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TECHNICAL NOTE

HAZARD FROM THE SEEDLING DEBARKING WEEVIL: A REVISED KEY TO PREDICTING DAMAGE ON SITES TO BE PLANTED

Predicting pest damage is one of the first steps in pest management. Decisions on whether to implement control techniques, the type of control, the worthiness of continuing a forestry operation or indeed what type of operation to conduct, are all founded on a sound knowledge of the pest's habits.

The seedling debarking weevil (Hylobius congener), a pest of newly established plantations, has caused significant injury to seedlings during the last several years in Nova Scotia and Prince Edward Island and, to a much lesser extent, in New Brunswick. Efforts to understand the biology, damage distribution, and management options for this pest have met with reasonable success[1]. A hazard key was published[2] in 1987 that considered all of the factors known to affect weevil damage. Although this preliminary key served reliably, it was general and, possibly, did not provide information precise enough for critical decision making.

An important missing component of that key was the ability to incorporate a measure of the number of weevils found on a site before planting. Furthermore, the clearer understanding gained since then of the implications of various site-specific characteristics and their actions and interactions should add to the predictive ability of a new hazard key.

Forestry Canada has examined effects of site on weevil damage since 1984, through study plots and extensive surveys, and had tested a prototype trap and lure as early as 1985. The development of a standardized trap and synthetic bait was completed under contract to the Research and Productivity Council of New Brunswick (RPC) in 1987. This trap was used to investigate a site-related hazard index during 1988 and 1989. While considerable integration and analysis of the data has yet to occur, the latest key provided by RPC in March, 1990 is presented here, in a slightly modified version, so that the most current information can be immediately put to use.

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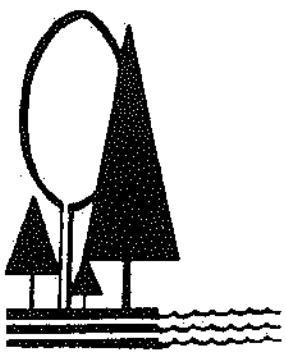

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This key incorporates the most recent information from study sites on Prince Edward Island in 1989, although its development began with work in Nova Scotia. Biological measurements must be taken after the harvest operation but in the springtime. Consequently, the lead-time available to decide on the commencement of early spring planting is poor. The required assessment is early enough to allow cancellation of a planting that would otherwise suffer serious damage. The lead-time for fall or second-season plantings might be considered to be more acceptable.

KEY TO PREDICTED DAMAGE FROM HYLOBIUS CONGENER IN ONE-YEAR-OLD CUTS

1 a GROUND COVER <10% FEATHER MOSS 2
b GROUND COVER >10% FEATHER MOSS 4

2 a EXPOSED MINERAL SOIL <10% 3
b EXPOSED MINERAL SOIL >10% 5

3 a REGENERATING STEMS <5/M^2 4
b REGENERATING STEMS >5/M^2 5

4 a WEEVILS TRAPPED <0.3/NIGHT 6
b WEEVILS TRAPPED >0.3/NIGHT 7

5 a WEEVILS TRAPPED <0.5/NIGHT 6
b WEEVILS TRAPPED >0.5/NIGHT 7

6 **LOW HAZARD.** MORTALITY 0-5%

7 **MODERATE TO HIGH HAZARD.** MORTALITY > 5%

USING THE KEY

The key is designed to be used in one-year-old cuts (i.e., during the first spring post-harvest) and in areas of major concern, such as sites where the softwood content was ≥25% or in those regions of the Maritimes where weevil damage has historically been a concern[3].

The rating system follows a dichotomous key design where couplets are compared and, depending on the answer, one numerical route or another is followed (for example, a decision is made between lines 1a & 1b which results in going to either 2 or 4, where a further decision must be made, eventually leading to a hazard rating of low or moderate to high).

Assessing weevil hazard with this revised key requires three or four visits to a potential planting site during late May or early June to assess weevil numbers. On the first visit, the site characteristics should be scored. These determine the pathway to be followed in assessing weevil numbers and may allow the observer to discontinue trapping earlier than could be done otherwise by leading to couplet 4 rather than 5.

Only four variables are used. Other factors have been found which correlate with weevil damage, however, an analysis of inter-correlations allowed these to be disregarded in favor of those which were more significant and/or easier to measure. The first variable, feather moss, refers to the common moss component of the litter, which creates a spongy layer over the soil, often a few centimeters thick. Moss provides an ideal micro-habitat for weevils to live in. The second, exposed mineral soil, relates to the surface area of soil which is bare of heavy-organic matter. On P.E.I., this usually means that the surface layer is disturbed so that the red sub-soil is plainly evident. Elsewhere, it implies a gravel or sand sub-soil, although large rocks and boulders are allowed. Weevils avoid mineral or exposed soils. Even a small patch around a seedling will deter feeding. Numerous areas of mineral soil on a site reduce overall damage.

These first two variables should be assessed during a walk-through of the site so that one can sample the variety of situations encountered. The key expresses threshold levels. In general, the more moss and less mineral soil, the greater the weevil hazard will be.

The third variable is the number of woody plant stems resulting from natural regeneration found in an area $1 m^2$. This is arrived at by taking measurements at a variety of locations throughout the site, using a meter stick as a guide, and averaging the results. Natural regeneration provides an alternative food source for the weevil, taking feeding pressure off the planted seedlings.

Weevil numbers are determined using pitfall traps and α-pinene/alcohol lures. These are available from RPC[4] and come with instructions for their placement. Three are required per site. After placement, the traps should be checked at daily intervals for three days and the average number of weevils caught each trap-day is used for the key. For example, if on the first day an average of two weevils are caught per trap, then trapping may be discontinued as greater than the minimum needed to satisfy the key will result. Trapping can be discontinued after the second day if the cumulative number caught per trap is two at that point.

This hazard rating system represents a refinement in predicting seedling debarking weevil damage and can be an important component in weevil management. Further improvements can be expected as our knowledge of this pest continues to build. Forest managers are encouraged to put this rating system to the test by implementing it this season. A follow-up assessment in the fall of seedling damage and mortality, will give a measure of the key's success. Individuals using the key are encouraged to send their results and comments to the Forest Insect and Disease Survey. Any questions regarding the use of this key should also be directed to FIDS.

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Forest Insect and Disease Survey

April, 1990

[1]Magasi, L.P. 1988. Forest Pest Conditions In The Maritimes In 1988. For. Can. - Maritimes Region Inf. Rep. M-X-174, pp. 10-12.

Quinn, J., Pendrel, B.A., Stewart, P. and Murray, T. 1989. Controlling The Seedling Debarking Weevil: An Economic Analysis. For. Can. - Maritimes Region Tech. Note No. 202, 7pgs.

[2]Pendrel, B.A. 1987. How To Live With The Seedling Debarking Weevil: A Key To Determine Degree Of Hazard To Planting Sites. For. Can. - Maritimes Region. Technical Note No. 171.

[3]On Prince Edward Island these are Queens and Kings Counties. In Nova Scotia these are all counties east of and including Hants and Halifax.

[4]Chemical and Biotechnical Services Dept., Research and Productivity Council, P.O. Box 20 000, Fredericton, New Brunswick, E3B 6C2, (506)452-8994.

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