

all treated replicates were significantly better than the check plots (1 per cent level). None of the treatments showed a significant difference in total yield of number of healthy berries produced during the season. However, Dyrene caused a bronzing and necrosis of the leaves of both Tioga and Fresno after several applications but Tioga appeared to be the most affected. Technical flowable Botran (dichloran) was applied to Tioga in an adjacent plot and, after three applications, there was severe bronzing and necrosis of flowers, fruit, and leaves.

1968 tests

In 1968, trials were again conducted at the South Coast Field Station. The Tioga variety was used with polyethylene mulch in all plots. Plots of 20 strawberry plants were replicated four times. Benlate 50W, Difolatan 80W, Bayer 47531 50W, Polyram 80W, and Daconil 2787 75W were used at the rate of 2 lbs of the formulation per 100 gallons of water. The fungicidal mixtures were applied at the rate of 125 gallons per acre and 250 psi. Two treatments with Benlate and Difola-

tan were sprayed only at flowering time on March 5 and 15. All other treatments were applied every 10 days beginning on March 5 and continuing through March 15, 25; April 4, 15, and 25. All plots were sprinkler irrigated three times weekly to further encourage the development of Botrytis fruit rot.

The number of rotted berries infected with visible Botrytis and the yield of the plots during the month of April are shown in table 2. Applications of Benlate, Bayer 47531, and Difolatan resulted in excellent control of Botrytis fruit rot in the strawberries. Two early sprays of Benlate at the flowering peak resulted in control equal to six sprays of Benlate applied every 10 days throughout the season. Difolatan sprayed twice was not as effective as Difolatan sprayed every 10 days. Polyram applications resulted in poor control of Botrytis fruit rot. Plots sprayed with Benlate and Difolatan (applied either twice or every 10 days) and Bayer 47531 gave a yield of healthy fruit significantly higher than the plots sprayed with any of the other treatments. No phy-

toxicity was noted from any of the chemical treatments used in 1968.

Only two sprays of Benlate, applied during the peak flowering period, had an effect equal to applications of the same material every 10 days. Benlate, Bayer 47531, and Difolatan effectively controlled Botrytis fruit rot of strawberry in the 1968 trials. Yield of healthy fruit was highest from the Benlate, Bayer 47531, and Difolatan treatments. In 1967, plots treated with Bayer 47531, Difolatan (wettable or flowable), Daconil 2787, Captan, Benlate, and Dyrene showed results significantly better than the check plot. Dyrene and Botran were phytotoxic to Tioga and Fresno strawberry plants.

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GRANULAR FORMULATIONS OF SYSTEMIC INSECTICIDES FOR CONTROL OF APHIDS ON EASTER LILIES

These experiments indicate that granular formulations of Temik and Furadan are promising insecticides for use in controlling aphids on lilies forced for Easter. Applications to the crown of the plants were as effective as when the granules were applied to the soil in the pots. Crown applications were also easier and thus required less time than soil applications. No phytotoxicity occurred on the varieties Ace and Nellie White. However, these insecticides need to be tested on a larger scale and on more varieties, before they can be recommended for commercial use.

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WHEN FORCED in the greenhouse, easter lilies are subject to continual infestation by aphids. In southern California, Plantfume 103 (sulfotepp, dithio) smoke generators are widely used for aphid control but because residual effects are short, almost weekly applications are required. In addition, Plantfume 103 is not very effective against the cotton aphid, *Aphis gossypii* Glover, one of the most common species attacking lilies. Malathion and Thiodan sprays are also used,

but new growth is subject to reinfestation and repeated applications may be necessary. The advantages of systemic insecticides are obvious but our experience with sprays and drenches has been similar to that of previous researchers who found that sprays of systemic insecticides damaged three out of the four varieties tested. However, granular formulations of two carbamate systemic insecticides, Temik and Furadan have shown promise when used on two varieties of lilies. Temik is 2-methyl-2-(methylthio) propionaldehyde O-(methylcarbamoyl) oxime; and Furadan is 2, 3-dihydro-2, 2-dimethyl-7-benzofuran-7-yl methylcarbamate.

Single lily plants in 6-inch pots were used in the tests. Ace and Nellie White varieties were used in 1965, and Ace alone in 1966. The plants were 3 to 4 inches tall when the experiments were begun and, except for the plant tolerance test in 1966, all plants were infested with the cotton aphid. The materials used were 10 per cent granular formulations of AC 47031 (P,P-diethyl cyclic ethylene ester of phosphonodithioimidocarbonic acid), Temik and Furadan. In 1965 these were applied at the rate of 1/4 teaspoon of the granules per plant. In terms of weight this was 0.7, 0.8 and 1.3 grams of the granules per plant for AC 47031, Temik, and Furadan respectively. In 1966 the materials were weighed out and both Temik and Furadan were used at the rate of 0.8 gram of the granules per plant.

Two experiments

Two experiments were conducted in 1965. In the first experiment with the Ace variety the treatments were: AC 47031, soil application; AC 47031, crown application; Temik, soil application; Temik, crown application; Furadan, soil application; Furadan, crown application; and check. There were 10 plants for each treatment, and they were arranged on the greenhouse bench in a randomized block design. The treatments were made on February 2. In the second experiment the variety Nellie White was used. Temik and Furadan were each applied to the crowns of 50 plants and 50 plants were left untreated as checks. The treatments were made on February 9 and the plants were randomized on the bench adjacent to those of the first experiment.

Only Temik and Furadan were used in 1966. In the first experiment each was applied to the crown of five plants, and five plants were kept as checks. The treatments were made on January 26 and the plants were randomized on the bench. To prevent the check plants from being killed off by the aphids, they were treated along with the rest of the grower's crop. After treatment they were brought back into the test house. The check plants received Plantfume 103 smoke treatments on January 31, February 9, March 9, 24, and 31 and were sprayed with malathion on February 16 and with Thiodan on February 24. The purpose of the second experiment was to see if there was any stage during the forcing period when the plants were susceptible to damage. Previous experience indicated that, after being treated with certain insecticides, the plants were more susceptible to damage when the roots had grown out to the sides of the

pots. Beginning January 26, Temik and Furadan were each applied to the crown of five plants each week until bud formation. These plants came from, and were kept with, the grower's regular crop.

Aphid Control

In 1965 all three materials controlled the aphids well. The plants, while subject to reinfestation from the heavily infested checks, remained free of aphids through March 31 when the experiments were terminated. However, the AC 47031 treated plants showed the first signs of phytotoxicity at 3 weeks, and at 4 weeks there was extreme leaf scorch and stunting. At this time the check plants also showed stunting from the aphids and were 2 to 3 inches shorter than the Temik- and Furadan-treated plants. On March 31 (one week before Easter) many of the check plants were dead and the others were stunted, covered with honey dew and black smut, and had set very few flowers. A comparison of Temik- and Furadan-treated plants with the grower's regular crop (which received seven Plantfume 103 treatments) showed that the experimental plants had broader and greener leaves and that the buds had developed 4 to 5 days earlier. No differences were observed between the Temik and Furadan treatments, or between the soil and crown treatments.

Crown treatments

In 1966 the Temik and Furadan crown treatments both controlled the aphids well. None of the insecticidal treatments on the checks completely controlled the aphids except the Thiodan spray—and about one week after the spray, new growth was reinfested. On March 31, when the experiment was terminated, the check plants were about 4 inches shorter than the Temik- and Furadan-treated plants, and their buds were smaller. As in 1965, the Temik- and Furadan-treated plants remained free of aphids after the initial infestation was cleaned up, and both showed somewhat better growth and color than the grower's regular crop. In the plant tolerance test no phytotoxicity resulted from any of the treatments. Aphids were quickly killed on all plants infested at the time of treatment, and none of the plants became reinfested.

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