

Converting Pine Stands to Hardwood... A Way to Control Southern Pine Beetles?

By **JIM HYLAND**, Forest Health Specialist, Alabama Forestry Commission

SOUTHERN pine beetles (SPB) are killing “all” the pines. Should we continue planting and growing pines? Why not grow yellow-poplar, oak, walnut or paulownia instead?

The summer of 2000 was a record year for SPB infestations. The extreme drought weakened and put the pines under stress. The Climate Prediction Center of the National Oceanic and Atmospheric Administration takes data from several sources and creates a U.S. drought monitor map. This map shows Alabama in the extreme and exceptional categories. Exceptional drought means “exceptional and widespread crop/pasture losses, exceptional fire risk, shortages of water in

reservoirs, streams and wells creating water emergencies, 60 percent of rainfall during the last 12 months, topsoil moisture 90 percent shortage, and soil moisture in the top five feet at extreme losses.” Since most tree roots are located in the top five feet of soil, in pines this means no water, no sap, and no protection from SPB.

This stress, combined with an in-place population of SPB, caused record numbers of spots and dead trees. The total number of spots statewide reached over 12,000 and the total number of trees reached over 1 million. This translates into a loss of \$87 million worth of standing timber with an economical value of

\$904 million. Not only was there an immediate loss, but some landowners will have annual losses of CRP payments or have to replant those lost acres.

Why Plant Pines?

Pines grown on pine sites by non-industrial private landowners (NIPL) are the most economical species and give the best return of money in the earliest time. The NIPL should be growing pines for sawtimber since selling sawtimber is the best return on his or her investment. Pulpwood should be cut (thinning) to select the less valuable trees with a forward view of which trees will be left for the “crop” or sawtimber trees. On pine sites, sawtimber can usually be cut by age 30-40.

Why Not Grow Hardwoods on Pine Sites?

It is true that since the SPB only attacks pines, to control or prevent SPB infestations one can plant hardwoods instead of pines. BUT, it is not good silviculturally or economically to try to grow hardwoods on pine sites. It is true that hardwoods should be regenerated on hardwood sites. Planting hardwoods on pine sites is expensive. Site preparation costs and seedling costs exceed costs of pine regeneration. And the return on the investment is not as good since you carry a higher cost for a longer time. Hardwood sawtimber takes at least 50-60 years to grow.

When hardwoods are planted the stand has insect problems. Hardwoods grow naturally in mixed stands of different species. In a plantation of one hardwood species it has been shown that usually minor insect populations will increase and kill large areas of trees. Example: cottonwood plantations have been killed by cottonwood leaf beetle and sycamores killed by anthracnose.



Trees killed by the Southern pine beetle were an all-too-common sight during summer months.

Manage Pines to Reduce Impact of SPB

It is not just growing pines but managing your forest stands that is important. You cannot just plant pines and return in 30 years expecting high value sawtimber. An acre of land will grow a maximum amount of wood. This wood can be on a lot of small trees or a few large trees. Since large trees (sawtimber) are worth much more than small trees (pulpwood), then it seems to make sense that a landowner should grow a few large trees as crop trees.

The U.S. Forest Service has published a risk map of the United States. They define a high-risk area as an area where one can expect 25 percent mortality over the next 15 years. This risk is based on insect and disease hazards and forest inventory plot data. In Alabama, there are 11.9 million acres of pine type; 2 million acres of these are in the “high risk” category. These are generally the stands that are being grown but not managed. How did these stands get this way? How can we manage our stands to keep them out of the high risk category?

Species selection—Even if a site is a “pine” site there are differences in soil types, geographic location and moisture that are more suited to some species of pine than others. Generally speaking, most sites in Alabama are suited to loblolly pine. But there are sites that are

better suited for longleaf pine, and those should be planted and managed for longleaf. Longleaf pine is more resistant to SPB attack and to some of the major diseases. BUT, to then say longleaf should be planted everywhere is a mistake. On sites suitable for longleaf, a landowner should favor longleaf.

Regulate stocking—Starting with the planting process, a landowner should consider SPB in the determination of the planting density (spacing). With modern planting techniques and site preparation methods pines grow faster and thus gain crown closure and start putting competition stress on each other. Stands planted at high numbers per acre reach “high hazard” for SPB at an early age (sometimes before the stand has an average diameter great enough to commercially thin). The easiest and best way to avoid this is by planting fewer than 544 seedlings per acre (8 x 10 spacing). Ideally, spacings of 9 x 10 or 10 x 10 are best.

Dense stocking (high basal area) and slow radial growth characterize high-hazard stands. Thinning will stimulate growth and vigor in stands and reduce the likelihood of future losses from SPB. The poorer crown classes—suppressed and intermediate trees—are cut first. Dominant and codominant trees with large crown ratios and desirable traits should be favored as crop trees. They will

most likely respond to thinning and provide the greatest number of silvicultural options in the management of residual stands. Thinning schedules depend on the close relationships between site quality, stand age, stocking, live crown ratio of individual trees and growth rate. Root and crown competition among individual trees develops at ages 10-15 on most sites. Crowding can occur earlier than age 10 on better quality sites that contain a large number of trees. Initial thinning should be scheduled before live crown ratios drop to 40 percent. Delay will reduce stand vigor to levels unfavorable for growth but attractive to SPB. The risk of beetle attack in most cases will increase considerably when stocking levels exceed 100 ft²/acre.

Minimize logging damage—Damage from recent logging (within the past year) favors SPB infestations. Careless cutting, skidding, and hauling often cause severe mechanical injury to above and below ground portions of residual trees. Moderately to severely damaged trees are high-hazard and should be removed from the stand as soon as possible.

Planning and application—The risk of SPB attack and the rapid spot growth is lowest when insect populations are down. This is the best time to plan and implement silvicultural treatments related to SPB. Mill quotas are not filled with salvage wood, and operators are available to conduct intermediate cutting. The “reservoir” of SPB infested and high hazard trees is removed, and more growing space is provided for residual trees. High hazard stands can be identified and treated to reduce their susceptibility to beetle attack and the potential for spot growth in a future outbreak. Low hazard stands can be tended to maintain vigor and rapid growth. Stands and forests that are highly resistant to SPB attack should be a primary objective of management. Prevention silviculture offers the most practical and long-lasting means of achieving this goal.

In short, good forest management is good Southern pine beetle management.

Reference

Silviculture Can Reduce Losses From the Southern Pine Beetle. USDA Forest Service, Agriculture Handbook No. 576, 1980. 📖

Terms to Understand

Crop Tree—Any tree selected to grow to final harvest or to a selected size. Crop trees are selected for quality, species, size, timber potential, or wildlife value.

Crown Class—A tree classification system based on the tree's relative height, foliage density, and ability to intercept light. Crown-class measures past growth performance and calls attention to crop trees that could benefit from future thinning and harvest operations. There are four classifications:

- * **Dominant Trees**—Larger-than-average trees with broad, well-developed crowns. These trees receive direct sunlight from all sides and above.
- * **Codominant Trees**—Average to fairly large trees with medium-sized crowns that form the forest canopy. These trees receive full light from above but are crowded on the sides.
- * **Intermediate Trees**—Medium-sized trees with small crowns below the general level of the canopy. Intermediate trees receive little direct light, are poor crop trees, and should be removed during thinning operations.
- * **Suppressed Trees**—Small trees that grow below the tree canopy and receive no direct sunlight from any direction.

Crown Ratio—The percent of the compacted portion of the tree bole or shrub supporting green, live, healthy foliage when compared to the total length or height.

Stand—An easily defined area of the forest that is relatively uniform in species composition or age and can be managed as a single unit.