

Southern Pine Beetle

Dendroctonus frontalis Zimmermann

Coleoptera: Scolytidae

Linit, M. J.; Stephen, F. M. 1978. Comparisons of methods for estimation of attacking adult populations of *Dendroctonus frontalis*. *Journal of Economic Entomology* 71: 732-735.

Objective: To determine the reliability of three methods used to estimate attacking densities of *D. frontalis*.

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.

Attacking adult densities of *D. frontalis* in loblolly pine were estimated by three procedures: X-ray analysis (XRAY), bark dissection to locate attacking adults (ADULT-DISS), and bark dissection to locate the entry point of attacks (ATK-SITE). Estimates of mean attacking density via ADULT-DISS and ATK-SITE methods were in close agreement. Analysis of XRAY estimates by one worker resulted in consistently lower estimates than either the ATK-SITE or ADULT-DISS method. Analysis of XRAY estimates by the second worker was variable and could not be attributed to inexperience on the part of that analyst.

Each of the three methods provided reliable estimates of attacking density. The authors suggested the XRAY method would not differ from other methods if the analysts were more experience and consistent in their observations. Both the ADULT-DISS and XRAY methods required precise timing in regard to the stage of adult colonization. Samples must be taken after attacks are complete and prior to reemergence. Since all three methods yielded reliable estimates, the authors suggested the choice of which method to use should depend on the level of personnel training and their objectives.

Sampling Procedure: To collect samples, fell each tree and remove a log from the central portion of the infested bole prior to adult emergence. Cut 36 100-cm² circular samples, and remove them from each log with the sapwood attached to prevent beetles from falling out of the galleries prior to analysis. Store samples in a refrigerator when not being processed.

X-ray determination of attacking adults (XRAY): X-ray each bark sample immediately following removal using a Faxitron 43805[®] or similar X-ray system.

Two workers are needed to examine the X-rays. Count and record the number of attacking adults on each sample separately.

Dissection for attacking adults (ADULT-DISS): Remove the sapwood from the bark sample with a chisel and count all *D. frontalis* adults. Remove frass and resin from egg galleries by using forceps and a stiff brush. Egg galleries are searched extensively for the presence of attacking adults as are all holes and crevices on the bark surface. Count the total number of adults and record their sex.

Attack site determination (ATK-SITE): Locate attack sites on each bark sample by using a binocular microscope and the criteria of Stephen and Taha (1976). If the criteria are met, then count the suspected attacked site and multiply by two to account for monogamous pairs.

Notes: In this study, samples were collected during mid-July from three loblolly pines 37-yr-old and 35-cm d.b.h. The sex ratio of attacking adults did not differ significantly from unity, supporting the premise that one male and one female are associated with each attack site. This assumption is necessary for the validity of the ATK-SITE method.

Reference:

*Stephen, F. M.; Taha, H. A. 1976. Optimization of sampling effort for within tree populations of southern pine beetle and its natural enemies. *Environmental Entomology* 5: 1001-1007.