

California tests for

ELM LEAF BEETLE CONTROLS

Researchers find carbaryl gives best protection

By C. S. KOEHLER, Associate Entomologist, University of California, Berkeley

and R. L. CAMPBELL, Assistant Professor, Ohio Agricultural Research and Development Center, Wooster

THOUGH lacking the stature which the American elm has in the midwestern and eastern states, elms in the western states are among the more common and more important shade trees in many municipalities. The principal species which have been planted are the Asian and English elms. Like their counterparts in most sections of the country, these trees are frequently heavily attacked by the elm leaf beetle, *Pyrrhalta luteola* (Muller). This insect is of particular significance in municipalities located in the high desert areas of the West owing to the widespread planting of the elm there and because of the real need for the shade provided by foliated trees in those hot, dry regions.

Although the elm leaf beetle has been in the West for many years, relatively little experimental work has been conducted here on methods of controlling it. Insecticide tests were therefore established in Inyo County, Calif., to gain this information.

Timing of Application

To determine the optimum time for spraying for elm leaf beetle control, sprays of carbaryl (Sevin) and methoxychlor, each at a dosage of 1 lb. of active ingredient per 100 gals. of water, were applied to different groups of Asian elms on four dates be-

tween May 15 and July 22. No tree was sprayed more than one time. On August 24, after all elm leaf beetle activity had ceased for the season, the trees were evaluated for insect injury using the following procedure: three persons examined each tree and independently noted the amount of feeding damage. Each individual then scored the tree on a numerical basis from 1 to 4. A value of 1 represented no feeding, or only very light feeding injury, and a value of 4 represented severe feeding damage. Intermediate damage was rated

Skeletonization of foliage is caused by beetle larvae.

2 or 3 depending on the severity. The values for each tree were then totaled and divided by the number of observers to give an average injury rating for each tree.

The results with carbaryl (Figure 1) show that the severity of insect injury decreased as the date of spraying progressed from May 15 to July 1 but increased thereafter. Treatments made too early apparently do not leave sufficient residue to last until needed for effective control of the larvae. Also, if elms are rapidly growing at the time an early treatment is made, foliage which appears after spraying will not be protected and consequently will be damaged by the larvae. Treatments made too late, on the other hand, do not protect trees from the early larval feeding. The low level of beetle injury found on trees sprayed on July 1 showed that a single application, timed properly, was sufficient to control the first generation of insects and adequately protected the trees from serious injury by the second generation which occurs in Inyo County.

Although methoxychlor was included also in the experiment, the emulsifiable formulation used resulted in injury characterized by a yellowing of the leaves and by partial, premature leaf drop. Because of this injury,

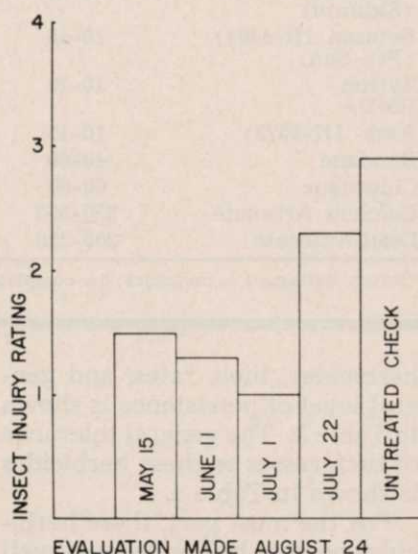


Figure 1. Injury ratings made Aug. 24 on elms treated at dates shown with 1 lb. of carbaryl per 100 gals. of water.

it was difficult to exclude personal bias from the injury ratings; for this reason, the ratings on the methoxychlor-treated trees are not shown in Figure 1.

Evaluation of Insecticides

Four different insecticides which are commonly recommended for elm leaf beetle control in various parts of the United States were applied as sprays to different groups of Asian elm trees in a different location in Inyo County on June 11. On that date the beetle larvae were present on the trees and their feeding damage was beginning to appear. On June 30, fifty shoots on each tree were examined and the number of first generation elm leaf beetle eggs and larvae were counted.

The results (Table 1) revealed that there were no statistically significant differences in the control afforded by methoxychlor, carbaryl and DDT, or between DDT and malathion. All treatments, however, were significantly better than the untreated check. In this experiment emulsifiable methoxychlor again caused injury to the foliage.

Insect injury ratings made on the trees in this experiment on August 24 (Figure 2) indicated that carbaryl performed more satisfactorily than any of the other insecticides under consideration. Again, since these ratings were made after all

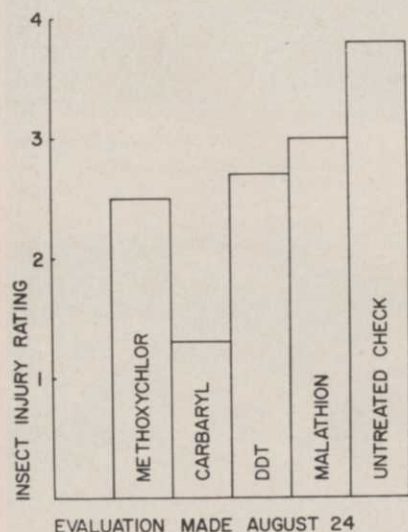


Figure 2. Injury ratings made Aug. 24 on elms treated June 11 with 4 insecticides, all at 1 lb. a.i. per 100 gals. of water.



Applying carbaryl at the optimum time gave good foliage protection. Photo taken Oct. 6.

beetle activity had terminated, it was clear that a single application of carbaryl made after the majority of the eggs had been laid in the spring, and at the time the young larvae were beginning to feed, had satisfactorily protected the trees from injury for the entire season.

Protection Is Practical

A single hydraulic spray applied at the optimum time from the standpoint of insect development did not prevent all elm leaf beetle damage. However, the feeding of the adults early in the season, and the feeding of the newly hatched larvae, were relatively unimportant and did not justify the application of very early season sprays. Results of the field experiments confirmed that it is both possible and practical to protect individual trees with carbaryl and that it is not essential that all trees in an area be treated. Of course, only the sprayed trees will be protected.

Spraying of individual trees with carbaryl or any other insecticide will not alleviate the nuisance created by adult beetles

as they leave unsprayed trees and seek the shelter of homes and other buildings for overwintering purposes. A community-wide spray program is the only approach to that particular problem.

Wide variations in elm leaf beetle development commonly occur—even from one section of a county to another. This will seriously influence the proper spraying date. Unlike Inyo County, some areas in the West have more than two generations of the elm leaf beetle each year. In such areas, it is not known whether a single spray application will adequately control the insect.

In some cities in California where carbaryl has been applied to elm trees for the control of other insects, serious spider mite infestations developed on the trees following the spraying. While this problem was not encountered in the Inyo County trials, the addition of a miticide to the spray tank containing the carbaryl is suggested where there is precedent for this problem.

Table 1. Evaluation of insecticides for control of the elm leaf beetle. Inyo County. 1964.

Material ¹	Formulation	Active toxicant in lbs./100 gals.	Average number eggs and larvae per 50 shoots on June 30 ²
Methoxychlor	emulsifiable conc.	1.0	0.25 a
Carbaryl (Sevin)	wettable powder	1.0	0.75 a
DDT	wettable powder	1.0	5.50 ab
Malathion	emulsifiable conc.	1.0	22.00 b
Untreated	—	—	96.75 c

¹ Sprays applied June 11.

² Means followed by the same letter are not significantly different at the 5% level.