MISSISSIPPI STATE UNIVERSITY EXTENSION

Ips: The Other Pine Bark Beetles

Compared to the southern pine beetle (SPB; *Dendroctonus frontalis* Zimmermann), which is a primary killer of healthy pine trees, less attention is given to the three species of *Ips* bark beetles that occur in the Southeast: the six-spined engraver, *Ips calligraphus* (Germar); the eastern five-spined engraver, *Ips grandicollis* (Eichhoff); and the small southern pine engraver, *Ips avulsus* (Eichhoff). *Ips* species derive their common names from and can be identified by the number of spines along a depression along the rear of the abdomen. Adult *Ips* beetles range in color as they mature from light brown (freshly emerged) to black. The beetles are small, ranging between one-eighth inch (*Ips avulsus*) and one-fifth inch (*Ips calligraphus*). *Ips* beetles also can be identified by the size and pattern of galleries they leave behind under the bark of trees they infest (Figure 1). Modern intensive forest management practices create ideal conditions for *Ips*, which is likely the reason *Ips*-infested trees are common in most Mississippi pine forests.

Attacks on pine trees or logging slash are usually initiated by male *Ips*, which bore entrance tunnels through the outer bark and excavate chambers within the inner bark. Afterward, females enter, mate, and lay eggs in galleries. Females begin construction of egg galleries that often form an H or Y shape. Individual galleries range from 4 to 7 inches in length, with eggs being laid in niches on either side of the gallery. After hatching, larvae make individual feeding galleries in the inner bark (Figure 1). Larvae pupate at the end of feeding galleries, and new adults mature and bore out through the outer bark to repeat the life cycle. *Ips* beetle populations increase rapidly under warm weather conditions but develop slowly when temperatures drop below 59 degrees Fahrenheit. Depending on weather conditions and host availability, *Ips* species can produce between six and ten generations per year.

Characteristics of *Ips* Infestations

Stand Infestations

Ips and southern pine beetles create many similar signs and symptoms on infested trees, so landowners often confuse *Ips* and SPB infestations. *Ips* beetles often work alongside SPB, and it is not uncommon to find both within a single attacked tree. However, the primary species causing the attack will have more signs present throughout the stand. Correctly identifying the bark beetle involved is critical for prescribing proper management strategies to lessen further damage to remaining trees.

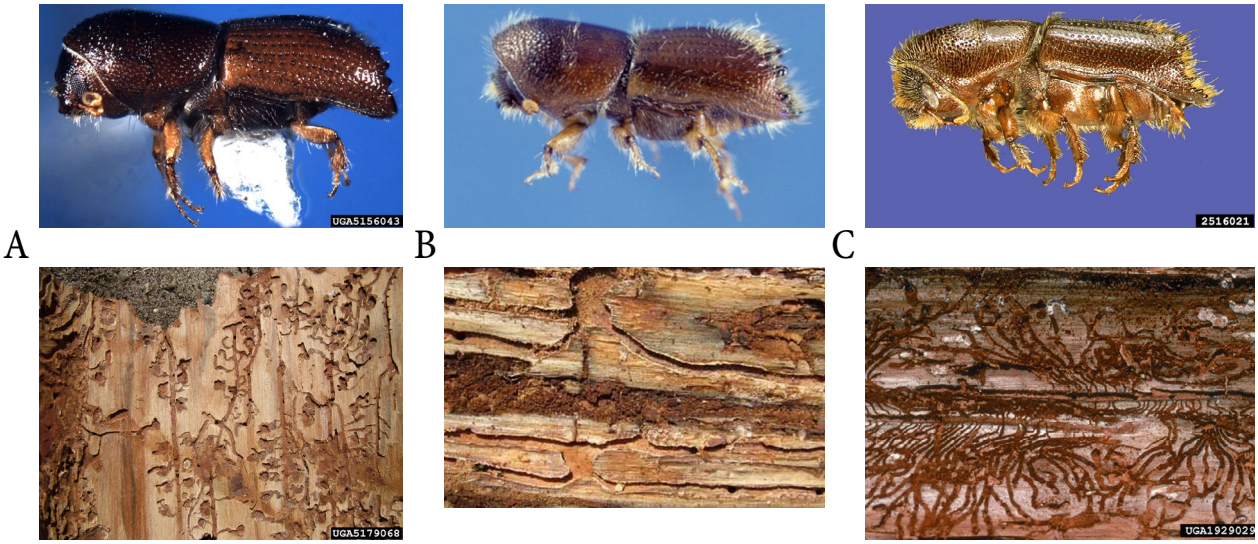

Figure 1. The three species of *Ips* in the southeastern United States and their associated gallery patterns: *I. avulsus* (A), *I. grandicollis* (B), and *I. calligraphus* (C). Photo credits: (top left) J. R. Baker and S. B. Bambara, North Carolina State University, Bugwood.org; (bottom left) Jeffrey Eickwort, Florida Department of Agriculture and Consumer Services, Bugwood.org; (top center) Gerald L. Lenhard, Louisiana State University, Bugwood.org; (bottom center) Jeffrey M. Eickwort, Florida DACS, Bugwood.org; (top right) David T. Almquist, University of Florida, Bugwood.org; (bottom right) Tim Tigner, Virginia Department of Forestry, Bugwood.org.

Ips infestations typically do not appear in defined "spots," as SPB infestations typically do. *Ips* tend to cause scattered mortality of only the weakest trees throughout stands. Consequently, *Ips* damage is generally distributed in a much more scattered pattern throughout a pine stand compared to that of the SPB. In many cases, the damage a stand suffers from an *Ips* infestation is limited to only one or a few trees. If *Ips* do persist, they are likely to create a checkerboard pattern of fading and healthy trees (Figure 2). This pattern is dramatically different from SPB infestations, which can continuously spread from the initially attacked tree unless environmental conditions or management activities halt beetle activity.

Large numbers of *Ips* may accumulate in areas where natural disturbances, such as lightning storms, ice storms, tornadoes, wildfires, hurricanes, and droughts, result in large numbers of damaged pines suitable for colonization. In 2005, Hurricane Katrina produced large amounts of suitable habitat in the form of slash, which greatly increased *Ips* populations in south Mississippi. More recently, the severe statewide drought in fall 2023 to winter 2024 led to catastrophic pine mortality warranting federal disaster aid. *Ips* populations may also increase following forestry activities such as prescribed burns that are too intense, as well as clearcutting or thinning operations that wound trees and leave large amounts of slash for breeding sites.

Slash Infestations

Ips populations are most visible to landowners when obvious symptoms of their infestation are present, such as fading treetops. However, this is not the only time *Ips* are present in a timber stand. *Ips* are present throughout most pine stands of the South and will take advantage of disturbances, such as thinning operations, to colonize logging slash or, worse, to colonize trees wounded during harvest. Fresh slash material from harvest operations or weather events provides breeding material that sustains all three southern *Ips* species. Minimizing wounding of residual trees and proper slash management following harvest operations are key to reducing subsequent *Ips* problems.

Signs and Symptoms of an Ips Attack

Symptoms of an *Ips* infestation are the tree's response to attack. Fading crowns, dead trees, pitch tubes, and sloughing bark are all symptoms of an *Ips* attack. Signs of an attack that relate to the beetle directly include galleries, emergence holes, boring dust, frass (beetle excrement and sawdust), and *Ips* beetles or larvae themselves. Symptoms of an *Ips* infestation are easier to recognize than signs. Symptoms of bark beetle infestations are usually the first thing observed in an infestation, but, through closer inspection, signs allow you to identify the type of bark beetle present. One of the signature symptoms of an SPB infestation is the popcorn-shaped pitch tubes along the stem (Figure 3). While *Ips* species also can cause pitch tubes, they are often lacking

Figure 2. Dead and fading tree killed in an *Ips* infestation. Photo by Andrew Ezell.

in trees under attack by *Ips* beetles, because *Ips* typically attack trees too weak to produce enough resin pressure to form pitch tubes. In contrast, SPB can attack trees with high vigor that have sufficient resin pressure to produce the characteristic pitch tubes.

The first visible sign is usually boring dust, which can collect around the root collar. Additionally, small emergence holes can be observed along the bole of the tree. When inspecting slash material, a pitch tube will likely not be present because of the lack of resin flow. Boring dust and frass will still be present, as it must be removed from the galleries.

Management Practices to Prevent *Ips* Infestations

Knowing what species of bark beetle is responsible for the damage in question will determine the optimal type of control method to use. Southern pine beetle infestations can grow continuously and eventually kill thousands of acres of pine forest if left unchecked. Cut-and-remove or cut-and-leave operations (along with adequate buffer strips in either case) are often recommended for suppressing SPB infestations. However, *Ips* beetle infestations are often randomly distributed throughout a stand, making these operations less feasible. Additionally, *Ips* rarely kill healthy pines and do not generally cause large-scale tree mortality over large acreages. For these reasons, proper *Ips* management is typically different from SPB management. In

Figure 3. Pine bark beetle pitch tubes. Photo by Brady Self.

Figure 4. *Ips* prevention through chemical application on highly valued residential trees. Photo by James Floyd.

fact, more often than not, letting individual *Ips* infestations run their course may be the most economical option.

Management practices for control of *Ips* have not been as extensively researched as those for SPB, but several techniques should lessen both frequency and severity of damage. Thinning is useful in preventing bark beetle attacks, but it should not be performed in drought conditions. It is during these periods that pines are the most susceptible to attack from *Ips*. Logging slash should not be left in concentrated quantities on loading decks or along skid trails. Slash should be distributed over as wide an area as possible so that it will be broken up by equipment traffic and dry out. Trees wounded during harvest should be removed, and any trees actually infested by *Ips* also should be removed post-harvest to ensure low populations of *Ips* moving forward.

Chemical Treatments

A few insecticides are labeled for *Ips*; 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. These treatments are not cost-effective for most nonindustrial private landowners for stand-level treatments. However, they may be cost-effective for highly valued trees in residential areas (Figure 4). Additionally, they are not very effective at killing *Ips* once trees are actually infested. Most importantly, a heavily infested tree will likely die anyway and cannot be saved by insecticides. Insecticides should, therefore, only be used as a preventive measure to control *Ips* damage in weakened, wounded, or stressed high-value trees **before** infestation occurs. Supplemental watering of pine trees growing in residential areas during periods of drought is also useful in preventing *Ips* attacks.

Stand Management Practices

When it comes to stand-level prevention of *Ips*, sound management practices are key. Thinnings should be scheduled so that trees remain vigorous. Thinning too early can decrease the value of future sawtimber, while thinning too late decreases tree vigor and can increase susceptibility to bark beetle infestations. Consult a forester before making a pine thinning decision. Foresters may be found on the Mississippi Board of Registered Foresters website.

To help alleviate *Ips* problems after harvest, slash should be redistributed throughout the stand. The more times slash is run over by equipment, the more it is broken down and the less suitable it becomes for infestation. Slash distribution over a wide area exposes it to moisture, light, wind, and temperature variability. All of these factors help lessen the suitability of slash material for *Ips* beetles.

Slash distribution is feasible for logging crews. After delivering a load to the deck, a skidder picks up slash material and deposits it along skid trails and thinning rows/corridors while retrieving the next load (Figure 5). Spreading potential *Ips* beetle habitat throughout your residual trees may seem strange, but logging equipment passing back and forth and exposure to the elements will make most redistributed slash

Figure 5. Skidder distributing slash from a loading deck into a thinned pine stand. Photo by James Floyd.

less suitable for *Ips*. Slash distribution may also provide some protection against soil compaction from logging equipment. If slash redistribution is not possible or desired, residual slash piles can be burned. However, if burning is employed, take care to ensure residual trees are not scorched.

Conclusions

Ips infestations are often misidentified as SPB infestations. However, proper identification of the species of bark beetle responsible for damage will greatly influence the recommended control method. Unlike SPB, *Ips* may infest slash left by natural disturbances or harvesting activity. Consideration should be given to proper handling of this potential resource for *Ips*. Not only is *Ips* habitat created in the form of slash material, but damage to residual trees and rutting/compacting soils during pine harvest is a possibility. However, if properly conducted, thinning can be a preventive measure that will help reduce future bark beetle damage. Proactive management practices are the best course of action to minimize future damage from both SPB and *Ips* bark beetles.

References

Clark, S. R. & J. T. Nowak. 2009. Southern Pine Beetle. U.S. Forest Service, Washington, DC, Forest and Disease Leaflet 49.

Connor, M. D. & R. C. Wilkinson. 1998. Ips bark beetles in the south: Forest Insect and Disease Leaflet 129, U.S. Department of Agriculture Forest Service.

Coulson, R. N. & K. D. Klepzig. 2011. The Southern Pine Beetle II. Gen. Tech. Rep. SRS140. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station.

Coyle, D. R., A. B. Self, J. D. Floyd & J. J. Riggins. 2016. Ips bark beetles in the southeastern U.S., Southern Regional Extension Forestry Publications. SREF-FH-002. Online at http://southernforesthealth.net/insects/ips-bark-beetle/ips-bark-beetles-in-the-southeastern-u.s

Eickwort, M. J., E. A. Mayfield III & L. J. Foltz. 2006. Ips Engraver Beetles (Coleoptera: Curculionidae: Scolytinae). Florida Dept. Agriculture & Con. Serv. Division of Plant Industry, Entomology Circular No. 417.

Nebeker, N. 2009. Forest Health. In: Publication 2470 Managing the Family Forest in Mississippi. Mississippi Forestry Commission and Mississippi State University Extension. pp. 95-98.

Mayfield, A. E., III, J. Nowak & G. C. Moses. 2006. Southern Pine Beetle Prevention in Florida: Assessing Landowner Awareness, Attitudes, and Actions. Journal of Forestry, 104:241–247.

Nebeker, T. E. 2004. Advances in the control and management of the southern pine beetles. General Technical Report SRS-75, U.S. Department of Agriculture, Forest Service. Southern Research Station. pp. 155–160.

Nebeker, T. E. 2003. Integrated forest pest management. Integrated Pest Management: Current and Future Strategies, Council for Agriculture Science and Technology (CAST), Task Force Report 140. pp. 11–116.

Stone, D., T. E. Nebeker, & A. J. Londo. 2007. Publication 2448 Identifying and Controlling the Southern Pine Bark Beetles. Mississippi Forestry Commission and Mississippi State Extension.

Thatcher, R. C., J. L. Searcy, J. E. Coster & G. D. Hertel (eds.). 1980. The southern pine beetle. U.S. Forest Service, Technical Bulletin 1631.

Traugott, T. A. & S. Dicke. 2006. Publication 2260 Are My Pine Trees Ready To Thin? Mississippi State Extension.

Publication 2876 (POD-05-26)

Revised by **Kristy M. McAndrew**, PhD, Assistant Professor, Forestry. Written by A. Brady Self, PhD, Extension Professor, Forestry; James D. Floyd, Forestry Instructor, Holmes Community College; and **John J. Riggins**, PhD, former Associate Professor.

Produced by Agricultural Communications.

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. ANGUS L. CATCHOT JR., Director

MISSISSIPPI STATE UNIVERSITY EXTENSION