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WANTED



THE ASIAN LONGHORNED BEETLE

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Cover photos were taken by Alan Sawyer (ALB insect), Marlene Bombara (photos of technicians performing a ground survey and the tree canopy survey by USDA climber), and Robert Benjamin (imidacloprid injection) of USDA.

The Asian Longhorned Beetle

The Asian longhorned beetle (*Anoplophora glabripennis*) (ALB) is an invasive pest from Asia that came to the United States concealed in solid wood packing material, the pallets and crates used to transport goods from overseas. Nobody is sure exactly when the first ALB arrived here.



Figure 1—An adult male ALB on a maple branch stripped of bark.

This insect is a serious threat to many species of deciduous hardwood trees in the United States (e.g., maple, elm, willow, birch, horsechestnut, and poplar). During its larval stage, the ALB bores deep into a tree's heartwood, where it feeds on nutrients. This tunneling damages, and eventually kills, the tree.

If the ALB were to become established here, it could be one of the most destructive and costly invasive species ever to enter the United States. It threatens urban and suburban shade trees and recreational and forest resources valued at hundreds of billions of dollars. It might also impact such industries as maple syrup production, hardwood lumber processing, nurseries, and tourism. If it became widely established, its impact would be felt in urban, suburban, and forested parts of the country.

Since its discovery in the Greenpoint section of Brooklyn, NY, in 1996, the ALB has been found in other parts of the greater New York City area and nearby suburbs in New Jersey; in and around Chicago, IL; in the Worcester, MA area; and in Toronto, ON. Alert workers have reported ALBs in warehouses in other parts of the United States, where the insects were destroyed before they could escape to start new infestations.

The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) has been cooperating with State and local governments and residents of affected areas to find and destroy ALB infestations. For USDA's eradication efforts to be completely successful, Americans in both infested and noninfested areas must keep a sharp eye out for this showy but destructive pest.

Meet the ALB

The adult ALB is a large, distinctive-looking insect measuring 1 to 1.5 inches long, not including its antennae. These antennae, which give the insect its common name, are as long as the body itself in females and almost twice the body length in males. The insect's body is shiny black with white spots; the antennae are banded in black and white. During summer months, adult beetles can be spotted on walls, outdoor furniture, cars, sidewalks, and tree limbs and branches.



Figure 2—ALB up close.



Figure 3—ALB larva.



Figure 4—ALB pupa surrounded by frass.

Many different hardwood tree species can host the ALB and are therefore at risk of infestation. Host trees include all species of maple (Norway, sugar, silver, red, and boxelder), elm, willow, birch, horsechestnut, London planetree, poplar, ash, mimosa (silk tree), mountain ash, hackberry, and katsura. While these beetles can fly for distances of 400 yards or more in search of a host tree, they tend to lay eggs in the same tree from which they emerged as adults until the insect population becomes too dense on that tree.

Adult beetle activity is most obvious during the summer and early fall. A mated female chews 35 to 90 individual depressions, called oviposition sites, into the bark of a host tree. She then lays a single egg beneath the bark at each site. After the egg hatches in 10 to 15 days, the white, caterpillarlike larva tunnels in the phloem and cambium layers beneath the bark. After several weeks, the larva tunnels into the woody tree tissue (xylem), where it continues to feed and develop over the winter.

In the spring, beetle larvae inside the host tree build a hard case for themselves and develop (pupate) within it. In summer, the fully developed adult ALBs chew their way out, leaving perfectly round exit holes one-fourth to one-half inch in diameter. As each beetle emerges, it often pushes sawdustlike material, called frass, out onto the ground or onto tree branches.

ALB adults feed on small twigs and leaves and then mate, beginning the cycle again. Adult beetles remain active only during the summer and early fall, when—depending on the climate—they begin to die.

Battling the Beetle

Due to the danger the ALB poses to trees in the United States, the environment, and various industries, USDA's goal is to eradicate it by eliminating reproducing populations in the United States. Over the years, extensive data on the ALB has been collected, enabling the ALB Cooperative Eradication Program's government partners to refine the eradication protocols, or methods, used against the ALB to achieve this goal.



Figure 5—An adult ALB emerges, leaving a perfectly round exit hole.

Through years of study and field examination of the ALB in all its life stages, USDA-APHIS knows that the protocols currently in use represent the best, science-based approach to ALB eradication available to date. And, with all cooperators working in concert, these protocols are effective against infestations.

The protocols used by the ALB Program to accomplish eradication include regulatory requirements that curtail the movement of host material, survey and detection activities to find infestations, control efforts that remove infested trees and treat trees against the ALB, restoration to replace lost trees, continued research into what constitutes best practices against the ALB, and public outreach and education.



Figure 6—An adult ALB rests beside its exit hole.

Regulatory Response Starts With ALB Quarantine Areas

To limit human-assisted spread of the ALB, officials from the Federal and State Governments establish quarantines around detected ALB infestations. When they detect and verify an infestation, ALB Program employees examine, or survey, host trees located in proximity to infested trees to identify the extent of the infestation and set the quarantine boundaries.

Quarantines reduce the chance that human actions will transport ALB-infested host materials to new areas. Federal and State regulations require that no individual or business remove firewood, trimmed or downed branches, logs, stumps, roots, or other wood debris from an ALB quarantine area.

The ALB Program enters into compliance agreements with businesses, local government agencies, and industries operating within quarantine zones to regulate host material moved for commerce. Compliance agreements also establish the mitigation methods for the safe disposal of removed ALB host trees, tree trimmings, and woody debris. The ALB Program provides training for businesses and municipalities that work with or handle firewood, nursery stock, tree limbs, branches, and any other woody debris. People who live or do business within ALB quarantines should be in compliance with all regulatory requirements put in place to protect trees from ALB infestation.

If you have any questions about working or living within an area under active ALB quarantine, please get in touch with the ALB Cooperative Eradication Program in New York, New Jersey, or Massachusetts. See the “Contacts” section at the end of this brochure for details.

As of February 2008, ALB quarantines exist in parts of New York State including portions of Manhattan, Brooklyn, Queens, Staten Island, and Nassau and Suffolk Counties. In central New Jersey, a quarantine exists in portions of Middlesex and Union Counties. For the latest ALB quarantine information, please log on to www.aphis.usda.gov/ALB or contact the nearest ALB Cooperative Eradication Program Office. These offices are listed in the “Contacts” section at the end of this brochure.

Due to successful ALB eradication efforts, established quarantines have been lifted in Hudson County, NJ, and in several areas of Illinois, including Chicago. An ALB has not been seen in Hudson County since 2002 or in Chicago since 2003. Both of these areas became eligible for a declaration of eradication in 2008.

Homeowner outreach and education are also provided to inform people living in quarantine zones that Federal and State ALB Program employees must have access to private property to survey, treat, and remove infested host trees and to perform restoration activities. Residents who live in an ALB quarantine zone and have questions should contact their local ALB Eradication Office.



Figure 7—Surveys are performed by ALB Program professionals, who look for any signs of ALB infestations high in host-tree canopies.

observed—one or two egg sites or healed-over exit holes, for example. Other signs of infestation include sap flows from wounds caused by the ALB, unseasonable yellowing or dropping of leaves when the weather has not been especially dry, and broken, dead, or dying branches.

The ALB Program requires 4 years of negative survey results to declare an area free of ALB infestation.

Survey and Detection: Constantly on the Lookout for ALBs

APHIS and cooperating State inspectors survey for ALBs within and outside of the quarantine zone by examining individual host trees from the ground for signs of beetle damage. Tree climbers also perform year-round searches in host-tree canopies, carefully examining every tree limb and branch for signs of ALB infestation.

Inspectors are looking for exit holes, oviposition sites, and frass, all of which signal a possible ALB infestation. This is challenging work because signs of ALB infestation can be few and



Figure 8—Trained ALB Program technicians are searching trees for signs of infestation, such as these multiple egg sites found on a New York tree.



Figure 9—Not all ALB-infested trees are as easy to spot as this one. Nearly 200 exit holes and more than 1,550 egg sites dot the trunk and branches of this red maple in Massapequa, NY. It was infested in 2000 and discovered in 2005.

Control: Tree Removal and Treatment



Figure 10—Ground inspections are carried out by trained program professionals.

Research and experience have shown that host-tree removal is critical to ALB eradication. The ALB program removes and chips infested host trees. In addition, host trees near infested trees are cut and chipped because they, too, may harbor undetected ALB eggs, larvae, or pupae. The chips are landfilled or incinerated; insects do not survive this treatment.

Control efforts also include treating noninfested host trees in the quarantine area with the insecticide imidacloprid. Whether a host tree is treated or not is determined by its distance from the original infestation. Program protocol calls for trees to be treated for a minimum of 3 consecutive years. The treatment reduces beetle populations and can prevent trees from becoming infested, protecting these trees and ensuring that an undetected ALB population cannot persist in the area.

In spring, imidacloprid is injected directly into the tree or into the soil at the tree's base. The insecticide disperses through the tree's vascular system to the smallest branches and twigs by the time adult beetles emerge in summer. ALB adults feed on the small twigs and leaves, ingest the chemical, and die. Young larvae tunneling under the bark may also ingest the insecticide and die.

Consumers use imidacloprid in some over-the-counter lawn and garden products, and some lawn-service companies use it to kill grubs in turf. Imidacloprid is also an ingredient in some domestic pet treatments used to kill fleas.

While imidacloprid decreases beetle populations and protects against future tree loss, APHIS removes every tree found to be infested—even if it has been treated.



Figures 11 and 12—ALB host trees are cut and chipped, a process that destroys all ALB eggs, larvae, and pupae.



Figures 13 and 14—Imidacloprid is injected directly into the host tree or into the soil around the base of the tree, where it is taken up by the roots.

Restoration

Because trees are so vital to the urban and suburban landscape—preserving air quality and providing shade and cooling in the summer—the program offers to replace removed trees with new, nonhost trees. The goal is to ensure diversity of tree species while reinvigorating neighborhoods and streetscapes.

Research

Research is continuing in laboratories across USDA to refine and improve the Department’s knowledge about invasive pests and diseases. U.S. scientists have even traveled to China to learn more about the insect known as the “starry night beetle” in its homeland. But, even in Asia, little scientific information was available back in 1996, when the beetle was first detected in the United States. Field studies and trials and laboratory research over the years have proven to be invaluable in developing the protocols used today to fight the ALB.

This research has disclosed a great deal of useful information

about the ALB. First, it is now understood that the ALB has no known predators in the United States. There are no pheromones (sex-attractant scents) that lure ALBs for trapping purposes. Research has taught USDA scientists how far the beetle typically flies in search of new host trees. Scientists can now date infestations by evaluating the annual growth rings of infested trees and can even link infestations via insect DNA. Research has demonstrated that generations of ALBs will live in one or a few trees in a localized area before spreading out in search of new hosts in response to overcrowding or declining food resources. Scientific research guides all decisions on eradication strategies and protocols formulated by the ALB Program and its partners.



Figure 15—In New Jersey, woody debris from ALB Program activities is chipped prior to incineration at a local cogeneration plant.

Public Outreach and Education

Sharing information about the ALB with homeowners and residents of affected areas is a critical component of the ALB program. An alert Brooklyn homeowner was the first to notice beetle damage on his trees and report it to authorities, leading to the discovery of this invasive pest in the United States. Since then, residents have been instrumental in helping to uncover infestations in New Jersey, Illinois, and Massachusetts.



Figure 16—Planting nonhost trees to replace trees lost to eradication activities is an integral part of restoring ALB-ravaged communities.



Figure 17—ALB Program professionals share beetle information with a New Jersey homeowner.

In addition to detection, informed citizens and residents also understand the importance of granting program officials access to their property so the experts can search for signs of the ALB, apply treatments, and address infestations before they impact entire neighborhoods.

Residents all across the United States should familiarize themselves with the ALB adult and with the signs of ALB infestation so they can report any possible ALB sightings to the proper authorities.

Firewood Movement Can Spread the ALB

Human transport is a prime way that invasive diseases, pathogens, and insects, including the ALB, move. So residents must refrain from moving wood out of ALB quarantine areas. Cutting a tree into firewood does not kill any of the life stages of ALB living within it. When firewood is moved from a quarantine area to an area free of pests and sits without being burned, any larvae and pupae inside can continue to develop until they emerge from the firewood as adults and spread the infestation to nearby trees.

To protect against spreading invasive insects and diseases, it is best to buy firewood where it will be burned. Many State parks and campgrounds will not let people bring in their own firewood. It will be confiscated and burned immediately.

APHIS' Role in Excluding Foreign Pests

In order to keep the ALB and other invasive pests from entering the United States, APHIS analyzes threats to U.S. agriculture and develops rules for importing commodities based on the risks they present.

The best way to fight the ALB and similar nonnative wood borers is to exclude such pests from the country. To stop ALBs from entering the United States, international regulations now require

all solid wood packing material imports to be heat-treated, fumigated, or treated with preservatives before being sent to this country. Special stamps and paperwork must accompany shipments to verify which of the prescribed treatments took place. Items that do not meet regulations are returned to their country of origin.

Inspection specialists at U.S. ports are the first line of defense against exotic plant and animal pests and diseases. In addition, all international passenger baggage, cargo, packages, mail, and conveyances are subject to inspection upon entry into the United States to exclude exotic pests.



Figure 18—Specialists at U.S. ports inspect high-risk cargoes for the ALB and other pests.

Contacts

For more information regarding the ALB—including quarantine maps, photographs, publications, pest alerts, the ALB Strategic Plan for Eradication, a detailed timeline, and other information—please visit <http://www.aphis.usda.gov> on the World Wide Web and click on the button for Asian longhorned beetle under “Hot Issues.”

- To report a sighting of the ALB in a State other than New York or New Jersey, please contact your APHIS State Plant Health Director or call the State department of agriculture or agricultural extension service. The State Plant Health Directors can be found at this Web site: http://www.aphis.usda.gov/contact_us/ppq.shtml. On the U.S. map, just click on the State of interest.
- Those living in New Jersey or Staten Island, NY, may call the New Jersey ALB Cooperative Eradication Program at **732-815-4700** or the New Jersey Department of Agriculture hotline at **866-233-8531**.
- Those living in New York, including Staten Island, may call **1-866-265-0301** or **1-877-STOP ALB**.
- Those living in Massachusetts may call the ALB Program at **508-852-8090** or **1-866-702-9938**.
- Those living in Illinois may call the ALB Program at **847-699-2424**.

The ALB Cooperative Eradication Program Is a Partnership

State and local government agencies working together comprise the ALB Cooperative Eradication Program. In New York, the partnership includes USDA-APHIS along with the New York State Department of Agriculture and Markets, New York State Department of Environmental Conservation, and The City of New York Department of Parks & Recreation. ALB Program partners in New Jersey include the New Jersey Departments of Agriculture and Environmental Protection. In Illinois, ALB Program partners are the Illinois Department of Agriculture and the City of Chicago Department of Streets and Sanitation's Bureau of Forestry. In Massachusetts, partners include the Massachusetts Department of Conservation and Recreation, the Massachusetts Department of Agricultural Resources, and the City of Worcester. Within USDA, partners include the Forest Service and Agricultural Research Service.

