Evaluation of

INSECTICIDES FOR CONTROL OF EGYPTIAN ALFALFA WEEVIL

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Imidan, methoxychlor, Guthion (azinphosmethyl), methyl parathion, malathion, Zolone (phosalone), Furadan (carbofuran), Vydate (oxamyl), and Lannate (methomyl) were evaluated in three field experiments at selected dosages for control of the Egyptian alfalfa weevil on first cutting alfalfa at Salinas, California. All the insecticide treatments resulted in significant weevil control compared with unsprayed check plots. Furadan, Zolone, and Vydate controlled the pea aphid, *Acyrthosiphon pisum*, present in one of the experiments.

In 1963 the first report of damage to alfalfa in the Salinas Valley of Monterey County attributed the damage to the alfalfa weevil, *Hypera postica*. This probably was a misidentification. Confusion in identification of *Hypera postica* and the Egyptian alfalfa weevil, *Hypera brunneipennis*, exists because no reliable morphological basis has been found to separate them. Based on present knowledge, particularly of its ecological, physiological and behavioral differences from *H. postica*, the Monterey County weevil apears to be *Hypera brunneipennis*. In the Salinas Valley the Egyptian alfalfa weevil has several overlapping generations annually and only a small part of the adult population goes into diapause. In contrast the interior valley infestations produce only one generation annually and all adults go into summer diapause.

The weevil parasite, *Bathyplectes curculionis*, is present in the Salinas Valley and has been effective in suppressing major peaks in the weevil population. But in certain years insecticidal control is necessary to prevent economic damage to some of the alfalfa acreage, usually the first cutting. The purpose of this study was to determine the effectiveness of insecticides against the Egyptian alfalfa weevil in the Salinas Valley where ecological differences are quite distinct from those in the desert and interior valleys of California where the Egyptian alfalfa weevil now exists.

The experimental design was a randomized complete block with plots of 1/100 acre replicated four times in experiments 1 and 3, and plots of 1/10 acre replicated three times in experiment 2. A tractor sprayer equipped with a boom 7 feet in width fitted with 7 Spraying Systems 8002 flat fan nozzles delivered 40 gallons of dilute spray per acre at 50 PSI in experiments 1 and 2.

In experiment 3, a Hudson hand sprayer fitted with a pressure regulator and a 5 lb. cylinder of CO_2 compressed gas was used to apply the insecticides at 45 PSI and 30 gal./acre of dilute spray. The materials were applied through a hand-held boom 6 feet wide equipped with five 8002 flat fan nozzles. X-77 spreader-activator at the rate of 1 pt./acre was added to all the insecticides used in experiments 1 and 2, but was omitted in experiment 3.

Insect populations were sampled by sweeping the plots with a standard 15 in. sweep net, taking 10 sweeps per plot in experiment 1, 50 sweeps per plot in experiment 2, and 5 sweeps per plot in experiment 3. The results of plot sampling are expressed as the average number of insects gathered in 10 sweeps (see tables). A modified pea aphid separator sorted the insects from plant material. Data from the experiments were analyzed by standard analysis of variance and mean separation by LSD.

Experiment 1. Insecticides were applied February 11, 1970, when the alfalfa was about 4 in. high and 5 weeks from the time of first cutting. Sweep counts from the unsprayed checks averaged 39 Egyptian alfalfa weevil larvae per 10 sweeps on the day of application. The alfalfa variety was Joaquin 11. Plots were sampled 13 days after spraying to determine treatment effects.

TABLE 1. EVALUATION OF INSECTICIDES FOR CONTROL OF THE EGYPTIAN ALFALFA WEEVIL, SALINAS, CA. 1970. EXPERIMENT 1.

Treatment	lb. AI/acre	Mean no. of larvae per 10 sweeps 13 days after spraying
Imidan	1.0	4.0
Methoxychlor	1.0	5.8
Guthion	0.75	6.5
Methyl parathion	0.375	9.5
Guthion	0.5	11.5
Malathion	1.0	19.8
Check	untreated	95.3
L.S.D.	.05	21.9

TABLE 2. EVALUATION OF INSECTICIDES FOR CONTROL OF THE EGYPTIAN ALFALFA WEEVIL, SALINAS, CA. 1970. EXPERIMENT 2.

Treatments	lb. AI/acre	Mean no. larvae per 10 sweeps. Days after spraying: 3 days	7 days	14 days
Imidan	1.0	7.5	6.1	7.5
Zolone	1.0	12.6	8.1	10.7
Zolone	1.5	9.5	4.4	5.5
Methoxychlor	1.0	4.2	3.9	11.3
Check	untreated	118.1	133.7	165.7
L.S.D.	.05	16.9	9.2	15.8

TABLE 3. EVALUATION OF INSECTICIDES FOR CONTROL OF THE EGYPTIAN ALFALFA WEEVIL, SALINAS, CA. 1972. EXPERIMENT 3.

Treatments	lb. AI/acre	Mean no. larvae per 10 sweeps. Days after spraying: 7 days	14 days	21 days
Furadan	1.0	4.5	0.0	0.5
Furadan	0.5	1.5	0.5	1.0
Vydate	0.5	7.5	7.5	6.5
Imidan	1.0	4.0	4.5	11.0
Imidan	0.5	5.5	4.5	2.5
Zolone	1.0	7.0	12.5	8.0
Zolone	0.5	14.5	11.5	9.5
Methyl parathion	0.5	4.0	22.5	25.0
Lannate	0.5	19.0	47.0	44.5
Lannate	0.25	46.5	147.5	142.5
Check	untreated	309.5	376.0	211.0
L.S.D.	.05	17.8	25.2	15.9

Experiment 2. Plots were sprayed March 18, 1970, at which time the weevil population in the check plots averaged 91 larvae per 10 sweeps. The alfalfa (Caliverde 65) was about 8 in. tall when sprayed and was 2 weeks from first cutting. Sweep counts were taken 3, 7, and 14 days after spraying to evaluate weevil control.

Experiment 3. Application of the insecticides was on March 2, 1972, at which time the alfalfa was about 8 in. tall and the population of weevils in the unsprayed check plots averaged 205 larvae per 10 sweeps. The interval from treatment to first harvest was about 3 weeks in this field of Joaquin 11.

The insecticides and rates evaluated in the experiments conducted in 1970 are summarized in tables 1 and 2. Counts of weevil larvae were significantly lower for all insecticide treated plots compared with the unsprayed checks.

Data from experiment 3 are summarized in counts taken 7, 14, and 21 days after treatment as shown in table 3. These data indicate that all treatments differed significantly from the unsprayed checks at each sampling interval. The Furadan, Imidan, Zolone, and Vydate treatments were very effective in controlling weevil larvae for 21 days. These insecticides caused a marked improvement in growth, visibly evident in contrast to the untreated check plots.

In experiment 3, the pea aphid, *Acyrthosiphon pisum*, was also found in the plots when sampling for weevil larvae, allowing evaluation of the insecticides on control of this additional pest of alfalfa. Furadan, Zolone, and Vydate effectively controlled the pea aphid for 21 days when final insect counts were taken. These insecticides are not registered on alfalfa at this time.

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Leafhoppers on Silage Corn

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Since leafhopper populations on silage corn increase rapidly late in the season, early plantings are able to escape serious damage. Chemical control measures are available for areas where late plantings are necessary or desirable. Leafhoppers have not been a pest every year.

Dalbulus maidis (DeLong and Wolcott), a leafhopper, occasionally can be a serious pest of silage corn in local areas of the southern San Joaquin Valley of California. A section of northern Kings County extending southeasterly into Tulare County is the only known area of California where damage has occurred. This leafhopper also occurs throughout the southern United States and in most of South America. Specimens were collected from Kern, Los Angeles, and Riverside counties more than 20 years ago, but no damage to corn was reported.

Damage occurs when nymphs and adults feed on the leaves in large numbers and secrete large amounts of honeydew. Damage is compounded by the honeydew which supports the growth of black sooty mold organisms that reduce the amount of light received by the leaves. Sooty mold is known to affect the palatability of dry alfalfa hay; its effect on wet silage, however, is unknown. Poor cultural practices, especially excessive irrigation, can contribute to yield losses from leafhopper damage.

Silage corn in this area is most often grown as a second crop following the June-July harvest of wheat or barley. At times, and usually in association with dairy operations, two summer silage crops are grown. The first crop is planted from March to May, and the second is planted late July-August, as soon as the ground can be made ready after harvest of the first crop. The most serious losses have occurred when leafhoppers attack young plants of the second summer crop of silage corn. Early planted corn has never been reported to be damaged.

Corn stunt, a mycoplasma disease carried by this leafhopper in other areas of the country, is not known to be present in California. Distorted leaves, small or deformed ears, and rosetting of plants are symptoms of this disease.

Leafhoppers are not a problem every year and it is suspected that biological or other natural control agents exert a cyclical regulating effect upon their populations. Pirate bugs, assassin bugs, lady-bird beetles, lacewings, and hymenopterous egg parasites can be found in infested fields. Their regulating effect on leafhopper population levels remains unknown. Chemicals are the only short term solution to the problem. The long term effects of chemical applications are not known and cannot be predicted; the past history of leafhopper infestations indicates they will not have to be used every year.

Experiments designed to provide growers with a means to control this pest were carried out in Kings County during 1969 and 1970. Plots were established in a second-crop field (Funk 5758, planted August 12, 1969) which contained large numbers of leafhoppers. In early September, this field had sustained enough damage that reduced growth was noticed. On September 23 (when plants were about 2 ft. high), phorate 10 G, diazinon 4 EC, disulfoton 6 EC and 15 G, all at 1.0 pounds active ingredient per acre (AI/a) were applied to replicated plots. These pesticides were selected because they were registered for other uses on silage