edu/topics.html?topic=5&subtopic=166>

National Forest Health Monitoring Program – <http://www.fs.fed.us/foresthealth/fhm/>

Forest Health Highlights by N Central State by year –
<http://www.fhm.fs.fed.us/fhh/ncregion.shtm>

Aerial survey maps – contact Regional Specialist or <http://na.fs.fed.us/fhp/ta/av/>

Urban Tree Risk Management - http://na.fs.fed.us/fhp/hazard_tree/

Pesticide products that are legal in Minnesota www.kellysolutions.com/mn

Tick and tick-borne disease information
www.health.state.mn.us/divs/idepc/diseases/lyme/index.html

Who to contact about suspected exotics - MN Dept of AG - Arrest-A Pest Hotline is 1-888-545-6684.
<http://www.mda.state.mn.us/plants/pestmanagement/default.htm>

Emerald Ash Borer

General web sites

U of MN Extension: <http://www.extension.umn.edu/issues/eab/>
National website: <http://emeraldashborer.info/>
MN Dept of AG: <http://www.mda.state.mn.us/plants/pestmanagement/eab.htm>
MN DNR: <http://www.dnr.state.mn.us/invasives/terrestrialanimals/eab/index.html>
MI Dept of Ag: http://www.michigan.gov/mda/0,1607,7-125-1568_2390_18298---,00.html
USFS: <http://na.fs.fed.us/fhp/eab/>

Quarantines for EAB in MN

State Quarantine information: <http://www.mda.state.mn.us/plants/pestmanagement/eabquarantine.htm>
Federal quarantine information: http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/7cfr301-53-08.pdf

Identification

Do I have EAB worksheet? http://www.mda.state.mn.us/news/publications/pestsplants/pestmanagement/eab_doihaveit.pdf
Signs and symptoms of EAB: www.emeraldashborer.info/files/E-2938.pdf
Ash tree identification: www.mda.state.mn.us/news/publications/ext/ashtreeid.pdf
EAB -CSI Missouri: <http://extension.missouri.edu/emeraldashborer/>
How to find a EAB first detector near you. Email to this address: treeinfo@umn.edu

Firewood information

Firewood identification: <http://www.forestry.umn.edu/extension/forest/firewoodID.html>
Labeling requirements MN Dept of Commerce: <http://www.mda.state.mn.us/plants/pestmanagement/firewood.htm>
<http://www.state.mn.us/portal/mn/jsp/content.do?hpage=true&contentid=536884590&contenttype=EDITORIAL&hpage=true&agency=Commerce>
Firewood on DNR lands: <http://www.dnr.state.mn.us/firewood/types.html>
How to become a DNR approved firewood vendor: <http://www.dnr.state.mn.us/firewood/vendorinfor.html>
DNR firewood rules: <http://www.dnr.state.mn.us/firewood/rules.html>

Insecticide options for EAB:

<http://www.extension.umn.edu/issues/eab/EABInsecticideFactSheet.pdf>
<http://www.extension.umn.edu/issues/eab/UMExtension-EAB-Insecticides.pdf>

Insects that can be confused with EAB

Pictures of insects –U of MN Extension <http://www.extension.umn.edu/distribution/horticulture/images/M1242-9-lg.jpg>
Pictures of galleries in ash: <http://www.mda.state.mn.us/news/publications/pestsplants/pestmanagement/eabreference.pdf>

Frequently asked questions

<http://www.emeraldashborer.info/faq.cfm#> <http://www.extension.umn.edu/distribution/horticulture/M1242.html>
<http://www.dnr.state.mn.us/invasives/terrestrialanimals/eab/faq.html>

Management

Emerald ash borer and your woodland MSU Ext: http://www.michigan.gov/documents/mda_EAB_and_your_Woodland_Trees_124432_7.pdf
Ash phloem reduction model: <http://www.ashmodel.org/>
MDA Strategies for managing EAB introductions in MN (includes SLAM): <http://www.mda.state.mn.us/plants/pestmanagement/eabstrategies.htm>
MN Eab Scientific Advisory Group- Preparing for Eab: <http://www.mda.state.mn.us/news/publications/pestsplants/pestmanagement/eab-recommends.pdf>
MN Response plan - MDA: http://www.mda.state.mn.us/news/publications/pestsplants/pestmanagement/eab_responseplan.pdf

This newsletter is developed as a service to forest managers and shade tree owners. The Forest Health Unit would appreciate comments concerning the newsletter and its contents. These can be directed to Jana Albers, Editor, 1201 E. Highway # 2, Grand Rapids, MN 55744.

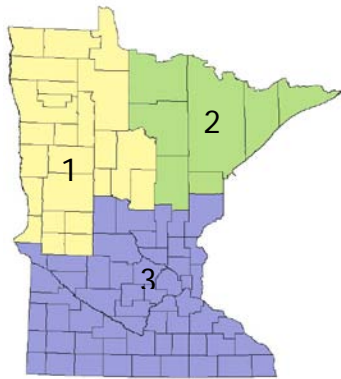
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Olin Phillips
Section Manager
500 Lafayette Rd.
St. Paul, MN 55155
(651) 259-5282

Alan Jones
Resource Management
500 Lafayette Rd.
St Paul, MN 55155
(651) 259-5271

Val Cervenka
FH Coordinator
500 Lafayette Rd.
St. Paul, MN 55155
(651) 259-5296

Jana Albers
Reg. 1 - Forest Health Specialist
1201 E. Hwy. # 2
Grand Rapids, MN 55744
(218) 327-4234



Mike Albers
Reg. 2 - Forest Health Specialist
1201 E. Hwy. # 2
Grand Rapids, MN 55744
(218) 327-4115

Ed Hayes
Reg. 3 - Forest Health Specialist
2300 Silver Creek Rd. NE
Rochester, MN 55901
(507) 206-2834

Neville Wilson
Reg. 3 - Plant
1200 Warner Rd
St. Paul, MN 55106
(651) 259-5821

DNR Forestry – Forest Health
1201 East Highway 2
Grand Rapids, MN 55744

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