

You Ain't From Around Here! Exotic Invasive of the Quarter: Laurel Wilt

By: Jennifer Gagnon, Virginia Tech

This quarter, I'm writing about laurel wilt, a disease which, as far as we know, isn't in Virginia yet. But it was originally identified in Georgia, and has since spread through much of Florida, has also been found in North and South Carolina. So, like so many other exotic invasives, it's probably well on the way. Although there is some migration of the beetles on their own (populations can spread up to 20 miles a year), humans moving firewood, wood for grills, mulch and tree trimmings are responsible for most of their travel.

Laurel wilt is a vascular wilt disease caused by the redbay ambrosia beetle (*Xyleborus glabratus*) and its fungal friend (*Raffaelea lauricola*). These partners in crime have a symbiotic relationship (a close and often obligate relationship between different species that live together, often to their mutual benefit). They are native to India, Japan, the Bonin Islands, Myanmar, and Taiwan. The beetle was identified in Georgia in 2002, presumably a hitchhiker on some solid wood packing materials (such as crates or pallets). As far as we know, it only affects species in the aromatic Lauraceae family, which includes Virginia species such as redbay, sassafras and spicebush.

So how does this beetle-fungus relationship work? A female redbay ambrosia beetle enters a healthy tree and creates galleries in the xylem (a layer of dead cells which transport water and nutrients from tree roots to the crown). As the beetle tunnels, the fungus, which she carries in her mycangia (specialized structures at the end of her mandibles), oozes out into the xylem. She may lay eggs at this time, but more commonly, she will simply create her fungus-filled galleries and exit the tree.

Symptoms of an infected tree may not be immediately apparent, although small sawdust tubes, made out of frass from the tunneling beetle, may appear on the bark. If the bark is peeled away at these locations, small shot holes where she entered will be present, as well as a dark-blue stain. The dark-blue stain is believed to be the tree's reaction to the introduction of the fungus. Redbay ambrosia beetles do not actually consume any wood during their tunneling escapades.

In the meantime, the fungus, now inside, sits back and allows the xylem to move it throughout the tree. This is a very aggressive vascular wilt pathogen, as it is capable of colonizing the entire tree from a single introduction. Once established, the fungus inhibits the xylem's transport system, interrupting the flow of water and nutrients throughout the tree.

At this stage, symptoms such as wilted foliage with red/purple coloration may begin to appear either in isolated parts of the crown, or throughout the entire crown. Eventually, the leaves will turn brown, although they will remain on the tree up to two years. Once the

tree reaches this weakened stage, the redbay ambrosia beetle will return, along with many other species of ambrosia beetles. Female redbay ambrosia beetles will create more galleries and lay their eggs in the dying tree. The larvae will then feed on the now well-established fungus (their ambrosia) as they develop. (It's important to note that not all ambrosia beetles are bad. In fact, some species of ambrosia beetle,, those which only invade weakened tree, are considered beneficial, expediting the decay of dead and dying woody material.)



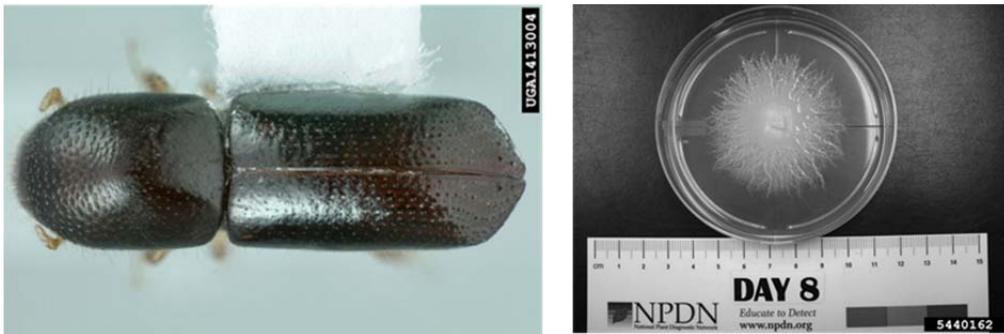
Signs and symptoms of laurel wilt disease include (left to right) blue-stained galleries in the wood, frass tubes, and eventually, wilted red/purple foliage. Photos by: James Johnson, Georgia Forestry Commission, and Albert Mayfield, USDA Forest Service.

Smaller trees do not seem to be as affected by laurel wilt disease. This may be because they are not well-suited for egg laying and as such are not targeted by female redbay ambrosia beetles. In areas where large infected trees are mostly dead, there is abundant regeneration of Lauraceae species. This means these species probably won't become extinct as a result of laurel wilt disease. But the question remains, are the beetles and their fungus still in the area, just lying low? And as the small trees grow larger and become more suitable for egg-laying, will the beetles emerge and whack them as well? Currently there isn't any research published which looks at these issues.

What types of impacts might we expect upon the arrival of laurel wilt disease? Redbay is not a very common species in most of Virginia, as its native range is limited to the far eastern part of the state. But sassafras and spicebush are commonly found throughout Virginia. Fortunately, none of these have major commercial value, although redbay and sassafras can be used for making cabinets and furniture. However, all three are valuable for wildlife, especially songbirds and insects. In fact, the Palmedes swallowtail butterfly larvae feed exclusively on redbay leaves and the Prometheus silk moth lays its eggs on spicebush. So wildlife stands to lose some valuable habitat elements. And in states like California and Florida, where an extremely economically important Lauraceae species, the avocado, is grown, laurel wilt disease could have staggering impacts.

How to identify the redbay ambrosia beetle: Probably very difficult for a non-entomologist to identify down to the species level. But, it is a small elongate, cylindrical beetle, about 2 mm long. They are almost black, and almost shiny (hence its Latin name *glabratus* which means smooth and shiny). The larvae are white legless grubs with amber colored head capsules. Males of the redbay ambrosia beetles have not been well-studied, but males of other ambrosia beetle species are dwarfed, haploid, and flightless.

How to identify *R. lauricola*: Unless you are a mycologist, you probably won't be examining fungal spores under a microscope, but I've included a photo, just in case you are curious.



A female redbay ambrosia beetle (left) and its fungal friend, R. lauricola (right).
Photos by: Michael C. Thomas, FL Department of Agriculture and Consumer Services, and Samuel Glucksman, Bugwood.org.

What can you do? Research is still being conducted on the best management strategies and to identify resistant individuals for breeding purposes. For now:

- Do nothing
- Limit the movement of infected materials (i.e., don't move firewood – a good practice to live by)
- Inspect nursery stock (although this has not been identified as a vector)
- Protect healthy trees by collecting trapping redbay ambrosia beetles in traps baited with manuka oil

The USDA Forest Service has compiled many useful resources on laurel wilt. Learn more by visiting the website: <http://www.fs.fed.us/r8/foresthealth/laurelwilt/index.shtml>.

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