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A FIELD TEST OF PROCEDURES FOR EVALUATING AND SCHEDULING WHITE-PINE WEEVIL CONTROL

Procedures have recently been developed that permit economic and biological information to be integrated in making decisions about the need for control against the white-pine weevil, and in scheduling control in young white pine plantations.[1] The procedures are based upon studies of the magnitude of economic losses that result from weevil attack in white pine and upon studies of the temporal and spatial pattern of weevil attack. The profitability of control can be determined by economic projections to maturity of values saved by control and of the costs of control.

The studies upon which the procedures are based were conducted in the last decade in New England, New York, and Pennsylvania. In 1964 a field test of the accuracy and applicability of these procedures throughout this area and Virginia was conducted by the Branch of Forest Pest Control (now Branch of Forest Protection), Eastern Region, U. S. Forest Service, in cooperation with several States, private individuals, and the Northeastern Forest Experiment Station.

Plots were established in 32 white-pine plantations. Data were collected in each stand on: site quality, tree height, height-growth rate, number of trees per acre, and the number of trees that had never been weeviled in each of the last 4 years. The proportion of never-weeviled trees was calculated for each year, 1961-64.

To use this method in making control decisions, a target height is selected up to which weeviling is to be prevented (one or two log lengths

[1]Marty, Robert, and D. Gordon Mott. EVALUATING AND SCHEDULING WHITE-PINE WEEVIL CONTROL IN THE NORTHEAST. U. S. Forest Serv. Res. Paper NE-19, 56 pp., 1964. Northeast. Forest Expt. Sta., Upper Darby, Pa.

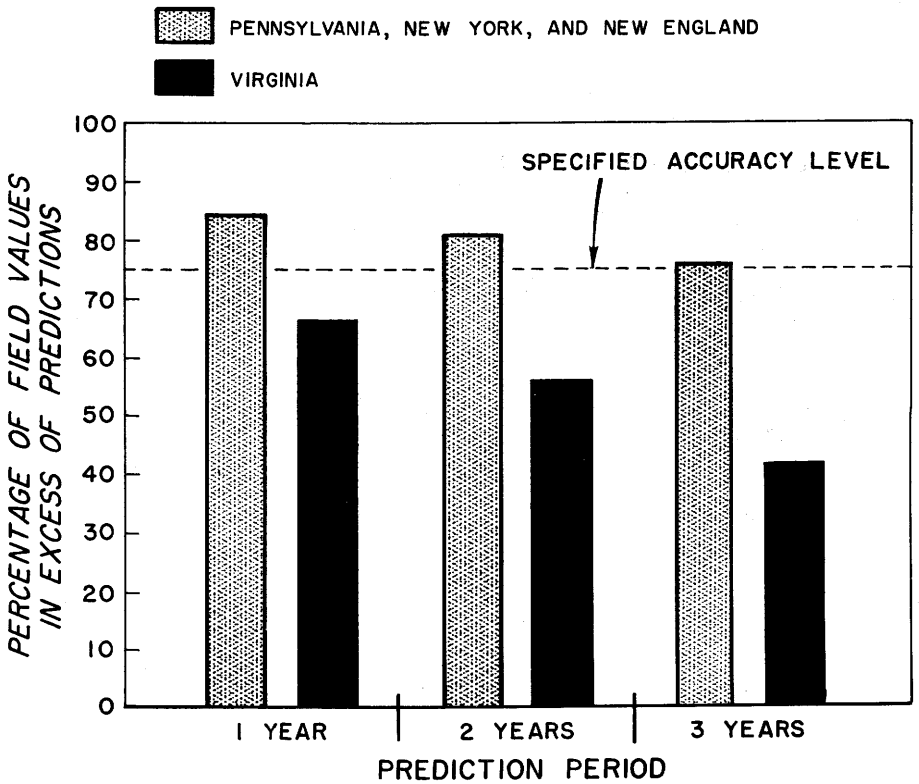

Figure 1.—Percentage of cases in which observed proportion of never-weeviled trees was greater than predicted proportions (75 percent is expected as a result of the accuracy level provided in the prediction tables).

plus an allowance for trim and weeviling) on a specified number of trees per acre. The number of years required for the stand to reach this target height is predicted from the current growth rate and present height.

Whether a sufficient number of unweeviled trees (specified as a management goal) will remain after this number of years as a result of the normal progress of the weevil infestation can be determined from a set of tables developed for this purpose. If the number of never-weeviled trees is predicted by the tables to fall below the number required, before these trees attain the target height, control is indicated. Alternatively, if a sufficient number of never-weeviled trees is predicted to survive to the target height, control is not needed. And if more than 5 years are predicted for the trees to grow to the target height, an evaluation must be made again in the future. The data collected in this field test permit the accuracy of these tables to be tested.

The tables prepared by Marty and Mott allowed one out of four predictions of the proportion of never-weeviled trees to be less than actual field experience. That is, three out of four field experiences would result in the survival of more than the predicted number of never-weeviled trees for each prediction period, and only one out of four would result in less than the predicted number. Prediction periods of 1, 2, and 3 years were used in this test of the method, in which predicted values were compared with the field record. The results are summarized in figure 1.

The predictions (fig. 1) were in close accord with the actual field-test results for New England, New York, and Pennsylvania. However, for Virginia the tables obviously do not predict actual field experience; and damage developed more rapidly than in the area for which the tables were designed.

For each of the 25 New England, New York, and Pennsylvania stands, the need for control and its profitability could be determined from the prediction tables developed by Marty and Mott. Management objectives vary among pine producers: rotation ages, stocking requirements at maturity, the bole length to which control is to be practiced, and the cost of control are by no means uniform. In these 25 stands, 200 unweeviled trees per acre — involving butt-log (18 feet total) protection only, and control costs of $3, $4, and $6 per acre per treatment — were assumed as management conditions for purposes of comparison among the stands. The profitability of weevil control depends as well upon whether the investor is willing to accept projections that assume rising stumpage values or prefers to assume stable stumpage values.

Of the 25 stands, 4 presently contain less than the target number of never-weeviled trees. The outcome is uncertain in 8, and these will need future examination. Control is required in 11 within the next 5 years to maintain the required number of trees until target height is attained; and 2 of the stands will reach target height without requiring control.

In the 11 stands that require control action within the next 5 years, the profitability of control has been calculated. This will depend upon the form of ownership, whether stable or rising stumpage values are assumed, and the cost of control. Three combinations of ownership and stumpage-value assumptions have been made: public ownership with rising stumpage values, private ownership with rising stumpage values, and private ownership with stable stumpage values. In addition, three control costs have also been assumed (table 1).

In summary: the prediction tables proposed by Marty and Mott for use in evaluating and scheduling white-pine weevil control in young white

Table 1.—Distribution of 11 stands requiring weevil control, by profitability class, assuming a variety of ownerships, stumpage values, and costs of control treatment

Profitability class (rate of return on control costs)	Public ownership, rising stumpage, and treatment cost per acre of —			Private ownership, rising stumpage, and treatment cost per acre of —			Private ownership, stable stumpage, and treatment cost per acre of —		
	$3	$4	$6	$3	$4	$6	$3	$4	$6
6 percent or more	5	4	—	4	—	—	—	—	—
5 to 6 percent	5	4	—	1	4	—	4	—	—
4 to 5 percent	1	3	5	6	4	—	4	5	—
3 to 4 percent	—	—	4	—	3	8	3	3	4
Less than 3 percent	—	—	2	—	—	3	—	3	7

pine plantations have been tested on 32 stands throughout New England, New York, Pennsylvania, and Virginia. The tables correctly predict the course of weevil infestations within the confidence level specified in all of this area except Virginia. As a result of the evaluation in the stands for which the procedures are appropriate, roughly one-half of the stands were found to require control to achieve management objectives; and in all cases where it was needed, control would be profitable.

However, profitability varied from near zero to over 6 percent. The greatest return would be realized from the stands in public ownership with rising stumpage values and low control costs. In contrast, over half the stands (assuming private ownership, stable stumpage values, and high control costs — $6 per acre per treatment) would be expected to yield less than 3 percent profit.

The actual values saved by control ranged from $165 to $575 per acre. These amounts, of course, represent the percentage returns discussed above and must not be taken as indicative of present investment values. Further work is in progress to develop these procedures for natural stands of white pine and to improve the field sampling technique.

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