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INCIDENCE AND LOCATION OF EASTERN PINESHOOT BORER DAMAGE IN SOME SCOTCH PINE CHRISTMAS TREE PLANTATIONS IN MICHIGAN (LEPIDOPTERA: OLETHREUTIDAE)¹

M. McKeague and G. Simmons²

ABSTRACT

A survey of Christmas tree farms in Michigan revealed that 26% of the Scotch pine Christmas trees have one or more shoots injured by the eastern pineshoot borer, *Eucosma gloriola* Heinrich. Most attacks occurred on lateral branches in the top half of the tree. Only 2% of the observed trees had pineshoot borer injury on the terminal leader. Control except for normal shearing, was not recommended for most plantations.

The eastern pineshoot borer, *Eucosma gloriola* Heinrich, (Lepidoptera: Olethreutidae) which is injurious to Christmas trees, is distributed throughout the northeastern U.S. and southern Canada. It feeds in the new shoots of Scotch pine, *Pinus sylvestris* L.; eastern white pine, *Pinus strobus* L.; jack pine, *Pinus banksiana* Lamb.; red pine, *Pinus resinosa* Ait.; Austrian pine, *Pinus nigra* Arnold; mugho pine, *Pinus mugho* Turra; and occasionally on white spruce, *Picea glauca* (Moench) Voss and Douglas fir, *Pseudotsuga menziesii* (Mirb.) Franco (Baker, 1972; Wilson, 1977). Its preferred host, however, is Scotch pine saplings from 3 to 8 feet tall (Wilson, 1972).

The pineshoot borer is sometimes a pest in Michigan's Christmas tree plantations (Wilson, 1977) since approximately 85% of the trees grown are Scotch pine³. It does not kill the tree but its feeding is detrimental to the tree's form and aesthetic appeal, as the dead, brown tips are unattractive to Christmas tree buyers. Repeated damage to new branch tips, especially terminal leaders, can cause bushiness and forked trunks. In the fall of 1977, 21 Christmas tree farms in Michigan were surveyed to determine the extent of injury caused by this pineshoot borer.

METHODS

Scotch pine Christmas tree plantations in 11 counties in Michigan's Lower Peninsula (Fig. 1) were surveyed for eastern pineshoot borer damage. Several plots were chosen in each of the 21 plantations, each plot in a different aged (sized) stand. Each plot consisted of 40 trees; a plot being determined by randomly choosing a location in a stand and examining the closest 40 trees. For each plot the following data were recorded: the number of injured shoots, location of the injury (i.e. terminal leader or laterals in the top or bottom half of the tree), and tree height. The injury present in early fall was surveyed because the hollowed-out shoots turn brown and usually bend over at right angles at that time, making it very noticeable. These bent-over, brown tips and the exit hole at the base of the injury are reliable identifying characteristics of injury by *gloriola*.

RESULTS AND DISCUSSION

The eastern pineshoot borer was found to be widespread throughout the Lower Peninsula of Michigan, but at low population densities. Damage was observed in all but

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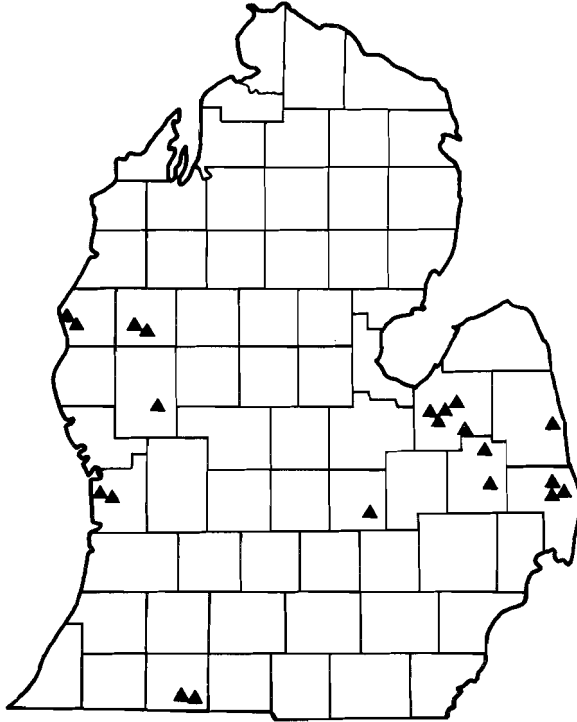


Fig. 1. Christmas tree plantations surveyed in the Lower Peninsula of Michigan.

four plots out of 52 surveyed. About 26% of all trees observed had one or more injured shoots, with the percentage of trees attacked ranging from 0 to 97% per plot (Table 1). A maximum of nine injured shoots per tree was observed in one plot. In examining genetic differences of Scotch pine varieties to attack by the eastern pineshoot borer, Steiner (1974) found that some varieties were attacked 10 times as heavily as others in the same plantations. This may help to account for the large differences observed between plots.

The incidence of attack for all trees observed averaged less than one (0.83) shoot per tree. The mean number of damaged shoots per attacked tree was 3.23, suggesting a tendency for the female moth to lay several eggs on one tree before moving to the next one. The results show the damaged shoots to be heavily concentrated (99%) on the laterals in the top half of attacked trees.

Drooz (1960) found a high incidence of terminal leader attack on Scotch pine by *gloriola* in Pennsylvania making it a serious problem to Christmas tree growers there. In this study, however, only 2% of the trees had terminal leader injury. The highest incidence of attack (25%) occurred on lateral branches in the top one or two whorls of branches. Lateral shoot injury is far less serious than terminal injury. When branch tips have been killed, the tree reacts as if it has been sheared and sets buds just below the dead portion of the injured shoot. Bushiness will result, which is a desirable characteristic for Christmas trees.

Butcher and Hodson (1949) found that this pineshoot borer (erroneously listed as *E.*

Table 1. Location of damage by eastern pineshoot borer on Scotch pine Christmas trees in Michigan.

	Location of Injury		
	Terminal Shoot	Laterals	
		Top half of tree	Bottom half of tree
Damage on all trees observed	2%	25%	2%
Damage on attacked trees	7%	99%	9%

sonomana Kearfott⁴) on jack pine preferred larger trees presumably because there is more food available on them. Our data suggested a slightly higher incidence of eastern pineshoot borer attack in the 3-4 foot size class, but differences between size classes were not significant at the 5% level (analysis of variance). Shearing the trees for the Christmas tree market might disguise a heavier attack of larger trees by the eastern pineshoot borer, since trees under 3 feet are seldom sheared.

Christmas trees are usually sheared in June and July while the eastern pineshoot borer larvae are still feeding inside the shoot, causing some of the infested shoots to drop off. Once the shoot is cut off the tree, the larva inside dies before completing its development. Normally, the full grown larva drops to the ground to pupate between mid-June and early July (Wilson, 1972). Therefore, if shearing is done before the insect is ready to pupate, it reduces the populations of the eastern pineshoot borer. Infested shoots, however, are not always recognizable at shearing time because they generally do not turn brown until late July (Wallner, 1975).

The results of this survey indicate that the eastern pineshoot borer is currently a minor pest in Michigan's Scotch pine Christmas tree plantations. At these low population densities and damage levels, attempts at control except for normal shearing are not recommended.

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