2010 ILLINOIS FOREST HEALTH HIGHLIGHTS

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PLEASE NOTE: *With the exception of the emerald ash borer (EAB) trap tree program, observations and data presented in this summary are not to be considered to be comprehensive nor all inclusive studies. The narrative reported here is based on visual and observational surveys of Dr. Fredric Miller, Project Manager, interviews with consultants and members of the green and forest industries, field ecologists, and plant diagnostic records provided by The Morton Arboretum and University of Illinois Plant Diagnostic Clinics.*

I. Illinois' Forest Resources

Nothing has changed. Please see template

II. Forest Health Issues: An Overview

Arthropod Pests: Overall, the 2010 growing season was relatively quiet. No serious arthropod pest outbreaks were observed in 2010. The ever present **Japanese beetle** was evident throughout the state, but defoliation was sporadic and not nearly as heavy as in 2008 or 2009. Some areas of east central Illinois (Champaign and Vermillion counties) had moderate to heavy defoliation, but in other areas, defoliation was minimal. Insect pest levels that were noticeable heavier in 2010 included the **elm flea weevil, cottony maple scale, magnolia scale**, **assorted leaf and stem gall particularly on oaks.**

One insect pest that has been on the decline in northern Illinois is the **bagworm**. Bagworm populations built up to heavy levels from 2000 through 2008 on both deciduous and evergreen hosts. Populations crashed following the 2008 winter (fairly harsh winter by northern Illinois standards) and defoliation has been much lower during the 2009 and 2010 growing seasons. Bagworm defoliation continues to be moderate to heavy in central and southern Illinois. Other common insect pests, such as **honeylocust plant bug** and **euonymus scale** were at low to moderate levels for 2010.

Diseases: Because of the wet spring, common foliar diseases were higher than normal including **peach leaf curl, all forms of anthracnose, rusts, scab,** and **powdery mildew**. Stress related diseases like **Cytospora canker** was also common. **Diplodia tip blight** and pine (Austrian and Scots) **tree mortality** was widespread in urban landscapes. Pine wilt disease and drought stress were probably the pre-disposing factors.

Abiotic Factors: Weather wise, 2009 and 2010 were very different. Snow for early 2010 (January- March) was 170 inches of snow (approximately 3 inches of precipitation) compared to the 226 inches of snow (10.5 inches of precipitation) in 2009 for the same time period. The summer months of June (9 inches) and July (6 inches) of 2010 were much wetter than 2009. In contrast, February – April, 2009 was much wetter than 2010 and precipitation in May for both

years was similar (1). Temperatures also differed between 2009 and 2010. January and February of 2010 were colder than the 70 year normal, but not as cold as 2009. Overall, with the exception of February, 2010 has been warmer than 2009 particularly July which was nine (9) degrees warmer that July 2009. July, 2009 was the "coldest" July in Illinois history and nearly 10 degrees below the 70 year average. While precipitation was plentiful throughout the summer of 2010, much of the rain came in heavy downpours of short duration (several hours) which led to minor flooding in some areas. In northern and east central Illinois drought like conditions prevailed from early August and are persisting through early November, 2010. Precipitation for October, 2010 was 2 inches below normal. These conditions will undoubtedly lead to both biotic and abiotic-related plant issues in spring and summer of 2011 (1).

III. Exotic Pests and Diseases

EMERALD ASH BORER (EAB)

The emerald ash borer (EAB) continues to spread throughout northern and central Illinois. The newest positive finds for 2010 include Kendall country (northeastern Illinois) and in Champaign county in east central Illinois. As a result, the statewide EAB quarantine has been extended to include Champaign and Vermillion counties in east central Illinois. To date, 24 Illinois counties are under quarantine.

Since 2008, EAB purple traps and trap trees have been employed for EAB monitoring in forested areas associated with Illinois state parks, U.S. Army Corps of Engineers (USACE) lands, and the Shawnee National Forest (SNF). Since 2008, trap trees were established at USACE lands at Carlyle, Renwick, and Shelbyville Lakes, Hazlet, Murphysboro, and Giant City state parks, and at the Garden of the Gods and Lake Glendale recreational use areas in the SNF. EAB trap trees were established using the USFS EAB trap tree guidelines. Approximately, one half of the 2009 trap trees have been cut down, peeled and examined for evidence of EAB life stages and galleries. In early spring, 2010 an additional group of trap trees were prepared with 50% of those trees being dropped and peeled in fall, 2010. The remaining trees will be left standing until fall, 2011. There have been no reports of EAB in southern Illinois (south of I-70).

Evaluation of 18 Asian and European ash (*Fraxinus* spp.) genotypes for susceptibility for colonization by the emerald ash borer (*Agrilus planipennis*) (Fredric Miller and Kunso Kim)
The objectives of this project are to determine (1) the relative susceptibility of 18 Asian and European (*Fraxinus*) taxa to the emerald ash borer (*Agrilus planipennis*) and (2) the preference of selected *Fraxinus* taxa for feeding by adult emerald ash borers.

This project is designed to evaluate the relative susceptibility of 18 Asian and European (*Fraxinus*) taxa to the emerald ash borer (EAB) (*Agrilus planipennis*) and (2) the preference of selected *Fraxinus* taxa for feeding by adult emerald ash borers through a series of feeding studies. The ash germplasm under evaluation at the Morton Arboretum will be accessioned into the U.S. National Plant Germplasm System (NPGS), and samples of these accessions will be incorporated into NPGS collections, either via seed or vegetative propagules. Once evaluations are completed, data on EAB egg production, larval galleries, leaf feeding, and adult EAB survival and longevity will be entered into the Germplasm Resources Information Network (GRIN) database.

Rearing of Adult Emerald Ash Borer Beetles. Prior to adult beetle flight in mid May, three to four feet long trunk and branch boles (2-8 inches in diameter) were collected from on-going tree removals, butt ends were waxed to prevent drying, the boles were placed in a walk-in cooler, and held at approximately 40^{o}F. Beginning in early May, 2010, the boles are removed from the cooler and placed in a secure walk-in rearing cage and held at 75^{o}F, 60-70% relative humidity, and a 16/8 photoperiod.

No-Choice Laboratory Feeding Studies. Newly emerged adult beetles are collected, sexed, and placed in clear, plastic, one quart capacity cylinders along with the ash foliage to be tested. The ash foliage is placed in a floral water pick and replaced every two to three days. Each leaf is photocopied *prior* to being placed in the floral pick and then again at leaf replacement. The amount of leaf tissue removed is determined visually by two different individuals to the nearest 5%. After two weeks of maturation feeding, two to three adult female-male beetle pairs are placed in a different plastic cylinder along with a bole of an ash genotype and allowed to mate. The bole is wrapped with ribbon to provide a protected area for oviposition. The study concludes when all of the beetles (male/female) expire.

No-Choice Laboratory Feeding Studies-2009. Eight different European and Asian ash genotypes were evaluated in the no-choice feeding studies. Due to the limited number of replications, no statistical analysis was performed. Adult beetles lived the longest (mean=14 days) on *F. pennsylvanica* (preferred host) with several individual beetles living several months. Beetles lived a mean of 8 days on *F. angustifolia* var. *australis* and consumed approximately 22% of the leaf tissue. The mean number of fecal pellets (275) for *F. bungeana* was second only to *F. pennsylvanica* with a mean of 326 fecal pellets. Beetles feeding on the other six ash biotypes lived less than six days, consumed less than 5% of leave tissue and had a mean of <100 fecal pellets. Preliminary data suggests that *F. angustifolia*, *F. chinensis*, and *F. excelsior* may have some level of resistance to the emerald ash borer.

No-Choice Laboratory Feeding Studies-2010. To date, ten of the twelve Asian genotypes have been evaluated for susceptibility for EAB. *Fraxinus apertisquamifera, F. insularis, F. paxiana,* and *F. stylosa,* had significantly more foliage (24-32%) consumed as compared to *F. chinensis ssp. rhynchophylla and F. longicuspis var. sieboldiana,* with less than 8% foliage consumed. *Fraxinus bungeana, F. chinensis, F. platypoda,* and *F. mandshurica* var. *japonica* were intermediate in susceptibility with 10-15% foliage consumed.

Adult female EABs lived the longest (15-35 days) when feeding on *F. chinensis, F. platypoda,F. pennsylvanica* (preferred), and *F. stylosa.* Beetles lived the shortest time (7-13 days) when feeding on *F. bungeana, F. chinensis ssp. rhynchophylla, F. longicuspis* var. *siebolidana,* and *F. paxiana.*

Multiple-Choice Laboratory Feeding Studies-2010. To date, two multiple-choice (MC) studies have been completed. In MC-Study #1, adult EAB's preferred *F. bungeana* more than *F. chinensis, F. mandshurica,* and *F. pennslyvanica* (preferred species). MC-Study #2 revealed no difference in preference between *F. bungeana, F. longicuspis* var. *sieboldiana, F. pennsylvanica,* and *F. stylosa.*

ASIAN LONG-HORNED BEETLE (ALB)
No new sightings of ALB have been discovered to date. The original ALB infested areas are no longer under quarantine and the Illinois quarantine is now lifted since ALB has not been found since 2007. Visual monitoring efforts are always on-going.

MARMORATED STINK BUG
This newest arrival to the Eastern and Midwestern states had been reported as close as Pennsylvania and Indiana (Elkhart county). This insect has a broad range host including tree fruits, vegetable, and woody landscape plants. It will be added to the Illinois' watch list for 2011. To date, the marmorated stink bug has not been found in Illinois (2).

VIBURNUM LEAF BEETLE (VLB).
As reported in the 2009 Forest Health Highlights (FHH), the viburnum leaf beetle (VLB) was found in 2009 in a urban Cook county landscape. The viburnum leaf beetle feeds on a variety of commonly planted viburnums and has the potential to become a major pest of these ubiquitous woody landscape plants. The VLB was added to our 2010 watch list and as of fall, 2010 no new finding of the VLB has been reported.

THOUSAND CANKERS DISEASE OF WALNUT (TCD)
To date, TCD has not been found in Illinois. However, because of the confirmed find in Tennessee in 2010 and the extensive movement of walnut wood veneer throughout the Midwest, extensive survey efforts and public outreach will be implemented in early 2011.

SUDDEN OAK DEATH (SOD)
To date, SOD has not been found in Illinois.

IV. Plant Diseases

DUTCH ELM DISEASE (DED): This vascular wilt disease has been with us for decades and continues to kill American and red elms throughout Illinois. Based on reports provided by the University of Illinois Plant Clinic (UIPC), DED cases continue to be a problem and levels were comparable to 2009 levels(3).

OAK WILT (OW): The dreaded oak wilt is found in every Illinois counties and has become a major urban and forest tree disease. Reports for 2010 by the University of Illinois (UIPC) and The Morton Arboretum Plant Clinics (MAPC) indicate that 2010 OW disease incidence was comparable to previous years (1,3)

VERTICILLIUM WILT (VW): This very ubiquitous and opportunistic vascular wilt fungus was very prevalent due to the very wet 2009. Trees stressed from the 2005, 2007, and 2008 droughts and the 2009 and early 2010 flooding are particularly susceptible to VW. Positive isolations of VW were found in sugar maple, red maple, ash, smoketree, Japanese maple, saucer magnolia, and, three-flowered maple (3).

BACTERIAL LEAF SCORCH (BLS): Bacterial leaf scorch resembles abiotic scorch, but is caused by a bacterium, *Xylella fastidiosa*. It is thought to be spread by leafhoppers and spittlebugs. Tree hosts include elm, hackberry, maple, mulberry, oak, sweetgum, sycamore, and planetree. Since 1999, the UIPC records show that BLS has tested positive in 10 Illinois counties stretching from Jefferson, Madison, and St. Clair counties in southern Illinois through parts of central Illinois (i.e. Sangamon, Champaign, Douglas-Moultrie, Iroquois) north to Cook and DuPage counties and to far JoDaviess county in extreme northwest Illinois (3). With the exception of Champaign county with 40 positive samples, the remaining 9 counties have had 1-3 positive cases confirmed (3). In terms of hosts, BLS has been found in bur, northern red, pin, white, swamp white, and shingle oaks from 1999-2008. In 2008, BLS was found in seven (7) oak positives including northern red, swamp white, pin and several unidentified oak species (3). Eleven (11) BLS samples submitted in 2010 to the MAPC. Of those 11 samples, two (2) were positive, one (1) inclusive and eight (8) were negative (1). The positives were found on oaks growing in DuPage and Cook counties.

ANTHRACNOSE DISEASES: As was pointed out above, May and June, 2010 were cool (50 to 60^{o}F) and wet. This provides an ideal environment for many common fungal leaf diseases including apple scab and anthracnose. Apple scab was extremely common on common apple species and crabapple varieties. Many of the older variety crabapples were completely defoliated by the end of summer. Commonly, sycamores were very slow to leaf out. Most sycamores did not have a full canopy until late June or early July. While not life-threatening, these diseases can reduce the photosynthetic capacity of trees leading to a reduction in food production, promote premature leaf drop, and pre-dispose trees to secondary agents mentioned above (3).

NEEDLE CAST DISEASES: Two very common diseases affecting conifers, *Rhizosphaera* needle cast and *Diplodia* (i.e. *Sphaeropsis*) were prevalent in 2010. Both of these fungal leaf diseases attack the needles of cone-bearing tree species causing premature needle cast or a browning and/or death of the growing tip, respectively. While not outright fatal, they stress the tree as pointed out above and reduce overall ornamental qualities and growth rates of affected trees. Coupled with regular drought conditions, as mentioned previously, a deadly combination may result (1,3).

STRESS-RELATED CANKER DISEASES: *Cytospora* canker of spruce is definitely a stress related disease particularly of Colorado blue spruce. Spruces are a common urban forest and landscape species. The cankers are initially found on the undersides of the branches and result from some type of stress. Spruce trees growing in urban environments are very prone to this canker. While not fatal, the cankers cause branches to die distal to the canker resulting in a loss of ornamental quality and landscape function (1,3).

V. Insect Pests

BAGWORM (BW): As mentioned above, for approximately the last decade, bagworm has continued to increase in severity and range in northern Illinois. Prior to the late 1990's, bagworm populations were very spotty and sporadic particularly north of I-80 with a few infestations in the City of Chicago. With the onset of milder winters, bagworm populations have been increasing throughout northern Illinois especially in many of the urban forests of the western and northwestern suburbs. Short term droughts in 2005, 2007, and the aforementioned

dry spell of 2008 have all exacerbated defoliation by the bagworm. Major species affected include Colorado blue spruce, common arborvitae , honeylocust, linden, hackberry, and bald cypress. For the past several years heavy to severe defoliation (50-75% of tree canopy) has been observed on the aforementioned species with honeylocust suffering the highest rate of mid to late summer defoliation.

Until the recent 2008 winter, previous winters have not been severe enough to have a major impact on overwintering bagworm egg survival. Apparently, the prolonged cold spells in late January and early February, 2009 and again in 2010 have been sufficient to cause significant mortality of overwintering bagworm eggs. Avererage temperatures for both years were 9 and 3 degrees, respectively below the 70 year average for January and 1 and 4 degrees for February. Further studies are needed to better identify the lethal supercooling point, production of cryoprotectants, and to quantify the effect of prolonged/cumulative cold temperatures on egg survival.

JAPANESE BEETLE (JB): The Japanese beetle (JB) is a well known and established invasive pest affecting over 300 different herbaceous and woody plant species including soybeans. Based on visual surveys conducted throughout Illinois, JB populations were much lower and spotty and compared to 2008 (heavy statewide defoliation) and 2009 (moderate statewide defoliation). In rural and agricultural landscapes, JB defoliation was very evident on linden, roses, wild and domestic grape, hawthorn, maples, and birch just to name a few. Defoliation at some sites in east central Illinois ranged from 50 to 75% of the plant canopies. In urban areas, JB defoliation was present, but not quite as high as in rural areas. This may be partly due to the homeowners and landscape managers attempting to control adult JB's with the use of insecticides (1).

FALL WEBWORM (FW): Fall webworm is a very common pest throughout the Midwest and mid-south. In the more southern realms there are two generations. In northern Illinois, only one generation of FWW occurs. Visual field surveys throughout the state for FWW webs and larvae revealed typical (low to moderate) levels of FWW. Population levels increased gradually from northern to southern Illinois consistent with the bivoltine nature of the insect farther south. As with JB, FWW feeds on hundreds of different tree species and was found on a multitude of hosts including, but not limited to persimmon, black walnut, crabapple and common apple, maple, linden, and ash. No obvious tree decline or mortality was observed on forest trees species, however, trees growing in the central and southern portions of Illinois may be more prone to stress due to FWW feeding throughout the season. Trees growing in northern Illinois usually do not suffer as much from late season FWW defoliation since the trees are approaching senescence. Usually aesthetic issues associated with the webs are more common.

BARK BEETLES (BB) and WOOD-BORERS (WB): Bark beetles attack primarily stressed trees including both hardwoods and conifers. Prolonged drought or a variety of abiotic and biotic stresses may pre-dispose trees to bark beetle attacks.

Based on field observations and in conversations with green industry members and foresters, 2010 appeared to a "normal year" for bark beetle activity. No major bark beetle outbreaks were observed or reported for 2010.

In addition, engraver beetles and the Zimmerman pine moth continue to be chronic problems for many of our common urban forest conifer species particularly Scots, Austrian pine, and mugho pines. As above, both of these insect pests tend to attack stressed conifers growing on poor sites (poor drainage) along with drought stress, soil compaction, construction damage, etc.

Exotic Bark Trapping Program (EDRR). Illinois, once again, participated in the EDRR program. The cooperative EDRR bark beetle trapping program was initiated beginning in early April, 2010. Three traps, one of each containing the ethanol, pinene + ethanol and Ips phermones were placed in the field beginning in early April, 2010 in southern Illinois and no later than the first of May, 2010 in northern Illinois. Fourteen (14) different trapping sites consisting of all three different pheromone traps were positioned at 14 different locations in four (4) northeastern Illinois counties (Cook, DuPage, Kane, Will) and two (2) counties (St. Clair and Madison in southwestern Illinois. Conifer tree species found at the trapping sites included a mixture of red pine (*Pinus resinosa*), eastern white pine (*P. strobus*), jack pine (*P. banksiana*), Austrian pine (*P. nigra*), and Scots pine (*P. sylvestris*). All of the trapping sites had extensive stands of trees growing on poor to moderate sites.

Trap locations were selected based on the EDRR survey protocols developed by USDA Forest Service, State and Private Forestry, Forest Health Protection. Trap placement criteria included wooded areas, fragmented woodlots, and/or urban forests in or near heavily used state parks and forest preserve recreational areas bordering or in close proximity to logistical centers, manufacturing, and major interstates. All three traps at a given trapping location were at least 75 feet apart.

The traps were checked every two weeks and the trap contents brought back to the lab for sorting. A total of 12 collections were made ending by 1 October 2010. All bark beetles were sorted, packaged, and shipped to Dr. Anthony Cognato at Michigan State University for positive identification. Final samples were submitted to Michigan State University by late September, 2010.

Trapping locations and collection dates were entered into the EDRR database. As of 1 November 2010, the trapping report summary revealed that at total of 153 bark beetles were trapped from early April through mid September, 2010 including 18 different species and 15 genera of bark beetles. Approximately 72**%** of the species collected came from just two (2) genera (i.e. *Ips* and *Orthotomicus*). The remaining 13 genera made up the remaining 28% of species trapped. Comparing 2009 with 2010, *Ips grandicolis* came in first place with 55%, up from 38% (17%) in 2009. *Orthotomicus caelatus* replaced *Xylosandrus germanus* (2009) for second place with 17% of the total. Refer to the Table 1 for details.

Table 1. Majority (%) of beetles captured in pheromone traps by species from Illinois (April – September, 2010)

GENERA	% OF TOTAL BEETLES COLLECTED	
	2009	**2010**
Ips grandicolis	38%	55%
Orthotomicus caelatus	----	17%
Xylosandrus germanus	30%	1%
Xyleborinus saxesenii	13%	2%

VI. Weather and Abiotic Related Damage

FLOODING: As mentioned previously, much of the summer precipitation arrived as heavy down pours accompanied with locally strong and gusty winds with several inches falling in just a matter of hours. Minor flooding did occur in various portions of the state, but nothing of the magnitude experienced in 2008 or 2009. There were no reports of extensive tree decline or mortality due to flooding.

Based on my own personal experience and observations, and field research associated with the 1993 Mississippi River flood event, certain woody plant species will begin showing dieback and mortality symptoms within just a few weeks of the inundation (i.e. evergreens, flowering fruit trees, lindens, sugar maples and some oaks). Flood tolerant species may not show stress or decline symptoms for a number of years after flooding. In addition, my research and others have shown that the time of the year, duration of the flood, and current flow rate also are major variables affecting potential woody plant decline and mortality.

WINDS: In mid October, 2010, very strong winds associated with a low (L) pressure system swept across the upper Midwest and Great Lakes regions. Accordingly to meteorologists, this storm was a major weather event with barometric pressures approaching the lowest on record and rivaling hurricane-like conditions. Isolated tree damage was reported throughout the state, but nothing of a catastrophic nature.

VII. Invasive Plant Species

No formal statewide surveys or studies were conducted related to invasive plant species however, an invasive plant study related to EAB caused tree mortality was initiated in 2010 at two different locations in northeastern Illinois. Site #1 is located in unincorporated Bloomingdale, Illinois in a residential area where EAB had been discovered in 2009. The infested area was an undeveloped woodland bordering on a wetland. Site #2 is located at the Fermi National Research Lab, Batavia, Illinois. EAB was first confirmed at Fermi in 2007 and has since spread throughout the Fermi Lab grounds.

Samples of herbaceous and woody invasive plants were taken in the two aforementioned study sites where significant ash decline and death has occurred in order to document potentially invasive vegetation types and density that is appearing and colonizing as ash tree numbers recede and the canopy opens. Plots and subplots were set up around a plot center (dimensions varied with site). At each cardinal direction, four quadrants were marked off on the edge of the subplot (dimensions varied at each site). Height or diameter at breast height (DBH) of all woody and invasive species found within each quadrant were recorded. At each subplot, height or DBH of all woody and invasive species over three feet high were recorded and an overall ground cover estimation was made. Height or DBH of all ash trees within the entire plot were recorded. Common buckthorn (*Rhamnus cathartica*,L.), garlic mustard (*Alliaria petiolata*) , and bittersweet nightshade (*Solanum dulcamara,* L.) were among the most common invasives found. Other woody species documented include box elder (*Acer negundo,* L.) and American elm (*Ulmus americana,* L.). Plans are to continue this project in 2011 in order to document growth of these species over the past year.

VIII. References

1. **Adams, S., 2010.** The Morton Arboretum Diagnostic Plant Clinic and Plant Health Care (PHC) Reports. The Morton Arboretum, Lisle, Illinois.
2. **Gill, C. 2010.** Plant Health Progress. Pennsylvania State University (PSU) (17 October 2010).
3. **Pataky, N. 2008-2010.** Woody Plant Disease Update for 2008. University of Illinois Plant Clinic (UIPC). Urbana, Illinois.