Discussion Group B — What can we learn from Historical Records?

Interpretation of the Historical Pattern of Western Spruce Budworm Outbreaks in British Columbia in Relation to Weather

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There are two distinct areas where outbreaks of western spruce budworm occur in British Columbia: one is centered around Pemberton with a high frequency of outbreaks and the other centered around Hope with a low frequency of outbreaks. The Anderson River area, which lies between these two areas, shows an intermediate frequency of outbreaks. The widespread onset of defoliation within an area in a single year suggests that initiation of an outbreak is related to weather. Similarly, the widespread disappearance of defoliation within an area in a single year, regardless of the composition and defoliation history of particular stands, suggests that outbreak collapse is related to weather.

Method of Study

The relation of long-term weather records from the Hope and Pemberton areas to appearance and disappearance of area-wide defoliation was investigated. No attempt was made to relate weather to the level of fluctuation in population density, or to percentage of defoliation. For each year of a weather record, accumulated heat units were used to define dates of budflush and stages of western spruce budworm development. These dates vary widely from year to year. Weather acting on specific stages of budworm development, as well as during specific periods of the year, was determined. Degree of synchrony of larval emergence and budflush was also determined (Thomson et al. 1984). Heat unit requirements for Douglas-fir budflush, used in the above study, were estimated from historical records (Thomson and Moncrieff 1982). The method of extrapolating from weather stations in the valley bottoms to locations at higher elevations was described by Thomson et al. (1983).

Results

Outbreaks were associated with warm dry summers in conjunction with synchrony of larval emergence and budflush. Collapse of the last two outbreaks was clearly associated with extreme high temperatures following moth flight and oviposition. Collapse of two earlier outbreaks may have been due to asynchrony between larval emergence and budflush.

Conclusions

The two areas of outbreak in British Columbia have quite different patterns of weather, one being under coastal influence and the other under the influence of interior conditions. The different probabilities of warm summers, optimal larval-host synchronization, and extreme warm temperatures following moth flight determines both the expected frequency and duration of outbreaks in the two regions.

Literature Cited

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