Southern Pine Beetle

Dendroctonus frontalis Zimmermann
Coleoptera: Scolytidae

Thatcher, R. C.; Mason, G. N.; Hertel, G. D.; Searcy, J. L. 1982. Detecting and controlling the southern pine beetle. *Southern Journal of Applied Forestry* 6: 153-159.

Objective: To summarize new and improved techniques for locating, evaluating, and treating *D. frontalis* infestations.

Abstract: The southern pine beetle, *Dendroctonus frontalis* Zimmermann, is the most damaging bark beetle in the southeastern USA. All species of indigenous pines are susceptible to attack except longleaf pine, *Pinus palustris* Mill., presumably due to its high resin flow. Mature, over-stocked stands of loblolly, *P. taeda* L., and shortleaf, *P. echinata* Mill, pines on poorly drained sites are most susceptible to infestation. During beetle epidemics, groups of host trees are typically killed, and termed "spots" to delineate from other infestations in close proximity.

Four USDA handbooks dealing with detection, evaluation, suppression and prevention of *D. frontalis* infestations are summarized here. Topics include aerial detection and evaluation of spots (Billings and Doggett 1980), ground checking (Billings and Pace 1979), and methods for assigning control priorities. Aerial surveys are used to locate infestations. Each infestation is assigned a low, medium or high priority based on the color of infested tree foliage, the number of infested trees, and the threat to surrounding forests (Table 1). At each spot, a ground crew checks to determine if *D. frontalis* is the mortality agent. Following correct diagnosis, trees are catalogued according to the stage of beetle attack (Table 2). This information is then used to assign control priorities based on stand hazard ratings (Table 3).

Sampling Procedure: Locate *D. frontalis* infestations by conducting an aerial survey via small fixed-wing aircraft or helicopter. These areas will appear as pockets of dead or dying pines commonly referred to as spots. Spots expand in late spring and early summer as adult beetles emerge from brood trees and attack adjacent pines at the leading edge of the infestation. An expanding spot viewed from the air appears most often as a group of red- and yellow-crowned trees. Trees of different crown colors (from red to yellow) indicate the direction of spread. Most red-crowned trees no longer contain viable brood. Yellow-crowned trees have been attacked more recently and often contain brood. Freshly attacked trees at the leading edge of the spot appear green and healthy. Therefore, you cannot distinguish uninfested from fresh-attacked trees without conducting a ground check.

Spots with 10 or more red- and yellow-crowned trees are assigned ground check priorities. Assign each spot a low, medium or low priority based on the color of infested tree foliage, the number and volume of infested trees, and the threat to surrounding forests (Table 1). Provide ground crews with a map indicating spot locations, sizes, and priorities for ground checking.

At each spot, a ground check crew determines if *D. frontalis* is the mortality agent by removal of bark sections from yellow-crowned trees and examining for the presence of *S*-shaped galleries. External symptoms such as the presence of pitch tubes on the bole, and reddish boring dust at the base of tree are also useful indicators of *D. frontalis* infestations. Following correct diagnosis, trees are catalogued according to the stage of beetle attack (Table 2).

This information is used to assign control priorities based on the proportion of stage 1 and 2 trees, stand density (basal area) and average d.b.h. (inches) (Table 3). For example, stands with stage 1 and 2 trees, high stand densities and large average diameters are assigned highest priority for control.

References:

Billings, R. F; Pase, H. A. III. 1979. A field guide for ground checking southern pine beetle spots. Agric. Handb. 558. Washington, DC: *U. S. Department of Agriculture, Forest Service*; 19 p.

Billings, R. F.; Doggett, C. 1980. An aerial observer's guide to recognizing and reporting southern pine beetle spots. Agric. Handb. 560. Washington, DC: *U. S. Department of Agriculture, Forest Service*; 12 p.

Table:

Table 1. Example of a table for setting southern pine beetle ground check priorities from the air, May through October. Choose the spot classification which best describes the spot. (From Agric. Handb. 560).

Priority for ground check	Spot classification
Priority 1 (high)	More yellow- than red-crowned trees. In dense natural pine stand or in area with past history of SPB outbreaks. Easy access or high salvageable volume. In plantation or other high value area.
Priority 2 (breakout)	Yellow-crowned trees in spot previously reported controlled or inactive.
Priority 3 (medium)	More red- than yellow-crowned trees. Poor access or moderate salvageable volume.
Priority 4 (low)	Few yellow-crowned trees. Infested pines surrounded by hardwoods or open land. Difficult to locate on ground because of small size or inaccessibility. In unmerchantable timber or with low salvageable volume.

Table 2. Symptoms associated with southern pine beetle-attacked trees in various stages of deterioration. (From Agric. Handb. 575).

Symptom	Stage 1 Trees with fresh SPB attacks	Stage 2 Trees with developing SPB broods	Stage 3 Vacated trees
Foliage color	Green	Green trees with larvae; fade to yellow before brood emerges	Red, needles falling
Pitch tubes	Soft, white or light pink	Hardened, white	Hard, yellow, crumbles easily
Checkered beetles	Red, white, and black adults crawling on bark	Pink or red larvae about ½ in. long in SPB galleries	Larvae and pupae are purple; occur in pockets in the outer bark
Bark	Tight, hard to remove	Loose, peels easily	Very loose, easily removed
Color of wood surface	White, except close to new adult galleries	Light brown with blue or black sections	Dark brown to black
Exit holes	None	Few, associated with attacking adult reemergence	Numerous
Ambrosia beetle dust	None	White, localized areas around base of trees	Abundant around base of trees

Table 3. Guide to southern pine beetle spot growth and control priorities (May through October). (From Agric. Handb. 558).

Key to spot growth	Your spot's classification	Risk-rating points
A. Stage 1 trees	absent	0
	present	30
B. Stage 1 and 2 trees	1–10	0
	11–20	10
	21–50	20
	more than 50	40
C. Pine basal area (ft^2/ac) (or stand density) at active head or heads of spot	less than 80 (low density)	0
	80–120 (medium density)	10
	more than 120 (high density)	20
D. Stand class by average d.b.h. (in inches)	pulpwood (9 in or less)	0
	sawtimber (more than 9 in)	10
	Total[1]	

[1] *If total is 70–100, control priority is high. If total is 40–60, control priority is medium. If total is 0-30, control priority is low.*