



The Redbay Ambrosia Beetle, *Xyleborus glabratus* Eichhoff (Scolytinae: Curculionidae)

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INTRODUCTION: The redbay ambrosia beetle, *Xyleborus glabratus* Eichhoff, was first detected in the U.S. in a survey trap near Port Wentworth, Georgia in 2002 (Rabaglia 2005). By 2003, this Asian beetle and its associated fungus had caused substantial mortality of redbay (*Persea borbonia* (L.) Spreng.) within a 40-mile radius of the initial trap detection (Douce and Johnson 2005), but the cause of the mortality was unknown at that time. By 2005, *Xyleborus glabratus* was found to be consistently associated with unusual redbay and sassafras (*Sassafras albidum* (Nutt.) Nees) mortality in an expanded area of coastal South Carolina and Georgia. In Florida, unusual mortality of redbay was first reported in the spring of 2005 at the Timucuan Ecological and Historic Preserve in northern Duval County, and the presence of *X. glabratus* was confirmed at this site in October 2005. At the time of this publication, the range of *X. glabratus* and associated redbay mortality continues to expand in Florida and the coastal Southeast. This ambrosia beetle introduces an unspecified vascular fungus (*Ophiostoma* sp.) into its host (Fraedrich 2005), causing infected redbays to wilt and die within a few weeks or months.

Xyleborus glabratus is the twelfth species of non-native ambrosia beetle known to have become established in the U.S. since 1990. All are suspected to have been introduced in solid wood packing materials, such as crates and pallets (Haack 2003).

IDENTIFICATION: *Xyleborus glabratus* is a small, elongate, cylindrical beetle about 2 mm in length (Fig. 1). It is very similar in appearance to the dozen other members of the genus, both native and exotic, already found in Florida. The combination of its almost blackish coloration, nearly glabrous upper surface, and abrupt apical declivity helps to distinguish it from other Florida species, but positive identification will depend on examination by a specialist.

BIOLOGY: Very little is known about the biology of *Xyleborus glabratus* at this time, but it is probably similar to other species in the genus. Like other ambrosia beetles of the tribe Xyleborini, *X. glabratus* does not actually feed on wood, but instead, adults and larvae feed on fungi that are inoculated into galleries in the sapwood by the adult females. Males of *Xyleborus* species are generally dwarfed, haploid and flightless (Rabaglia 2005). The vascular wilt pathogen (*Ophiostoma* sp.) recovered from infested redbays is believed to be vectored by *X. glabratus* and may be the ambrosia fungus on which the beetle feeds. Most ambrosia beetles attack stressed, dead or dying woody plants, but a few - notably several exotic species of the genus *Xylosandrus* in the southeastern U.S. - will attack seemingly healthy trees and shrubs. In the U.S., *Xyleborus glabratus* appears to attack healthy hosts. Adult beetles have been successfully flight trapped in low numbers in Florida during both winter and summer months (A. Mayfield and J. Eickwort, FDACS, unpublished).

COMMON HOSTS: Confirmed hosts in the U.S. at this time include redbay and sassafras. The wilt pathogen associated with *X. glabratus* (*Ophiostoma* sp.) has also been recovered from pondspice (*Litsea aestivalis* (L.) Fernald) (S. Fraedrich, USDA Forest Service, personal communication), an endangered plant species in Florida. Known host trees in Asia include an Asian spicebush, *Lindera latifolia*; yellow litsea, *Litsea elongata*; and sal, *Shorea robusta* (Rabaglia 2005).

HOST SYMPTOMS: Trees freshly attacked by *Xyleborus glabratus* exhibit few external symptoms initially. Small strings of compacted sawdust (Fig. 2) may protrude from the bark at the point of attack, but these strings disintegrate easily and are not always readily apparent. Removal of bark at the point of attack reveals

shotholes from which a dark stain extends into the surrounding xylem (Fig 3A). The stain is the tree's response to infection by the *Ophiostoma* sp. fungus, which gradually spreads through much of the outer sapwood (Fig. 3B,C). Attacked trees eventually exhibit wilted foliage with a reddish or purplish discoloration (Fig. 4A). Foliar discoloration may occur first within a section of the crown (*e.g.*, major branch) or simultaneously throughout the entire crown. The foliage eventually turns brown and tends to remain on the branches (Fig. 4B). This wilt scenario is more extensive than the isolated branch "flagging" caused by the black twig borer (*Xylosandrus compactus* (Eichhoff)), which commonly kills twigs and outer portions of small-diameter branches of redbay (Dixon and Woodruff 1982). As the host weakens and dies, it is typically colonized by several other species of ambrosia beetles, including *Xylosandrus crassiusculus* (Motschulsky), *Monarthrum mali* (Fitch), *Xyleborus affinis* (Eichhoff), and several others (Foltz et al. 2006).

ECOLOGICAL AND ECONOMIC IMPORTANCE: Given the current pattern of redbay mortality and the rapid range expansion of *Xyleborus glabratus*, this non-native ambrosia beetle and its associated fungus have the potential to seriously affect redbay populations in the southeastern U.S. At the site of the initial *X. glabratus* detection in Florida, redbay mortality has increased from 10% to nearly 60% in a period of only nine months (A. Mayfield and J. Eickwort, FDACS, unpublished). Areas near Hilton Head, South Carolina have experienced nearly complete mortality of the local redbay population. Redbay is important to wildlife as its fruit, seed and/or foliage are eaten by several species of songbirds, wild turkeys, quail, deer, and black bear (Brendemuehl 1990). Larvae of the Palamedes swallowtail (*Papilio palamedes* (Drury)) feed primarily on species of *Persea*, thus this butterfly species is likely to be negatively impacted by *X. glabratus*. Although not yet confirmed as hosts, Florida's other native *Persea* species, including the commercially valuable avocado (*Persea americana* Mill.), may also be at risk. The current and potential impact on populations of confirmed hosts like sassafras and pondspice is uncertain.

DISTRIBUTION: *Xyleborus glabratus* is native to India (Assam, Bengal), Japan (and the Bonin Islands), Myanmar and Taiwan (Rabaglia 2005). The current range in the southeastern U.S. includes most of the coastal and adjacent inland counties from Charleston County, SC to St. Johns County, FL. This range is expected to continue to expand.

MANAGEMENT: At this time there are no tested or proven treatments for prevention or control of this insect and its associated pathogen. To avoid spreading the beetle and pathogen to new areas, wood or chips from infested trees should not be transported out of the local area where the trees were found. Dead redbay or other Lauraceous tree species cut in residential areas should be chipped and left onsite as mulch, or disposed of as locally as possible. Redbay firewood should not be transported.

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Fig 1. *Xyleborus glabratus* female. A) lateral view, B) dorsal view. (Photography credit: M.C. Thomas)

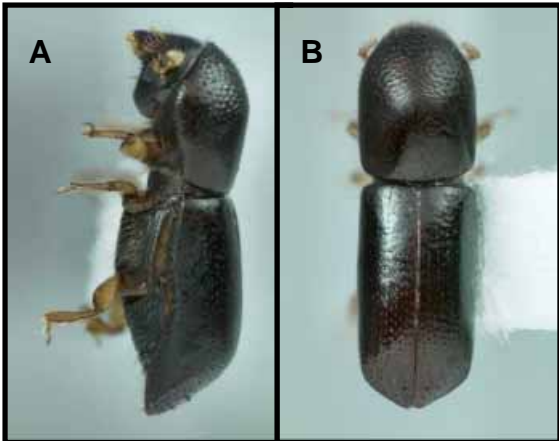


Fig 2. String of compacted ambrosia beetle sawdust on redbay. (Photography credit: A.E. Mayfield)



Fig 3. Stained sapwood of redbay caused by *Ophiostoma* sp. fungal infection A) around *Xyleborus glabratus* entrance holes, B) in stem cross section, C) on lower stem with bark removed. (Photography credit: A.E. Mayfield)

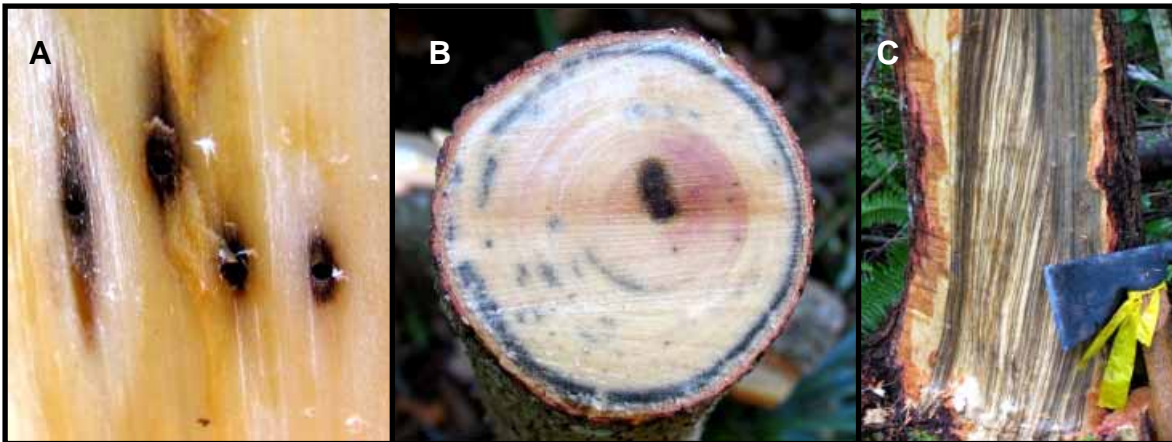


Fig 4. Wilt symptoms of redbay attacked by *Xyleborus glabratus* and infected with *Ophiostoma* sp. A) Sections of crown turning purple to red. B) Same tree eight months later (May 2006). (Photography credit: A.E. Mayfield)

