

BIOLOGICAL EVALUATION
OF REPRODUCTION WEEVIL INFESTATIONS
CROATAN DISTRICT, NORTH CAROLINA NATIONAL FORESTS

By

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Introduction

Since 1950 attempts have been made to convert nonproductive low-pocosin areas on the Croatan District into productive acreage through construction of elaborate drainage systems, subsequent site preparation and planting. Planting success has been consistently poor and recent observations indicate that pine reproduction weevils may be an important factor in causing seedling mortality.

A biological evaluation of pine reproduction weevil infestations on the Croatan District was made June 5 and 6 by W. M. Ciesla, Forest Insect and Disease Control Branch, assisted by Gene Sirmon of the Croatan District. The purpose of the evaluation was to determine the importance of pine reproduction weevils as a factor causing mortality in low-pocosin plantations.

Methods and Materials

Three areas, planted in January, 1963, were examined for evidence of weevil activity (Fig. 1). These areas are designated as follows:

Area 1 -- An eight acre block adjacent to the Black Swamp Road. All existing vegetation, including a considerable number of small pond pines, Pinus serotina, was cut with a rolling chopper and disked during the fall of 1962.

Area 2 -- A 480 acre block adjacent to the Catfish Road, previously planted in 1957. Rows were cut at 7' intervals with a rolling chopper and planted by machine immediately after.

Area 3 -- A 320 acre block adjacent to the Catfish Road, previously planted in 1956. Rows were plowed with a fire plow and seedlings were planted immediately after on the side of the berm.

A sample of three rows of approximately 80 seedlings each were examined in each area and were classified as follows:

Apparently healthy -- Living seedlings with no evidence of insect injury since they were planted.

Weeviled -- Living or dead seedlings with feeding injuries that are characteristic of adult weevils.

Killed by other agent -- Dead or dying seedlings, with no visible weevil injury, that are the result of poor planting technique, freezing or other undetermined causes.

The data were summarized and analyzed in contingency tables, using chi-square in an attempt to detect differences in levels of weevil activity. In addition, weevil traps consisting of radial discs cut from a green loblolly pine were set in each area, and the weevils that came to the traps were collected the following morning. These served as an index to compare the weevil population levels in each area.

Technical Information

Causal agent -- Examination of adults collected in reproduction weevil traps indicate that the causal agent is the pales weevil, Hylobius pales (Hbst.). The closely related pitch-eating weevil, Pachylobius picivorus, Germ., may also be causing some damage but since no specimens of the latter species were collected, it is concluded that the primary causal agent is the pales weevil.

Host trees attacked -- Loblolly pine, Pinus taeda L., was the only species observed attacked.

Type of damage -- Damage is caused by the adult, which feeds on the tender bark and twigs of pine seedlings. The feeding girdles the seedlings and subsequently kills them.

Biological data -- The immature stages of this insect are of no economic importance because brood development takes place beneath the bark of dying pine stumps or roots. On the Croatan District, brood development was observed in dying loblolly pine that was planted in 1957 where weevil brood was associated with Ips grandicollis and termites.

No evidence of biological control agents was observed.

Environmental Factors -- Analysis of the seedling samples indicated the following: (Tables 1 & 2).

1. Weevil activity and mortality from other factors was significantly higher in Area 1 than Area 2.

2. Weevil activity was significantly higher in Area 1 than Area 3. However, there were no differences in mortality due to other causes.

3. There was no difference in the level of weevil activity on Areas 2 and 3. However, there was a significantly greater mortality due to "other agents" on Area 3. 1

The only major difference observed between these areas was that the vegetation in Area 1 was chopped and disked the previous fall, therefore, a considerable volume of fresh pond pine slash was present. The presence of this slash could have attracted large numbers of adult weevils during the fall; these overwintered in the litter and were present when the seedlings were planted.

TABLE 1 -- Summary of loblolly pine plantation mortality survey - Croatan District, June, 1963.

Area	Condition of Seedlings			Total
	Apparently Healthy	Weeviled	Other Causes	
1	78	131	31	240
2	140	13	8	161
3	173	13	56	242

1/ Since this mortality did not appear to be caused by insect, the reasons for this difference were not determined.

**TABLE 2 -- Summary of contingency analysis, plantation mortality survey -
Croatan District, June, 1963**

Test	Degrees of Freedom	Chi-Square		
		Area 1 vs. Area 2	Area 1 vs. Area 3	Area 2 vs. Area 3
Level of weevil activity and mortality by other causes	2	116.90*	139.89*	24.36*
Level of weevil activity	1	90.60*	139.27*	1.25
Level of mortality by other causes	1	26.20*	.59	23.09*

* -- Population levels significantly different at the .001 level where chi-square = 10.8 for one degree of freedom and 13.8 for two degrees of freedom.

Location and intensity of outbreak -- For the locations of the outbreak, see Figure 1.

Differences in population levels of adult weevils as indicated by trap collections were not analyzed statistically. These indicate, however, that there was a significantly higher adult weevil population in Area 1 (Table 3).

**TABLE 3 -- Summary of weevil trap collections - Croatan District, June
6, 1963**

Area	Number of Traps	Total Number of Adults Collected	Mean/Trap
1	6	53	8.83
2	6	7	1.16
3	6	10	1.66

On the basis of these collections, plus the data obtained from the seedling survey, it is concluded that H. pales is epidemic in the eight acre block designated as "Area 1". The degree of damage in Areas 2 and 3 is considered as normal or endemic.

Impact of control on other resources -- Since chemical control is not being considered here, this section is not applicable.

Discussion

The fact that weevil broods were found in dead and dying saplings planted several years before, indicates that these trees are weakened. They serve as a source of local population increases of H. pales and brood, which emerges from them, will find an abundant supply of food in areas which are replanted. Therefore, H. pales must be regarded as a potential pest in all areas which are to be replanted.

Top dips consisting of a 2% Aldrin solution are available, which give seedlings reasonably good protection against attack by H. pales (Speers, 1958). It is questionable, however, as to whether the cost of dipping, added to an already high site preparation and planting cost, can be justified.

Recommendations

Site preparation methods, as used in Area 1, are apparently attracted to H. pales. If such methods are continued it is advisable to delay planting for two to three growing seasons after treatment, unless seedlings are dipped prior to planting.

References Cited

Craighead, F. C. - 1950. Insect Enemies of Eastern Forests. USDA Misc. Publ. 657: 285-286.

Speers, C. F., 1958. Effectiveness of Three Concentrations of Aldrin on pales weevil control methods. USDA, Southeast Forest Experiment Station, Asheville, N. C. Res. Note 124.

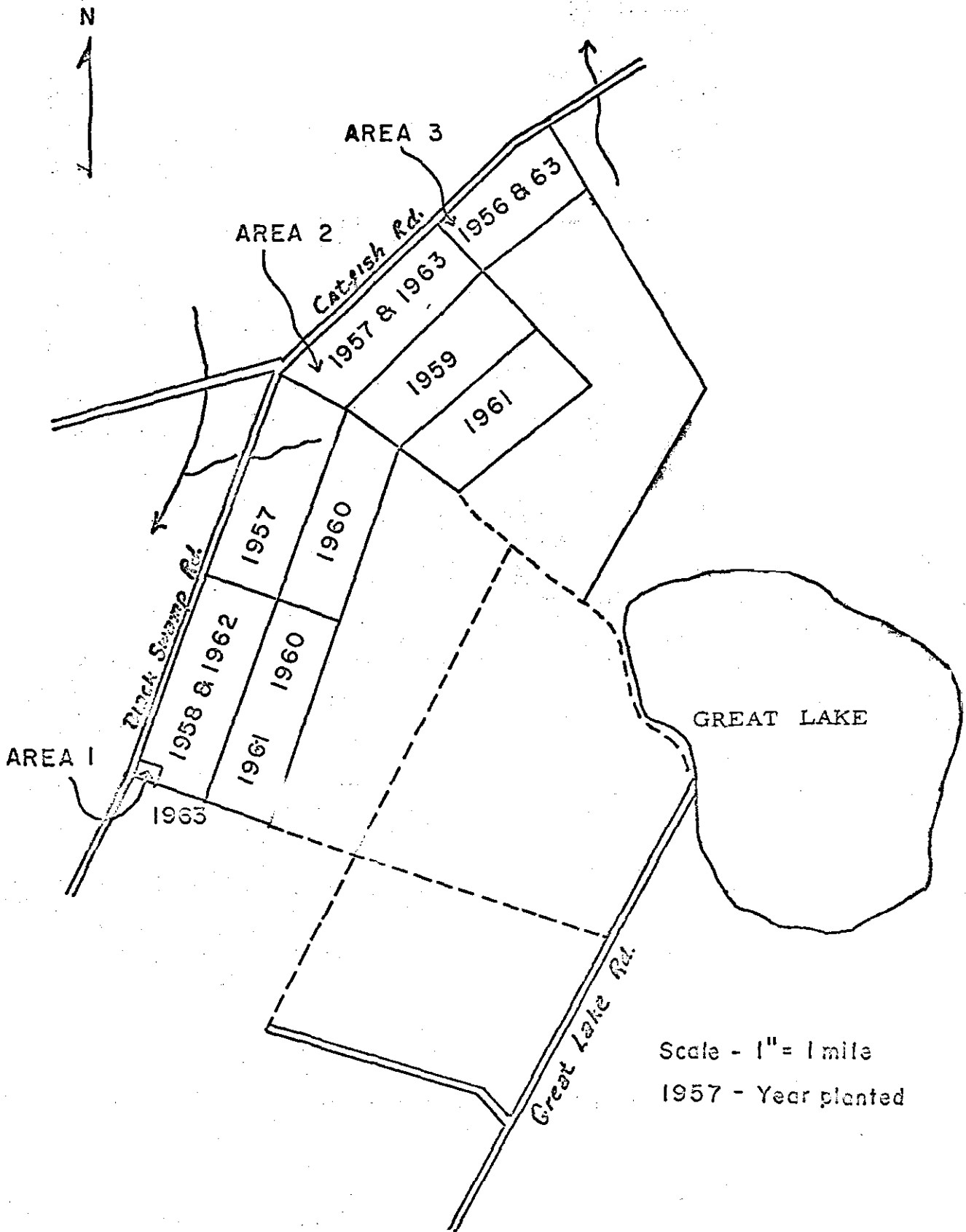


Fig. 1. Location of pocomin plantations and areas surveyed for weevil activity - Croatan District June 1963