



# Tree Conservation Notes

## Athens-Clarke County Community Tree Program

### Southern Pine Beetle

The southern pine beetle (*Dendroctonus frontalis*) is one of the most destructive pine bark beetles in our area. Southern pine beetles (SPB) are natives to our area; their presence in the southern United States has been documented for over 250 years. SPB attacks range in size and intensity; years with heavy attacks can result in incredible tree mortality. Most attacks last less than three years. It is believed that SPB attacks are cyclical. SPB attacks can be especially damaging in urban areas, where inferior soils, heavy pollution loads, poor water infiltration and other difficult site conditions are already impacting tree health.

#### **Biology**

Adult beetles are very small (2 to 4 mm in length). They are brown or black in color. SPB have cylindrical bodies with short legs. They are one of the smaller bark beetles in our area.

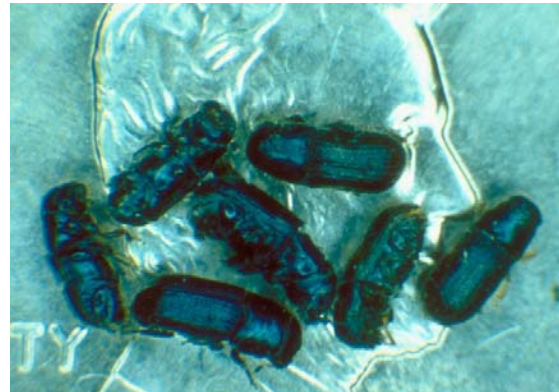


Figure 1. Adult southern pine beetles (penny added for reference).

In the early stages of an attack, female beetles select a suitable host tree. In most instances, healthy trees will exude enough sap to force the beetles out of their bark. Once a female invades a tree, it begins making galleries in the inner phloem. Female beetles release an aggregation pheromone soon after the initial invasion. The aggregation pheromone (frontalin) is a chemical that attracts male and female beetles to the tree. This pheromone results in mass attacks on individual trees. Mass attacking allows the beetles to overcome the tree's defenses.

As male beetles begin to congregate at the host tree, they release an anti-aggregation pheromone. The anti-aggregation pheromone (verbenone) is a chemical that deters other beetles from joining the attack. These pheromones are released so the initial attack does build to a point that it results in the immediate death of the tree.

Once mating occurs, females continue to create long winding galleries in the inner bark. Up to 30 eggs are laid in niches along these galleries. Males pack these galleries with insect dung and wood dust. The adults generally reemerge from the tree and continue to attack the same or other nearby trees.

Eggs take three to nine days to hatch. The larvae create winding galleries perpendicular to parent galleries while feeding on the inner phloem. The larvae work their way to the outer bark. Once they are near the surface, they form a pupal cell and pupate for five to seventeen days. Once the pupae become adults, they emerge from the bark and move on to attack other trees. SPB can produce several generations per year.

## Range and Host Preference

The SPB is found in the southern and southeastern United States. They are found as far north as New Jersey and Pennsylvania and as far west as Arizona. Populations extend to the south as far as Central America. Because there is a lack of host tree continuity, SPB attacks were rarely found in Florida. Unfortunately, prolonged periods of dry weather and the use of highly susceptible species in plantation forestry have resulted in larger attacks in north Florida.

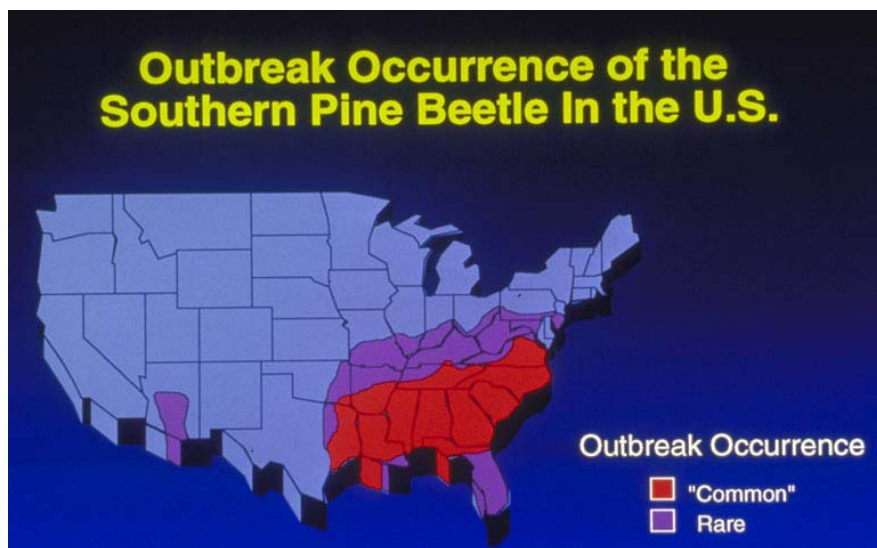


Figure 2. A distribution map for southern pine beetles in the United States.

SPB are capable of attacking all pine species in their range. Thick-barked trees capable of producing copious amounts of sap are more resilient. Loblolly pine (*Pinus taeda*) and shortleaf pine (*Pinus echinata*) are very susceptible to SPB attack. Pond pine (*Pinus serotina*), Virginia pine (*Pinus virginiana*), spruce pine (*Pinus glabra*) and sand pine (*Pinus clausa*) are also commonly attacked. Slash pine (*Pinus elliottii*), Eastern white pine (*Pinus strobus*) and longleaf pine (*Pinus palustris*) are resistant to large outbreaks.

## Signs and Symptoms of an Attack

Early indicators of a SPB attack are small, popcorn-like sap protuberances (pitch tubes) found on the trunk and the presence of wood dust at the base of the tree. Pitch tubes are not as likely to form on trees that were weakened prior to the attack. Needles will start to change color soon after an infestation begins. Usually, one or more generations of beetles have emerged from the tree by the time the needles turn brown. Many small emergence holes can be seen in the bark after the beetles pupate and leave the tree. Since the trees are near death at the point of emergence, pitch tubes are generally not associated with these holes. Inner bark should be examined in order to confirm a SPB attack; southern pine beetles leave characteristic S-shaped galleries that are packed with wood dust.



Figure 3. Examples of southern pine beetle galleries, pitch tubes and host trees.

## Prevention and Control

Prevention is the best way to minimize SPB attacks. Tree densities should be kept low to encourage tree vigor. Ideally, pines should be spaced at least 25' apart. Homeowners should use SPB resistant pines such as Eastern white pine, slash pine and longleaf pine. Diversity is important in any landscape. Maintain tree health by providing supplemental watering during drought. Remove any trees that have been damaged by construction.

There is research that supports the use of synthetically produced anti-aggregation pheromones (verbenone) in an effort to drive southern pine beetles away from high risk sites. Verbenone applications have proven to be very effective in deterring mountain pine beetle attacks. In some studies, verbenone applications have reduced the likelihood of SPB attacks by more than 50%. Homeowners should carefully consider verbenone treatments. If surrounding neighbors have sites with pines in a similar condition, applications of verbenone will likely “push” the beetles onto those sites. This does not greatly decrease an individual’s risk of attack over several years. Verbenone should be used on sites where pines are uniquely stressed.

Removal is usually the best form of control. In a forested setting, infected trees and trees within 75' of infected trees should be removed. In the landscape setting, infected trees should be removed and nearby trees should be closely monitored for continuing attacks. Bifenthrin (Onyx®) is a pesticide labeled for SPB control in urban landscapes. It has excellent control, but unless the site conditions change enough to improve tree vigor, it is likely that a tree will be reattacked. Please contact a licensed pesticide applicator if you are interested in Bifenthrin applications.

## References:

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