Minnesota Department of Natural Resources
Division of Forestry

FOREST INSECT & DISEASE NEWSLETTER

May 10, 2007

Introducing…Val Cervenka

At last, a forest entomologist!

Not since the days of Tom Eiber and Mike Carroll has the Division of Forestry been graced with a forest entomologist. It has been a long time since either Tom or Mike killed and counted bugs in the woods. And, the reason for the long entomologist-free period was due to many unanswered questions. Questions such as who could ever trap and count as many bugs, write as many bug guidelines, squash as many forest tent caterpillars and jack pine budworms, or dish out as much entomological blarney as the Eiber-Carroll tandem ever did?

Val Cervenka could and can, and was hired to help address those unanswered questions. Val became the forest entomologist in January of this year, and rarely has the central office in St. Paul been exposed to so many bug specimens and bug talk in so short of time.

Val comes to us from the MN Department of Agriculture where she was involved in everything from emerald ash borer to honey bees. While at the Department of Agriculture, Val developed and designed detection surveys for invasive species exclusion programs, managed the gypsy moth trapping program, and provided oversight of the apiary program. Because of her experience working with MDA and invasive species, Val will also help develop an invasive species program for the Division of Forestry.

Val is a graduate of the University of Minnesota. So, a pretty good start. In her entomological experience she has been involved in forest, forensic, livestock and vegetable crop entomology. She has expertise in insect damage identification with over 20 years of experience. A dubious sidelight is her expertise in forensic entomology. Val is the only board-certified female forensic entomologist in the United States. She consults in the field and conducts forensic training. She recommends that she not be invited to speak at brown bag seminars unless the brown bags can double as the same types of bags found in the seat pockets on airplanes.

We welcome Val to the Division and look forward to a long relationship with her as she joins us in the continual struggle for motherhood, apple pie, and the perfect recipe for forest tent caterpillar wine. Because of Val, we look forward to a closer working relationship with MDA because she has brought with her MDA's secret handshake and code words. And, we expect that her entomological blarney will assure her predecessors, Tom and Mike, that the Division is once again in good hands.

In this issue:

An unusually dry fall and winter

Winter injured conifer needles turn red in the spring

Winter has taken its toll on conifers this year. By this time you have probably noticed all the red needles on red pines and other conifers especially those growing along highways. Although the needles look terrible, the buds, twigs and trees are not dead. The needles had a rough winter and they were discolored by winter injuries. Resist the urge to prune them away or remove discolored trees. Chances are very good that these trees are live and healthy beneath their mask of red needles. If you look closely, the tips of the needles are red or brown but the base of the needles is usually still green. If you break open a bud with your thumbnail it should still be green and moist. Buds are well protected during the winter and will grow once spring arrives.

Winter injury occurs when needle temperature rises above freezing during sunny winter days resulting in the needles losing moisture. When the water stored in the needles, twigs and stems is gone and can't be replaced because the ground is frozen, needle tissues dry out and die. Last year's drought, the lack of snow cover during much of this past winter, deep frost in the ground, strong dry winds, many days of bright sunshine and low relative humidity all contributed to the winter drying injury we are now seeing.

Winter injury is often worse and most noticeable on trees lining the north side of a road that runs east and west. This is because in the winter the low angle of the sun to the south shines on the trees on the north side of the road warming and thawing the needles. The trees on the south side of the road remain shaded and cool and lose less water from their needles, which remain green and healthy looking.

Humans also added to the injury by applying road de-icing salts. Both sodium and chlorine ions in the salt can accumulate to lethal concentrations in needle tissue. High levels of salt in the soil, also contributes to stress and damage in trees. White and red pines, Norway and Colorado blue spruce are very susceptible to salt spray damage; Scots pine, white spruce, juniper and eastern red cedar are moderately susceptible and jack pine, Austrian pine, larch and black spruce are tolerant to salt spray damage.

Some trees seem to get winter injury every year. In these situations, it is likely that the trees are under stress and do not have the resources to tolerate any internal desiccation and therefore suffer winter injury every year. For example, some groups or stands of red pines show winter injury symptoms every year because they are growing offsite, either in soils that are too wet or in soils that have a hardpan or for some other reason restricts rooting depth. This stress predisposes the trees to needle desiccation and ultimately to repeated winter injury. While these trees often survive many years with repeat winter injury they grow slower and may eventually die because the combination of stresses makes them more susceptible to attack by insects and fungi.

Normally, snow cover prevents winter injury of young conifers by providing shelter from drying winds and from the glare of the sun. In some years, it is common to see young conifers with a strong line of demarcation separating the brown, desiccated tops that were exposed to wind and sun from the healthy, green bottom branches that were covered and protected by snow.

Is there anything people can do to prevent winter injury?

1. When selecting trees to plant, choose species and cultivars that are adapted to your local growing conditions and to the soils where you will plant them.
2. Avoid planting trees susceptible to salt within 150 feet of a highway to prevent salt damage.
3. Erect screens using plywood, snow fences or plastic fences to slow down drying winds and reduce salt spray drift. Small trees can be wrapped in burlap to reduce exposure.
4. Reduce or eliminate the use of de-icing salts if possible.
5. Consider replacing trees that have severe winter injury year after year. They are not in the right location and will only decline due to needle and twig loss over a period of many years.
6. Keep conifers properly watered throughout the growing season and in the fall until the ground freezes to help reduce winter injury. But don't flood the soil either.
7. If drought continues this spring begin to water trees as soon as the frost leaves the ground.
8. Mulch over as much of the root system as possible with 2 to 4 inches of wood chips to help maintain soil moisture and reduce the depth frost penetrates into the soil.

Conifers growing in Minnesota have had a rough winter with plenty of opportunities for winter injury. But in spite of their appearance, chances are good that your trees are live and healthy beneath their mask of red needles. Buds were well protected during the winter and will grow once spring arrives.

The damages trees have to overcome during Minnesota winters

By Gary Johnson and Rebecca Koetter,
Univ. of Minnesota – Department of Forest Resources

Winter in Minnesota never seems to end. With that said, winter includes months with several stressful damage opportunities that take many forms including damage from cold temperatures, chemicals, drought (yes this happens even during winter), and mechanical damage caused by critters or equipment.

Cold temperature damage

Trees in Northern climates that have originated from a northern seed source are genetically adapted to slowly undergo an acclimation process starting in middle to late August. Provenance, the original location source of a propagule, is important in genetically determining when the trees begin or end their acclimation. Northern species' acclimation occurs an estimated one month earlier than southern species' acclimation onset.

Photo courtesy of Dave Hanson
Figure 1: Cold temperature damage- Late spring frost

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. The cold temperature susceptibility of tree tissue ranges from the roots being the most sensitive to cambial tissue, flower buds, and vegetative buds being the least sensitive, respectively. 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. See Figure 1.

Drought damage

Drought damage is seen in the form of scorching or desiccation in evergreens. Even though winter means that trees are not actively growing, water still moves within a tree's stem or through needles during transpiration when temperatures are above freezing- even if the soil is frozen. Water is stored in the tree's root system and sapwood. When foliar or bud tissues are warmed by the sun, transpiration occurs and takes water from the water reserves. If there is no water stored in the tissues, the needles brown and death may result. Complete death is not inevitable if new buds are present as seen in Figure 2.

Photo courtesy of Gary Johnson
Figure 2: Drought damage- Buds emerging from scorched conifer.

Cold temperature and drought damage combined

Another water issue dealing with roots that is indirectly tied to drought is associated with below-ground temperatures. Frost penetrates deeper in porous or dry soils. Trees from a northern provenance go into bud dormancy and can sustain sub-zero temperatures…except their roots. Fine roots can be killed at temperatures of 12 to 26°F! To avoid this, water the root system until the ground freezes and add a layer of organic mulch to act as an insulator.

Chemical damage

Photo courtesy of Gary Johnson
Figure 3: Chemical damage- De-icing salt damage to buds causing witches' brooming

Winter equals snow (hopefully) which further leads to the use of de-icing salts. De-icing salts usually include a chlorine compound of some form that is toxic to the trees' roots. Sodium chloride is a common de-icing salt, which decreases available water, ties up calcium, breaks down the soil structure, and raises the soil pH. As seen in Figure 3, salt spray also distorts buds by causing witches' brooming.

Mechanical damage

Snow removal equipment, flinging ice debris, deer antler rubbing, rabbit browsing, and squirrel bark removal all fall into the category of mechanical damage. Mechanical damages range in their level of severity. Of course, the most severe damage is done when the sensitive cambial

tissues responsible for nutrient and water transport are disrupted around the entire stem.

Photo courtesy of Gary Johnson
Figure 4: Mechanical damage- Cambial removal from deer rubbing.

Beyond the other damage types

The overall vitality of a tree going into the winter months can determine how well the tree will survive this harsh Minnesota season, regardless of stressful winter damages. Some stresses that determine overall vitality going into winter or general winter hardiness include caterpillar or sawfly defoliation, construction damage, and severe pruning. Also, when a tree is stressed by drought conditions or pH problems it may not have the necessary reserves to go into bud dormancy, continue life throughout the winter, or be able to flush its leaves in spring.

Symptomology of winter damages is similar to the symptoms caused by other stressors and includes scorching, dieback, witches' brooming, late leaf-out, poor canopy density, sudden leaf wilt, and complete death. The good news is that you can prevent most winter damage from occurring. For more information on protecting trees from winter damage visit: http://fr.cfans.umn.edu/extension/SeasonalCare/WickedWinters.pdf

Drought stress

Plants, like animals, are composed mainly of water and water is essential for the biochemical processes necessary for life. On average, soft leaves are 80-90% water, fine roots are 70-95% water and freshly cut wood is about 50% water. Lack of rainfall and shortage of soil moisture result in drought stress in plants. But, what is actually going on (or not going on) in plants suffering from drought stress?

Drought stress in plants develops gradually and affects plant function through a sequence of events as the internal water deficit intensifies.

1. The first response to a water deficit is a decrease in turgor pressure within cells and a slowing of growth or expansion. Water stress during leaf expansion results in smaller leaves; during the summer results in less wood production.
2. Next, the metabolism of proteins and the synthesis of amino acids and chlorophyll are reduced. This suppresses cell division, further reducing growth.
3. As drought stress increases from mild to moderate, cell biochemistry is increasingly disturbed. One of the enzymes most inhibited by water stress is nitrate reductase. This enzyme is necessary for nitrogen assimilation in plants. Plants need nitrogen to form amino acids, which are the basic ingredients of proteins.
4. A moderate water deficit is also enough to start the production of abscisic acid, a plant hormone, which is created in the roots. Abscisic acid is transported upwards and acts as a signal to different parts of the plant, including the leaves, where it stimulates stomates to close. This reduces water loss through transpiration but also reduces the uptake of carbon dioxide leading to a further decrease in photosynthesis.
5. The conversion of starches to sugars increases. The tree uses its stored reserves for emergencies such as this.
6. If water stress continues, premature senescence and shedding of leaves may occur. This may involve the normal process of abscission with the formation of an abscission layer or simply a wilting and drying of leaves. Premature senescence and shedding of leaves varies by season and species of trees.
7. Reproduction of trees is affected because drought stress generally lowers pollen fertility.

There are also many indirect effects of drought. For example, slowing or cessation of root growth during drought indirectly decreases water absorption because it reduces the invasion of previously unoccupied soil. Also, as root growth slows and ceases, the outer tissues of the root turn brown and harden or they degenerate, so they are less able to absorb moisture.

Drought stress usually increases the susceptibility of affected trees to attack by opportunistic insects and fungi. Drought stress in oaks increases their susceptibility to attack by two-lined chestnut borers; in birches to bronze birch borers; and, in pines to bark beetles. Drought stress can increase the ability of *Armillaria* fungi to grow, invade roots and kill trees. Here's how it is thought to work in oak trees. A seriously drought-stressed oak converts stored starches into sugars. These sugars are a preferred energy source for *Armillaria*, so fungal activity is stimulated and nourished. Under normal conditions, phenols in the bark inhibit the growth of *Armillaria* but in the presence of a rich sugar source, the growth of *Armillaria* is actually stimulated. These two significant changes in host physiology allow *Armillaria* to attack and kill the cambium of the roots. If prolonged, the drought and fungal attack can kill oak trees. Drought stress increases attack by opportunistic insects and fungi, usually due to the host tree's altered metabolism.

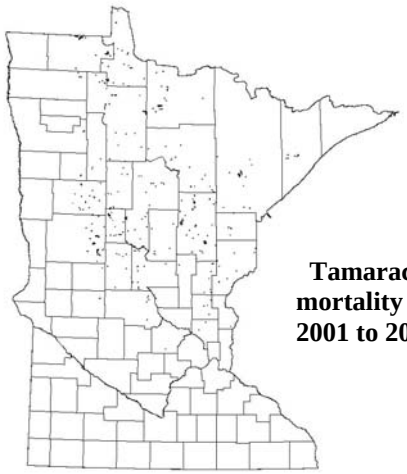
Information from The Physiological Ecology of Woody Plants by Kozlowski, Kramer and Pallardy, 1991,
and, Physiological Plant Ecology by Larcher, 1995.

Bug Season is Upon Us

Eastern larch beetle

Eastern larch beetle continues to kill tamarack. Although only 8927 acres of mortality were mapped by aerial survey in 2006, mortality due to eastern larch continues to be very common and widespread. From 2001 through 2006, aerial survey mapped tamarack mortality on 53,734 acres in 911 stands. See map below. No consistent stress factor contributing to the current mortality by eastern larch beetle has been found. Trees from 40 to 160 years have been killed by the beetle. Mortality has occurred on upland as well as lowland sites and in mixed species stands as well as in pure stands.

Researchers (Langor and Raske, 1987) in Newfoundland found that only adult beetles were able to survive overwinter and that freezing temperatures caused complete mortality of overwintering larvae. Overwintering survival has been followed on a few trees just north of Grand Rapids the past four years. Larvae as well as adults have been surviving the mild winters we have been experiencing. The lowest temperature in Grand Rapids this past winter was –27 F and larvae survived again. Perhaps the current outbreak of larch beetle is a result of the mild



Tamarack mortality from 2001 to 2006.

winters allowing the immature stages as well as the adults to overwinter resulting in larger populations than normal. The drought of 2006 and the resulting stress on tamarack trees may also contribute to a continuation of the outbreak.

However, the survival of larch beetle larvae during a normally cold, "old-fashioned" winter in Minnesota has never been studied. So, perhaps Minnesota larvae are just tougher than Canadian larvae and winter temperatures rally have nothing to do with this outbreak. At this time, we really don't know.

Early detection and rapid response for non-native bark beetles

Non-native bark and ambrosia beetles are a serious threat to our nation's urban and rural forests. In 2007, the USFS-Forest Health Protection will begin implementation of an early detection and rapid response project for non-native bark and ambrosia beetles. An Early Detection and Rapid Response Team (consisting of Forest Service, APHIS, university and state representatives) has developed a framework for implementing a national, interagency detection, monitoring, and response system for these insects. This framework involves the cooperation of state partners, regional taxonomists and regional Forest Service staff. Participating states will be responsible for following project protocols with funding from the Forest Service. The EDRR project for non-native bark beetles will begin national implementation this growing season.

The goals of the national EDRR project are to detect, delimit and monitor newly introduced exotic bark and ambrosia beetles at selected high-risk forest areas and, if necessary, quickly assess and respond to newly detected infestations.

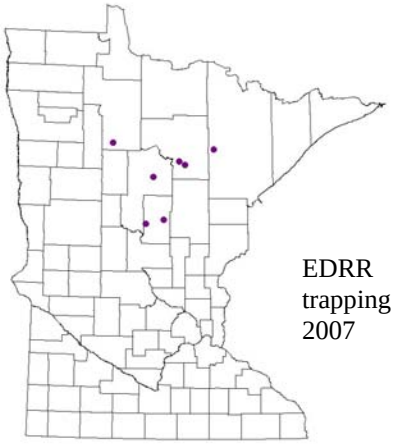
Background

In 2001, with the support of the National Plant Board and the National Association of State Foresters, the Forest Service and APHIS Plant Protection and Quarantine initiated a Memorandum of Understanding to establish an Exotic Forest Pest Early Detection and Rapid Response (EDRR) Pilot Project. The Pilot Project was conducted from 2001-2006 to: develop and test a prototype national survey; identify potential exotic pests and likely pathways; identify detection and management guidelines; address gaps in detection protocols and taxonomic resources; and use the information collected to set agency protocols and priorities. Ten nonnative bark beetle species were specifically targeted, although all bark beetles captured were identified. The target species are among the most common and threatening species intercepted during port inspections.

Since pilot project implementation in 2001, five exotic bark and ambrosia beetles have been detected for the first time in North America: *Hylurgops palliatus* (Erie, PA, 2001); *Xyleborus similis* (Houston, TX, 2002); *Xyleborus glabratus* (Port Wentworth/ Savannah, GA, 2002); *Scolytus schevyrewi* (Denver, CO and Ogden, UT, 2003); and *Xyleborus seriatus* (Southboro, MA, 2005).

Plan for National Implementation

The EDRR Pilot Project demonstrated the feasibility of a nationally-coordinated survey for bark beetles. The Team has developed guidelines for state participation and selected target species. Protocols developed during the pilot project will be utilized in the national survey. Based upon anticipated funding levels approximately 17 states will be surveyed in 2007, including Minnesota. Funding will be made available to states to select high risk sites, approximately 7-9/state, such as urban parks, forests and wooded areas in the wildland-urban interface in coordination with state regulatory officials or APHIS. Taxonomists will identify all bark and ambrosia beetles in trap samples.



EDRR trapping sites 2007

A national, web-based database will be used for data entry, sample tracking and as the reporting system for the project. If a new, non-native species is found, a team will be assembled to develop assessment and response strategies. States and the national EDRR Team will coordinate detection and response activities with APHIS and the Cooperative Agriculture Pest Survey to ensure these programs complement each other.

Cynipid gall wasps

The Cynipidae family consists of hundreds of gall wasp species that induce galls on their plant hosts in which they live and feed during the larval stage. The females deposit their eggs in the tissues of all parts of the host, from the roots to the flowers. Gall production is believed to result from the reaction of the cambium and other meristematic tissues to stimuli produced by the larvae. Many gall wasp species inhabit galls produced by other gall making wasps. The adults are extremely small in size and usually black. Many gall-forming species produce two very different generations per year. One generation develops during the spring and summer months in one type of gall, and then another generation occur in the late summer to fall in the second-generation galls. These second generation adults can be rather complex, consisting of entirely parthenogenic females (unfertilized eggs develop into adults, no need for mating). Eggs laid by these females result in the fall galls. The adults that arise from these galls consist of both males and females, and may be quite different in appearance from those of the first generation. There are over 700 species of gall wasps occurring in the United States and Canada, 76 percent of which form galls on oaks. The great majority of species are of little or no economic importance. However, several species that induce large irregular galls on the smaller branches are capable of causing severe injury and, when extremely abundant, mortality.

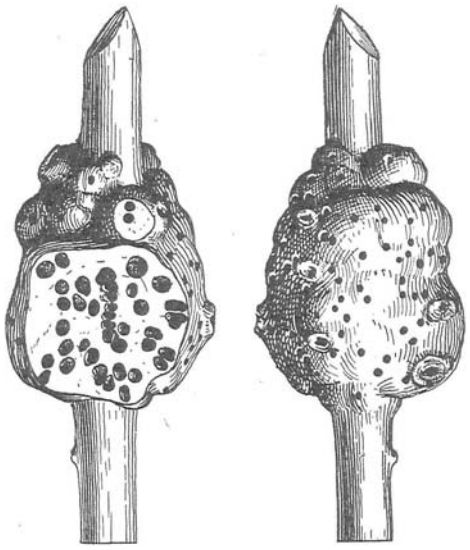


Fig. 57. Gouty oak gall, Andricus punctatus Bass. Old gall and one in section. (Original)

Gouty oak gall wasps, *Callirhytis quercuspunctata,* occur from southern Canada to North Carolina and west to Illinois and Minnesota. They induce galls on the twigs and smaller limbs of red, scarlet, pin, and black oaks. Galls slow or stop the flow of water and nutrients in infested branches. Gouty oak galls have been found associated with oak mortality in Sandstone Area last fall.

These galls are about 12 to 38 mm long and they frequently occur so close together that they form practically continuous masses. Galls are solid and woody, with many larval cells near the center. The gouty oak gall has the alternate generations as mentioned above. The first generation induces small blister like galls on the leaves near the veins in the spring. The second generation induces gouty galls during the summer months.

Source: "Insects of Eastern Forests" USDS-USFS Pub. No. 1426, Dec. 1985, p 423.

Feature Article

Firewood restrictions on DNR-administered lands

By Susan Burks, FHU

The State Legislature has just passed a law that will restrict all firewood entering DNR-administered lands to firewood which has been approved by the Commissioner of the DNR. Approved firewood would include wood sold by the DNR, wood obtained from an approved vendor or clean, dimensional lumber. An on-line process is being developed for anyone interested in being put on the "approved DNR vendor" list. Private individuals and vendors can apply as long as the wood comes from within Minnesota and within 100 miles of the DNR facility where it will be used. The likely date of implementation is the 2007 Fishing Opener, May 12th.

So why pick on firewood?

Campfires are a critical part of the camping experience and the DNR has no desire to change that. Campfires are an important part of the culture of outdoor recreation and the DNR wants to keep it that way. But it is critical that campers recognize the risks they are taking by moving firewood from one area to area. Folks are putting the State's forests at risk, as well as the trees that make our communities livable.

Just like other raw wood products, firewood is capable of harboring "bad bugs", invasive insect and disease pests. And just like other raw wood products, the movement of infested firewood can spread these pests to areas where we don't want them. But unlike other raw wood products, firewood is moved primarily by home owners and campers who do not fall under state and federal regulations meant to limit accidental introductions of these bad bugs. So the point of this legislation is to change how we think about firewood and the precautions we take to protect the things we love.

Minnesota campgrounds are one place where pests like gypsy moth and EAB can be introduced because of the transport of personal firewood supplies from infested areas. There are 637 campgrounds in Minnesota, 85 percent privately owned and 15 percent managed by DNR. In 2005, as part of a one-day survey of state park campers, we found that:

- 56% of all campers brought their own firewood to State Parks, and,
- 35% of out-of-state campers brought their own firewood.

Parks and Recreation Division reservation data indicates that about 14 percent of reservations come from out-of-state. So, in 2005, nearly 8000 vehicles came into MN campgrounds carrying firewood from out-of-state.

What about the other guys?

When a "bad bug" becomes established within a state, state and federal regulations are put in place to help keep it from spreading. So when the emerald ash borer (EAB) was found in Michigan, the state was quarantined. Quarantines do not ban trade, but they do regulate articles capable of harboring the pest. That means raw wood products and nursery stock have to meet certain criteria before they can be moved. In the case of firewood coming from EAB quarantined states, it means the bark has to be removed and the wood milled down .5" into the sapwood to make certain any EAB life stage has been removed. Or the wood has to be heat-treated for a set amount of time (based on the size of the piece) so that all EAB life stages are killed. Since either of these treatments would also kill a tree, ash nursery stock cannot be moved outside those states quarantined for EAB. Logs and other raw wood products have specific criteria for their shipment as well. So while there is always a chance for something to slip through, most commercially sold products are safe to move.

The exception is firewood because of the nature of the industry. Anyone with a little land or a chain saw can go into business for himself or herself, and, many do. As a result, it is difficult if not impossible to keep track of who is in business and to make sure that they are aware of state and federal regulations. And because small operators may or may not label their firewood bundles, it is extremely difficult to know where the wood is coming from. Often the label has the distributor's location but not where the wood was harvested. We know of instances where the firewood was labeled Texas, but it really came from Minnesota.

Which "bad bugs"?

Firewood can serve as a vehicle for a variety of forest insect and disease pests, including the fungi causing oak wilt and Dutch elm disease, wood stain fungi and insects including gypsy moths, Sirex wood wasps, ambrosia beetles, bark beetles, and long-

horned beetles. Although the movement of forest diseases and pests in firewood has been an ongoing concern, the approach of the emerald ash borer (EAB) has brought the issue to the forefront in Minnesota and nearby states.

EAB, a small metallic-green woodborer insect, poses an extreme threat to Minnesota's ash tree population. First discovered in Michigan in 2002, EAB has spread to Indiana, Illinois, Ohio, Maryland and Ontario. Those areas are now all quarantined. Although not yet found in Wisconsin or Minnesota, EAB could easily spread to our state.

Infested trees are killed by the feeding activities of the EAB larvae, which bore through bark to feed on sapwood as they grow, creating serpentine tunnels while feeding. Adults bore exit holes in the bark, emerge in early June, mate, and lay the next generation of eggs in ash bark.

EAB are able to attack and kill both healthy and stressed trees. They also attack all species of ash, of all ages and forest types. Because they can kill trees outright without the assistance of stress factors like weather extremes or site disturbances, EAB is considered the number one threat to ash in the Great Lakes region.

What's at risk?

There are four species of ash found in Minnesota, although blue ash is of minor importance. Of the other three (black, green and white ash), black ash is the most abundant in forests and green ash is the most abundant in our communities. Minnesota forests have the third largest volume of ash in the country with over 1.2 billion cubic board ft. in them. Our communities are estimated to hold another 3 million ash trees. This large number reflects the fact that ash was the replacement tree of choice when Dutch elm disease took out a large number of our mature elms back in the 1970's. Those folks here in the 1970s will remember the vast number of trees that came down due to Dutch elm disease and the large quantities of wood that piled up waiting for disposal. In reality, the outbreak that peaked in 1976 took out only about 50% of the mature elms in our urban areas. Since 1977 when the first community grants were awarded to help manage DED, losses have averaged between 3 and 10% annually (2004 was an exception when the number of trees lost temporarily shot up again).

In comparison, the core area of EAB infestation in Detroit has lost close to 100% of their ash. During the first year after they discovered EAB in Michigan, the state hired 100 new employees and spent over $24 million in an attempt to contain its spread. And, federal agencies spent even more. Since then, federal funds have been cut back and the state has given up trying to control the pest. That means that individual communities and their residents face the burden of removing large numbers of dead and dying trees without financial assistance. Estimates indicate that the rate of ash mortality is going up about 30% per year in the areas surrounding Detroit.

Black ash seems to be the most EAB preferred species of the ash. And the slower growing black ash trees, those best for veneer logs and basketry, are even more susceptible than their vigorous, rapidly growing neighbors. In the wettest native plant communities, black ash is found growing in monocultures. If the trees are lost, the water table is likely to rise, preventing new tress from becoming established. So if EAB is introduced into the state, those wettest ash forests may be lost altogether. Less wet black ash sites will require careful management to maintain the water level at their current depths.

Why the DNR?

The DNR manages 15% of the campgrounds in the state. So restrictions on DNR lands only address a fraction of the recreationally used firewood being moved around the state. It's important to note that DNR restrictions wouldn't touch firewood being used for home heating. So what do we hope to accomplish? While it's a big undertaking, the DNR hopes to change public behavior with aggressive outreach program and faith in Minnesota residents to "do what's right". We plan to take every opportunity to educate campers:

when they make reservations or check into their campsite for the night,
when campground hosts stop by for a chat or
when folks go to buy their fishing permit,

they will be seeing materials that explain the risks associated with firewood and what to do to help protect their favorite campsite. So like Smokey Bear and the litterbug education campaigns of past decades, the DNR hopes to use the proposed restrictions to gain public attention and convey the critical role campground visitors play in protecting our natural resources.

The DNR also hopes to enlist the support of other landowners, so that recreationists through out the state get the same message. Toward that goal, the DNR has been hosting stakeholders meetings and talking to other public and private campground owners. As is already being done in Wisconsin, they are being encouraged to put similar restrictions in place to protect their own resources. And as is being done in Wisconsin, the emphasis in Minnesota will be on education, not enforcement. Public outreach and the honor system will be the foundation of the Minnesota DNR program.

So what can we do?

Because it is no longer possible to eliminate EAB from the United States, it will get to Minnesota eventually. But it only spreads a few miles a year on its own. So spreading by itself, would take EAB decades to get here. So keeping it out of Minnesota provides a long time for research, planning and forest management to limit future impacts. That makes it's well worth the effort to keep it from being accidentally introduced.

Since most commercial pathways are being covered by the regulatory agencies, the thing the DNR, residents and recreational visitors can do is address how we think about firewood. It's fine to use firewood. But we need to stop moving it unless we are absolutely sure it is pest free. To do that, we can 1) buy Minnesota grown wood within 100 miles of the recreation site from an approved vendor, 2) buy wood from the campground or park, or, 3) bring clean, dimensional lumber to burn.

Protect our trees from "bad bugs"; don't move firewood.

This newsletter is developed as a service to forest land 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. To add, change or delete your name from our mailing list, please contact the editor. Thanks.

Tom Baumann
Section Manager
500 Lafayette Rd.
St. Paul, MN 55155
(651) 259- 5253

Alan Jones
Management Supervisor
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

Susan Burks
Reg. 3 - Forest Health Specialist
1200 Warner Rd.
St. Paul, MN 55106
(651) 772-7927

Ed Hayes
Reg. 3 - Forest Health Specialist
2300 Silver Creek Rd. NE
Rochester, MN 55901
(507) 285-7431

Neville Wilson
Plant Health Specialist
1200 Warner Rd.
St. Paul, MN 55106
(651) 772-7929

DNR Forestry
1201 E. Hwy. # 2
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