FLORIDA FOREST SERVICE

Ips Pine Engraver Beetles

Leaflet Number 2

OVERVIEW

Ips pine engraver beetles (*Ips* spp., or simply "ips beetles") are among the most common and destructive pests of southern pines. Like other bark beetles, they feed and reproduce in the inner bark layers (phloem and cambium) of trees. Most commonly, these beetles attack trees that are stressed, declining or recently dead from another cause such as drought, flooding, lightning, wind damage, root disturbance, disease or other insects. Trees that are otherwise healthy and vigorous are not attractive to these beetles and can typically resist infestation. However, trees that have been successfully colonized by ips engraver beetles will usually die.

Hosts

All species of pine (*Pinus* spp.) found in Florida can be infested by ips pine engraver beetles.

Identification

Adult ips pine engraver beetles are tiny (between 2 and 7 mm in length), light to dark brown and somewhat cylindrical in shape. Their back end has a "scooped-out" appearance and is ringed with small spines. Immature beetles (larvae) are white, legless and have brown heads. The three species found in Florida (in order from largest to smallest) are: the sixspined ips (*Ips calligraphus*), the eastern fivespined ips (*Ips grandicollis*) and the small southern pine engraver (*Ips avulsus*).

Below: An eastern fivespined ips beetle (*Ips grandicollis*), viewed from above.

Above: Side view of Florida's three species of ips engraver beetles, placed on a U.S. quarter for scale.

Signs and Symptoms of Infestation

Initial signs of attack include reddish or whitish "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 not form at all if the tree is severely stressed or already dead when attacked. Reddish-brown boring dust will often be pushed out of the entrance hole. Peeling back the bark reveals the distinctive "galleries" (tunnels) made in the inner bark by adult beetles. These consist of small central chambers from which long, linear galleries extend roughly parallel to the grain of the wood. These galleries are kept clear and free of boring dust, and may also score (or "engrave") the surface of the sapwood.

Examples of "pitch tubes" on the outer bark surface, where ips beetles have tunneled into the tree. Their appearance varies with the species and condition of the tree.

An infested pine with outer bark shaved off to reveal ips beetles making "galleries" (tunnels) in the inner bark.

IPS PINE ENGRAVER BEETLES

The needles of infested trees will gradually wilt, turning from green, to yellow, to reddish-brown. This wilting is often the first symptom noticed; however, by the time an infested tree's needles turn brown, the ips beetles have often completed their life cycle and departed. Adult beetles emerge through the bark, leaving small (1-2 mm diameter), scattered, circular "exit holes."

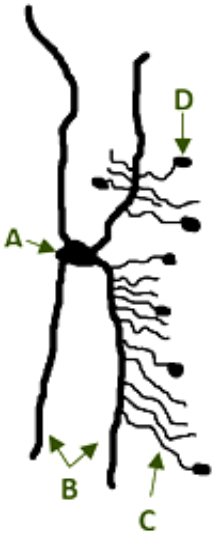
Trees in varying stages of wilt and death following infestation by ips beetles. (Image by Michael Rinehart, Broward County Parks & Recreation Division.)

Life Cycle and Biology

Male ips beetles are the first to attack, attracted by odors released by pines that are stressed, damaged, declining or recently dead. As they tunnel through the bark and into the inner bark layers (cambium/phloem), they emit chemical signals (pheromones) that attract females and other males to the tree. Each male excavates a small area in the inner bark called a "nuptial chamber," where it may be joined by multiple females (commonly between one and five). After mating, each female will mine a long, linear tunnel in the inner bark, called an "egg gallery," which extends up or down from the nuptial chamber and runs roughly parallel to the grain of the wood. Eggs are laid along the sides of these egg galleries.

Upon hatching, the larvae begin tunneling away from the egg gallery, feeding on inner bark tissue until they are fully grown. Each larva then transitions into an intermediate form (pupa) in a small chamber in the inner bark and eventually develops into an adult beetle. The adult beetles tunnel out through the bark and may fly several kilometers to seek new host trees.

The three species of ips engraver beetles in Florida tend to attack trees at different heights. The smallest species (*I. avulsus*) typically infests small-diameter upper branches, the largest species (*I. calligraphus*) is more common in lower portions and larger-diameter stems, and the middle species (*I. grandicollis*) tends to infest an intermediate range. However, these height/size relationships are not completely reliable, and the three species are often found infesting overlapping portions of the same tree.



Above left: Simplified diagram of a typical pattern of ips galleries (tunnels) in the inner bark. A: Nuptial chamber. B: Egg galleries. C: Larval gallery. D: Pupal chamber. Above right: Photo example of ips galleries.

Management

Because ips beetles mainly infest trees that are unhealthy or stressed, infestations can be prevented by general forest management and tree care practices that enhance and preserve tree health and vigor.

In forested settings, it is not recommended to selectively remove infested trees; the root disturbance and other damage caused by harvesting equipment tends to stress the remaining trees, thus increasing and prolonging the outbreak. Left alone, mortality due to ips beetles tends to be limited in scale unless there is a large-scale stress factor (such as severe drought, flooding, wildfire, root disease, etc.), and the presence of a few scattered ips-infested trees in a forest stand is generally not cause for alarm. Heavier activity should be closely monitored. If the damage threatens to exceed the landowner's tolerance for financial losses, the worst-affected areas can be salvaged by clearcutting in contiguous blocks. In urban and residential settings, infested trees should be removed if they may pose a falling hazard to people or property.

Control with insecticides is rarely necessary or cost-effective. No insecticides are currently available that will reliably save an infested tree. However, there are insecticide treatments that can temporarily protect an uninfested tree from attack during short-term periods of stress (see Leaflet 14, "Insecticides for Bark Beetle Management").

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