SPATIAL AND TEMPORAL DISTRIBUTION OF WEEVILED ACORNS WITHIN A NORTHERN RED OAK SEEDLING ORCHARD

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SUMMARY

Acorn insects can have a severe impact on mass production and regeneration. Gibson (1972) reported losses of 10 to 100 percent of acorn crops in stands of white oak, whereas Gibson (1982) reported losses of up to 96 percent in stands of northern red oak. Acorn insects can be divided into two groups: primary and secondary insects. The primary insects include the *Curculio* weevils, filbertworms, and gall wasps, and damage acorns directly to introduce larvae. The secondary insects include acorn moths, midges, and *Conotrachelus* weevils, and take advantage of existing holes or damage. The most damaging of all these insects are the *Curculio* weevils, with 23 species recorded on oak in North America, often accounting for most, if not all, damage caused by acorn insects. Myers (1978) found that weevils accounted for half of the 62 percent loss of acorns in stands of white, black, northern red, and scarlet oaks in Missouri between 1973 and 1976; wildlife only took 11 percent. Three or four species of *Curculio* weevils can be present at the same time in a forested stand or seed orchard. Currently, there are no registered control products or tactics for acorn insects, although various pesticides are registered and used for related *Curculio* weevils in pecan and chestnut orchards. Adult weevils generally emerge from the forest floor in August and September, climb trees, mate, and lay eggs inside acorns. Larvae feed freely within acorns, often with numerous larvae inside the same acorn, until the acorns fall and larvae leave the acorns to burrow into the ground to depths approaching 12 inches. Larvae remain underground for about 2 years, pupate, and re-emerge as adults.

Our objective was to examine the level of acorn losses in a northern red oak seedling orchard in northeastern Tennessee, looking for relationships of damage with the size of acorn crops and time of acorn fall. In summer of 2000, 42 northern red oaks bearing acornets were selected at the Watauga Seedling Orchard in northeastern Tennessee. During the fall of 2000, all acorns falling from each tree were collected at 2-week intervals and floated to determine damage levels. Damaged acorns float while healthy acorns sink. Prior to floating, a subsample of 100 acorns was taken and dissected for comparison with the floating method. The level of damage to acorns at the Watauga Seedling Orchard in 2000 was 42 percent (SE = 2 percent), with 67 percent of the damage caused by weevils. Floating overestimated damage by 36 percent. Acorns that fell in early fall were more likely to be damaged by weevils (39 percent) than acorns that fell in late fall (10 percent). The levels of damage by weevils were higher in trees with small acorn crops than in those with large acorn crops ($r2 = 0.418$; $P < 0.01$).

LITERATURE CITED

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