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EXOTIC PEST THREATS

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Granulate Ambrosia Beetle

Xylosandrus crassiusculus Motschulsky (Coleoptera: Curculionidae: Scolytinae)

INTRODUCTION:

The granulate ambrosia beetle (GAB), formerly Asian ambrosia beetle, is an exotic invasive wood boring bark beetle native to east Africa and Southeast Asia. GAB is thought to have arrived in the U.S. in infested crating and shipping materials originating in its native range. It was first reported attacking peach trees near Charleston, S.C. in 1974, and has become a serious pest of woody ornamental, fruit and nut trees. GAB tends to be more of problem to woody ornamentals in production nurseries than in landscapes.

GAB adult. J.R. Baker & S.B. Bambara, NCSU, Bugwood.org

DISTRIBUTION/SPREAD:

GAB is currently found in China, East Africa, India, Sri Lanka, Japan, Southeast Asia, Indonesia, New Guinea, South Pacific islands, and throughout much of the United States, including Hawaii. As of 2007, GAB has spread throughout the southeastern and Gulf coasts from the Carolinas to Texas, through Oklahoma and Arkansas, and into Tennessee, Virginia, Maryland, Delaware, Ohio, Indiana, and Oregon. GAB has spread naturally and by shipment of infested nursery stock, wooden crating and packing material, and raw wood products (e.g., rail ties, logs, lumber, firewood).

HOST PLANTS:

GAB attacks over 200 species of plants in 41 families with a preference for hardwoods, although recently it has been reported to attack conifers. It is considered an aggressive species and may attack stressed trees, freshly cut trees, newly transplanted trees and seedlings, and even apparently healthy trees. Trees with a diameter of 3 inches (76.2 mm) or less are preferred, but injured or stressed older trees are also attacked, and even raw lumber can be infested.

Known ornamental hosts in the U.S. include: alder, azalea, beech, Bradford pear, cottonwood, crape myrtle, dogwood, elm, Golden rain tree, hickory, holly, honey locust, Japanese maple, Japanese snowbell, magnolia, mimosa, ornamental cherry, oaks, persimmon, pines, poplars, redbud, red maple, styrax, sweetgum, black walnut, willow, and yellowwood, along with orchard species of fruit and nut trees.

BIOLOGY and DAMAGE:

It is unknown where GAB overwinter, but they are thought to overwinter as adults. Anecdotal evidence from NC suggests GAB overwinter somewhere outside of nurseries, and in the spring mated adult females fly to and infest nursery stock. In the South, adult GAB females begin activity in March, mating and then flying to new host plants, leaving the flightless males behind. Adult activity peaks in early April, but adults remain active at low levels throughout summer into fall. The life cycle (egg to adult) averages 55 days in the South, and there may be two or more generations per year.

Female GAB bore into twigs, branches, or trunks of susceptible hosts, excavate tunnels into the sapwood, and infect galleries with a symbiotic ambrosial fungus. Both adult beetles and larvae feed on the ambrosial fungus, not on the wood. Females lay their eggs in brood chambers constructed into the heartwood and remain with their brood until they mature. There are no individual egg niches, larval tunnels or pupal chambers. All life stages can be found together in the galleries during the growing season, with up to 100 eggs, larvae, and pupae in a gallery. Newly hatched females mate before emerging from the host plant and the next cycle of colonization and reproduction follows.

GAB adult. Natasha Wright, Florida Department of Agriculture and Consumer Services, Bugwood.org

GAB adult. Natasha Wright, Florida Department of Agriculture and Consumer Services, Bugwood.org

Eggs and larvae in gallery. Will Hudson, University of Georgia, Bugwood.org

Damaged tree. Laura Lazarus, NC Div. of Forest Resources, Bugwood.org

IDENTIFICATION:

- Adult females are 0.08-0.11” long (2-2.9 mm), and can fly.
- Adult males are smaller than females, about 0.06” long (1.5 mm), and do not fly.
- Adults have a downward facing head completely hidden by the pronotum from the dorsal view.
- The body is stout, “hunch-backed,” and reddish- brown in color with darker brown to black elytra (forewings).
- The front portion of the head and the declivity (sloping area of the back at the posterior of the elytra) are densely granulated (grainy looking).
- Long setae (bristles) can be seen on the back end of the elytra.
- Larvae are white, legless, “C” shaped, with a well developed, tan head capsule. They are not easily distinguishable from the larvae of many other scolytid beetles.

WHAT TO LOOK FOR:

Infestation usually occurs on the main trunk close to the ground, but can be found throughout the tree in heavy infestations. Trees are usually attacked by large numbers of beetles at once and can decline rapidly, progressing quickly through wilting, dieback and eventual death. Tree death more commonly occurs from attacks during the leafing-out stage. It is not clear if death is from large numbers of beetles infesting a tree, and/or if the ambrosial fungi block the vascular system and eventually kill the tree.

Symptoms of GAB infestation include:

- Wilted foliage and branch/twig dieback.
- Many toothpick-like spikes of frass (compacted sawdust), up to 1.5” long (38.1 mm), sticking out of the trunks of infested trees. Frass “toothpicks” break off easily in the wind and may not always be seen.
- Numerous, perfectly round, pencil-lead size holes (~ 0.08” or 2 mm) can be seen if frass toothpicks and/or gummosis are missing.
- Heavy gummosis on tree trunks of hosts with high levels of resin, such as *Prunus*.
- Fungal staining from ambrosial fungi is often seen in wood next to GAB galleries.
- Splitting open a section of trunk or branch may reveal galleries in the sapwood.
- On rare occasions, adult GAB are seen sticking out of their holes in a tree trunk, but they are difficult to accurately identify. Specimens should be submitted to a trained entomologist for identification.

Frass spikes. R. F. Mizell, University of Florida.

Exit hole and broken frass spike. G. Keith Douce, University of Georgia, Bugwood.org

Typical galleries and fungal staining. G. Keith Douce, University of Georgia, Bugwood.org

MONITORING:

Traps baited with ethyl alcohol are used to detect the first GAB flight in early spring, and to monitor their activity throughout the season. Traps should be in place by February in southern states and should be checked every two or three days. Typically, two traps per acre placed around the outside of susceptible plant blocks within a nursery should suffice.

Commercial traps are available, but homemade traps in several designs offer a useful alternative. James Baker of NC State University designed a trap using a two liter inverted soft drink bottle mounted about three feet above the ground on a wooden tomato stake. Lindgren funnel traps or modified Japanese beetle traps can also be used. Soda bottle traps are the least expensive, but are less durable. The ethanol release strips purchased for use with the funnel trap tend to provide the most consistent lure release. For a good discussion of trap designs, see NC State University ENT/ort-111: http://www.ces.ncsu.edu/depts/ent/notes/O&T/trees/note122/note122.html

MANAGEMENT:

Once GAB infest a tree, they are very difficult to control with chemical pesticides. The beetles do not consume plant material as they excavate their galleries, so a systemic pesticide is not effective, nor are fungicides effective against the ambrosia fungus. GAB entry holes can also provide access for pathogenic fungi such as Fusarium spp. Juvenile trees up to three years old are usually killed, and infected nursery trees are more likely to die than landscape plants. Although mature trees have a better chance of survival, they may serve as a staging base for the beetles to attack nearby hosts.

Cultural Control

Keep trees healthy and correct conditions that may cause tree stress (drought, injury, nutrition, soil compaction, etc.). Spacing further apart in nurseries may help slow the spread from plant to plant. Choose less preferred species of plants, and avoid those known to attract GAB. In North Carolina, styrax and Yoshino cherry are often heavily damaged, and in Maryland a study reported heavy damage to ‘Stellar Pink’ dogwood. See the host plant section above.

Mechanical/Physical Control

Heavily infested plants should be removed and destroyed, and the trunks of nearby unaffected host plants treated with an insecticide to prevent attack. Once a tree is attacked, it becomes even more attractive to the beetles. Infested trees can be left in place to serve as trap trees to attract the greatest number of beetles possible before being removed and destroyed. This may help reduce damage to new hosts when combined with protective sprays to nearby unaffected host trees. It should be safe to leave trap trees in place up to 6 weeks after monitoring traps first indicate GAB activity. However, trap trees must be destroyed before the 55-day life cycle is completed to prevent them from becoming a staging source for more adult beetles.

Chemical Control

In areas known to have GAB activity, insecticidal bark sprays provide the best protection. Check trees or traps frequently beginning in early March and begin protective sprays soon after beetles appear in monitoring traps, rather than waiting for peak capture periods. Multiple applications may be needed during a season while the beetles are active. Trees are less attractive to beetles once leaves are fully expanded, so it may be possible to lengthen spray intervals after that time. There is no need to spray once beetle flight stops, nor are sprays recommended in the fall.

There are various commercial pesticide formulations registered for use on tree trunks. Most recommended formulations contain bifenthrin or permethrin. Consider applying protective sprays to the trunks of host plants that are near known infested trees. Homeowners may try trunk/limb sprays of a labeled landscape borer spray that contains a pyrethroid such as bifenthrin, permethrin or cyfluthrin. For current chemical control recommendations, contact your local Cooperative Extension Service office. Always read and follow label directions for the insecticide used.

LOOK-ALIKE INSECTS and DAMAGE:

- Gummosis on tree tru nks can be caused by a number of insect pests and diseases.
- There are some reports of Black Stem Borer *(Xylosandrus germanus*) producing frass toothpick spikes like those of GAB.
- Boring damage by GAB can be easily confused with damage from shot hole borer (*Scolytus rugulosus*). GAB damage differs by going deeper into the sapwood; shot hole borers cause damage only just beneath the bark.
- The tiny reddish brown GAB beetles somewhat resemble the darker brown Southern Pine Beetle (SPB), but are slightly larger than SPB and other related species.
- GAB is further distinguished from related species by the dull, densely granulate surface of the posterior end of the elytra (which is smooth and shiny in native species).

How to Report a Possible Sighting/Infestation

In Maryland:

University of Maryland Cooperative Extension Exotic Pest Threats Website:
http://hgic.umd.edu/faq/sendAQuestion.cfm

Maryland Department of Agriculture: call 410-841-5920 to report suspect pests; visit http://www.mda.state.md.us/plants-pests/invasive_species.php for information.

Nationally: USDA-Animal and Plant Health Inspection Service (APHIS)
http://www.aphis.usda.gov/services/report_pest_disease/report_pest_disease.shtml

Actual Size:

Where to Get More Information:

UMD Cooperative Extension Exotic Pest Threats Website: http://www.PestThreats.umd.edu/index.cfm
Images: http://www.forestryimages.org/browse/subthumb.cfm?sub=2437&Start=1&display=60&sort=2

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