4-1972

Evaluation of Four Systemic Insecticides Against the Cottonwood Twig Borer

Jack E. Coster

Robert G. Merrifield

R.A. Woessner

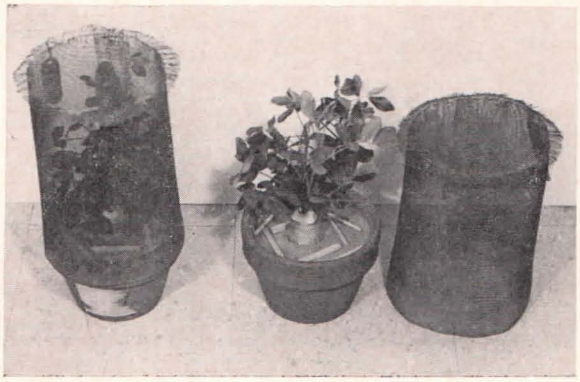

FIG. 1.—Screen-enclosed oviposition cage.

clay surface within screens were piled several masses deep and could not be counted accurately because of the debris adhering to their surfaces. Also eggs adhered to the clay surface of the pot when sticks were removed. These inaccessible eggs were partially responsible for the 46,300 difference for the 2 types of containers when both were held in the insectary. Availability of eggs was therefore an important factor in evaluating efficiency of technique.

In the insectary, general activity of adults in both type cages was high during daylight hours. However, movement was not oriented, and beetles were observed feeding infrequently. Beetles held in the rearing room in the dark were less active, but generally were found feeding or ovipositing whenever observed. Their feeding habits and degrees of activity had a marked effect on survival as indicated by mortalities of 63.3, 44.2, and 13.3% in the screened cages, metal cylinders held in the insectary, and metal cylinders held in the rearing room, respectively. Thus conditions maintained in the rearing room were

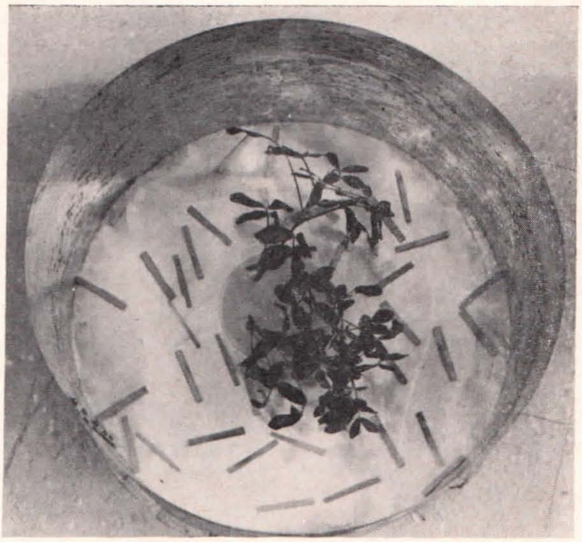

FIG. 2.—Metal oviposition cage with aluminum-foil floor.

apparently more conducive to extended survival of adults.

Maintenance of cylinders was minimum. The aluminum-foil floors were vacuum cleaned weekly to remove fecal material and plant debris.

As a result of the test, whitefringed beetles maintained by our laboratory for egg production are now held in metal cylinders at 80° ± 2°F and 90 ± 3% RH in darkness. Factors responsible for the change to the new conditions were (1) reduced maintenance time, (2) higher egg production, (3) more available eggs, (4) eggs free of debris, and (5) extended survival of adults.

Evaluation of Four Systemic Insecticides Against the Cottonwood Twig Borer[1,2]

JACK E. COSTER,[3] ROBERT G. MERRIFIELD,[4] and R. A. WOESSNER[5]

Eastern cottonwood, *Populus deltoides* Bartram, 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 loams 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

[1] Lepidoptera: Olethreutidae.
[2] Approved for publication as TA-9197 by the Director, Texas Agricultural Experiment Station. Received for publication May 28, 1971.
[3] School of Forestry, Stephen F. Austin State University, Nacogdoches, Tex. 75961.
[4] Department of Forest Science, Texas A&M University, College Station 77843.
[5] Texas Forest Service, College Station 77843.

phorate. Each chemical was tested at 0, ½, 1, and 2 oz of G formulation/tree. The granules were placed in 4 holes made equidistantly 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 signficant 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 (73%) 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 ⅔ 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.

ACKNOWLEDGMENT. — We thank R. C. Morris and L. Abrahamson of the Southern Forest Experiment Station, Stoneville, Miss., for reading the manuscript and offering helpful suggestions.

Table 1.—Mean number of *G. Haimbachiana* attacks per tree in eastern cottonwood plots treated with systemic insecticides. Insecticides applied May 14 and Aug. 14, 1970.

Insecticide per tree, oz	Insecticide[a] Phorate	Disul-foton	Carbo-furan	Aldicarb
June, 1970[b]				
0 (control)	0.20 a	0.29 a	0.27 a	0.20 a
½	.21 a	.21 a	.18 a	.12 a
1	.14 a	.21 a	.07	.10
2	.12 a	.20 a	.07	.07
Insecticide means	.16	.21	.11	.10
November, 1970[c]				
0 (control)	.57 a	.51 a	.61 a	.58 a
½	.29	.39 a	.22	.31
1	.15	.40 a	.11	.26
2	.18	.49 a	.18	.22
Insecticide means	.21	.43	.17	.26

[a] Means within a column followed by a common letter are not significantly different from the controls at the 5% level according to Dunnett's procedure.
[b] Number of attacks counted for entire trees.
[c] Number of attacks counted for uppermost 15-in. terminal.

REFERENCES CITED

Morris, R. C. 1958. Insect pests of cottonwood reproduction. Miss. Agr. Exp. Sta. Inform. Sheet 591. 2 p.
1960. Control of cottonwood insects with a systemic insecticide. J. Forest. 59: 718.
1965. Controlling insect damage to southern hardwood forests. Proc. 14th For. Symp., La. State Univ., p. 114–24.
1967. Biology of *Gypsonoma haimbachiana* (Lepidoptera: Olethreutidae), a twig borer in eastern cottonwood. Ann. Entomol. Soc. Amer. 60: 423–7.

Roller Cages for Study of Wood-Products Insects in Building Crawl Spaces[1]

LONNIE H. WILLIAMS[2]

Southern Forest Experiment Station, USDA Forest Service, Gulfport, Mississippi 39501

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 18½ in. long. These dimensions permit inclusion of one 2×4×17-in. test block for life-history studies. Test pieces of this size are

[1] Received for publication June 8, 1971.
[2] Associate Entomologist.