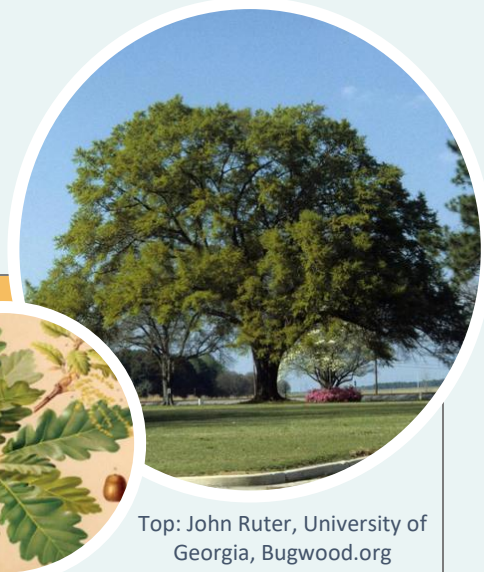




Oak (*Quercus sp.*) pests



Top: John Ruter, University of Georgia, Bugwood.org

Gold Spotted Oak Borer (*Agrilus auroguttatus*)

The gold spotted oak borer (GSOB) is a flat-headed buprestid (jewel beetle) which is native to southeastern Arizona. The borer generally spreads via infected firewood and wood products and has led to widespread losses of oak trees in California.

Main symptoms:

- Adults are bullet-shaped, dark green in colour and have 6 yellow spots on the wingcases (Fig. 1).
- Larvae are small and white in appearance (Fig. 2).
- Feeding larvae form galleries as they burrow through the wood (Fig. 3).



Figure 1. Gold spotted oak borer adult (Mike Lewis, Centre for Invasive Species Research, Bugwood.com)



Figure 2. GSOB larvae 2 (Mark S. Hodde, University of California-Riverside, Bugwood.org)



Figure 3. GSOB larval galleries (Tom Coleman, USDA Forest Service, Bugwood.org)

Two-Lined Chestnut Borer (*Agrilus bilineatus*)

The two-lined chestnut borer (TLCB) is native to North America. Attacks occur in stressed or dying oak and less frequently in American chestnut.

Main symptoms:

- Adults are dark-coloured with two golden stripes running lengthwise along their back (Fig. 1).
- Larvae are light-coloured, up to 2.5cm long and have two spines at the tip of the abdomen (Fig. 2).
- Larvae construct meandering galleries which interrupt the transport of water and nutrients and eventually girdles the tree (Fig. 3).
- Attacks usually begin in the crown of the tree, with some branches dying in the first year, and mortality usually in the second or third (Fig. 4).



Figure 1. TLCB larva (Robert A. Haack, USDA Forest Service, Bugwood.org)



Figure 2. TLCB adult (Robert A. Haack, USDA Forest Service, Bugwood.org)



Figure 3. TLCB larval galleries (Minnesota Department of Natural Resources, Bugwood.org)



Figure 3. TLCB larval galleries (Minnesota Department of Natural Resources, Bugwood.org)

Polyphagous Shot Hole Borer (*Euwallacea whitfordiodendrus*)

The polyphagous shot hole borer (PSHB) vectors the fungus *Fusarium* which causes Fusarium Dieback. This disease can affect and kill over 110 different tree species, including oak. Experts believe the PSHB was introduced to California from Southeast Asia, and the borer (along with Fusarium Dieback) has also been found in South Africa and Israel.

Main symptoms:

- Adults are tiny, smaller than a sesame seed (2-2.5mm long) (Fig 1)
- Larvae are small and white in appearance (Fig 2).
- The beetle is named for the cluster of multiple boreholes which can be seen in infected trees (Fig 3).



Figure 1. The tiny PSHB adult (Javier E Mercado, Bark Beetle Genera of the U.S., USDA APHIS PPO, Bugwood.org)



Figure 2. PSHB life stages (Michael Lewis, University of California-Riverside, Bugwood.org)



Figure 3. 'Shot hole' exit holes symptomatic of a PSHB infestation (Akif Eskalen, University of California-Riverside, Bugwood.org)