



FLORIDA FOREST SERVICE

Southern Pine Beetle

Leaflet Number 1

OVERVIEW

Southern pine beetle (*Dendroctonus frontalis*, or SPB) is the most destructive species of pine bark beetle in the southern United States. Like other bark beetles, SPB feeds and reproduces in the inner bark layers (phloem and cambium) of trees. Most of the time, infestations of SPB are uncommon compared to ips pine engraver beetles or black turpentine beetle, two other types of pine bark beetle in Florida. When attacking in small numbers, SPB can only infest trees that are close to death from other causes such as lightning strikes or disease. However, outbreaks can occur in which SPB spreads rapidly and kills large numbers of apparently healthy trees, overwhelming the defenses of each tree by attacking in large numbers (a strategy known as "mass attack").

Hosts

All species of pine (*Pinus* spp.) found in the range of southern pine beetle are potential hosts. However, SPB has a distinct preference for loblolly pine (*P. taeda*), shortleaf pine (*P. echinata*) and pond pine (*P. serotina*).

Identification

Adult southern pine beetles are tiny (between 2 and 4 mm in length), dark brown to black in color and somewhat cylindrical in shape. The beetle's back end is rounded, and its head is visible when viewed from above. Immature beetles (larvae) are yellowish-white, legless and have reddish-brown heads.

Range:

In Florida, southern pine beetle activity has historically been limited to the northern half of the state, corresponding to the natural range of loblolly pine. SPB has never been recorded south of a line extending approximately from Pasco County to Volusia County. Pine bark beetle infestations in South Florida involve ips pine engraver beetles and/or black turpentine beetle.

Signs and Symptoms of Infestation

Initial signs of attack include whitish or reddish pitch tubes (clumps of resin on the outer bark), usually 2 cm in diameter or less, at the locations where beetles have bored in. Pitch tubes may be crumbly or absent if the tree is severely stressed or dead when attacked. Unlike ips beetles, SPB preferentially enters at the crevices between the bark plates. Attacks can occur from the base of the tree up to about 18 meters high. The most reliable way to distinguish SPB infestations from those of other bark beetles is to view the galleries (tunnels) that the adult beetles make in the inner bark. These galleries form curving and crisscrossing S-shaped patterns, and are packed with boring dust. Adult beetles emerge through the bark, leaving small (1 mm diameter) circular exit holes. The needles of infested trees gradually wilt, turning from green, to yellow, to reddish-brown. By the time the needles of an infested tree have turned brown, the next generation of SPB has often completed its life cycle and departed from that tree. In forests, SPB infestations tend to occur in contiguous "spots" that spread outwards from the margins; the direction(s) of recent spread can be determined by finding areas with infested trees that still have green needles.



Top-down view of an adult southern pine beetle, placed on the sharpened tip of a standard pencil for scale.

Adult southern pine beetle, side view.



Above: Pitch tubes formed along the bark crevices of a pine tree infested with SPB.



Right: An adult southern pine beetle stuck to a pitch tube forming around an entrance hole.

SOUTHERN PINE BEETLE

Life Cycle and Biology

The female beetle selects a host tree and tunnels in through the bark, fighting the flow of defensive resin produced by the tree. If successful, it releases a pheromone (chemical scent signal) that attracts males and more females to the tree, potentially in large numbers. This “mass attack” is often enough to overwhelm tree defenses, and successfully attacked trees will usually die. When a tree is fully colonized, different pheromones are released that signal incoming beetles to divert their attacks to other trees nearby.

After mating, each pair of female and male beetles constructs winding, S-shaped galleries where the female lays her eggs. Those same adults often will emerge from the tree and either fly to seek new host trees, or reinfest the same tree. After hatching, the larvae tunnel away from the gallery, feeding on inner bark tissue and fungi. They later tunnel into the outer bark to pupate (transition into the adult stage). Eventually, the new adults will tunnel out through the bark, leaving circular exit holes. In ideal conditions, development from egg to adult can take as little as 26 days.

SPB development and activity is slowed during the cold season, but infestations may still spread when temperatures exceed 60°F (15°C). Adult beetles have a dispersal period in the early spring, when they emerge in larger numbers and fly to start new infestations. Infestations spread most rapidly through the summer months, although SPB development is again slowed when temperatures exceed 95°F (35°C). A second dispersal period occurs in the fall, when adults fly to start small, scattered infestations that can remain through the winter.

Management

Preventative management is the most cost-effective way to avoid losses from SPB outbreaks. SPB spreads most aggressively where pine trees are closely packed together, allowing the beetles to use pheromone signals to mass attack nearby trees. In forested settings, thin overstocked or stagnant stands to a basal area of 80 sq. ft/ac or less, reduce understory competition with prescribed burns or mechanical control and remove trees that are weakened or damaged. Conduct thinning operations in the coolest months and avoid damage to the remaining trees. When planting pines, select species that are well adapted to the site and consider choosing less-susceptible species (such as longleaf or slash pine) rather than loblolly pine. Maintain a spacing of at least 8 meters between pines when planting trees in residential and urban settings.

The tree-to-tree spread of active SPB infestations can potentially be stopped by removing actively infested trees, plus a buffer strip of green, uninfested trees ahead of the direction(s) where the spot is spreading. In urban and residential settings, actively infested trees should be cut and removed as quickly as possible, and it may be advisable to protect nearby uninfested, high-value landscape pine trees with an approved insecticide (see Leaflet Number 14, "Insecticides for Bark Beetle Management"). There are no insecticides currently available that will reliably save an infested tree or kill beetles that are already inside the tree.



Above: Section of bark peeled off of an infested tree, showing SPB galleries (tunnels) in the inner bark. The SPB galleries are often partly obscured by feeding from other insects that infest dead trees. Right: close-up of SPB galleries (image by Ronald F. Billings, Texas A&M Forest Service, Bugwood.org).



Aerial view of a small SPB infestation (image by Terry S. Price, Georgia Forestry Commission, Bugwood.org).



Buffer strip being cut around a rapidly spreading SPB spot (image by Ronald F. Billings, Texas A&M Forest Service, Bugwood.org).

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