SPECIAL REPORT:
Asian Longhorned Beetle

Anoplophora glabripennis

Dan A. Meyer. Editor, National Hardwood Lumber Association.
P.O. Box 34518, Memphis, TN 38184-0518.
Phone (901) 377-1818 Fax (901) 382-6419
E-mail d.meyer@natlhardwood.org
NHLA Web Site: http://www.natlhardwood.org

The Entomology and Forest Resources
Digital Information Work Group

By now, you've heard of the Asian longhorned beetle (ALB), the latest threat to North America's hardwood forests (Figure 1). It's introduction to the United States has been covered by CNN and NBC Nightly News. Even President Clinton was questioned about the beetle during a recent press conference. A simple search on the Internet will turn up tens if not hundreds of pages dedicated to this troublesome beetle. At the same time, this beetle is not "old news." There is new knowledge emerging about the insect, new research projects underway to help detect and control infestations, and new concerns about the possible ramifications of a U.S. ban on untreated wood packing materials. This feature article will introduce you to the latest facts and figures surrounding this exotic pest, its potential damage to North American forests, and the requirements and possible impacts of the new phytosanitary control measures being implemented by the U.S. Department of Agriculture (USDA).

Figure 1. An Asian longhorn beetle adult. Adults are glossy black, from 1 - 1 1/4 inches long, and have long antennae with up to 20 irregularly distinct white spots on their back. (Photo by Ken Law, USDA-APHIS-PPQ).

Where Is It?

The first infestations of the Asian longhorned beetle (*Anoplophora glabripennis*) in U.S. trees were detected in Brooklyn and Amityville, New York, in 1996. In July of 1998, additional infestations were detected in three greater-Chicago neighborhoods. While the New York and Chicago infestations are the only ones detected to date, Asian longhorned beetles have been detected at 26 warehouse sites in 14 states (Figure 2).

Where Did It Come From?

The beetle is native to China, Japan, Korea and the Isle of Hainan. It is believed to have been introduced from China in untreated solid wood packing materials (crates, pallets, dunnage). As the volume of Chinese imports to the United States has increased from $5 billion in 1985 to $72.8 billion in 1997, so has the volume of solid wood packing materials (SWPM) accompanying these shipments. While foreign shipments are inspected for insects by the USDA's Animal and Plant Health Inspection Service (APHIS), the ALB spends its pupal and larval stages buried inside the wood, making it difficult to detect.

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Many Hardwood Species at Risk

The Asian longhorned beetle has a long and growing list of hardwood host species in North America. While it seems to prefer maples and horsechestnut, it will readily attack yellow-poplar, willow, elm, mulberry, black locust, and several commercial fruit trees including pear and plum. ALB's species preference leaves a majority of northern hardwood forests, western hardwood forests and most North American urban forests at risk (Figure 3). In addition, new hardwood species are continually being added to the susceptibility list, according to Dr. Kathleen Shields, Project Leader of the USDA Forest Service's Forest Insect Biology and Biocontrol research unit in Hamden, Connecticut. It is not unlikely that the ALB will find southern hardwood species equally as palatable.

Risks to the Timber Industry

In 1986, timber was the most important agricultural crop in the U.S. in terms of dollar value of production, surpassing corn, soybean and hay. The delivered value of the 1986 U.S. timber output was $17.1 billion (in 1996 dollars). Total shipments of wood manufactured products were valued at $252 billion. If left unchecked, the USDA estimates the Asian longhorned beetle and other Chinese wood-boring insects could cause as much as $138 billion in damage to the U.S. economy.

What Does ALB Do to Trees?

Asian longhorned beetles are wood-boring beetles. Adult females lay their eggs in an opening in the bark (often the exit hole left by an emerging adult). The larvae then bore large galleries deep into the wood. By the time the adults bore out of the tree, the tunnels they leave behind are 3/8-inch in diameter or larger. These tunnels disrupt the vascular functioning of the tree and eventually weaken the tree to the point that the tree literally falls apart and dies.

It's Difficult to Squash this Bug

There are no U.S. Environmental Protection Agency-approved pesticides which effectively control the Asian longhorned beetle. Even if there were, the adults emerge over such a long time span that spraying would have to be conducted repeatedly. While they are inside the wood, the beetle larvae are protected from pesticide applications. Once ALB has infested a tree, the only 'treatment' is to cut down, chip and burn the infested tree. Because of the beetle's life cycle, however, the difficulty is in knowing which trees are infested.

Figure 2. Warehouse detections and introductions (tree infestations) as of August 1998.

Have We Cornered ALB in North America?

According to Dr. Shields, we are likely to find more ALB infestations in the coming years. Because the beetle first attacks the smallest and youngest branches of a tree, which are mostly at the top, it takes several years before an infestation is detectable from the ground. Generally, it is the dropping of these smaller, gallery-ridden branches that is the first sign of an infestation. Shields estimates the ALB may have arrived in New York as early as 1988, and in Chicago as early as 1991, even though the infestations were not detected until 1996 and 1998, respectively. There may be many more infestations out there waiting to be discovered.

Interim Rule Designed to Stop New Introductions

Because of the difficulties in treating ALB infestations, APHIS is enacting tough new measures to exclude new introductions of the beetle. Beginning December 17, 1998, APHIS will enforce an 'interim rule' requiring all solid wood packing materials entering the U.S. from China to be heat treated (kiln-dried), fumigated, or treated with preservatives. Current regulations only require most imported SWPM to be "totally free from bark and apparently free from live plant pests." Details on specific treating requirements are available from APHIS.

The new treatment rules are designed to exclude not only ALB, but also three other wood-boring insects that have been repeatedly intercepted in shipments from China. Between 1985 and 1996, APHIS inspectors intercepted and destroyed insects on various wood products shipped from China on nearly 5,900 occasions.

APHIS estimates the costs associated with enforcing the new SWPM regulation on the more than one million shipments imported into the United States from China each year will total $2.7 million annually. Enforcement will be somewhat facilitated by the fact that 75% of all Chinese imports enter the U.S. through the ports of Long Beach, CA, Seattle, WA, or Charleston, SC.

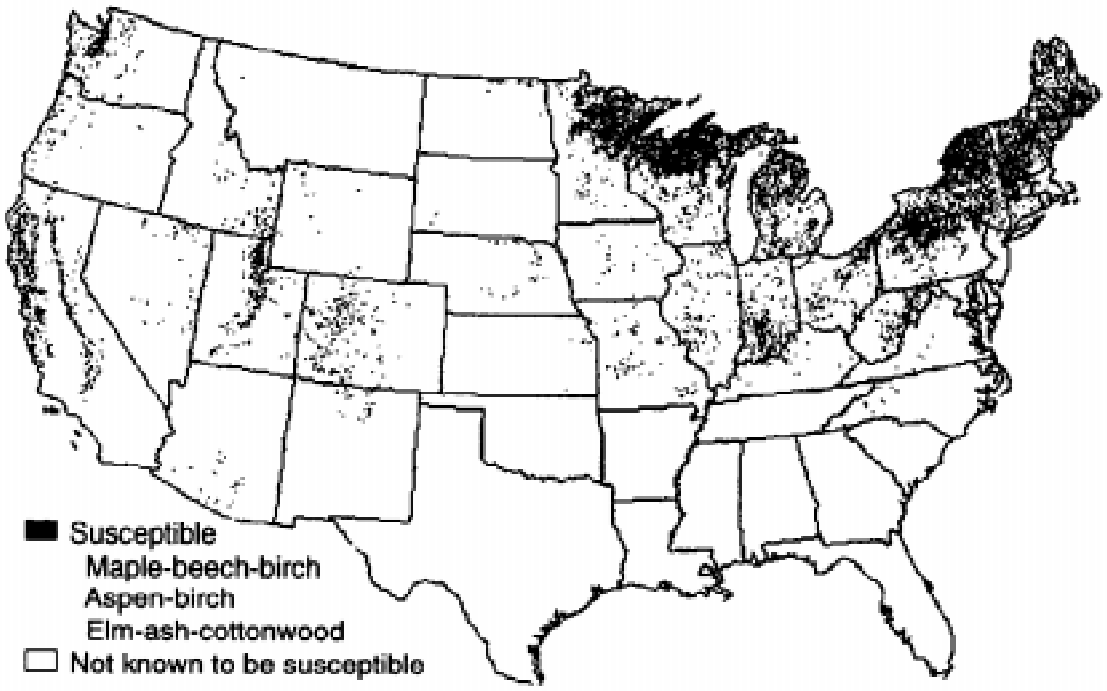

Figure 3. U.S. forest types potentially at risk to Asian longhorned beetle infestations. (Source: USDA Forest Service)

Possible Impacts on U.S. Trade with China

In 1997, China's total exports to the United States were valued at $72.8 billion, 8.4 percent of all U.S. imports. China ranks behind Canada, Japan and Mexico as the fourth largest source of imports for the U.S. The USDA estimates that, in 1997, 24 to 31 percent of imports from China, with corresponding values of $17 to $23 billion, arrived with some type of solid wood packing materials. However, roughly 30 percent of Chinese imports that arrive with SWPM are voluntarily fumigated before arrival. Thus, the value of imports potentially affected by this interim rule is between $12 and $16 billion, or 17 to 22 percent of total imports from China (1.4 to 1.8% of all U.S. imports).

That is not to say that those $12 to $16 billion worth of goods will not be shipped, rather that those shipments will incur additional packing costs (drying, fumigating, treating), which ultimately will be borne by the SWPM manufacturer, the exporter, the importer, or passed on to the U.S. customers.

Beyond the physical limitations on Chinese SWPM, there is now a political battle brewing. According to the Chicago Tribune, Chinese agriculture officials are rejecting blame for the ALB introductions, arguing that the date of infestation is unclear and that the insects could have come from Japan or Korea. In addition, they have petitioned the USDA to allow alternative treatments for SWPM which they say are equally effective at killing the beetles, such as extended air-drying or a 30-day soak in soapy water. In September, the Tribune reported that China's Ministry of Foreign Trade and Economic Cooperation had warned that the restrictions would "severely hinder" U.S.-Chinese trade relations, and that China "reserves the right to further reactions" in light of the measures. The U.S. currently accounts for 40 percent of China's exports, reportedly a major factor in China's ability to withstand the worst shocks of the Asian economic slump. MSNBC reports that Chinese officials have called the interim rule a veiled attempt to narrow America's $1 billion-a-week trade deficit with China.

Possible Impacts on North American Forest Products Industry

It is difficult to forecast the impact of increased phytosanitary regulations on the U.S. forest products industry. Both the American Forest and Paper Association (AF&PA) and the National Wooden Pallet and Container Association (NWPCA) agree that the direct impacts of the interim rule should not be severe. Both organizations strongly support the USDA's interim rule and are primarily committed to preventing additional introductions of ALB into North America. However, industry representatives are concerned that the "interim rule" is just that, an *interim* rule—the first in a long line of APHIS regulations which may soon restrict wood product imports from many or all countries. Some believe there could soon be regulations restricting SWPM shipments between the U.S., Canada and Mexico. There is also concern that if the U.S. levies what might be viewed as "trade restrictions" on imports from other countries, those other countries will establish reciprocal restrictions on imports from the U.S. If either of these two scenarios comes to pass, both the U.S. pallet industry and the U.S. hardwood lumber industry will be impacted directly.

Currently 40% of all hardwood lumber manufactured in North America is utilized in the manufacture of pallets and other SWPM. Pallets consume a majority of the lower grade lumber produced. NWPCA estimates that fumigation or borate preservative treatments would increase the cost of a pallet or container by 10%, while kiln-drying would increase their cost by 50%. If solid wood pallets become more expensive to produce, pallet manufacturers will 1) pay less for the lumber, 2) raise the price of their solid wood pallets, or 3) switch to other raw materials to manufacture pallets (engineered wood, corrugated paper, plastics, etc.). If solid wood pallets become more expensive, shippers may reduce their pallet use or switch to other pallet types. Ultimately, somebody—lumber producer, pallet producer, shipper, end-use customer—will have to pay the costs associated with increased phytosanitary requirements.

NWPCA says its members are ready and willing to comply with any new phytosanitary requirements—they have even volunteered to help the Chinese comply with the interim rule—but notes that there will be associated costs.

Research Underway to Thwart Beetle

The USDA's Agricultural Research Service has developed a research program, in cooperation with APHIS, the USDA Forest Service, Cornell University and the New York State Department of Agriculture and Markets, aimed at providing technology to better detect, control and ultimately eradicate ALB from North America.

USDA Forest Service Research has reallocated $400,000 in FY1999, including 2 scientist-years, to initiate research on ALB. "We are just now initiating research on the Asian longhorned beetle because initially it was thought to be a problem of eradication," said Dr. Kathleen Shields. "They didn't see much use for Forest Service Research in an eradication program." Now Dr. Shields believes the problem is much larger than eradicating ALB from New York and Chicago. She believes it will take a significant research effort first to fully understand the biology of the insect, and then to develop the detection and control technologies necessary to eventually eradicate ALB from the landscape.

Shields is currently seeking permits to study ALB in the Forest Service's quarantine labs in Hamden, the only quarantine facilities owned by the Forest Service. She plans to establish a colony from the Chicago population this December. Scientists will analyze the DNA of the Chicago bugs to try to pinpoint their origin(s) in Asia. There are several closely related species and understanding which the U.S. has is key to controlling it. It also is important to determine whether all of the infestations are coming (or came) from one area, or are coming from multiple regions. Additional Forest Service research will investigate the effectiveness of "vaccinating" susceptible tree species with systemic pesticides to prevent their infestation.

Researchers at the State University of New York are trying to isolate the chemical pheromones that attract male Asian longhorned beetles to females. Once isolated these sexual attractants can be reproduced and incorporated into ALB traps, which will make widespread surveying and identification of ALB populations possible (similar to the gypsy moth traps currently hanging from trees in many eastern forests and urban areas).

At Cornell University, researchers are looking for pathogens, predators and parasitoids to combat the beetles. One scientist is investigating a fungal parasitoid—a parasite that kills its host—that just might consume the beetle like a fatal case of athlete's foot. Another is looking at a beetle-eating beetle from Japan that hunts down beetle larvae inside their wooden tunnels and may be introduced as a predator of ALB's grubs.

For More Information

For more information on the Asian longhorned beetle or the APHIS interim rule on importing solid wood packing materials from China, contact the USDA's Animal and Plant Health Inspection Service (APHIS) at www.aphis.usda.gov or 301-734-8295.

For more information on the industry associations discussed here, contact:
AF&PA www.afandpa.org 202-463-2700
NWPCA www.nwpca.com 703-527-7667