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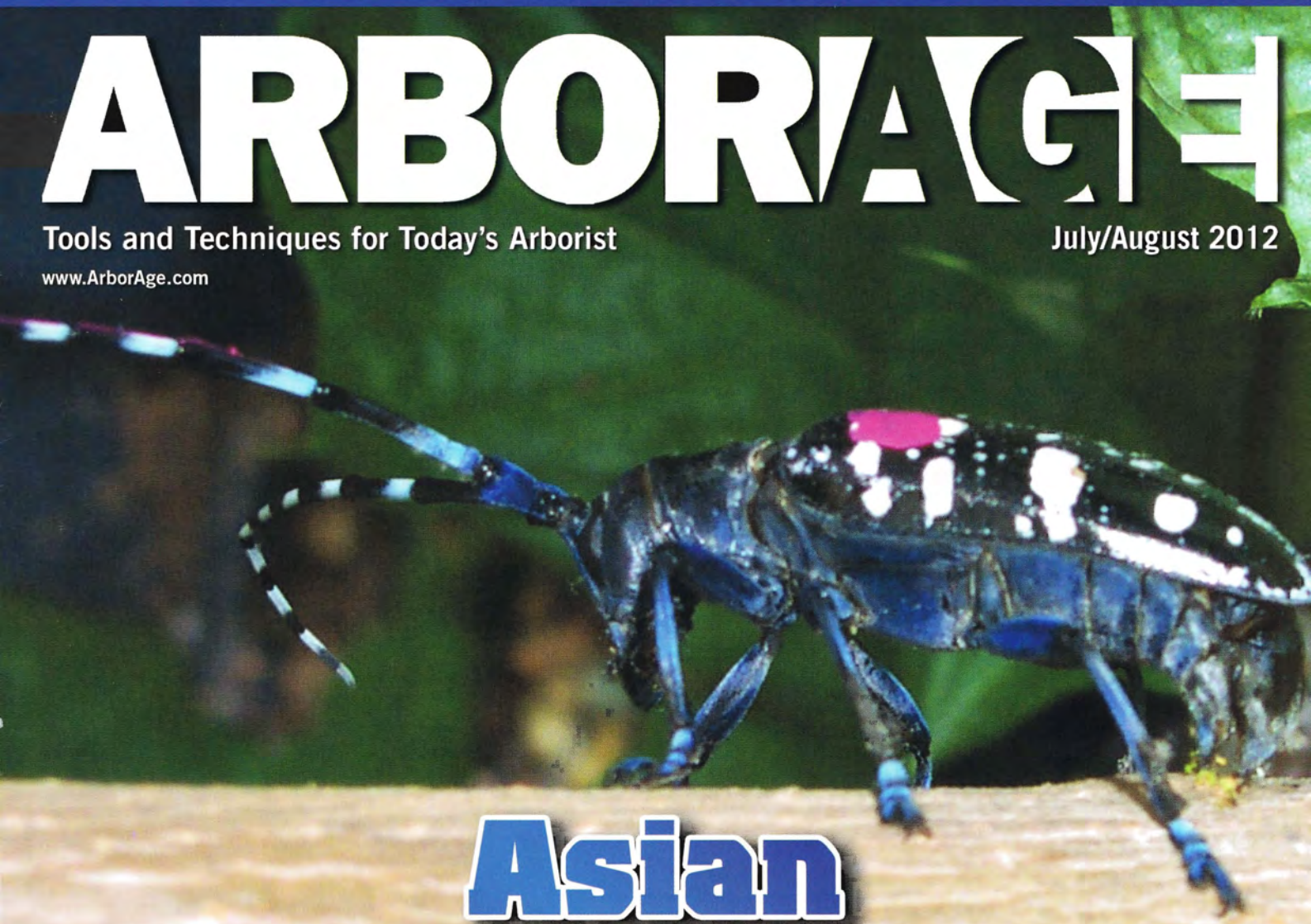

Asian Longhorned Beetle: 10 Myths and Misconceptions

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Asian Longhorned Beetle: 10 Myths and Misconceptions

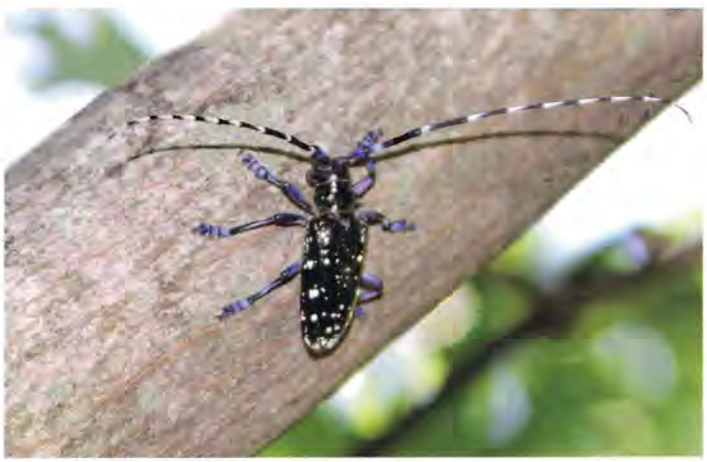
By Joe Boggs and Amy Stone

Asian longhorned beetle (ALB; *Anoplophora glabripennis*) has the potential to cause an unprecedented catastrophic loss of trees in North America. Unlike other devastating pests and diseases of non-native origins such as emerald ash borer (EAB; *Agrilus planipennis*), Dutch elm disease, and chestnut blight, which kill members in one plant genera, ALB kills trees belonging to 13 plant genera.

ALB is native to China and the Koreas, and it is now well known that the beetle is capable of hitchhiking across the globe as larvae, pupae, and newly developed adults inside the wood of packing materials. The beetle was first discovered in North America in Brooklyn, N.Y., in 1996, and was subsequently detected in Illinois and New Jersey. In 2008, the largest infestation in North America was discovered in Worcester, Mass. And just last year, Ohio became the fifth U.S. state affected by ALB when an infestation was found in Bethel, a small town about 25 miles east of Cincinnati.

The Ohio infestation represented several "firsts" for ALB. It was the first time the beetle had been found in a rural area dominated by farmland, it is the southern-most infestation to be found in North America, and it was the first time the beetle was found in an area where EAB is also wreaking havoc. EAB actually overlapped ALB in Chicago; however, it was not known in 1998 that EAB had established beachheads in North America.

As with any new discovery that finds its way into the news media, science sometimes takes a back seat to opinions formed out of rampant speculation. Some misconceptions arise from the fact that science is an ever-advancing enterprise based on new discoveries made through research. Other misunderstandings can be traced to the overlap of ALB and

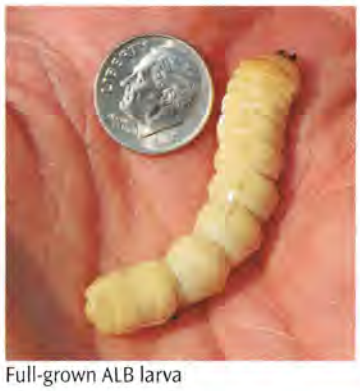


EAB in Ohio; two very different non-native borers.

The following are 10 myths and misconceptions about ALB that have been gleaned from news reports, web postings, and social media. Some arose years ago, while others are very recent. Unfortunately, these misconceptions have often gained traction based on appearing in multiple venues. As William James said, "There's nothing so absurd that if you repeat it often enough, people will believe it."

#1: "Asian longhorned beetles behave exactly like emerald ash borers." Taxonomy illustrates that ALB and EAB are like apples to oranges. While both beetles belong to the same insect order (Coleoptera = Beetles), ALB belongs to the family Cerambycidae (adults = longhorned beetles; larvae = roundheaded borers) and EAB belongs to the family Buprestidae (adults = metallic wood borers; larvae = flatheaded borers).


ALB Adult

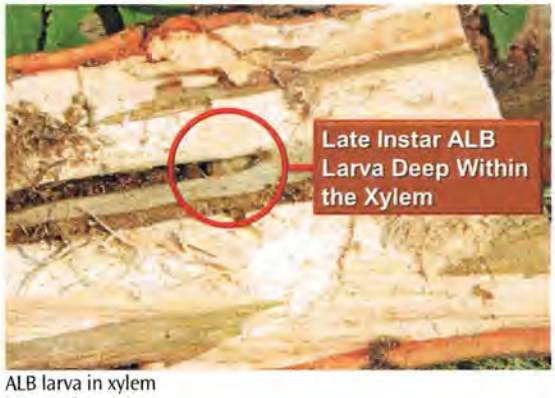

Full-grown ALB larva


EAB adults

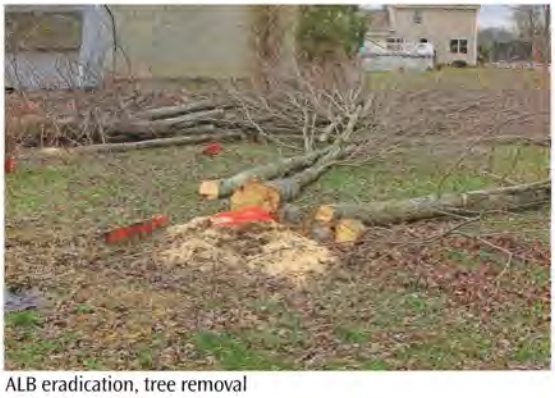
The much smaller EAB adults are very good fliers and they easily disperse. While ALB adults are relatively good fliers, they take flight much less frequently compared to EAB, perhaps because their large bodies require much more energy to launch and remain airborne. Thus, ALB tends to stay and continually re-infest trees until the trees die and are no longer able to support a new generation. As a result, ALB does not spread very fast from tree to tree compared to EAB.

#2. "ALB behaves differently in each North American infestation." This myth is related to a misconception regarding the true nature of the genetic testing used to reveal that ALB infestations in the five states where ALB has been discovered came directly from Asia. Each North American ALB infestation most likely started with only a few beetles, thus all the progeny are closely related. However, this genetic bottleneck produced by the "founder effect" imparts only slight genetic variability; about the same that is used to determine paternity in humans. The variability is not large enough to produce truly different beetles. Thus, research conducted on beetles in one location is applicable to beetles in other locations.

#3. "ALB only infests maples: no need to worry about other hosts." This myth may have flowed from our emphasis on highlighting maples as a primary target for the beetle. While maples are indeed at the top of ALB's food menu, the beetle's complete table fare comprises trees belonging to 13 plant genera including *Acer* (all maple species), *Aesculus* (horsechestnuts and buckeyes), *Ulmus* (elms), *Salix* (willows), *Betula* (birches), *Platanus* (Sycamore / Planetrees), *Populus* (Poplars); *Albizia* (Mimosa), *Cercidiphyllum* (Katsura), *Fraxinus* (ashes), *Koelreuteria* (goldenraintree), *Sorbus* (mountainash) and *Celtis* (Hackberry). While the first six in this list of genera are generally considered the trees most commonly attacked by ALB, all of the trees in this list can be attacked and killed by ALB; trees in the first group are like steak to ALB while trees in the second group are like hamburger. All are trees that the ALB can complete its lifecycle in.



ALB larva in xylem


ALB eradication, tree removal

#4. "ALB is not a pest in its native China." In fact, ALB is a major pest in its home territory, causing widespread mortality to poplar, willow and elm. Much of the damage in China occurs on street trees, trees in windbreaks and hedgerows, and trees in manmade forests and plantations. Many of the plantations are dedicated to growing trees that are processed into wood packing material including crates and pallets. Globe-trotting by the beetle has in the past stemmed from larvae, pupae, and newly developed adults hitchhiking inside such packing materials. Thankfully, regulations to prevent the import of this and other non-native plant pests and diseases now have a much greater "bite" than in recent years in terms of fines and penalties.

#5. "ALB does not kill trees." This myth most likely arose from a misunderstanding based on observing the rapid tree-killing behavior of EAB. EAB attacks ash trees, which are "ring porous," water and nutrients are only transported through the outermost xylem ring. EAB is a phloem feeder; however, as the larvae gain size, they start etching the outermost xylem ring. Consequently, trees may die quickly as EAB larvae girdle trees by consuming the phloem and etching the single functioning xylem ring.

ALB infests some ring porous trees; however, maples are most commonly attacked and maples are "diffuse porous," water and nutrients are carried by four to five of the outermost xylem rings. Although ALB larvae bore into the xylem, their tunneling causes less disruption of the xylem vascular flow compared to damage caused by EAB in a ring porous tree. In the end, the ALB larval damage does kill trees, but infested trees may linger for many years giving the false impression that they are not being killed. Of course, as they linger, the trees are a constant source of new beetles.

#6. "Insecticides are highly effective in controlling ALB: they make treated trees immune to the beetle." This misconception may be related to the success that can be achieved with using insecticides to protect ash trees from EAB. Again, EAB and ALB are like apples to oranges. Although EAB is not targeted for eradication, ash trees can be successfully

treated to maintain full canopies. EAB larvae feed exclusively on the phloem, and this tissue is highly effective in transporting systemic insecticides. Adult EAB beetles are also killed when they feed on the leaves of systemically treated trees. Systemic insecticide treatments are highly effective in EAB suppression; however, the overarching management goal is very different from ALB. Maintaining a full canopy does not require 100 percent efficacy; every EAB beetle does not need to be killed.

Eradication using insecticides means the treatments must be 100 percent effective. Although ALB larvae start out feeding on the phloem, they quickly bore into the xylem. Unfortunately, this places the larvae out of the reach of systemic insecticides. If a tree already has ALB larvae in the xylem, those larvae will successfully complete their development and new adults will emerge even if the tree is treated. Insecticides do not make trees "immune."


ALB larval tunneling damage in white wood.


ALB emergence hole


ALB pencil test


ALB oviposition pits


Woodpecker damage

Insecticides have been used in ALB eradication programs in North America, but the primary target is the adult beetles rather than the larvae. The beetles spend time feeding on the phloem tissue of twigs and small branches prior to laying eggs; this is called "maturation feeding." Although ALB adults are susceptible to systemic insecticides during maturation feeding, achieving high adult mortality is challenged by the extended period of time that adults are active during the season, limitations associated with product label restrictions, and the fact that size matters: efficacy is uncertain on large trees. This is why insecticides have always been used in conjunction with other eradication tools. Unfortunately, the most effective eradication tool remains the chain saw with trees being cut down and destroyed.

#7. "A thinning tree canopy is a sure-fire symptom of ALB."

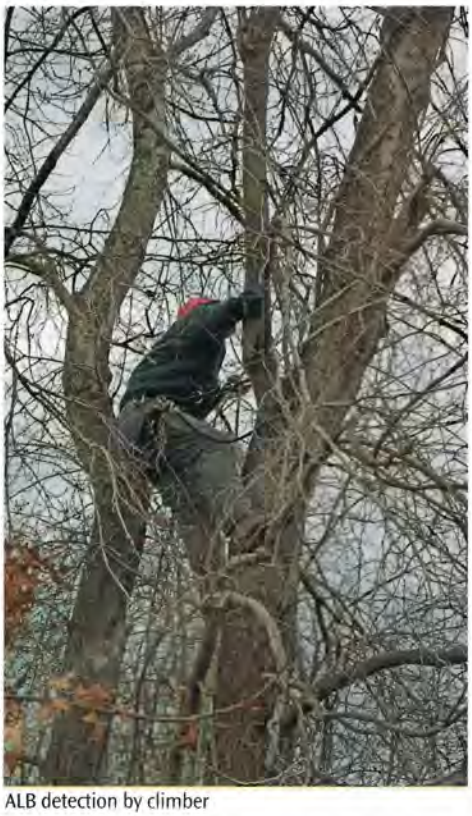
Stunted leaves and stem dieback are symptoms commonly associated with many tree-boring insects. However, it is not a reliable symptom for detecting an ALB infestation. In fact, it is amazing how long maples will retain healthy-looking canopies while being eaten alive by ALB. Symptoms that are more reliable in revealing that a tree is infested include: large, perfectly round adult emergence holes; oviposition pits in the bark; coarse, Excelsior-like frass that collects in branch forks and on the ground around infested trees; heavy woodpecker damage; and branch breakage.

ALB larval tunneling activity in the white wood (xylem) causes substantial structural weakening of infested branches leading to branch breakage. Always look at the ends of broken branches to see why the branch broke. Look for heavy tunneling across the rings of the white wood. Adult emergence holes measure approximately 3/8 inch to 1/2 inch in diameter and the holes extend deep into the xylem. The holes are large enough to easily insert a Number 2 pencil, and this "pencil test" is effective in separating phloem feeding borers from ALB as emergence holes of phloem feeders are much shallower.


Holes and pits on a heavily infested tree.

Every ALB infestation starts with female beetles chewing circular to oblong-shaped pits, around 1/2 inch in diameter, through the bark and down to the white wood of host trees. Pits remain obvious for about a year until the wound heals, then they become harder to detect. Beetles will lay eggs throughout the tree; pits are as likely to be seen at eye-level as they are to be found high in the tree. Trees of all sizes are selected: as long as stem size can support complete larval development.

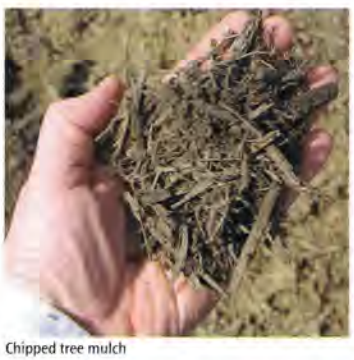
#8. "Infested trees are easy to detect." Damage found on heavily infested trees is relatively easy to detect; the large oviposition pits and emergence holes are hard to miss. However, detecting ALB infections on lightly infested trees is a different matter. Remember that a single oviposition pit means the tree is infested. Imagine spotting a 1/2-inch-diameter pit in the bark high in the canopy of a 70-foot sugar maple... even using good binoculars. In fact, research has shown that well-trained "ground spotters" will only be about 30 percent effective in detecting ALB infestations in lightly infested trees. The detection rate of well-trained tree climbers is around



ALB detection by climber

70 percent. This means that under the best of circumstances, there is a detection error rate on lightly infested trees of approximately 30 percent.

#9. "Mulch created by grinding up infested trees will spread ALB." This myth speaks to unreasonable fears that may arise from a general lack of understanding of the needs of insects. Trees that are removed as part of an ALB eradication program are reduced to wood chips that are less than an inch in two dimensions. This allows the material to become a deregulated article. ALB requires a specific type and amount of food to support complete development through the larval stages. Extensive research has shown that chipping trees to this size will not only physically eliminate the immature life stages of the beetle; the chipped wood is also incapable of supporting larval development. Also, ALB larvae are found in a specific location. They are inside trees, not crawling about on the outside of trees. Chipping trees to the prescribed chip size destroys the beetle's food supply and obliterates the "home" where the larvae live. ALB may be a scary beetle, but it's not a "super beetle."



Chipped tree mulch

#10. "Little has been learned about ALB and eradication doesn't work." The United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA APHIS) has been waging war against ALB since 1996. Much has been learned during the past 15 years, and several battles have been won; ALB has been eradicated in Chicago and in several locations in New York and New Jersey.

However, as we have learned with EAB, the ultimate success of any eradication program targeting a non-native pest depends upon early detection.

ALB has been found in distinct and mostly small populations. It was first found in North America in 1996 and even now, infestations remain confined. Thus, the management strategy for ALB is eradication with the overarching goal to eliminate ALB from all of North America.

How do we avoid falling into the trap of believing these and other ALB myths and misconceptions? First, keep yourself informed and updated; never miss attending training programs on ALB. Second, always consider the source of your information; does your source have an alternate agenda? Finally, always separate facts from opinions. Daniel Patrick Moynihan said it best: "Everyone is entitled to their own opinions, but not their own facts." **AA**

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August is Asian Longhorned Beetle Awareness Month. For more information, visit www.beetlebusters.info.