

Ips Bark (Engraver) Beetles

(Coleoptera: Scolytidae)

Description:

Four species of Ips bark beetles (commonly known as Ips engraver beetles or Ips beetles) occur throughout pure and mixed pine forests in the southeastern U.S.: the six-spined ips (*Ips calligraphus*), the pine engraver (*Ips pini*), the eastern five-spined ips (*Ips grandicollis*), and the small southern pine engraver (*Ips avulsus*).

Immature stages – Eggs are oblong, pearly white, and about 1 mm (1/25 in) long by 0.5 mm (1/50 in) wide. The larvae are small, white, legless, with orange-brown heads up to 1 mm (1/25 in) wide.

Adult stages – Freshly emerged adult Ips beetles are light brown and become black as they mature. They are small, ranging between 1/16 inch and nearly 1/4 inch in length. Ips beetles can be distinguished from other bark beetles by the presence of “spines” along a depression located at the rear of the abdomen. The posterior of Ips adults looks as if it has been cut off at an angle and hollowed out.

Biology:

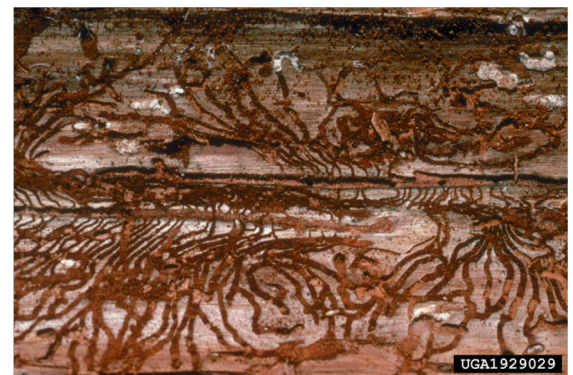
Life Cycle – Ips beetles usually colonize stressed trees, logging slash, or injured branches. Ips species tend to attack predictable sections of a tree, although there is considerable overlap. Male Ips bore entrance tunnels through the outer bark and excavate chambers in the inner bark (cambium and phloem tissue). Males produce chemicals (pheromones) that are released into the air and attract females to the newly-made chamber. Multiple females (up to 7) enter the chamber, mate, and lay eggs along galleries in the phloem. Female egg galleries are straight and vertically-oriented on the stem, and often form an “I”, “H”, or “Y” shape. Individual galleries range from 4 to 7 inches in length with eggs being laid along either side of the gallery. After hatching, the larvae create their own galleries (perpendicular to the parent galleries) as they feed in the inner bark. Larvae pupate at the end of the feeding galleries, and the new adults mature and bore out through the outer bark to repeat the life cycle. Exit holes are about 1/16 inch in diameter and perfectly round. Depending on weather conditions and host availability, Ips beetles can produce between six and ten generations per year in warm climates and may complete development in less than three weeks.

Damage to Crop:

Discolored crowns, dying and dead branches, sloughing bark, and dead trees are all symptoms of an Ips infestation. Pitch tubes, galleries, emergence holes, boring dust, frass (beetle excrement and sawdust), and Ips beetles or larvae themselves are all direct signs of bark beetles. It is not uncommon to see multiple Ips species attacking a tree resulting in individual larger branches turning



Adult Ips with depression and spines on posterior



Galleries



Pitch tube

yellow (called “fading”), followed by the remainder of the crown fading, then turning red (recently dead) and finally brown (completely dead). Pitch tubes caused by Ips beetles generally occur on the flat part of bark plates. When Ips beetles colonize a drought stressed tree, pitch tubes may be absent and the boring dust and frass may be the only external sign of attack. Additionally, small emergence holes can be observed along the bole of the tree after a life cycle is completed.

Adult Ips beetles carry numerous spores of a bluestain fungus, *Ceratocystis ips* (Rumbold) C. Moreau, in their gut. When the adults attack trees or logging slash, the bluestain spores are excreted with beetle feces into egg galleries, where the spores germinate. Bluestain fungus colonies grow into the outer sapwood of infested pines, stopping the upward flow of water to the tree crown. Lack of water causes needles to wilt and die, gradually changing their color, from dull green to yellow green to red brown. These color changes may occur in 2 to 4 weeks during the summer, but take several months in the winter.



Damage

In otherwise healthy trees, Ips rarely move beyond damaged branches. Normally referred to as “secondary invaders,” Ips beetles attack trees that are affected by some other condition; a stressed or damaged tree produces chemical signals that indicate the tree is vulnerable. A cluster of tree mortality from an infestation is unusual.

Management:

Several techniques should lessen both frequency and severity of damage from Ips bark beetles. The best way to decrease risk of Ips beetles and mitigate damage if they occur is to promote tree and stand health through good management. Preventative management strategies include planting tree species appropriate to a particular site, keeping woody and herbaceous competition under control, and implementing prescribed burning when appropriate. Avoiding injuries to residual trees during a harvest is also important. Ultimately, preventative strategies limit the host suitability in a given area by creating favorable growing conditions.

Preventative treatments may be suitable for high-value trees, but chemicals are generally not used for Ips bark beetles over large areas. A few topical insecticides are labeled for Ips bark beetles (e.g. *carbaryl* and *permethrin*); however, these chemicals must be applied repeatedly, and the entire tree, including the upper portions of the crown, must be sprayed by a certified applicator. Systemic insecticides have shown effectiveness in controlling bark beetles, but these require injection directly into the trunk of the tree.

Sound management practices are key to the stand-level prevention of Ips bark beetle infestations. Stand thinning should be scheduled and conducted so that trees remain vigorous. Thinning is useful in preventing bark beetle attacks, but doing so too early in the rotation can decrease the value of future sawtimber, while thinning too late decreases tree vigor and can actually increase the stand’s susceptibility to bark beetle infestations. Pine trees are most susceptible to attack from Ips bark beetles during drought conditions, so thinning during these times should be avoided if possible. Consultation with a professional forester is recommended.

Any practice that reduces tree stress will lessen the chance of an Ips bark beetle infestation. In urban areas, this can include avoiding or minimizing soil compaction, especially in construction areas. Replacing turfgrass with mulch within the drip zone or extent of the crown provides a more natural environment for roots to thrive. Supplemental watering of pine trees growing in residential areas during periods of drought may be useful in preventing Ips bark beetle attacks, as this could reduce overall tree stress.