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Field Tests of Insecticides against *Plagiotrochus cornigerus**

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Pin oaks, *Quercus palustris* Muenchhausen, are one of the important shade trees in west Tennessee. The horned oak-gall wasp, *Plagiotrochus cornigerus* Osten Sacken, causes a deformation of the twigs and leaves of the tree. The twig gall is a knotty oval enlargement varying in size with hornlike projections which are tubular extensions from the cells of the gall makers (Fig. 1). The alternate generation develops in inconspicuous ovoid blister galls (Fig. 2) along the midrib of major veins of leaves (Felt 1940). According to Craighead (1950), in species of gallflies having alternation of generations, one generation consists only of agamic females, whereas the other consists of both males and females. The former, unisexual, overwinters; the latter, bisexual, reproduces sexually and is the summer stage.

In 1965, K. E. Stewart, an entomologist at the University of Toronto, Ontario, Canada, injected pin oaks with systemic insecticides to evaluate their effectiveness in controlling the leaf gall and the stem gall caused by the horned oak-gall wasp (unpublished information). He found oxydemeton-methyl EC at a rate of 25 g AI/in. diameter and technical demeton at a rate of 3 g AI/in. diameter were the best materials tested, each resulting in 83% control. In the present study we attempted to evaluate effectiveness of several systemic insecticides by applying them at the base of the tree.

* Hymenoptera: Cynipidae

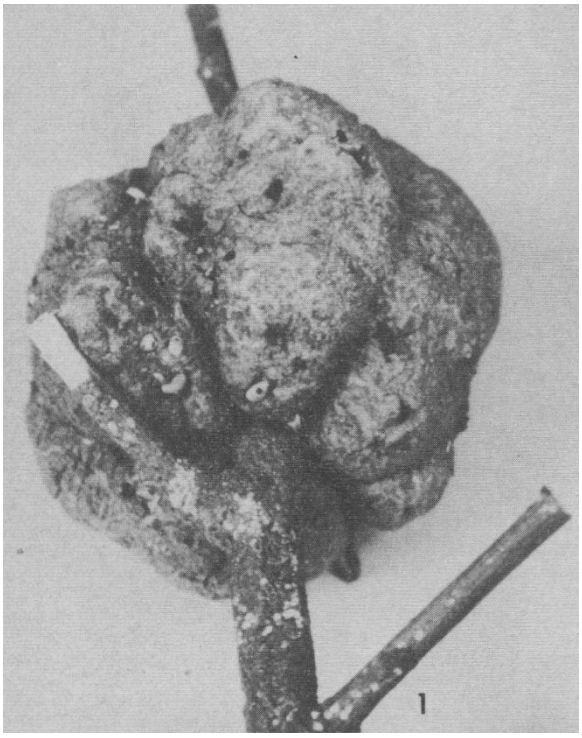

Figure 1. The twig gall of the horned oak-gall wasp on a pin oak.

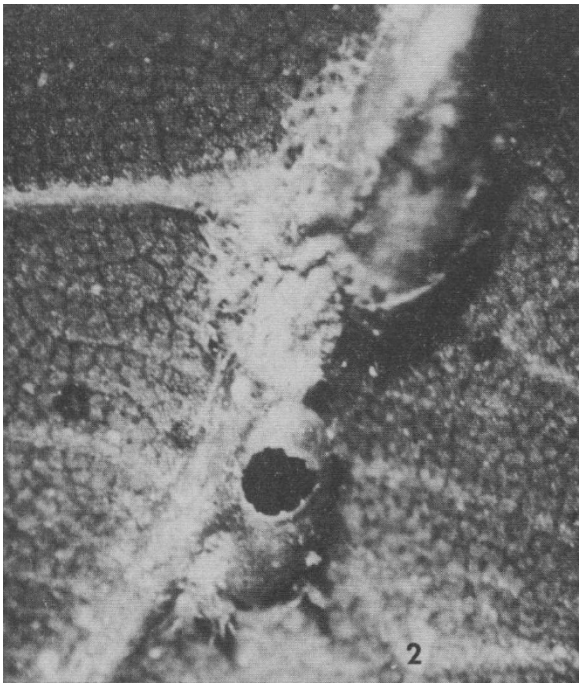

Figure 2. The leaf gall of the horned oak-gall wasp on a pin oak leaf.

Materials and Methods

Twig galls were severed from the trees periodically in late february and March. These galls were dissected to see if adults had begun emerging. When a large amount of emergence occurred the chemicals were applied. A test was initiated March 30, 1971, on a group of pin oaks in Memphis, Tennessee. When the eggs from the agamic females were deposited on leaves, chemicals were applied to evaluate their effectiveness in controlling the leaf gall and subsequently the twig gall generation.

Seven insecticides were tested and applied at 0.4 oz AI/in. DBH. Trees were randomly selected with 4 replications of 8 different treatments. Insecticide granules were applied with a Universal spreader. The emulsifiable concentrates were applied with a hose proportion-sprayer using 15 gal of water/treatment. These materials were distributed on the soil surface in a circular band in the drip line area of the trees.

Dissections of leaf galls were made weekly to examine the condition of the larvae and pupae and to check for adult emergence.

Approximately 2 months following heavy emergence 100 leaves with galls were picked from each replication and counts of emergence holes were taken to evaluate effectiveness of the insecticides.

The data for insecticide effectiveness were analyzed statistically by the analysis of variance, using the "F" test. The significance of mean comparisons was based on Duncan's multiple range test at the 5% level.

Results and Discussion

During the 1st and 2nd weeks of March, a large percentage of empty cells occurred in dissected overwintering twig galls because of adult emergence. This was about 1 month earlier than K. E. Stewart (personal communication) observed in Canada. From 25 dissected leaves May 10, all immatures were in the pupal stage. The bisexual generation was then observed for emergence. At least 10% emergence from the leaf galls had started by May 26, and 50–75% emergence had occurred by May 28. The bisexual generation was approximately 1 month ahead of Stewart's observations.

Table 1 shows that carbofuran was significantly different from all other treatments with an average of only 6% emerging from 4 replications. This percentage of emergence indicates a highly satisfactory degree of control. The other treatments did not result in so effective a control. However, dimethoate FC and phorate 10G were also significantly different from the check with a mean emergence of 51 and 52%, respectively. The other 4 treatments were not significantly different from the check.

Table 1. Relative effectiveness of systemic insecticides for control of the horned oak galls

Insecticide	Rate oz. AI/in. diam	% emerged
Carbofuran 10G	0.4	6 a
Dimethoate 267F,C	.4	51 b
Phorate l0G	.4	52 b
Demeton 25E	.4	57 bc
Disulfoton 15G	.4	64 bc
Oxydemetom-methyl EC	.4	67 bcd
Check		73 cd
Disulfoton 2G	.4	86 d

a. Numbers followed by the same letter are not significantly different at the 5% level using Duncan's multiple range test.

Conclusion

Carbofuran was far superior to the other materials tested at equivalent rates for the control of the horned oak-gall wasp. This material will be excellent for commercial use. Dimethoate and phorate showed some promise for homeowners use, but further testing is needed. Of the test insecticides, disulfoton 2G offered the least plant protection.

References Cited

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Felt, E. P. 1940. Plant Galls and Gall Makers. Comstock Publishing Co., New York. 364 p.