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Evaluation of Four Systemic Insecticides Against the Cottonwood Twig Borer

JACK E. COSTER, ROBERT G. MERRIFIELD, and R. A. WOESSNER

Eastern cottonwood, *Populus deltoides* Bartrum, is one of the fastest growing trees in North America when planted on the most favorable sites. Its wood has a wide range of uses from furniture parts and cores to shipping containers and paneling. Its pulping characteristics are excellent. Because of its value and rapid growth, cottonwood is an excellent tree to grow in plantations.

The tree is attacked by numerous insects including leaf miners, sawflies, caterpillars, and borers. Throughout the South, however, the most serious pest is the cottonwood twig borer, *Gypsonoma haimbachiana* (Kearfott) (Morris 1958, 1967). The larvae of this olethreutid moth tunnel inside terminals and lateral branches. This activity results in killing or injuring the terminal bud and twig with subsequent loss in height and in objectionable forking.

Morris (1960) reported use of a dust containing 44% phorate and activated carbon as a dip at planting time. Granular phorate has also been evaluated against the cottonwood twig borer in a Mississippi study (Morris 1965). Treated trees showed significant increases in height and diameter after 5 years.

In 1968, aldicarb, carbofuran, and disulfoton granules were used in various combinations of root dips and side dressing in a newly established cottonwood plantation in Texas (R. G. Merrifield and N. H. Anderson, unpublished data). In these tests, all the chemicals provided a reduction in twig borer attacks, but the results were highly variable.

The present studies were undertaken in 1970 to determine further the effectiveness of 4 systemic insecticides against the cottonwood twig borer in Texas.

**Methods.**—The test plots were situated on the Texas A&M University farm, Burleson County. The soils on the test area are Norwood silt loam and Miller clays. These are alluvial deposits along the Brazos River and are considered highly productive soils for agriculture. Eastern cottonwood is found in natural stands along the river and appears well suited for these soils.

The trees used in the study grew from 20-in. cottonwood cuttings that had been planted at a spacing of 5×14 ft in April 1970. The insecticide tests were replicated 3 times; each replicate contained 160 trees and was arranged in a split-plot design.

The insecticides chosen for evaluation were 10% g formulations of aldicarb, carbofuran, disulfoton, and...
plorate. Each chemical was tested at 0, 1/4, 1, and 2 oz of 6 formulation/tree. The granules were placed in 4 holes made equidistant around the trees with a tree-planting bar. The specified dosage was placed in the holes to a depth of 6-8 in. and covered with soil. Insecticide applications were made May 14 and again Aug. 14.

The plots were cultivated 3 times during the season but received no irrigation or fertilization. Rainfall from April to September totaled about 16 in. However, 14.5 in. occurred during April, May, and September. June, July, and August were extremely dry.

Twig-borer damage was determined by counting the attacks on terminals or lateral branches. The 1st count was made June 25, 1970, and consisted of a tally of all twig borer attacks on the trees, since their average height at the time was only about 1.5 ft. The 2nd count was made Nov. 20. At this time, the average tree height was about 4.5 ft, so counts were made of attacks only on the top 15 in. of the uppermost terminal of each tree. Heights of all trees were measured June 25 and again Nov. 20.

**Results and Discussion.**—By June 25, 6 weeks after the 1st application of the chemicals, the only significant reduction in number of twig-borer attacks was for aldicarb and carbofuran at 1 and 2 oz/tree (Table 1). At this time, also, it was observed that about 15% of the trees in the 1- and 2-oz aldicarb plots exhibited marginal leaf burning. Signs of phytotoxicity were not found in any other plots.

The November count of twig borer attacks was made 14 weeks after the 2nd application of chemicals. Growth of the trees was completed and twig borer flight activity was nearly over. All the chemicals significantly reduced the number of attacks with the exception of disulfoton (Table 1). Average control for all rates of each insecticide was 15% for disulfoton, 55% for aldicarb, 63% for phorate, and 66% for carbofuran. The best control (82%) was achieved with carbofuran at 1 oz/tree followed by phorate (75%) at 1 oz/tree.

In spite of the fact that the attacks were reduced in number, height growth of the treated trees was not increased significantly. This phenomenon was thought to be due to lack of rainfall in the mid-growing season. The trees attained only about 2/3 of the height normally expected. In all cases, however, the height of the treated trees was greater than that of untreated trees, even though the differences were not significant.

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**REFERENCES CITED**


**Roller Cages for Study of Wood-Products Insects in Building Crawl Spaces**

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Beetles that destroy seasoned wood frequently initiate their infestations in the crawl spaces under raised buildings. Here untreated wood is available, and the environment is often favorable; the temperature is cooler and more stable than in most exposed parts of buildings, and the relative humidity is higher. The equilibrium moisture content of wood in crawl spaces typically is higher than in the rest of the building, and it constantly varies with changes in the rate of vaporization and condensation of moisture from the soil below. This environment is difficult and expensive to reproduce in a laboratory, and for many research purposes a crawl space serves as well as a controlled-environment chamber designed to simulate it.

The spaces under buildings were not designed for scientific experimentation, however. Since height normally varies from 1 to 3 ft, entry and maneuverability are difficult. Enclosure varies from negligible in open-pier construction to completely enclosed, dark, and unventilated in some buildings.

At the Wood Products Insect Laboratory in Gulfport, Miss., we have designed and built cages that roll on tracks attached to the undersurfaces of subflooring or floor joists (Fig. 1). The cages are easily inserted or removed for examination of wood test blocks. We think the system is excellent for study of Anobiidae and other structural pests in the habitat where they are usually destructive.

Our cages are 3 in. wide, 5 in. high, and 18 1/2 in. long. These dimensions permit inclusion of one 2 1/4 x 17-in. test block for life-history studies. Test pieces of this size are 1 Received for publication June 8, 1971. 2 Associate Entomologist.