Argentine Ant Control on Citrus

granular formulations of certain chlorinated hydrocarbons applied to soil surface show promise in preliminary trials

G. E. Carman

Chlorinated hydrocarbon insecticides—dieldrin, heptachlor, chlordane, and aldrin—in granular formulations spread evenly over the ground in citrus orchards, have given as good ant control as comparative spray tests.

The use of certain chlorinated hydrocarbon insecticides, particularly chlordane in sprays or dusts, is a common practice for the control of the Argentine ant—*Iridomyrmex humilis* Mayr—and other ant species on citrus. In most instances, such treatments are on the tree trunk, skirt, and ground litter, but often low-hanging fruit are unavoidably treated with the insecticidal compound which may persist as a surface or penetrated residue—or both—of the marketed fruit. The magnitude of these residues is relatively high at harvest and—because of the presently indicated tolerance levels—might jeopardize the marketability of an entire crop even though only a small proportion of the fruit was actually sprayed or dusted.

Another, but less limiting, disadvantage in treating citrus trees with dusts or sprays is the fact that the insecticide residues on the lower parts of the tree may be toxic or repellent to parasites or predators of economic pests such as mealybug or scale species which are present in the grove.

As a possible means of capitalizing on the unusual effectiveness of the chlorinated hydrocarbon insecticides for ant control, while avoiding the difficulties associated with their use as sprays or dusts, preliminary trials were undertaken with granular formulations of the compounds.

The results of the preliminary field studies have been encouraging, and the use of granules has not involved undesirable post-treatment effects, including the involvement of fruits with insecticide residues. Further evaluation of the granular formulations is necessary because of the limited number of completed trials. However, the greatest liability in their use that can presently be anticipated would result from failure to obtain fully satisfactory ant control.

Granular Types Tested

In the preliminary tests, the insecticides were formulated—2½% and 5% actual toxicant—on granules of bentonites, attapulgus clays, vermiculite, and on screened cut tobacco stems. A 30/60-mesh granule size appears most desirable. With materials such as an attapulgus clay, a 30/40 mesh size might be helpful in minimizing dustiness so as to avoid the deposition of residues on tree surfaces and to limit the exposure of personnel during application, but it would contain considerably fewer granules per pound of material.

Bentonite granules disperse most satisfactorily with traction-activated mechanical equipment because of their greater density. Vermiculite and ground tobacco-stem granules are less suited for use in such equipment.

Cost factors restrict consideration of amounts greatly in excess of 100 pounds per acre, and amounts as minimal as 50 pounds per acre of the most effective materials have generally given unsatisfactory control if less than 2.5 pounds of actual toxicant per acre were used.

Method of Application

The granular formulations can be broadcast by hand or from a crank-type broadcast seeder, but a rapid mechanical means of distribution is probably most practical. Small hand-operated dusters and truck-mounted duster units have been used successfully. The available equipment currently preferred is the revolving disc spreader used for applying commercial fertilizers. Such units are usually traction-activated, and when pulled through the grove at approximately five miles per hour can be adjusted to achieve a reasonably effective distribution pattern of the granules. The momentum of individual granules must be sufficient to penetrate the peripheral shell of the tree and attain a reasonably uniform distribution of granules over the ground under the tree as well as between the trees. Distribution of granules over the area between tree rows does not appear necessary and limits the amount of material broadcast onto the more critical areas under the trees.

Thrown into the tree—in any manner—granules tend to sift groundward. Only rarely have granules been seen to lodge on fruit surfaces and remain there for any length of time. On the other hand, granules have been found over extended periods lodged in cupped leaves, leaf axes, and on surfaces parallel with the ground.

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VALENCIA

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showed that the 2, 4-D had a real effect in reducing the number of fruits per tree. In the more moist treatments—comparing Nos. *1* and *2*—the reduction of total fruits was 20%, while in the other irrigation treatments—comparing Nos. *3* and *4*—it was 25%.

A median maximum soil moisture tension of 700 cm of water at the 2′-depth was not a severely dry condition, inasmuch as none of the trees showed signs of moisture stress, such as temporary wilting, even in warm weather prior to an irrigation. Nevertheless, this treatment curtailed fruit growth in comparison with the 300 cm mean maximum tension at the 1′-depth. The more moist treatment resulted in more fruit of large sizes and fewer of small sizes, in addition to shifting the peak size from 344 and smaller to size 252, as shown in the graph in the first column on page 9.

A random sample of 50 oranges was taken from each tree, 25 being used for juice determinations and 25 for a count of granulation. The differences in distribution of fruit sizes in the four treatments were also reflected by the significant differences in mean fruit weights of the random samples, as recorded in the accompanying table. The per cent juice, per cent rag—that portion of pulp screened from the juice by the juicer—showed a small but significant increase due to reduced soil moisture. The reduced soil moisture also resulted in an increase in the soluble solids content and ratio of soluble solids to acid where 2,4-D was applied but not in its absence. Where 2,4-D was used, the reduced moisture resulted in less granulation.

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ANTS

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No trials have been specifically made to determine which periods of the year are most favorable for treatment. In earlier ant control work, it was found advisable to treat when the ants were active, particularly during the spring period.

In using granular formulations, it is probably more critical to apply the material as far in advance of certain cultural activities—such as those of irrigation, cultivation, and harvesting—as can be arranged.

If spray treatments are anticipated for the control of the economic pests that are attracting the ants in a grove, it may be advisable to delay the ant treatment until such time after the spray treatments as ants again become a factor.

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