DEPARTMENT OF FORESTRY · CANADA ·

# Timber Talks

Prepared by V. H. Phelps, Forest Research Laboratory, 506 W. Burnside Road, Victoria, B.C.

## SPRUCE BEETLE POPULATIONS

No. 43

The spruce beetle is the most destructive bark beetle of mature spruce. Endemic populations breed in wind-blown trees and logging slash, but when populations become epidemic, living trees are frequently attacked and tree mortality is heavy. In northern latitudes and high elevations where spruce grows, two years are usually required for the insect to attain maturity. Overwintering in the adult stage is necessary before the beetles can reproduce and thus the rate at which the insect matures affects the population the following year.

Spruce logs infested with beetles were placed at three sites in the East Kootenays, B. C. in June, and thermograph temperatures recorded throughout the summer. Site A was on a mountain slope at 4700 a.s.l. and Sites B and C in valley bottoms at elevations of 3500' and 4600', respectively. Broods in all logs were examined in October to determine their degree of development. Minimum temperature for brood development was determined in the laboratory to be approximately 43°F.

Due to summer temperature inversions, mean and minimum temperatures were consistently higher on the mountain slope than at the valley bottoms. At the lower valley bottom temperatures dropped to 5 and 7°F on two successive nights in late August; temperatures were consistently lower in the other valley but minimum temperatures in August were 3 degrees higher. Brood development was fastest on the mountain slope and continued until October, at which time 96 per cent of the progeny were mature. Larval development terminated after the August frost at Site B but pupae continued their development. Only 13 and 9 per cent of the broods in the valley bottom matured before winter.

Accumulated degree hours above the development threshold and the date and severity of the first late summer frost influence the seasonal rate of brood development. Night temperature inversions create more degree hours of heat and higher minimum temperatures on mountain slopes than in valley bottoms, resulting in a greater percentage of the broods becoming mature in one season. These beetles, combined with those that mature after two years in the cooler sites, may result in such high populations the following year that living forests are attacked and serious losses sustained.

REPORT: Influence of Temperature Inversion on Development of Spruce Beetles, Dendroctonus obesus (Mannerheim). E. D. A. Dyer, Forest Research Laboratory, Victoria, B. C.