Striped Ambrosia Beetle

Trypodendron lineatum (Olivier)
Coleoptera: Scolytidae

Lindgren, B. S.; Borden, J. H. 1983. Survey and mass trapping of ambrosia beetles (Coleoptera: Scolytidae) in timber processing areas on Vancouver Island. *Canadian Journal of Forest Research* 13: 481-493.

Objectives: To develop a method of sampling and estimating overwintering populations of *T. lineatum*; to determine the spatial and temporal distribution of *T. lineatum* using pheromone-baited traps; and to determine the prevalence of *T. lineatum* that has been imported onto the site via infested host material.

Abstract: The striped ambrosia beetle, *Trypodendron lineatum* (Olivier), is a serious pest in timber yards of the Pacific Northwest. Losses result from degradation of lumber and plywood veneer, which are attacked on dryland log sorts. The distribution and population density of overwintering *T. lineatum* were determined by sampling beetles in the duff at four dryland log sorts in British Columbia, Canada. Significantly fewer beetles overwintered at the base of trees directly facing the sort than in any other quadrant (Fig. 1). Therefore, samples should be collected on the far side of the tree relative to the sort.

The temporal and spatial distributions of flying *T. lineatum* were determined by catches in pheromone-baited traps. The heavy flight of *T. lineatum* in May and early June accounted for 79% of the total trap catch. At one dryland sort, the data from duff sampling and trapping were used to establish optimal trap placement for the subsequent year, and trapping effort was expanded into a mass trapping program. A reduction in damage as a result of removing *T. lineatum* was not evident.

Sampling Procedure:

Overwintering samples: Collect duff samples of 20 by 20 cm and 2-4 cm deep from at least 10 points 15-20 m inside the forest margin. At each sample point, take a sample from the base of each designated tree in quadrant 3, which is always placed directly away from the sort (Fig. 1). Return samples to the lab and place them in 2 L milk cartons with an emergence jar attached. Collect and record the number of emergent beetles by sex for the first week, and every other day during the second week.

Estimating overwintering populations of *T. lineatum*: Factors influencing the distribution of overwintering *T. lineatum* have been investigated thoroughly (Dyer and Kinghorn 1961). Based on data from that study, an equation for estimating the total population (*N*) of overwintering beetles was derived (see Fig. 1). To estimate the total overwintering area (*TOA*), three beetle densities from transect samples (*DT*) are calculated by dividing the total number of

beetles by sample area. *DT*s were then compared with the mean density of overwintering beetles from the permanent overwintering samples (*DP*) from that year, and the equation that yielded a value of *DT* closest to *DP*, but still smaller, was chosen. The 60 m distance used to calculate *TOA* was the maximum included in the total sample area for that equation.

All duff samples are taken as close to trees as possible, and the mean number of beetles per square meter at each sort is considered the maximum density (*X*) at that sort. A high (*Nh*) and low (*Nl*) estimate is made by varying the area (*A*) within which the population density was *X*. For *Nh*, it is assumed that the density *X* extended to 0.9 m (i.e., where highest densities are encountered) from each tree within *TOA* and for *Nl* to 0.45 m. To calculate the actual *A*, the mean basal area (*BA*) multiplied by the total number of stems (*S*) within *TOA* is deducted from the area of *S* circles with the radius 1 m + mean radius of the trees for *Ah* and 0.5 m + mean radius of trees for *Al*. The total number of beetles within *A* is then (*Al* x *X*) for *Nl* and (*Ah* x *X*) for *Nh*.

The density of *T. lineatum* in overwintering bark was about 60% of the density in the adjacent duff, and therefore density was $Y = 0.6X$. The mean area of 1 m of stem is calculated, and multiplied by *S* for the total stem area (*SA*) with beetle density *Y*. The total number of beetles overwintering in bark is then calculated as (*SA* x *Y*).

No direct information is available on the relative density of *T. lineatum* in duff greater than 0.9 m from trees. It is assumed that the density of overwintering beetles in the area *Oal* or *Oah*, outside the perimeter of *Al* and *Ah*, is ($Z = 0.15X$). *Oal* and *Oah* are calculated by deducting the area of *S* circles with the radius 0.5 m + mean radius of trees and 1 m + mean radius of trees, respectively, from *TOA*. The total number of beetles within *Oal* is calculated as (*Oal* x *Z*) and within *Oah* as (*Oah* x *Z*). To obtain a low (*Nl*) and high estimate (*Nh*) of the population use the following equations:

$$Nl = (Al \times X) + (SA \times Y) + (OAl \times Z)$$
$$Nh = (Ah \times X) + (SA \times Y) + (OAh \times Z)$$

Survey for temporal and spatial distribution: Setup 12 cylindrical sticky traps (Browne 1978) around the margin of dryland ports at each of four locations from early spring through fall. Bait one trap with lineatin, one with (±) – sulcatol, and one with *s*-(*x*)-sulcatol. The latter two are also baited with ethanol and α-pinene (Lindgren and others 1982). Placing traps near or inside stands of red alder, *Alnus rubra* (Bong.), reduces the number destroyed by bears, *Ursus americanus* Pallas, but also decreases trap efficiency. Placement should depend on the level of bear interference. Check traps weekly and replace baits as needed. Count and record the number of *T. lineatum*.

Log sampling: Sample incoming logs regularly as they are placed on log decks. Cut a 20 by 20 cm area of bark out with a chainsaw, remove with a chisel, and count and record the number of *T. lineatum* attacks. Sampled logs should be marked and resampled at the sawmill. Managers can use this information to define problem areas in the forest or improperly handled logs in order to take appropriate control measures.

Note: Overwintering estimates were less reliable in areas with ill-defined forest margins. These methods have largely been replaced by the use of multiple-funnel traps which are much less labor intensive to use.

References:

Browne, L. E. 1978. A trapping system for the western pine beetle using attractive pheromones. *Journal of Chemical Ecology* 4: 261-275.

Dyer, E. D. A.; Kinghorn, J. M. 1961. Factors influencing the distribution of overwintering ambrosia beetles, *Trypodendron lineatum* (Oliv.). *Canadian Entomologist* 93: 746-759.

Lindgren, B. S.; Borden, J. H.; Gray, D. R.; Lee, P. C.; Palmer, D. A.; Chong, L. 1982. Evaluation of two trap log techniques for ambrosia beetles in timber processing areas. *Journal of Economic Entomology* 75: 577-586.

Figure:

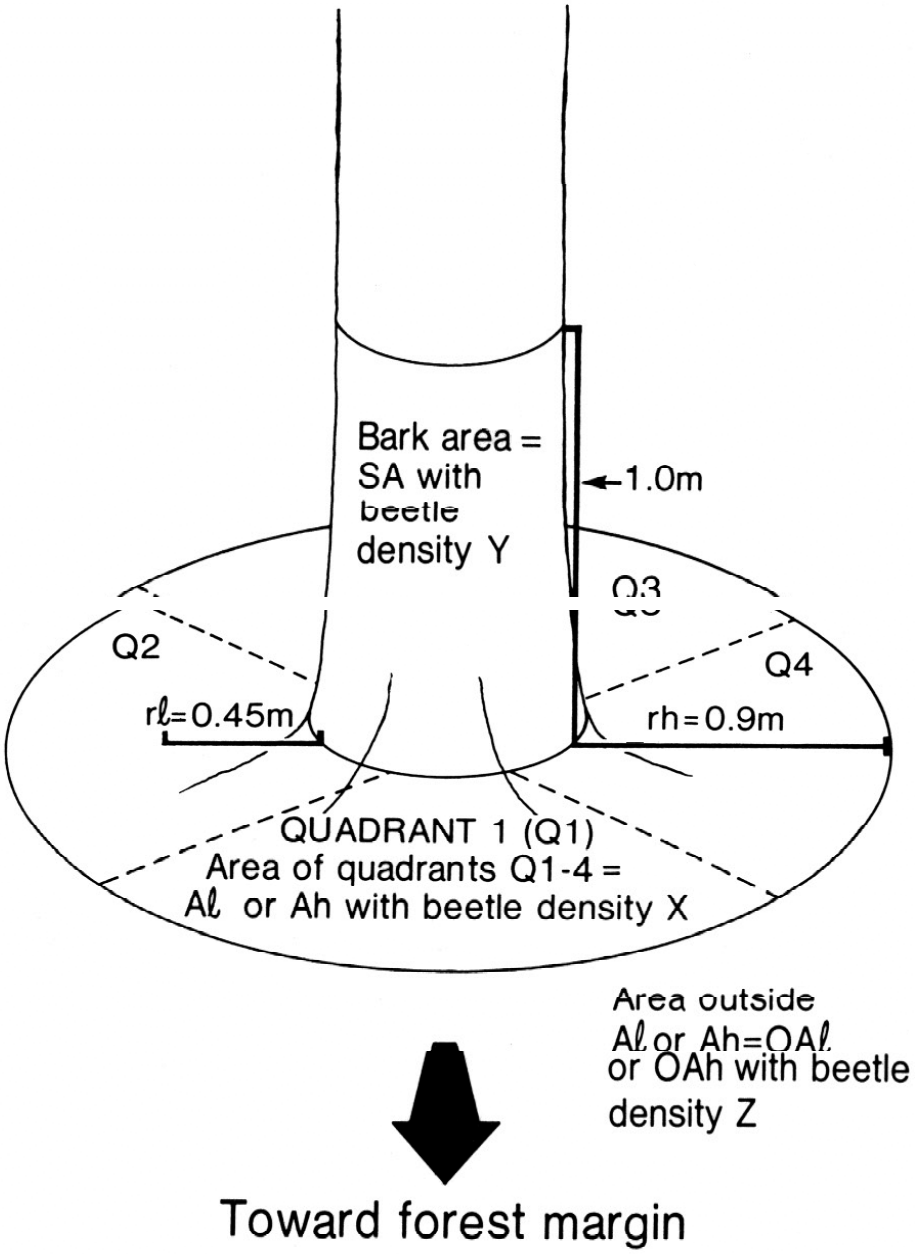

FIG. 1. Diagram illustrating areas used for estimating overwintering populations of *T. lineatum* at four dryland sorts on Vancouver Island. See text for explanation of symbols.