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LIVE BRANCHES ON PINE STUMPS DETER PALES WEEVIL BREEDING IN MICHIGAN (COLEOPTERA: CURCULIONIDAE)Jeffrey A. Corneil¹ and Louis F. Wilson²

ABSTRACT

Eastern white pine and Scotch pine stumps with living branches were unattractive to pales weevil for breeding. When feasible, leaving a few lower branches on Christmas tree stumps during harvest should prevent weevil buildup.

Pine stumps are the major breeding material for the pales weevil, *Hylobius pales* (Herbst) (Pierson 1921, Finnegan 1959). While studying the pales weevil in Christmas tree plantations in Michigan (Corneil and Wilson, 1984), we noticed that stumps left with a whorl of living branches were not used for breeding. In Wisconsin, however, Goyer et al. (1971) reported that pales weevils attacked living Scotch pine (*Pinus sylvestris* L.) trees and stumps left with a living whorl of branches. Our study was made in two Michigan Christmas tree plantations on Scotch pine and eastern white pine, *P. strobus* L., to determine if pine stumps with a living whorl of branches intact would be used by pales weevil for breeding.

METHODS AND MATERIALS

A preliminary test was made in July 1979 on 30 Scotch pine Christmas trees in a plantation in Tuscola County, Michigan (T11N, R8E, S1). Fifty percent of the trees were cut so the stumps were left with a whorl of live branches; the other 50% were cut leaving no branches. All stumps were dug up in September, examined for weevil injury, and then recorded as infested or not.

Encouraging results of the first trial prompted a second test in 1980. In July, 30 more Scotch pine and 30 eastern white pine trees were selected in another Christmas tree plantation in Genesee County, Michigan (T9N, R5E, S22). Fifty percent of the trees of each species were cut and left with branches as before; the remaining 50% were cut leaving no branches. In September, seven stumps were selected randomly from each species and treatment group, dug up, and taken to the laboratory for dissection. The bark was removed from each stump, and the number of pales weevil larvae, pupae, adults, and empty pupal cells were counted to determine the level of attack.

RESULTS AND DISCUSSION

In the 1979 preliminary test, only Scotch pine stumps left with branches intact were uninfested by the pales weevil. All stumps with branches removed, however, were infested. Similarly in the 1980 test, eastern white pine and Scotch pine stumps with live branches did not have any sign of the pales weevil or its injury, nor was there apparent feeding nor oviposition. All but one stump without branches were infested (Table 1). The uninfested stump was partially rotted and attacked only by the northern pine weevil,

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Table 1. Number of pales weevil attacks on eastern white pine and Scotch pine stumps, with and without living branches, in the 1980 test.

Sample number	Stumps with branches		Stumps without branches	
	E. white pine	Scotch pine	E. white pine	Scotch pine
1	0	^a	31	9
2	0	0	21	77
3	^a	0	32	38
4	0	0	19	29
5	0	0	33	0 ^b
6	0	0	22	50
7	0	0	8	6
Total	0	0	166	209

^a Branches on these stumps died during the summer. White pine and Scotch pine stumps had 14 and 74 attacks, respectively.

^b Stump was partially rotted and contained only *Pissodes approximatus*.

Pissodes approximatus Hopkins. Though this sample was small, Scotch pine stumps averaged 34.8 attacks and were apparently preferred over eastern white pine, which averaged 23.7 attacks.

Apparently, as long as branches left on the stumps remained alive, the stumps were unattractive to the weevil for breeding, unlike the situation reported by Goyer et al. (1971) in Wisconsin. When branches died on two stumps in our test, weevils readily attacked them; one white pine had 14 and one Scotch pine had 74 attacks (Table 1). These findings were further supported by the observations of some Michigan Christmas tree growers that used tip-up stump culture, in which a lower branch is left on the stump and later shaped into a Christmas tree. When growers stopped using stump culture and cut their trees normally, problems with the pales weevil began again.

Goyer et al. (1971) also reported flagging of living Scotch pine trees and tree mortality from larval pales weevil feeding in the roots. Examination of six injured Christmas tree plantations showed flagging, but it was always associated with adult feeding and not larval injury. No whole-tree mortality was observed.

In a heavily infested Christmas tree plantation, we examined several living Scotch pines for root feeding by the weevil and found none. The reason for these differences between Wisconsin and Michigan Christmas tree plantings is unknown. Perhaps the trees must be heavily stressed before pales weevils will attack living trees or stumps with live branches. Most pales weevil problems in Michigan are in the "thumb" area where soils are better than average for Christmas tree growth and vigor, and only branchless stumps are attacked there.

Goyer et al. (1971) were also dealing with a complex of three *Hylobius* species: *pales*, *radicis* Buchanan, and *rhizophagus* Millers. Flagging due to larval feeding is normally associated only with *H. rhizophagus*, but Goyer et al. (1971) noted that 60% of the trees with flags were injured only by larval pales weevils. Unless the adults they reared were misidentified, this means there is a strain, new species, or perhaps a hybrid weevil that is as destructive to living trees as *rhizophagus*. We recorded a *Hylobius* complex on Scotch pine in several stands in Michigan but found only *radicis* and *rhizophagus*, and only where trees were grown for stump culture of Christmas trees but later abandoned (Mosher and Wilson 1977).

In Michigan *radicis* and *rhizophagus* have not yet been a problem where *pales* is important. So, until pales weevils take on a new role and attack living trees in Michigan, we recommend when practicable leaving a whorl of live branches on stumps until final harvest to prevent pales weevil injury. Then destroy the stumps before establishing a new plantation.

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