



Ambrosia Beetles in the News

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Students of classical Greek mythology will recall ambrosia as the ‘food of the gods,’ while the rest of us may connect it with a dessert. Unfortunately the term is now taking on less favorable associations of damage to and death of trees, even mature and apparently healthy specimens, primarily due to a rise in tree attacks by ambrosia beetles, so-called because many carry with them various ‘ambrosia’ fungi for inoculating the interior of the galleries. The beetles and their larvae feed upon the fungi – they typically do not feed upon the wood. Ambrosia beetles, distinct from other kinds of bark beetles that confine their galleries to the inner bark area, primarily bore into the wood itself of trees and shrubs. The photo (from an *Ailanthus*) shows a typical gallery made by an ambrosia beetle. As the fungi colonize the area trees rightly

sense they are under attack. The tree’s ‘plumbing’ begins to fail, followed by wilting or dieback. One of the most noted symptoms are the ‘toothpicks’ of compressed wood material pushed out of the gallery by the beetles as they bore in, more commonly seen with some species than others. Though ambrosia beetles tend to attack live or recently killed trees or shrubs and some are not associated with



Cross-section of a gallery in *Ailanthus* showing a typical gallery made by an ambrosia beetle. © Dan Gilrein



Characteristic toothpick-like frass tubes from granulate ambrosia beetles. © Dan Gilrein

from around Long Island, some of which are turning out to be GAB, with reports from other regions as well. Ambrosia beetles were once classified in the bark beetle family (Scolytidae), but contemporary taxonomists busy revising classifications using new technologies now place them in the weevil family (Curculionidae). Twig beetles (*Pityophthorus* spp.) sometimes behave similar to other ambrosia beetles boring into wood or pith of twigs.

Species of Ambrosia Beetles

GAB, one of several notorious species turning up, is an Asian native first found in the US (SC) around 1974 and has since spread throughout much of the southeastern US, reaching New York (Long Island) only in the last few years. It has become a damaging pest in southern tree nurseries, peach and pecan orchards, and to some extent in landscapes. On Long Island we have seen it primarily **attack landscape European beech, though Callery pear and styrax have also been hosts.**



On the left is the granulate ambrosia beetle, *X. crassiusculus*. Note the dull ‘granulate’ sloping back end of the wing covers (the ‘declivity’ in entomological parlance). The right shows *X. germanus*, the black stem borer. The declivity is shiny, very easy to see in this photo. It is also devoid of any spines or projections, the presence (or absence) of which can be helpful diagnostic features. *X. crassiusculus* is relatively new here on Long Island. Photo © Dan Gilrein.

Several other ambrosia beetle species have been found attacking trees on Long Island, elsewhere in New York and around the southeastern US into Ohio. These include ***X. germanus*, the black stem borer in European beech and other hosts, and less commonly *X. compactus*, the black twig borer. *Xyleborinus saxeseni*, the lesser shothole borer, has been found with the other species or alone in Kwansan cherry**, the only time we have seen an ambrosia beetle problem in the nursery to date. *Xyleborus dispar*, (pear blight beetle), *X. obesus*, *Monarthrum mali* (apple wood stainer), *Corthylus columbianus* (Columbian timber beetle) and *Euwallacea validus* are some others we have come across in the diagnostic lab on occasion (some do not yet have common names). Main hosts for these are various hardwoods, though some appear to have preferences for one or several types of trees. A few, such as the pear blight beetle, have also been reported (possibly erroneously) from conifers. In 2009 we found a white pine twig borer, *Pityophthorus cariniceps*, causing flagging twigs around the canopy of landscape white pines. *Anisandrus maiche* is a relatively recent introduction into Pennsylvania found attacking junipers. The redbay ambrosia beetle has become a serious pest in the southeast, killing nearly all redbay trees in forest and landscape areas; there is concern the tree may be extirpated from its home range and whether the related avocado is also at risk.

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Management Options

We don't really know a lot about this group of insects, least of all why and when they attack their host trees, but the effects can be quite dramatic and traumatic for the tree, the property owner and the landscape professional wrongfully accused of negligence. Pyrethroid (Astro/permethrin generics; Onxy or OnyxPro) bark sprays can sometimes deter attacks but timing is an outstanding question and frequent preventive sprays are both costly and disruptive of natural enemies. Trees in the early stages of attack have sometimes been spared further damage following pyrethroid insecticide bark sprays but we have no information on how consistent this has been or when the 'tipping point' is reached beyond which trees can't be saved. Drenches with some systemic insecticides have not provided consistent results in limited studies.

Ongoing Research

There is reason for some optimism, however. Based upon knowledge that stressed trees, compared with healthy ones, produce higher concentrations of some volatile chemicals such as ethanol, methanol and acetone, researchers in Ohio (Ranger et al.) following this trail have been able to induce ambrosia beetle attacks especially by the black stem borer (*X. germanus*) by injecting trees with ethanol (grain alcohol) solutions. The Ohio investigators are using this information to evaluate insecticide treatments and considering how this might be used to assess risk of or susceptibility to attack or possibly assess level of tree 'stress.' They feel our subjective assessment of tree health may need to be revised to consider factors that may be inducing tree stress which are not apparent, yet revealed in the enhanced production of these chemicals some of which (ethanol in particular) are highly attractive to some ambrosia beetles. Arborists assessing tree health already round up the usual suspects such as soil compaction, excessive or irregular irrigation, root competition



Granulate ambrosia beetle adults. © Dan Gilrein.

and look at new shoot growth, leaf color and size, canopy density, branch dieback as indicators of how 'happy' trees are or have been. But some day we may be taking the 'volatile profile' of trees like we do the body temperature of human patients to learn what the trees would like to tell us more completely, in their language, about their environment and health.

Submitting a Sample

Until then, if you find trees with suspect ambrosia beetle infestation I suggest having the culprit(s) identified by submitting a sample of the infested branch or trunk to a diagnostic lab. If that isn't practical or possible, try carefully splitting open infested material to extract the beetles – they need to be intact and in good condition (at least several specimens); place in rubbing alcohol until they can get to the lab for identification. A



An entrance hole of an ambrosia beetle. © Dan Gilrein

letter of explanation from the lab may help arborists and landscape professionals explain to their clients more about this new problem. Reassess site conditions and tree health as best as possible and make adjustments if needed. More details on the biology and hosts of ambrosia beetles can be found in the Solomon reference below.

References

Ranger, C. M.; M. E. Reding; A. B. Persad and D. A. Herms. 2010. Ability of stress-related volatiles to attract and induce attacks by *Xylosandrus germanus* and other ambrosia beetles. *Agricultural and Forest Entomology*12: 177–185.

Solomon, J.D. 1995. *Guide to Insect Borers in North American Broadleaf Trees and Shrubs*. U.S. Department of Agriculture-Forest Service Agriculture Handbook AH-706, Washington, DC.

Phenology

- Monroe County:** Flowering—Bottlebrush Buckeye, Mimosa, Rose of Sharon
- Rockland County:** Flowering—Bottlebrush Buckeye, Clethra, Mimosa, Rose of Sharon, Sourwood
- Tompkins County:** Flowering—Abelia, Bottlebrush Buckeye, Buddleia, Golden Raintree, Mimosa, St. John's Wort
- Westchester County:** Flowering—Mimosa, Stewartia

Growing Degree Days

As of July 19, 2011



Station	GDD ₅₀	Station	GDD ₅₀
Albany.....	1475	Ithaca.....	1252
Binghamton.....	1266	New Brunswick,NJ	1785m
Boston, MA	1443	Riverhead (7/18)	1578
Bridgeport, CT	1552	Rochester.....	1341
Buffalo	1329	Syracuse	1557
Farmingdale	1565	Watertown	1144
Glens Falls	1230	Westchester	1509m
Hartford, CT.....	1538	Worcester, MA	1237

* m indicates missing data

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