Central States
Forest Health Watch
Current forest health information for land managers in Illinois, Indiana, Iowa and Missouri

May 1, 2005

About This Newsletter…
This collaborative effort of the USDA Forest Service Northeastern Area, Missouri Department of Conservation, and Indiana, Iowa and Illinois Departments of Natural Resources will provide updates three times per year (Spring, Summer, Autumn) on forest health issues of regional interest.

Important Regional Forest Health Issues
Our most significant regional forest health issues continue to be nonnative insect and pathogens. Below you will find updates on Sudden Oak Death, Emerald Ash Borer, and Gypsy Moth. But to start things off, we’ll address a regional forest health issue that probably isn’t caused by an insect or a pathogen: oak tatters.

Oak Tatters
“Oak Tatters” is a condition of oak leaves emerging from the bud without some or all of the interveinal tissue. It generally occurs on white and bur oaks in the spring. A similar condition on hackberry is commonly referred to as “hackberry laceleaf”. The tatters or laceleaf symptom could have a variety of causes, including herbicides, cold temperature injury, or insect damage in the bud. Photographs and a more detailed description are included in the pest alert, on the web at: http://www.na.fs.fed.us/spfo/pubs/pest_al/oaktatters/oaktatters.htm

The condition was first recorded in the Midwest around 1980. When oak tatters began to be reported, it was a rare, elusive event. Since the late 1990’s, oak tatters and hackberry laceleaf are no longer rare, particularly in “corn belt” areas of Iowa, Illinois, and Indiana. The frequency, level, and repeated occurrence indicate that something has changed since the syndrome was first discovered. Anecdotal evidence suggests that the increase in occurrence of oak tatters and hackberry laceleaf corresponds to an increase in the use of chloroacetamide herbicides, which are a common component of pre-emergent broadleaf herbicide blends for use on corn. In 2004 studies conducted by J. B. Samtani, J. B. Masiunas, and J. E. Appleby have shown that white oak seedlings that were sprayed with low doses of chloroacetamide and chloroacetamide + triazine herbicides developed leaf tatters. In the experiment it was shown that the same herbicides when applied in the tight bud stage or when the leaves were fully expanded did not develop leaf tatters. It appears it is the newly unfolding leaves that are very sensitive to applications of the chloroacetamide herbicides. In 2005, tests will be repeated and will include red oak and hackberry seedlings. Seedlings will also be sprayed with only a triazine herbicide to see if that also produces leaf tatters. (A summary of the research article can be viewed on the www at http://www.plantmanagementnetwork.org/php/elements/sum.asp?id=4589&photo=2312.) The impact of tatters on oak health is presumed to be similar to that of any other spring defoliating event. Decline and tree death is now being observed on some sites where repeated, heavy oak tatters has been observed.

’Sudden Oak Death’
The pathogen Phytophthora ramorum was identified in 2000 as the cause of high levels of mortality of tanoak and coast live oak in Marin County, California. We now know that the pathogen causes three different types of damage to hosts: On red and live oaks, it causes bleeding cankers on the main stem of trees, leading to tree death. The fungus, however, does not produce spores on oak cankers. On tanoak, it causes stem cankers, but also causes shoot blight and shoot lesions. On many, many shrub and herbaceous species, it causes foliar blight. There are already over 40 species of plants on which P. ramorum is known to produce leafspots or foliar blight, many of which are popular landscape plants, including camellias and...
rhododendrons. On some foliar hosts, the fungus produces a huge amount of spores that serve as a source of
new infections on other plants. The potential for the pathogen to spread and cause stem cankers to oaks
depends on the availability of suitable foliar hosts for the pathogen to produce spores. Scientists are
beginning to understand the ecology of the pathogen and disease in California, but we do not yet know what
understory plants might be important in the ability of the pathogen to survive, spread, and cause disease
outside of the West Coast region.

Currently, the only known established populations of the pathogen in the USA are in 14 coastal
counties in California and Curry County in Oregon. It has also been found in nurseries in California,
Oregon and Washington. Because the risk of movement of the pathogen in nursery stock is so great, APHIS
has implemented an Emergency Federal Order that requires inspection and certification of material from CA,
OR, and WA nurseries before P. ramorum host plants can be transported across state lines. Complete text of
the Emergency Federal Order and other regulatory updates can be found on the APHIS website
(http://www.aphis.usda.gov/ppq/isp/pramorum/overview.html). Despite efforts to contain this pathogen,
shipments of plants from infested nurseries prior to the discovery of the pathogen in the nursery have resulted
in distribution of the pathogen across the USA. Because of the high potential of the fungus to have been
introduced into landscapes and forests across the country, a network of surveys is being conducted in
nurseries and forest stands. So far, “trace forwards” of nursery stock from infested nurseries have not yet
discovered any positive incidences of P. ramorum in MO, IL, IA or IN. No established infestations in forest
stands have been discovered outside of California and Oregon. Good information on the situation can be
found on the California Oak Mortality Task Force website, http://suddenoakdeath.org/

**Emerald Ash Borer (EAB)**

EAB has been found across a large
area in southeast Michigan where the existing
EAB quarantine has been expanded to 20
counties. A number of smaller quarantine
areas have been established around
infestations found in lower Michigan counties
and around infestations found in northeast
Indiana and northwest Ohio. Many outlying
populations have apparently been established
through the movement of infested firewood.
There are literally millions of dead ash trees in
southeast Michigan and some of this wood is
being moved as firewood. This insect is
proving to be a tremendous tree killer, with all
of our native Fraxinus (ash) susceptible. Two
locations were found last summer on or in
very close proximity to the Huron-Manistee
National Forest.

In 2004, our Field Office conducted
visual surveys at recreation areas on Federal
Lands across the Midwest. Additional surveys
on state and private lands were conducted by
many of our cooperating state partners with
Forest Service financial assistance. No
evidence of EAB was observed in Illinois,
Iowa, or Missouri. Survey efforts continue
this summer. Additional information on the
Illinois survey is included below.

In 2004 ash trees were surveyed
throughout Illinois particularly in the northeastern sections of the state in urban plantings, nurseries, state and
private parks. No infestations were found. In the spring of 2005, selected live ash trees in some locations will be girdled by removing the bark around the trunk. Such weakened trees are often referred to as trap trees as they are readily selected by many borer species including the emerald ash borer. In the fall months the trap trees will be felled and all the bark will be removed to search for emerald ash borer larvae. The trap trees will be a good indicator whether emerald ash borers are present in the area.

See the following websites for more information on EAB status:
For emerald ash borer status in Indiana  http://www.entm.purdue.edu/EAB/
For emerald ash borer status in Ohio  http://ashalert.osu.edu/
For emerald ash borer status in Michigan  http://www.emeraldashborer.info/index.cfm

Asian Longhorned Beetle

After several seasons of low activity, we have some significant news to report on the ALB situation in Chicago, and it is good news. Most of the quarantines for ALB in the Chicago area were deregulated on April, 20 2005. Surveys in the main Ravenswood infestation have not detected an infested tree or any adult beetles in over 2 years. The only remaining quarantined area in Chicago is the Oz Park infestation, where 2 infested trees were detected in November 2003. Surveys will continue in the formerly quarantined areas, and if no further signs of ALB are detected during the next 2 years, the infestations will be classified as eradicated. The success of the Chicago ALB eradication project has greatly reduced the risk of ALB spreading to forests in the Midwest.

However, this is not the time for complacency. In the last 2 years, new infestations have been found in Toronto, Canada (September 2003) and Carteret, New Jersey (August 2004). Originally, the Carteret infestation was thought to be from infested wood transported from the New York infestation, but DNA analysis determined that the Carteret infestation was due to a separate introduction from Asia, since these beetle differed genetically from beetles collected in New York, Chicago, and Toronto. For the Midwest, this is a reminder that undetected ALB infestations still could be out there. ALB awareness is key to the early detection of any additional infestations, and the rapid response to eradicate the infestation. To keep current on what is new with ALB, visit the ALB website at http://www.na.fs.fed.us/fhp/alb/ Note that this is a new URL, a new look, but the same up-to-date information.

Gypsy Moth Activities – Spring 2005

States without established populations:

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<thead>
<tr>
<th>State</th>
<th>Treatment Activities</th>
<th>Trapping Activities</th>
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</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>None</td>
<td>A joint effort of USDA APHIS, IDALS, Eastern Iowa City Foresters, and the IA DNR Bureau of Forestry will place approximately 5000 gypsy moth detection traps across the state.</td>
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<tr>
<td>Missouri</td>
<td>None</td>
<td>MO Dept. of Agriculture, MO Dept. of Conservation, USDA APHIS, U.S. Dept. of Defense and MO National Guard will cooperate to set out over 11,000 detection traps in Missouri. Delimit trapping will be done in 7 counties where gypsy moths were captured last year (St. Louis, St. Charles, Boone, Jackson, Taney, Stone, and Barry Counties).</td>
</tr>
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States with established populations:

<table>
<thead>
<tr>
<th>State</th>
<th>Planned Treatment Activities</th>
<th>Trapping Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>Aerial spray of Btk on 7 sites (3828 acres) and pheromone flakes on 8 sites (29,448 acres) in Northern Illinois. The intent of the treatment of these 33,276 acres on 15 sites is to slow the spread of gypsy moth by eliminating reproducing populations on the treatment sites.</td>
<td>USDA APHIS traditionally places detection traps in the portion of the state not covered by the STS program and delimit traps in areas where moths were caught the previous year. STS monitoring traps will be placed in the northern ¼ of the state.</td>
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<tr>
<td>Indiana</td>
<td>Aerial spray of Btk on approx 8231 acres and pheromone flakes on approx 31,393 acres. The intent of the treatment of these 24 sites in 10 counties is to slow the spread of gypsy moth by eliminating reproducing populations on the treatment sites.</td>
<td>Over 17,000 traps will be placed on 2K and 3K grids over the entire state. Delimit surveys are planned for all positive sites outside and selected sites within the STS Zone.</td>
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</tbody>
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Weather Overview
Where we left off… Summer and autumn 2004 left most of us with fairly normal and generally adequate moisture conditions across the region. The exception was an abnormally cool, wet summer in Missouri that left much of the state with soil aeration and foliar disease problems.

As the maps show, winter in the Central States was generally above normal temperature and normal to above normal precipitation.

Spring started off with a fairly cool, dry March across the region. The first few weeks of April were significantly warmer than usual, but temperatures have now cooled. March and April also offered a wide variety of weather events, including severe weather and hail in Central Illinois on March 30th and a band of heavy rain and hail across much of MO, IA, IL and IN on April 20th. The only portion of the region that is currently abnormally dry is northeast Indiana.

Maps and climate information are from the Midwest Regional Climate Center’s “Midwest Climate Watch” at http://mrcc.sws.uiuc.edu/Watch/watch.htm.

A Look into the Crystal Ball…
With a fairly normal winter and start to spring, we can anticipate the standard suite of common spring pests. Some common spring pests to watch for are described below.

Cedar-Apple rust orange telial tentacles develop from galls formed on the Juniperus spp. and are especially prevalent right after periods of spring rains. These telial horns will give rise to spores that infect a multiple of roseaceous hosts such as apple and hawthorn. Severe infection on these hosts can cause leaf browning and defoliation beginning in May and through most of the summer. Roseaceous hosts produce spores that are blown back to junipers in mid summer to fall, where galls develop on junipers over a one and a half year period and the cycle begins again. Windborne spread of spores between the hosts of several hundred yards is not unusual and spread can be over many miles.

Anthracnose leaf and twig diseases can be very prevalent on several hardwood species in early spring, especially if we have wet weather. The most common symptom is dead areas or blotches on the leaves. On white oaks, the lower leaves often get large blotches. On ash, blotches are less visible but leaf drop is very common. On sycamore, irregular blotches form, blighted leaves fall off, and cankered twigs die. Conditions that favor development of sycamore anthracnose include average weekly rainfall one inch or greater and average weekly maximum temperature in the 50’s.

In Missouri, activity by the spring oak defoliator complex (loopers and cankerworms) is being reported this spring. Defoliator populations have been at low levels during the last three years, so we are probably “due” to see them rebound nearer to normal activity soon.

What else is being reported across the Region
Missouri’s diagnostic lab has been taking in a large number of calls regarding winter desiccation on various conifers such as white pine, juniper, and Scotch pine. This situation occurs annually as soils are slow to provide adequate moisture to trees that have begun to transpire in response to increased ambient temperatures. In addition, there have been at least two cases of SNEED or spruce needle drop caused by Setomelanomma holmii confirmed in the lab by the presence of asci and ascospores. The pathogenicity is still unknown for this fungus and control recommendations have been suggested to be similar to those used to control Rhizosphaera needlecast on spruce.
Also in Missouri, especially in the Kansas City area, large numbers of tiny white-yellow-greenish larvae (1-3 mm long) have been reported dropping from oaks (esp. pin oaks). These "falling maggots" are a type of gall midge larvae (possibly Contarinia sp.). The larvae hatch early in the spring, feed first on oak flowers and then expanding leaves. By mid-April they finish feeding and drop to the soil to pupate, where they remain until emerging as adults next spring. These are not a health concern for the tree. No controls are needed. Large numbers were also seen in the St. Louis area in 2002 and KC & western MO in 2004.

Editor’s comment: Although many of you work primarily with forest trees, many of you also work with the urban forestry community and/or landscape trees in parks and recreation areas. With spring tree-planting well upon us, it seemed appropriate to share this article from the experts!

Feature Topic: Buried Root Systems Affect Long-Term Tree Health and Stem Girdling Root Formation
By Gary R. Johnson and Richard J. Hauer
Gary is a Professor of Urban and Community Forestry at the University of Minnesota and Richard is an Instructor in Urban and Community Forestry at the University of Wisconsin, Stevens Point.

During the last few decades increasing numbers of landscape trees have been declining and dying prematurely. In many of these cases the depth to the main lateral roots (syn. primary lateral and first order lateral roots) from the soil surface is correlated with premature tree loss. There are numerous explanations for why main lateral roots systems in the landscape are not near the surface. Three possible explanations are (1) nursery culture (e.g., planting and cultivation, (2) tree planting (e.g., deep holes, root balls sinking into backfill) and, (3) changes to the established tree root environment (e.g., fill over roots, excessive mulch, water table change, soil compaction). However, scientific studies to document the predominant causes are just beginning. Regardless of the plethora of potential causes, when tree root systems are placed into environments not suitable for growth they will decline and die prematurely over time if they cannot adapt.

Why do roots grow where they do?
Tree roots need oxygen and water in order to survive and grow. Because of those basic requirements, the majority of woody plants grow in the upper 3 feet of most soils. And specifically, the majority of fine roots - those roots that absorb more than 90% of the water and minerals required for plant growth - usually grow in the upper 12 inches of most soils. In soils that are low in soil oxygen - compacted clayey soils or water-soaked soils - all roots may be confined to the upper few inches, rarely penetrating deeper than a couple of feet.

When the roots of trees and shrubs are buried too deep, their health and condition are often affected over time, and sometimes immediately. Health refers to their growth rate, leaf color, ability to recover from diseases and damage, and ability to withstand adverse environments. Condition refers to their structural integrity: sound stem wood that is free of decay, cracks or weak points; supportive root systems; and canopies that are free of large amounts of dead wood.

A properly grown, planted or established tree or shrub normally will have the first main order roots at or slightly below the soil or mulch level. The root collar flare is the transition area between stem wood and the first, main order roots. In natural plantings, the root collar flare is clearly visible above the soil line, or may be slightly covered by leaf litter. When root systems are buried, less soil oxygen and water is available to the roots, and the roots must grow closer to the surface where there usually is a more reliable source of both. The energy that a newly transplanted tree or shrub must use to grow new roots and develop a normal, expanded root system must be used to grow upward before it can grow in a normal outward direction.
Effects on tree health and stem girdling roots
Some, maybe many, plants survive artificially deep root systems and live normal lives after developing a normal root system. Others begin a long, slow decline of health and condition. Since tree roots require oxygen for respiration to consume stored energy (sugars) for survival and growth, oxygen deficiencies impair the respiration process and make trees less efficient at using stored energy, less healthy, and more susceptible to secondary pests. Often these plants die of secondary problems, indirectly related to the dysfunctional root system. If root systems are abnormal, the health of the plant is stressed or strained to a point that the plant becomes abnormally vulnerable to common site stresses. Whereas healthy plants can survive most periodic droughts or defoliation due to insects, stressed plants may die from the additional stresses placed on them.

In addition to the decline in health and condition of trees, burying root collar flares may create another adverse condition. Tree root systems may respond to oxygen limitations by growing into oxygen sufficient areas, typically near the soil surface. The ascent of the roots to the surface often causes roots to lose their normal outward radiating pattern. Roots that have grown up toward the soil surface often wrap around or grow against the buried stems. As these roots enlarge over the years, along with the normal enlargement of the buried stems, the roots begin to compress and restrict the development of stem tissues. Stem girdling roots affect normal stem tissue expansion, resulting in abnormal and compressed bark and woody tissue and affect tree transport processes. This creates a weak point in the tree's stem and leaves the tree more vulnerable to stem breakage during windstorms. A study of tree failure during windstorms in Minnesota demonstrates this point. Approximately 30 percent of trees (600 surveyed trees in '97-'98) that failed completely (the entire tree went down) and were at the edges of storms were caused by deep root systems. In littleleaf linden alone, 73 percent of the complete failures were caused by deeply buried (4 inches or more of soil over the first main order root) root systems accompanied by stem girdling roots. “Edges of storms” are areas outside the direct paths of straight-line windstorms or tornadoes. In addition to the risk of complete tree failure there is a general decline in the remaining root system. The compression makes it more difficult for the roots to move water and minerals up to the foliage, and more difficult for the tree to move photosynthates ("food") to the roots. Over time, the root system declines in health and the aboveground canopy and foliage likewise declines. As root collar flares are increasingly buried, more of the stem tissue is buried and out of sight, so these below-ground problems go undetected.

Research conducted in the Forest Resources Department at the University of Minnesota has revealed that buried root systems of street trees are alarmingly common. In five randomized studies, it was found that the main order roots of sampled individuals of sugar maple, green ash, linden, common hackberry and thornless honeylocust were buried with 1-11 inches of soil (total number sampled was approximately 100 trees per species). When the trees were then condition rated (a numerical evaluation of the condition of the stems, canopies and foliage), there was a direct relationship between declining tree condition and depth of soil over the roots for maples, lindens and ashes. In other words, as main order roots were covered by more and more inches of soil, the condition of all three tree species further declined.

Prevention is the solution!
How deep is too deep? Based on the previous studies, as little as one inch of soil over the origination point of the first main order root (a.k.a., root collar/trunk flare) can disguise stem girdling roots until it is too late. With sugar maple in particular, the significant decline in health began when the soil depth was 4 inches over the origination point. Regardless, there is no biological reason to bury stems. Healthy trees growing in native forests have visible root collar flares at the soil line. Therefore, it is not logical to believe that planting deeper is better.

Nursery stock is sometimes lined out with roots placed deeply to minimize wind throw before root systems grow outward. Anecdotal reports are conflicting with some nurseries suggesting this practice minimizes wind throw within a few months of lining out and others noting windthrow a year or more later on those trees that were planted deeply. A field research study implemented at the University of Minnesota in which tree roots were planted at the surface, 5 inches deep, and 10 inches deep has been monitored for wind throw.
among other things. Out of 360 trees planted in 2000, none have windthrown. However, when the first third
of the blocks were harvested in 2003, a trend had already developed with the littleleaf lindens in the study:
those planted with 5-10 inches of soil over their roots were developing stem encircling root systems, as
opposed to those planted with the roots at the surface. In a similar study conducted in 2002 with
containerized trees (4 species, 4 depths, 15 replicates per treatment), planting depth had no significant effect
on whether the trees leaned in the containers or were windthrown from the containers.

To prevent early decline or sudden failure during windstorms, make sure that those first, main order roots
that originate at or near the soil line are planted at that depth in the landscape. Make certain that those roots
are at the top of the soil ball of balled-in-burlap trees and containerized trees before you dig the planting
hole. Either dig down through the top of the soil ball with a trowel until you find those first roots, or probe
down with a stiff wire to find the depth of soil over the roots. If there are 4 inches of soil over the roots of
the purchased plants, dig the hole 4 inches shallow and scrape off the excess soil before mulching the newly
planted tree or shrub. These few minutes of care at planting time will help ensure that you enjoy a healthy,
long-lived landscape tree or shrub.

For additional information see A Practitioner’s Guide to Stem Girdling Roots of Trees at

Upcoming Opportunities
Illinois has scheduled training opportunities for IL Dept of Natural Resources District Foresters:
June 14, 2005 IL Forest Pest Workshop at IL River Locks Facility near Starve Rock State Park
June 15, 2005 IL Forest Pest Workshop at Benton, IL
Contact Jim Appleby for more information.

Other Resources and Sources of Information
For information on invasive plants, log on to the new Northeastern Area Invasive Plants Website. Here you
will find fact sheets on a number of major invasive plants, downloadable invasive plant publications, links to
invasive plant organizations, and Area-wide contact information. The website is located at:
http://www.na.fs.fed.us/fhp/invasive_plants/

The North Central Region Integrated Pest Management Center is one of four centers in a national network
established to strengthen USDA's connection with production agriculture, research and extension programs,
and agricultural stakeholders throughout the United States. Check it out at: http://www.ncpme.org/

Forest Health Highlights webpage (with yearly forest health report for each state):
www.na.fs.fed.us/spfo/fhm/fhh/fhusamap.htm

This newsletter is also available on the WWW at:
www.na.fs.fed.us/spfo/pubs/newsletters/csfhw

For More Information:
Forest Health Protection
USDA Forest Service
1992 Folwell Avenue
St. Paul, MN 55108
(651) 649-5029
lhaugen@fs.fed.us