Pests susceptible to control based on degree day forecasts ( )=Degree day ranges
- Cooley Spruce Gall Adelgid (2800-3000)
- Eastern Spruce Gall Adelgid (2800-3000)
- Juniper Webworm (2700-2900)
- Locust Borer (2700-2900)
- San Jose Scale (1800-2900)
- Spruce Spider Mite (2900-3100)
- Willow Aphid (2700-2900)
- Wooly Apple Aphid (2900-3100)
- Zimmerman Pine Moth (2700-2900)

**Pests to Continue to Monitor**
- Yellow-necked caterpillar
- Japanese beetles
- 2-spotted spider mites
- Azalea lacebugs
- Mimosa webworms
- Redheaded pine sawfly

Plan treatments for Japanese beetle & masked chafer grubs in late August to early September

Emerald Ash Borer—Notes from a recent trip to Detroit Pg 2
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Emerald Ash Borer—Notes from a recent trip to Detroit
Emerald Ash Borer larva
Emerald Ash Borer adult
Emerald ash borer larva
D-shaped exit holes from emerald ash borer
Ash tree dying from emerald ash borer
Ash tree dying from emerald ash borer
Epicormic shoots as a result of borers
Galleries on ash log caused from emerald ash borer larvae
Galleries produced by emerald ash borer. The holes were made by the larvae as they prepare a place to pupate
Emerald Ash Borer—
Notes from a recent trip to Detroit

We were recently given the chance to go to Detroit, Michigan, along with three members of the USDA/APHIS (Animal and Plant Health Inspection Service) from Kentucky to look at the damage caused by the emerald ash borer. It didn’t take us long to spot damage as four ash trees in the hotel parking lot were dying as a result of the borers. The trees were probably 8 - 10 years old. Jim Minor, of the USDA in Michigan, showed us several sites in the area where the beetles had been detected.

Jim said the emerald ash borer (EAB) prefers to fly on warm, sunny days and are most abundant when temperatures are in the upper 80’s and 90’s. The beetles are strong fliers although it is not known how far they can fly. It appears that the borers have a one year life cycle with emergence beginning in late May to early June. Once the beetles have emerged, they only live for a few weeks. They spend this time mating, laying eggs and occasionally resting on a leaf. The borers attack the trees on both the trunk and in the crown. We noticed in the parking lot, that the borers seemed to prefer to attack the trees on the south and west side of the trunk. After attack, the ash trees begin to produce epicormic shoots along the trunk. In heavily infested areas, these shoots may also be attacked. This pest is so aggressive that trees usually die within two to three years of infestation.

At this time, there are no known chemical treatments for EAB. Research is being done with tree injection but the results have not been determined. The USDA is also conducting some experiments using light traps and different colored sticky traps hung at different heights but these do not look promising at this time. Management efforts are aimed at the perimeter edges of the quarantine zone. Trees that are infested with the borers are cut and brought to one of three central dumping yards where the trees are chipped to .25” thickness. The wood chips are then taken to a local electrical facility where they are burned for fuel. Due to the large number of trees in the central part of the quarantine zone, there are no plans to remove those trees. It is believed that by removing host material around the zone the EAB will run out of host material.

It is not known exactly where or how EAB arrived in the area but it is believed to have come from China on solid wood packing material. Michigan officials estimate that EAB may have been in the area for as many as 8 years before it was first noticed. All species of ash appear to be susceptible and so far ash is the only host.

The Michigan Department of Agriculture has quarantined six counties in the Detroit metro region. There is also a possibility that two counties in the Grand Rapids area of Michigan could also be quarantined pending further investigation. One site was found in Toledo, Ohio but that site is believed to be have eradicated in April. The Canadian officials in Windsor, Ontario, have also imposed a quarantine for a small area where EAB has been found there.

One interesting discovery is the presence of woodpecker activity on many EAB-infested trees. In fact, woodpecker activity may be the first signs of EAB. Woodpeckers make about 1/4-1/2 inch jagged round holes in the bark as they extract EAB larvae for food.
New State Entomologist

John Obrycki began serving as Department Chair and State Entomologist on July 7. He takes over for Fred Knapp who served in an interim capacity after Bobby Pass’ death in December 2001.

John comes to UK from Iowa State University where he was a faculty member with a Research, Teaching and Extension appointment. John received his Ph.D. from Cornell University in 1982. While at Iowa State, his major research area was the biological control of agricultural insect pests. His specific research interests include the biology, predatory behavior, and population ecology of insect predators, focusing on the lady beetles. The role of biological control agents in sustainable agricultural systems was also examined because a weakness of many pest management models is a trivial representation of predation. Fundamental knowledge of these insects is required to understand how insect predators subsist in crops, how they impact prey dynamics, and how changes in cropping practices influence predator populations. The goal of these investigations was to provide the basis for theoretical and experimental approaches needed to develop sustainable pest management systems.

Rinse & Return Recycling Program

Fayette County is once again participating in the Rinse and Return Plastic Pesticide Container Recycling Program. This project is a cooperative program between the Kentucky Fertilizer and Agricultural Chemical Association, the Kentucky Department of Agriculture Division of Pesticides, the Kentucky Farm Bureau Federation and the University of Kentucky Cooperative Extension Service.

<table>
<thead>
<tr>
<th>Date: September 23, 2003</th>
<th>Location: Fayette County Extension Office, 1140 Red Mile Place, Lexington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time: 10 am – 2 pm</td>
<td>What: five gallons or smaller plastic containers</td>
</tr>
<tr>
<td>To Participate: triple rinse all empty plastic containers, dispose of container cap, sleeves and labels</td>
<td></td>
</tr>
</tbody>
</table>

If you are not in Fayette county, check with your local county extension agent to see if they have a similar program in your area.

Seasonal Appearance of Ornamental Pests and Normal Time Frame to Apply Control Measures (for the month of August)

From the University of Tennessee Agricultural Extension Service PB 1589, Frank Hale, University of Tennessee

<table>
<thead>
<tr>
<th>Hosts</th>
<th>Pests</th>
<th>August (mid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>August (early)</td>
<td>Honey locust mimosa webworm</td>
<td>Pine</td>
</tr>
<tr>
<td></td>
<td>Mimosa mimosa webworm</td>
<td>aphid, pine web worm, red headed pine sawfly</td>
</tr>
</tbody>
</table>

Aquatic Plants

From NMPro weekly email (July 8, 2003)

Growers may be inadvertently selling plants listed on the federal noxious weed list as water garden plants. USDA stepped up monitoring and enforcement efforts for these weeds, said Craig Regelbrugge, ANLA senior director of government relations. “Fines can reach the thousands and hundreds of thousands [dollars], so it’s something the industry needs to pay attention to,” Regelbrugge said. He urged growers to check their list of aquatic plants against the federal noxious weed list, which includes Eichhornia azurea (anchored water hyacinth); Hydrilla verticillata; Sagittaria sagittifolia (arrowhead); and Salvinia auriculata (giant salvinia).


Aquatic Plants

Giant salvinia—this plant can double in size in just a few days. It forms dense mats that may become 2 or more feet thick.
Twig Girdlers
James Baker & Stephen Bambara, Extension Entomologists, NC State University

Twig girdlers are typical longhorned beetles that are 1/2 to 5/8 inch long. The body is cylindrical and generally grayish brown with a broad, ashy-gray band across the middle of the wing covers.

The eggs are white, elongate oval, and about 3/32 inch in length. The larvae are whitish, cylindrical, legless grubs that reach 5/8 to 1 inch long. The pupae are white at first with short, dark spines on the top sides of the abdominal segments.

Biology

The twig girdler is most common in the southern states but is known as far north as New England and westward to Arizona. It is a pest of pecan and hickory, and to a lesser extent several other hardwood trees. The adult beetles girdle twigs and small branches causing the injured portions to break away or hang loosely on the tree. It is not uncommon to see the ground under infested trees almost covered with twigs that have been cut off. Girdling affects the beauty and aesthetic quality of ornamental plantings. With pecans, the fruiting twigs of heavily infested trees are often greatly reduced, resulting in low nut yields the following year or years. This type of injury causes the development of many offshoots that adversely affect the symmetry of the tree. Pecan nurseries located close to heavily infested wood lots occasionally suffer considerable loss from girdled seedlings. Repeated girdling of terminals causes forks, crooks, and other stem deformities in young timber plantations as well as in natural reproduction.

During late summer and fall, the presence of severed twigs on the ground or hanging loosely attached or lodged in the canopy is good evidence of twig girdler activity. Most girdled twigs are from 1/4 to 1/2 inch (occasionally up to 3/4 inch) in diameter, and 10 to 30 inches long. The nature of the girdle itself distinguishes the twig girdler from other branch pruners. The cut by the twig girdler is the only one made from the outside by a beetle and is seldom complete, leaving a small central cylinder (this leaves a central jagged area when the twig breaks). The girdling extends through the bark and well into the wood in a complete circle around the stem and leaves only a thin column of the center wood attached.

Since the twigs are girdled while the leaves are present, the severed twigs retain the brown leaves for some time. Severed twigs lodged in the tree canopy or on the ground often retain leaves even after the tree sheds its leaves in the autumn. Close inspection of the severed twigs will reveal tiny egg niches and many mandible marks or grooves made in the bark by the female beetles. Large trees usually sustain the most girdling, but young trees are sometimes heavily damaged.

The adults emerge from late August to early October. They feed on the tender bark near branch ends and mate before ovipositing and girdling the twigs. The branches are apparently girdled by the female so that proper conditions will be provided for the development of the larvae. Eggs are laid during or after the cutting process, but never before the beetle makes part of the cut. They are inserted singly beneath the bark or slightly into the wood, usually near a bud scar or adjacent to a side shoot. The number of eggs per twig varies from 3 to 8 but may range up to 40.

Adults live 6 to 10 weeks. Females deposit 50 to 200 eggs each, which hatch in about 3 weeks. After overwintering, the larvae grow rapidly in the spring and tunnel toward the severed end of the twig by feeding only on the woody portion and leaving the bark intact. A few small circular holes are made in the bark to eject pellets of frass and excrement. The mature larvae close off the gallery with shredded fibers to form a pupation chamber. Pupation occurs during August and September and lasts 12 to 14 days. The new adult chews a circular hole in the bark to emerge. There is one generation per year.

Control

In orchards, nurseries, and ornamental plantings, the severed twigs on the ground as well as those lodged in the trees should be gathered and burned during the fall, winter, and spring when the eggs and grubs are in the twigs. The same practice should be followed in nearby wood lots when plantings in the vicinity have a history of serious damage from this insect pest. Populations can be greatly reduced in one or two seasons. Insecticides may be necessary to prevent damage from heavy infestations. These may be applied once or twice in September and again in October to control the majority of the twig girdlers. Natural controls are important in keeping twig girdler populations low; desiccation of the eggs is apparently the greatest single mortality factor. The parasites, Eurytoma magdalis, Iphiaulax agrili, and Horismenus sp., and a checkered flower beetle, Cymatodera undulata all help to reduce girdler populations.

Pesticides: carbaryl (Sevin)
* Some formulations suitable for home use.
Summer’s Big Guys
Lee Townsend, Extension Entomologist

Two of our largest beetles can be found now. They are most frequently seen resting on tree trunks but can show up almost anywhere. Both are impressive, neither is harmful. On top of that, many of our large caterpillars will be seen over the next few weeks.

The eastern Hercules beetle has a large, greenish grey to black body with spotted markings and is 2” to 2-1/2” long. Males have a large horn on the head and are sometimes called rhinoceros beetles. These beetles occur throughout the southeastern US. We see them during July and August in Kentucky. The beetles will feed some on ripe fruit but are not a pest. They are attracted to lights so they may be found around homes. The larvae, large white grubs, feed in decaying logs and stumps. They can be dredged out of the crumbly earthy material in wet, rotting wood. It probably takes a little more than a year to complete a generation.

The eyed elater is an elongate black beetle with distinctive eye-like markings just behind the head. The markings are probably effective in scaring potential predators, such as birds, but these false eyes are sightless. The larval stage is a yellow-brown wireworm that occurs in decaying wood.

Caterpillars of the giant silkworm moths are beginning to finish feeding and leave the trees to find sites to spin a cocoon and pupate. Some are brightly colored, others have spines and spikes. A few can give a painful sting. Pictures of the common species can be found at www.uky.edu/Agriculture/Entomology/entfacts/misc/ef008.htm

Pine Sawflies Devour from the Top Down
Lee Townsend, Extension Entomologist

We are beginning to see redheaded pine sawfly activity in Kentucky. It tends to attack trees in the 1 foot to 12 foot height range, especially those already under stress due to poor site or severe competition from other trees. This species attacks jack, short leaf loblolly, slash, red, Scots, and other 2- and 3-needled pines. These distinctive larvae have red heads with 2 black eye spots and a yellow-white body with six rows of black spots. When full grown, the caterpillars are 1” to 1-1/4” long.

There can be two or three generations each year, with the first appearing in the spring. The larvae feed gregariously on new and old needles as well as the tender bark of young twigs. They generally feed downward from the top of the tree. After complete defoliation, they may crawl over ground for several yards to find new foliage. Orthene or Sevin can be used for control, Bt caterpillar sprays do not work against these insects.
Japanese Beetle
David Shetlar, Ohio State University
HYG-2504-91

Editor’s note: while those of us in the central and eastern part of Kentucky are familiar with Japanese beetles, those in the western part of the state are just now beginning to see large numbers of beetles. While on a recent trip to Ballard county, a Japanese beetle was found on the banks of the Mississippi River. From that we can now assume that the entire state is infested with Japanese beetles.

This imported pest is generally found east of a line running from Michigan, southern Wisconsin and Illinois, south to Alabama. Occasional introductions are made into western states such as California and Oregon when the adult beetles or larvae are shipped in commerce. The original population was detected in New Jersey in 1916, having been introduced from Japan. In Ohio, the most damaging populations are east of a line running from Cleveland to Cincinnati. Isolated, damaging populations of grubs are occasionally found west of this line, usually in high-quality urban turf.

Hosts
The adult beetles are general herbivores and are known to feed on over 400 species of broad-leaved plants, although only about 50 species are preferred. The grubs will also feed on a wide variety of plant roots including ornamental trees and shrubs, garden and truck crops, and turfgrasses. They seem to especially relish Kentucky bluegrass, perennial ryegrass, tall fescue and bentgrass.

Damage Symptoms
The adults are skeletonizers, that is, they eat the leaf tissue between the leaf veins but leave the veins behind. Attacked leaves look like lace that soon withers and dies. The adults will often attack flower buds and fruit. The grubs can kill small seedling plants but most commonly damage turf. The turf first appears off-color as if under water stress. Irrigating causes a short-lasting response or no response at all. The turf feels spongy under foot and can be easily pulled back like old carpet to reveal the grubs. Large populations of grubs kill the turf in irregular patches.

Description of Stages
The life stages of the Japanese beetle are typical of white grubs.

Eggs: The white oval eggs are usually about 1/16 inch (1.5 mm) long and 3/64 inch (1.0 mm) wide. They are placed in the soil where they absorb moisture and become more roundish.

Larvae: The larvae are typical white grubs that can be separated from other soil dwelling white grubs by the presence of a V-shaped series of bristles on the rarser. First instar larvae are about 1/16 inch (1.5 mm) long while the mature third instars are about 1-1/4 inch (32 mm) long.

Pupae: The pupae are first cream colored and become light reddish-brown with age. The average pupa is about 1/2 inch (14 mm) long and 1/4 inch (7 mm) wide.

Adults: The adults are a brilliant, metallic green color, generally oval in outline, 3/8 inch (10 mm) long and 1/4 inch (7 mm) wide. The wing covers are copper-brown and the abdomen has a row of five tufts of white hairs on each side. These white tufts are diagnostic. The males have a sharp tip on the foreleg tibia while the female has a long rounded tip.

Life Cycle and Habits
Larvae that have matured by June pupate and the adult beetles emerge from the last week of June through July. On warm sunny days the new beetles crawl onto low growing plants and warm for a while before taking flight. The first beetles out of the ground seek out suitable food plants and begin to feed as soon as possible. These early arrivals begin to release a congregation pheromone (odor) which is attractive to adults that emerge later. These odors attract additional adults to gather in masses on the unfortunate plants first selected. In cool weather, the adults may feign death by dropping from the plants but normally they will take flight. Newly emerged females release an additional sex pheromone which attracts males. The first mating usually takes place on turf with several male suitors awaiting the emergence of a new female. Mating also is common on the food plants and several matings by both males and females is common.

After feeding for a day or two, the females leave feeding sites in the afternoon and burrow into the soil to lay eggs at a depth of 2 to 4 inches. Females may lay 1 to 5 eggs scattered in an area before leaving the soil. These females will leave the following morning or a day or two later and will return to feed and mate. This cycle of feeding, mating and egg laying continues until the female has laid 40 to 60 eggs. About 95% of a population are generally laid by mid-August, though adults may be found until the first frost of fall.

If the soil is sufficiently moist, eggs will swell in a few days. Egg development takes only 8 to 9 days at 80 to 90 degrees F or as long as 30 days at 65 degrees F. The first instar larvae dig to the soil surface where they feed on roots and organic material. If sufficient food and moisture are available, the first instars can complete development in 17 days at 78 degrees F or as long as 30 days at 68 degrees F. The second instar larvae take 18 days to mature at 78 degrees F and 56 days at 68 degrees F.

While this development is occurring, grubs may tunnel laterally in search of organic matter and fresh roots. This creates a very spongy feel to the soil and turf. Generally most of the grubs are in the third instar by early fall and are ready to dig into the soil to hibernate. The grubs burrow 4 to 8 inches into the soil as cold temperatures arrive. At this depth, the soil rarely gets below 25 degrees F and the grubs survive with no difficulty. If the soil begins to cool further, the grubs may dig deeper. The grubs return to the surface in the spring as the soil temperature warms. Generally the grubs can be expected to be active at the surface when the surface soil temperatures are about 60 degrees F, usually in mid-April. The grubs continue their development in the spring and the few second instars seem to mature in time to pupate along with the third instars. The mature grubs form a pre-pupa in early-June. The prepupa voids its gut contents and has a translucent appearance. The pupa is formed in the split skin of the pre-pupa in an earthen cell 1-to-3 inches in the soil.
Control Strategies

See: White Grubs in Turfgrass (HYG-2500). Since this pest is important in agriculture and commerce, considerable effort has been placed on developing control options.

**Option 1: Cultural Control - Quarantine** - Japanese beetle quarantines are currently operated by the USDA-APHIS and states involved with shipping materials out of infested areas to uninfested areas. Though this has not stopped the slow progression of Japanese beetles westward, it seems to have slowed the process. Nurserymen and sod producers shipping plant material with soil out of Japanese beetle infested areas must obtain an inspection and certification. Often, airports and rail yards are under quarantine and transporters must treat their containers before shipping.

**Option 2: Cultural Control - Habitat Modification** - Since the eggs and young grubs are very susceptible to dry soils, do not irrigate during the time the eggs and first instar larvae are developing. However, if natural rainfall occurs, this tactic will not work. Do not plant trees and shrubs that are highly attractive to adult Japanese beetles near turf. This is especially true along golf course fairways. Trees and shrubs most attractive to adults include: Japanese and Norway maple, birch, pin oak, horse chestnut, rose of Sharon, sycamore, ornamental apple, plum, cherry, rose, mountain ash, willows, lindens, elms and Virginia creeper. Trees and shrubs rarely attacked include: red and silver maple, holly, boxwood, euonymus, flowering dogwood, cedar, juniper, arbor vitae, red oak, tulip tree, magnolias, red mulberry, forsythia, ashes, privet, lilac, spruces, hydrangeas and taxus (yew).

**Option 3: Biological Controls - Insect Parasites** - Several parasitic wasps, especially *Tiphia popilliavora* and *T. vernalis*, and the wasp fly, *Hyperecteina aldrichi*, have been imported and are now known to be established in several eastern states. Unfortunately, these parasites do not seem to be reliable in reducing Japanese beetle populations below damaging levels. However, the *Tiphia* appear to be more efficient in southern states.

**Option 4: Biological Control - Bacterial Milky Disease** - The bacterial Milky diseases, *Bacillus popilliae* Dutky and *B. lentimorbus* Dutky, have been quite effective at controlling grubs in certain areas of the eastern United States. The spore count must build up for 2 to 3 years to be very effective. During this time you should not use an insecticide against grubs that are needed to complete the bacterium cycle. There is some recent data that suggests that these bacterial diseases may not be performing well in certain areas. This may be due to reduced virulence, soil conditions or grub resistance. More commonly, different white grub species have displaced the Japanese beetle grubs. In Ohio and Kentucky, test trials have not produced satisfactory results. Additional experiments are needed to determine the lack of efficacy of milky disease in these soils.

**Option 5: Biological Control - Entomophagous Nematodes** - The insect parasitic nematode, *Steinernema (=Neoaplectana) glaseri* Steiner, was used before 1940 and had considerable promise but this agent was not developed further because of problems of rearing and expense. This nematode may be economically available in the future. Commercially available products containing strains of *S. carpocapsae* have been marginally effective. Preparations containing *Heterorhabditis* spp. seem to be the most effective of the currently available nematodes. Apply the nematodes when the white grubs are in the second instars. Irrigation before and after nematode application with 1/4 inch of water minimum greatly increases the efficacy of the nematodes.

**Option 6: Mechanical Control - Trapping** - Several traps have been developed to capture the adults. These traps generally use a mixture of the aggregation and sex pheromones. Recent data indicate that these traps do not significantly reduce grub populations and in some cases may actually contribute to increased foliar plant damage. There has been no correlation between trap captures and reductions in white grub populations in surrounding turfgrass areas.

**Option 7: Chemical Controls - Insecticides** - Consult, HYG--2500, White Grubs in Turfgrass for insecticide use recommendations. Bulletin L-187 lists the pesticides currently registered. When using trapping to monitor adult activity, keep in mind that the females lay the majority of their eggs within the first 7 to 10 days of their existence. They may live considerably longer than this and could be trapped into September and October. Usually, in Ohio the majority of Japanese beetle eggs have been laid by the end of the first week of August.

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![Japanese Beetle Life Cycle](image-url)
**Brown Patch in Tall Fescue**

Paul Vincelli, Extension Plant Pathologist

Brown patch disease has been very destructive this year in new seedings of tall fescue. New seedings are at greatest risk because (1) they are more susceptible than established swards, and (2) infections are more readily lethal to young plants than to established plants.

Check seedings made this spring or last fall carefully for the disease. Although many blighted leaves will be dried up and dead, making detection difficult, some leaves will likely still have the typical lesions: irregular lesions on leaf blades that are olive-green when fresh, and which fade to a tan color with a thin brown border as they dry.

If an outbreak is detected on a new seeding, often one or two applications are justified during the hot, muggy weather of summer in order to get the turf established. The most effective curative materials are azoxystrobin (Heritage) and flutolanil (Prostar), but these are only available to the professional applicator. Other less effective options for curative control are listed in Chemical Control of Turfgrass Diseases, UK Extension Publication PPA-1, available at [www.ca.uky.edu/age/pubs/ppa/ppa1/ppa1.pdf](http://www.ca.uky.edu/age/pubs/ppa/ppa1/ppa1.pdf). For cultural practices that can help control brown patch, see [www.ca.uky.edu/age/pubs/id/id112/id112.htm](http://www.ca.uky.edu/age/pubs/id/id112/id112.htm).

**Degree Day Totals through July 25, 2003**

- Bardstown—2075
- Bowling Green—2276
- Covington—1836
- Henderson—2176
- Huntington WV—1993
- Lexington—2002
- London—1982
- Louisville—2101
- Mayfield—2107
- Paducah—2320
- Princeton—2325
- Quicksand—2058
- Somerset—2129

**Degree Day Totals through July 23, 2002**

- Bardstown—2274
- Bowling Green—2371
- Covington—1959
- Henderson—2370
- Huntington WV—2156
- Lexington—2174
- London—2132
- Louisville—2228
- Mayfield—2272
- Paducah—2506
- Princeton—2592
- Quicksand—2233
- Somerset—2209