EFFECTIVENESS OF FOLIAR SPRAYS FOR CONTROL OF FULLER ROSE BEETLE ON FLORIDA CITRUS [1]

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In Florida, control of the Fuller rose beetle, *Pantomorus godmani* (Crotch), is accomplished with soil applications of granulated dieldrin and aldrin. California citrus growers control the Fuller rose beetle with foliar applications of sprays or dusts. The use of soil treatment in Florida, introduced by King (1958), was dictated by the fact that the beetle population in Florida has a prolonged season of emergence characterized by peak periods in June and September. By contrast, Dickson (1950) has reported that in California the rose beetles emerge from July through November with a peak in September.

For California growers, the period of treatment extends from August through December, coinciding with the period of peak emergence. For their control program, they may select one of several chemicals recommended specifically for use against *P. godmani* (Department of Entomology, Citrus Res. Center 1964). Or, if that pest is of minor importance they may choose from a variety of pesticides that, though advocated primarily for control of other insects, will give some control of the Fuller rose beetle.

Granulated insecticides, including dieldrin, are recommended as soil treatments for control of the Argentine ant, *Iridomyrex humilis* (Mayr.), in California but no concomitant benefit in control of Fuller rose beetle is acknowledged.

King (1958) reported inconclusive results in tests with broad spectrum insecticides applied as foliar sprays in Florida, at best obtaining a population suppression for approximately two weeks. Of the insecticides tested, only parathion, lindane, and malathion appear in the latest edition of Florida's Better Fruit Program (Florida Citrus Commission 1964). None of the remaining pesticides listed in that publication have been tested against Fuller rose beetle in Florida. The possibility exists that some of these materials may be effective, as foliar sprays, in supplementing or replacing soil treatments. This possibility was investigated.

MATERIALS AND METHODS

The investigation was conducted in the laboratory by caging beetles on the treated foliage of citrus seedlings. This method was adopted because of the difficulties reported by King (1958) and Elmer (1960) in their attempts to evaluate beetle populations quantitatively in field tests by shaking limbs to dislodge the adults on to ground cloths or by searching trees for a specified length of time.

In the initial screening, 1 gallon of spray of each material was prepared containing the amount of insecticide proportional to the rate recommended in the Better Fruit Program for 100 gallons of spray. The foliage of four potted citrus seedlings was dipped in this test mixture and each pot laid on its side to permit the excess liquid to drain without contaminating either

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the pot or soil. When the foliage was dry, five beetles were caged on each of the treated plants. Untreated seedlings were also infested with beetles.

Mortality data were collected during two, 3-day exposure periods with an intervening 4-day interlude during which the plants were placed outside the building and the foliar residues permitted to weather.

Mortality counts were made at 24, 48, and 72 hour intervals. Beetles were classified as alive, moribund, or dead. Dead beetles exhibited no trace of visible movement when subjected to the observer's exhaled breath. Moribund beetles were those who were active but unable to stand or who would react at least feebly to breath.

Promising materials were then evaluated to determine the relative persistence of their toxic residues. In this phase of the investigation, treatment of foliage was similar to that used in the initial screening. Three separate tests were run in which each material was represented by a pair of treated seedlings with five beetles confined on each plant. Testing was conducted out of doors and performance was determined by the method employed by Elmer (1960). At weekly intervals the plants were examined, and when all the beetles were dead they were removed and replaced with five live beetles. This procedure was repeated until none of the exposed insects were killed by the residues. During examination, new leaves and developing buds were removed from the plants so that only treated foliage was available to the insects.

Chemical names of the proprictary compounds used are these:

Guthion®—0,0-dimethyl s-(4-oxo-1,2,3-benzotriazin-3(4H)-ylmethyl) phosphorodithioate

Kelthane®—1,1-bis(p-chlorophenyl)-2,2,2--trichloroethanol.

Results

Results, corrected for control mortality by Abbott's (1925) formula, are presented in Table 1 as cumulative percent mortality for the 3-day periods of exposure to fresh and weathered foliage.

Of the 14 pesticides tested, only Guthion, carbophenothion, parathion, and malathion were of value in control of the Fuller rose beetle.

These four materials were then subjected to persistence tests. The results obtained from six replications of each insecticide evaluated, computed as the average number of weeks that foliar residues were toxic to the beetles were: parathion, 1.5 weeks; carbophenothion, 1.8 weeks; malathion, 4 weeks; and Guthion, at least 12 weeks.

Conclusions

Under the conditions of the experiments, Guthion, malathion, carbophenothion, and parathion did not exhibit sufficient persistence to permit a Florida grower, wishing to employ foliar spraying as his sole method of Fuller rose beetle control, to realize success with a single application. For the express purpose of controlling Fuller rose beetle, multiple applications would be required, and this method was not considered practical by King (1958) and still lacks grower appeal.

When used for their recommended purpose, Guthion, malathion, carbophenothion, and parathion would augment the recommended Fuller rose

beetle control program and be of supplementary benefit to growers if applications coincide with periods of peak beetle emergence.

TABLE 1.—MORTALITY OF FULLER ROSE BEETLE EXPOSED TO FRESH AND WEATHERED CITRUS FOLIAGE TREATED WITH SELECTED PESTICIDES.

Material	Amount/100 gal.		Adjusted cumulative per cent mortality after 3-day exposure	
	Formulation	Actual	Fresh	Weathered
Parathion 15% WP	1.7 lbs.	4.0 oz.	100	92
Carbophenothion 4E	0.75 pint	6.0 oz.	100	53
Guthion 2LC	1.0 pint	4.0 oz.	95	95
Malathion 5E	1.5 pints	15.0 oz.	100	0
Lindane 25% WP	0.6 lb.	2.4 oz.	73	0
Dioxathion 4EC	0.5 pint	4.0 oz.	44	0
Demeton 2SC	1.0 pint	4.0 oz.	32	5
Lead Arsenate	1.25 lbs.	19.4 oz.	5	0
Nicotine Sulfate 40% EC	1.0 pint	8.0 oz.	0	0
Ethion 4 Miscible	0.75 pint	6.0 oz.	0	0
Tetradifon 1 Miscible	1.0 pint	2.0 oz.	0	0
Chlorobenzilate 25E	0.5 pint	2.0 oz.	0	0
Kelthane 4MF	0.8 pint	6.4 oz.	0	0
Zineb 75% WP	1.0 lb.	12.0 oz.	0	6

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