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PALES AND PITCH-EATING WEEVILS: RATIO AND PERIOD OF ATTACK IN THE SOUTH

Abstract.--Weevils were trapped for 3 years after a pine stand was cut near Asheville, North Carolina, and for 14 months after a pine stand was cut near Olustee, Florida. Of the weevils collected in North Carolina, about 89 percent were pales, Hylobius pales (Herbst), 8 percent were pitch-eating, Pachylobius picivorus (Germar), and 3 percent were Pissodes spp. In North Carolina. weevil activity ceased in the early part of October or November each year and did not resume until spring. Of the weevils collected in Florida, 66 percent were pales and 34 percent were pitch-eating. In Florida, adults were active the year round and activity was restricted only in December and January. Disking and burning of the Florida site in early November was followed by an immediate renewal of weevil attraction, indicating that these measures probably increase rather than decrease the likelihood of additional weevil damage.

Reproduction weevils are medium-sized snout beetles that feed on the tender bark and cambium of pine trees. The feeding often causes serious injury or death of small trees.[1] The principal species in the South are the pales weevil, Hylobius pales (Herbst), and the pitch-eating weevil, Pachylobius picivorus (Germar). Minor species include various Pissodes such as the white-nine weevil and deodar weevil.

Severe seedling damage in the South has caused an increased concern about better methods of controlling these weevils. The species composition and period of adult activity must be determined before control studies can be initiated. We selected trapping as the best means of obtaining this information.

TRAPPING STUDIES

In December 1955, a half-acre stand of shortleaf (Pinus echinata Mill.) and Virginia (Pinus virginiana Mill.) pines in the mountains near Asheville, North Carolina, was clearcut. After the area was planted with Virginia pine the following spring, 14 traps were installed. Each trap consisted of two or three fresh-cut bolts of shortleaf pine,' 2 to 3 inches in diameter and 18 inches long, laid in a shallow trench on a piece

[1] **Speers, Charles F. Pales weevil. USDA Forest Serv. Forest Pest Leafl. 104, 4 pp. 1967.**

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of muslin and covered with green pine boughs. These traps were patterned after those of the British Forestry Commission.[2] All bolts and branches were replaced with fresh material biweekly and then sprayed with a 2-percent aldrin emulsion. Spraying killed the weevils coming to the traps and eliminated the need of making daily collections of live weevils. (Our studies have indicated that aldrin is neither a weevil attractant nor a repellant.) The cloth under the traps allowed us to recover the dead insects more easily. The weevils were collected at about 2-week intervals and their number and species recorded.

A second trapping study was conducted near Olustee, Florida, to determine the seasonal occurrence and species composition of weevils in the Deep South. Four traps were installed in March 1958 in a 5-acre tract of longleaf pine (Pinus palustris Mill.) that had been clearcut the previous October. The traps were of similar construction, and were treated in the same manner, as those in North Carolina, but the host material was changed at monthly intervals and weevils were collected at about 2-week intervals. The site was disked and burned in early November 1958.

WHAT DO THESE STUDIES SHOW?

In North Carolina, 3,724 weevils were trapped the first year, 794 the second year, and 137 the third year (table 1). The life history of these insects indicates that the weevils captured the first year were all attracted from the surrounding forest. During the second year, the catch up through June represented weevils attracted from the surrounding forests; those captured after June represented weevils that emerged from stumps after breeding in the area plus weevils attracted from the surrounding area. The weevils collected the third year represented an endemic population that could be trapped in any uncut pine stand, because by that time the stumps had lost their attractiveness to flying weevils and all brood had emerged from the stumps. In each of the 3 years, pales weevils made up 85 to 90 percent of the population trapped, whereas the pitch-eating weevil made up 4 to 8 percent and Pissodes about 3 percent (table 1).

Table 1. --Reproduction weevils trapped during a 3-year period after a pine stand was cut in North Carolina

Years since cutting	Hylobius pales		Pachylobius picivorus		Pissodes spp.		Total
	Number	Percent	Number	Percent	Number	Percent	Number
1	3,296	89	301	8	127	3	3,724
2	715	90	60	a	19	2	794
3	117	85	5	4	15	11	137
Total	4,128(89%)		366(8%)		161(3%)		4,655(100%)

[2] Anonymous. The large pine weevil (Hylobius abietis). Great Brit. Forest. Comm. Leafl. 1, 9 pp. 1952.

Table 2. --Number of weevils collected biweekly in North Carolina during the first, second, and third years after cutting of a pine stand

Period of collection	1st year'			2nd year			3rd year		
	Hylobius pales	Pachylobius picivorus	Pissodes spp.	Hylobius pales	Pachylobius picivorus	Pissodes spp.	Hylobius	Pachylobius picivorus	Pissodes spp.
	Number								
Mar. 1-15	--	--	--	0	0	0	0	0	0
Mar. 16-31	--	--	--	27		1	0	0	0
Apr. 1-15	--	--	--	156	1	10	19	0	3
Apr. 16-30	--	--	--	307	4	2	27	0	
May 1-15	--	--	--	72	1	0	28	1	8
May 16-31	1,046	40	0	34	1	0	14	2	0
June 1-15	629	49	0	12	0	0	6	0	0
June 16-30	414	67	0	14	2	0	12	2	1
July 1-15	354	40	0	5	2	0	0	0	0
July 16-31	438	48	0	19	5	0	5	0	0
Aug. 1-15	112	18	0	17	12	2	3	0	0
Aug. 16-31	92	1	12	21	16	4	0	0	0
Sept. 1-15	37	1	31	16	10	0	1	0	1
Sept. 16-30	48	0	61	13	5	0	1	0	1
Oct. 1-15	40	12	19	2	0	0	1	0	0
Oct. 16-31	22	21	2	0	0	0	0	0	0
NOV. 1-15	4	4	2	--		--	--	--	--
NOV. 16-30	0	0	0	--		--	--	--	--

'Area cut in December of previous year.

Table 3.--Number of weevils collected biweekly in Florida during a period of 14 months after cutting of a pine stand'

Period of collection	Hylobius pales	Pachylobius picivorus
	Number	
Mar. 1-15	--	--
Mar. 16-31	10	2
Apr. 1-15	8	4
Apr. 16-30	17	10
May 1-15	6	6
May 16-31	20	14
June 1-15	5	4
June 16-30	5	1
July 1-15	11	4
July 16-31	4	5
Aug. 1-15	4	3
Aug. 16-31	0	6
Sept. 1-15	5	6
Sept. 16-30	3	3
Oct. 1-15	2	6
Oct. 16-31	2	5
NOV. 1-15[2]	--	--
NOV. 16-30	40	3
Dec. 1-15	3	2
Dec. 16-31	2	1
Jan. 1-15	3	2
Jan. 16-31	8	1
Feb. 1-15	20	3
Feb. 16-26	13	3
Mar. 1-15[3]	--	--
Mar. 16-31	13	2
Apr. 1-15	9	8
Apr. 16-30	8	6
May 1-15	2	6
May 16-31	--	--

'Area cut in October of previous year.
[2] No collection, area burned and disked.
[3] No collection, area repeatedly flooded.

As shown by the biweekly collections (table 2), the weevil population in the mountains of North Carolina was highest in April and May of each year; it then gradually diminished except for a slight rise in August and September. Activity ceased in the early part of October or November in each year and did not resume until spring. The extremely high collection of weevils during the first collection period represented an accumulation of weevils in the area prior to the initiation of the study.

The data collected in Florida show that, in warmer parts of the South, adult weevils are active the year round and activity is restricted only in December and January (table 3). The weevils do not enter diapause, as is commonly indicated in the literature, but merely become inactive at low temperatures, increasing their activity rapidly by February.

In Florida, a total of 223 pales weevils and 116 pitch-eating weevils

were trapped during the 14-month study. Proportionally, pitch-eating weevils were more prevalent in the Deep South than in North Carolina: 34 percent of the weevil population in Florida and only 8 percent in North Carolina were Pachylobius. Pales represented 89 percent of the population in North Carolina and only 66 percent in Florida.

The greater proportion of pitch-eating weevils over pales weevils in the Deep South has been corroborated by other studies. Reports of the Southern Forest Experiment Station indicate that pitch-eating weevils greatly outnumber pales weevils along the gulf coast. At the Harrison Experimental Forest in Mississippi, 96 percent pitch-eating weevils and only 4 percent pales weevils were collected in light traps.[3] In east Texas, a series of traps similar to those used in our study attracted '78 percent pitch-eating weevils and 22 percent pales weevils during May and June[4] and 8'7 percent pitch-eating weevils and 13 percent pales weevils during August and September."

The data collected in our study and in other studies indicate that the ratio of the two species is considerably different in North Carolina than in warmer parts of the South. These differences in ratio coupled with differing habits and life cycles of the two species could have important implications in control efforts. Obviously, control measures in warmer parts of the South must be taken at a much earlier time of year than they are further north. Also, the longer life cycle of the pitch-eating weevil in comparison with that of the pales weevil could be an important factor in the timing of control operations.

Frequently, we are asked if burning-over an area after cutting will control the weevils. At the Florida site, disking and burning in early November were followed by an immediate renewal of attraction (table 3). These data demonstrate that operations such as disking and burning serve as rapid and strong attractions to weevils and probably increase rather than decrease the likelihood of weevil damage.

In addition to determining when and in what proportion the various species of weevils attack pine reproduction in the Southern Appalachians and in the Deep South, the following conclusions may be drawn from these studies:

(1) Weevil Control--These studies have shown that traps attract large numbers of weevils. As a means of preventing weevil damage, traps may be used on small areas to supplement chemical treatment of valuable seedlings.

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[3] USDA Forest Service. South. Forest Exp. Sta., Div. Forest Insect Res., Bi-Mon. Progr. Rep.. 5 pp. May-June 1956.

*USDA Forest Service. South. Forest Exp. Sta., Div. Forest Insect Res., Quart. Progr. Rep., 11 pp. Apr. -June 1957.

[5] USDA Forest Service. South. Forest Exp. Sta., Div. Forest Insect Res., Quart. Progr. Rep., 17 pp. July-Sept. 1957.

(2) Determining Periods of Weevil Activity--For the best timing of local control measures, it is very important to know when insect activity begins and ends. Traps may be used for this purpose.

(3) Detection of Weevils--Trapping can be used to detect the presence and intensity of weevil activity in cutover areas. If traps indicate that weevils are present in large numbers, the seedlings may be protected by prompt control action.

(4) Determination of Weevil Species Causing Damage--Although trees dying from weevil attack are commonly seen, the weevils themselves are rarely observed because they feed at night and hide in the soil during the day. Trapping is a quick and convenient method of determining if weevils are the cause of the observed seedling mortality and the insect species concerned.

(5) Study Purposes--When weevils are needed for life-history, behavior, or control studies, or for use in educational or extension work, sprayed or unsprayed traps provide an easy and excellent means of collecting specimens in recently cut pine stands.

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