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Distribution of eggs and leaf mines of *Choristoneura houstonana* (Lepidoptera: Tortricidae) attacking eastern red cedar, *Juniperus virginiana*

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DISTRIBUTION OF EGGS AND LEAF MINES OF *CHORISTONEURA HOUSTONANA* (Lepidoptera: Tortricidae) ATTACKING EASTERN REDCEDAR, *JUNIPERUS VIRGINIANA*[1]

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ABSTRACT

Cedar at Larned, Kansas, appeared to be more severely damaged in the upper and southern portions of the trees. There was a significant difference, in numbers of eggs and leaf mines, between the upper and lower halves and between compass directions; the upper and southern portions of the trees being most highly infested.

INTRODUCTION

Choristoneura houstonana (Grote) is a pest of eastern red cedar, *Juniperus virginiana*, grown as a home landscape ornamental in shelterbelts and windbreaks in western Kansas. It has been present for many years but the first reliable record in Kansas was in 1964, when it was sent for identification by Richard Beams, the assistant agricultural agent of Rooks County. Study was begun in 1964.

Lindquist and Bowser (1966) studying the biology of the leaf miner, *Chrysopeleia ostryaella* Chambers (Cosmopterygidae), found that the upper portion of the crown of an ironwood tree contained more mines per leaf than the middle and lower portions. Stark (1952) found about twice as many larvae of lodgepole needle miner, *Coleotechnites milleri* (Busck), in the upper crown than in the lower crown. Prentice (1955) found a significant difference between crown levels infested with larvae of the large aspen tortrix, *Choristoneura conflictana*, but did not state which level had the most larvae. He reported no significant directional differences in distribution.

Eggs of *C. houstonana* are deposited singly on foliage of the trees in July. The larvae, on hatching, usually spin an entrance cocoon near the egg and begin leaf mining. Larvae continue to mine through late summer and fall. Chorions of hatched eggs remain on the foliage several days before falling off.

METHODS

Samples were obtained from globe shaped trees approximately 2.4 m tall at the Larned, Kansas, Country Club. Samples of foliage were

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TABLE 1. Vertical distribution of eggs and leaf mines expressed in number per gram of foliage.

	Eggs	Mines	
Crown level	1966	1965	1966
Upper	0.519	2.780	0.565
Lower	0.254	1.710	0.390
	(29.71)[a]	(30.69)[a]	(11.61)[a]
	(7.43)[b]	(6.97)[b]	(7.43)[b]

[a] Calculated F.
[b] F required to be significant at the .01 level.

removed from eight directional locations in the upper crown and from eight locations in the lower portions of the crown. In August, 1965, shoots were collected from 12 trees from which 5 g samples were cut and the number of mines in each sample recorded. In July and August, 1966, samples were collected from six trees to determine the number of hatched and unhatched eggs and mines. Fifteen gram samples were examined in 1966 because of a lower population. Eggs and mines were expressed as number per gram of foliage. The data were subjected to an analysis of variance. Means for the upper and lower directional locations were averaged and Duncan's multiple range test was run, to determine significance of directional means.

RESULTS AND CONCLUSIONS

Significant differences among trees, crown levels and directions on the trees were demonstrated for both eggs and mines, both in 1965 and 1966.

Upper crown levels contained significantly more eggs and mines than lower crown levels, in both 1965 and 1966 (Table 1).

TABLE 2. Mean number of eggs and leaf mines per gram of foliage at eight directional locations.[a]

	Leaf mines		Eggs
Location	1965[b]	1966	1966
North	1.734fgh	0.276cdefg	0.173cdefgh
Northeast	1.922fg	0.345bcdef	0.217cdefg
East	2.284ef	0.469bcd	0.419abcd
Southeast	3.187d	0.463bcde	0.388bcde
South	4.116ab	0.915a	0.671a
Southwest	4.253a	0.587b	0.554ab
West	3.890abc	0.490bc	0.426abc
Northwest	2.642de	0.253cdefgh	0.233cdef

[a] Means followed by the same letter are not significantly different at the .01 level. Duncan's multiple range test.
[b] Data transformed to $\sqrt{x+1}$.

In 1965 significantly more mines occurred in the south, southwest and west portions of the trees. The southwest had the highest, and the north the lowest number (Table 2). In 1966, eggs were most numerous on the south and least numerous on the north. The south was significantly different from the southeast, northwest, northeast and north. In 1966, a significant difference in leaf mines was found between south and each other location. The northwest had the least. The greater number of mines compared to eggs, in 1966 (Table 2) may have resulted from the chorion of the hatched egg falling from the tree.

Eggs and larval mines were unevenly distributed within a tree. It appeared that more larvae in upper and southern portions of trees caused the most severe damage. Because the number of larvae and mines coincided with the number of eggs deposited in a given part of a tree, it is concluded that larvae do not migrate far from the egg after hatching. Extensive observations on the behavior of ovipositing moths in relation to moonlight, wind direction and temperature, were planned during 1966 but low populations limited observations.

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