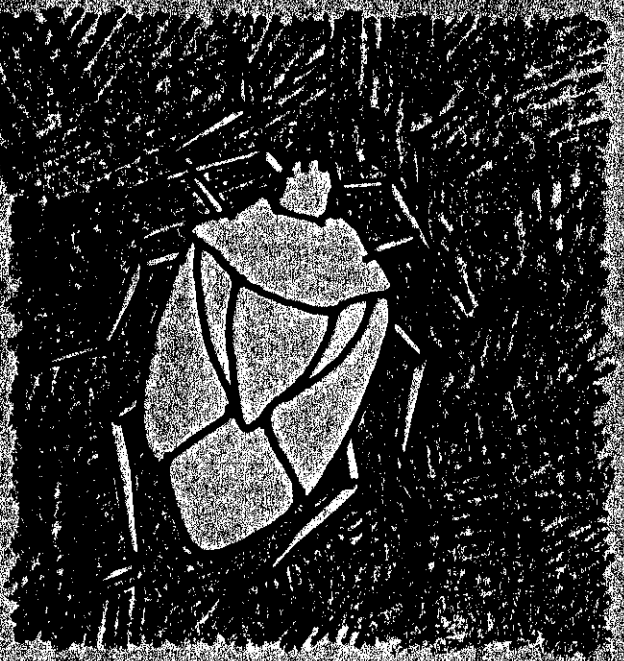
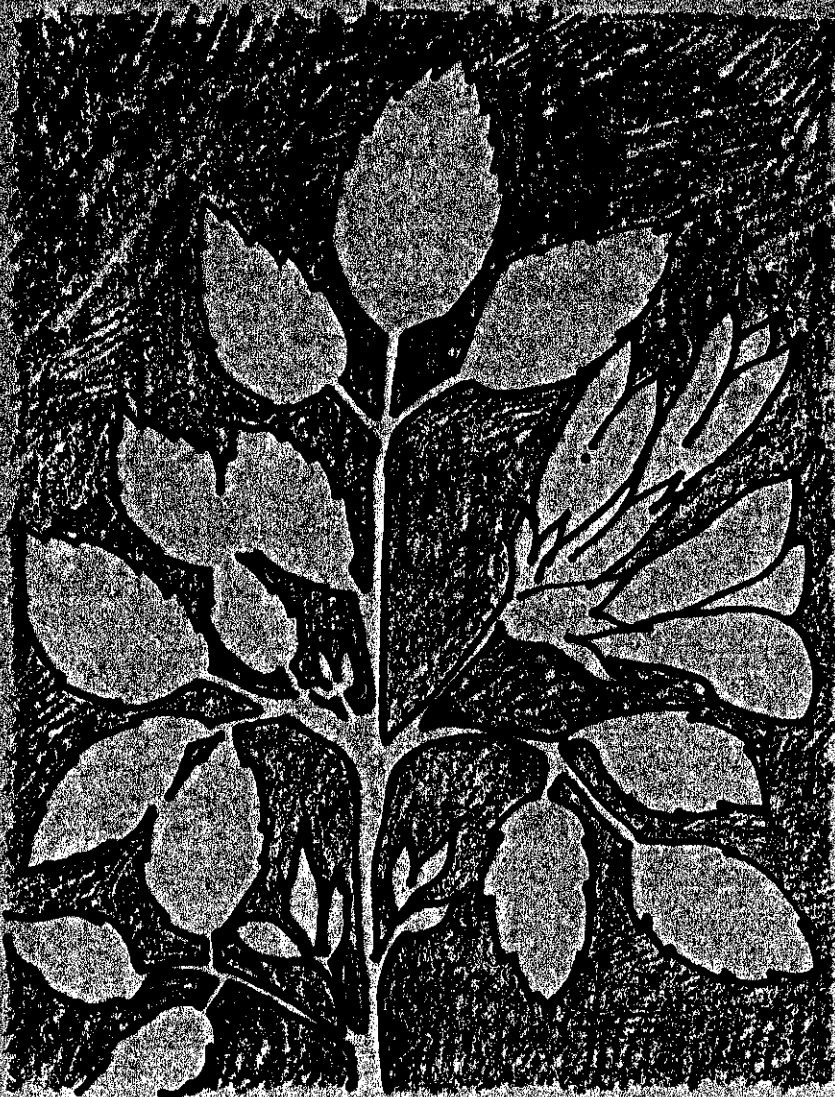


Sharon C. Mueller

A Progress Report of

INSECT STUDY RESULTS



SEED
ALFALFA
1977

Acknowledgements

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Research on insects affecting
Seed Alfalfa 1977

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Introduction

Because of the drouth, the 1977 season was not typical of normal alfalfa seed production practices in many areas of the San Joaquin Valley. In the Firebaugh area, where most of the experimental work with insects was conducted, many fields were clipped or otherwise started for seed a month or more earlier than usual. Many of the fields received less than a normal supply of irrigation water and the crop was allowed to dry and mature earlier than usual. Thus, much of the experimental work was also curtailed with trials ending in early August.

In general, the lygus bug populations were slow in developing early in the season and problems with this insect were not severe. Aphid populations were also generally low. Populations of the spotted alfalfa aphid were so low in the area where tests were conducted that it was impossible to obtain any conclusive data relative to the effect of some of the newer insecticides on control of this species. Populations of the consperse stink bug were also extremely low. Spider mite populations, on the other hand, were generally heavy. In some fields where tests were conducted, severe populations were encountered.

During 1977 five separate experiments were conducted in which eight insecticides, six acaricides, and seven insecticide-acaricide combinations were evaluated for control of lygus bugs, the spotted alfalfa aphid, the pea aphid and spider mites. Stink bug populations were assessed in 15 alfalfa seed fields in the Firebaugh, Helm and San Joaquin areas and seed samples were hand stripped from 57 alfalfa seed fields on the west side of Fresno County for analysis of damage by the alfalfa seed chalcid. Although data were obtained on several insect species in each of the experiments and surveys, the results are categorized and reported according to species rather than by individual experiments.

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Lygus bugs

The following insecticides and combinations were evaluated for control of lygus bugs: Orthene, Ambush, Carzol, Union Carbide 21865, Pydrin, Monitor, PP-199, Malanoben, Plictran, Comite, Ambush + PP-199, Pydrin + Comite, Orthene + Comite, Toxaphene + Comite, Monitor + Comite and Monitor + Plictran. PP-199, Malanoben, Plictran and Comite are all acaricides and were included in the combinations for control of spider mites. The materials were all applied as foliar sprays by aircraft from 1:00 to 5:00 A.M. Most of the applications were made prior to 4:30 A.M. The following briefly summarizes the results obtained with each of the materials in controlling lygus bugs.

Orthene was evaluated at 0.5 and 1.0 lb. AI/acre in an experiment in which plots were treated on June 8. In this trial there were no differences in lygus bug control with the two dosage rates, both provided population reductions, 7 days after application, of approximately 97 per cent under pretreatment levels. Twenty-one days after application the populations were still 68 to 70 per cent under pretreatment levels. In another experiment where Orthene was applied on June 30 and July 13 at 0.5 lb. AI/acre, populations 7 days after application were 79 and 60 per cent below pretreatment levels. These treatments provided control for approximately 14 days after application.

Monitor was applied in 4 experiments at 0.5 lb. AI/acre. The per cent reduction of lygus bug populations under pretreatment levels 7 days after Monitor was applied ranged from 97 to 79 per cent. The average per cent reduction during the first 7 days was 86. The percent reduction in the population under pretreatment levels 14 days after application of Monitor ranged from 86 to 30 and averaged 57.

Pydrin and Ambush, two synthetic pyrethroid compounds, applied at the rate of 0.2 lb. AI/acre resulted in excellent control of lygus bugs with little difference between the two compounds. The percent reduction in the lygus bug population over pretreatment levels 7 days after application in two experiments were 96 and 86 for Pydrin and 80 and 73 for Ambush. Fourteen days after application, the percent population reduction under pretreatment levels was 44 and 0 for Pydrin and 57 and 37 for Ambush. In one experiment, Ambush was applied at the rate of 0.1 lb. AI/acre. Seven days after application, the lygus bug population was only 43 per cent below pretreatment levels and no reduction

was evident 14 days after the application.

Union Carbide 21865 was applied in two experiments at 1.0 lb. AI/acre. Seven days after application, these treatments had reduced the lygus bug populations only 55 and 38 per cent under pretreatment levels. In one experiment, the treatment gave control for 14 days after application, but in the other no control was evident at the end of the 14 day posttreatment period.

Carzol was applied at the rate of 0.75 lbs. AI/acre in all five experiments as the standard against which the other materials were compared. The reduction in lygus bug populations 7 days after application ranged from 55 to 75 per cent. Fourteen days after application population reductions under the pretreatment levels ranged from 0 to 49 percent.

An experiment was conducted to evaluate an insecticide timing program throughout the season. Applications were timed to coincide with hatching and nymphal development of lygus bugs and according to average lygus bug population levels of 4 to 8 bugs per 180° sweep with a standard insect sweeping net. Four insecticides were evaluated in this experiment they were, Carzol 0.75 lb. AI/acre, Pydrin 0.20 lb. AI/acre, Orthene 0.5 lb. AI/acre and Monitor 0.5 lb. AI/acre. Comite 1.69 lb. AI/acre was added to each treatment once during the season (July 13) to control spider mites. The treatments were not replicated and each was applied to a 10 acre plot. Insect populations were sampled each week with a sweep net and with a D-Vac® suction machine. The insecticides were applied by aircraft in 10 gallons of water per acre no later than 4:30 A.M. on each application date.

Lygus bug populations developed slowly during the spring of 1977 and as a result, insecticides were not applied in this experiment until June 30 when lygus bug populations in the various areas ranged from 2.75 to 5.80 bugs per sweep and averaged slightly over 4 bugs per sweep for the entire experimental area. The plots were retreated for lygus bug control when populations reached levels of 6 to 8 bugs per sweep. Under this treatment regime, two applications were required of each insecticide over the period June 30 to July 30 when the experiment was terminated because of dry conditions within the field. Carzol and Monitor held lygus bug populations below 6 to 8 bugs per sweep for 20 days after the initial application. Plots

treated with Pydrin and Orthene required a second application 13 days after the initial treatment.

On August 9, four two-quart samples of seed pods were hand stripped from each plot. Samples were hand threshed and lightly cleaned in a clipper seed cleaner. The seeds were examined for lygus bug injury, seed chalcid, stink bug and other damage. The percentages of good seeds in the samples were Carzol 84.6, Pydrin 81.9, Orthene 85.4 and Monitor 83.3. The percentages of seeds damaged by lygus bug feeding in the treatments were Carzol 5.3, Pydrin 6.2, Orthene 4.5 and Monitor 1.8.

Aphids

Although data on control of aphids were obtained for all materials evaluated for lygus bug control, aphid populations were so low that the information is not conclusive. Although there was no evidence of control of the spotted alfalfa aphid resulting from applications of Orthene or Carzol there was also no indication that these treatments induced increases in populations of this species. There were indications, although slight, that Ambush treatments may have reduced spotted alfalfa aphid numbers. Pea aphid populations were also extremely low in all trials and the data are not conclusive with respect to control of this species. Again, there were some slight indications that Monitor and Orthene might effectively control this species.

During the period March 8 through April 18, populations of the blue alfalfa aphid, the pea aphid and the spotted alfalfa aphid were monitored biweekly in 9 alfalfa seed fields in the Firebaugh area and in 4 seed fields near San Joaquin. The populations were sampled with a D-Vac suction machine taking 50 D-Vac samples in each field on each sampling date. The blue alfalfa aphid and the pea aphid were present in all of these fields on March 8 with the blue alfalfa aphid representing from 85 to 98 percent, and averaging 94 percent overall of the combined populations of these two species.

The blue alfalfa aphid reached population peaks in the majority of these fields on March 23 although peaks occurred in a few fields on March 8 and April 5.

In general, populations of the blue alfalfa aphid were low. The heaviest populations of this species were found in fields in the San Joaquin area, but only one field had a moderately high population when on March 9, 26,528 aphids

were found per 50 D-Vac samples.

Although direct comparisons cannot be made with population samples taken from the same fields in 1976, the data from Firebaugh would indicate that populations of the blue alfalfa aphid and the pea aphid were lower in 1977 than in 1976.

In a field in the Firebaugh area, sampled weekly throughout the winter and spring of 1976, the population peak of the two species together occurred on April 20 with 7,546 aphids per 50 D-Vac samples. In 1977, the highest combined population in the Firebaugh area occurred on March 23 with 3,633 aphids per 50 D-Vac samples. Populations of the blue alfalfa aphid declined sharply after the peaks and by April 18 no blue alfalfa aphids were found in samples from some fields and in other fields populations were extremely low, ranging from 2 to 54 aphids per 50 D-Vac samples.

Spider Mites

The effects of insecticide applications on spider mite populations were evaluated in all experiments. One experiment was conducted in which only acaricides were evaluated. Materials specifically evaluated for spider mite control were Comite, PP-199, Malanoben, Zardex, Kelthane, and Plictran. Data on spider mite control were also obtained for Carzol, and Union Carbide 21865.

The effectiveness of Carzol in controlling spider mites in seed alfalfa has steadily declined over the past three years. In all trials in 1977, Carzol alone or in combination with Lorsban did not control spider mite populations. In most of the trials, spider mite populations increased following applications of Carzol.

Comite at 1.69 lb. AI/acre resulted in fair to good control of spider mites and was one of the most effective acaricides tested. It was interesting to note that in all trials where Comite followed a Carzol application, control of spider mites was more effective than with Comite alone. This suggests that there may be a synergistic effect that might significantly enhance spider mite control if the two materials were to be applied in combination.

Plictran at 0.75 lb. AI/acre alone or in combination with Monitor at 0.5 lb. AI/acre resulted in excellent control of spider mites for 14 days after application.

Kelthane E.C. at 1.0 lb. AI/acre initially reduced spider mite populations,

but at 14 days after application the population had again reached pre-treatment levels and at 21 days after application continued to increase.

PP-199, an experimental material under development by ICI United States Inc. applied at 0.2 lb. AI/acre in combination with Ambush, another ICI product, at 0.2 lb. AI/acre resulted in good control of spider mites and appeared to be effective for at least 21 days following application. In another experiment, however, PP-199 applied alone at rates of 0.1 and 0.2 lbs. AI/acre did not significantly reduce spider mite populations.

Malanoben and Zardex, two new acaricides applied at 1.0 lb. AI/acre were not effective in reducing populations of adult mites or eggs.

The insecticides Orthene, and Ambush did not control spider mites.

Combinations of Monitor 0.5 lb. AI/acre with Comite 1.69 lb. AI/acre or Plictran 0.75 lb. AI/acre resulted in excellent control of spider mites.

Comite and Plictran appear to offer the greatest promise for control of spider mites in seed alfalfa commercially. Currently Plictran is not registered for use on seed alfalfa.

Conspense stink bug

Stink bug populations were measured in nine alfalfa seed fields in the Firebaugh area on July 14, in four fields in the Helm-San Joaquin area on August 3 and in two fields in the Helm-San Joaquin area on August 11. Thus, a total of 15 fields were surveyed in 1977. The stink bug populations were sampled using the "beating pan" technique where five pan samples (25 feet of row) were examined in each field on each sampling date. Very low populations occurred in these fields. The consperse stink bug was found in 12 of the 15 fields. The numbers of bugs per 25 feet of row, in fields where they occurred, ranged from 1 to 6 and the populations were about equally divided between nymphs and adults. A total of only 34 consperse stink bugs were collected in the samples from all 15 fields. Numbers of Say's stink bug were recorded in 4 of the fields. The numbers of this species were also extremely small with nymphs and adults about equally divided. A total of only 7 Says stink bugs were collected in samples from the 4 fields.

Seed samples were hand stripped from each of the fields included in the stink bug survey. The percentages of good seeds in these fields ranged from 84 to 93. The percentages of seeds with damage attributed to stink

bugs ranged from 1.5 to 4.9 and averaged 3.1.

The alfalfa seed chalcid

An extensive survey was conducted in the Firebaugh, San Joaquin and Five Points areas to ascertain the magnitude of infestations of the alfalfa seed chalcid. Data concerning seed chalcid infestations were desired because it was not known what effect the drouth, and changes in cultural practices because of the drouth, might have on populations and damage caused by this species. Samples of seed pods were hand stripped, before commercial harvest, from 57 fields, 13 in the Firebaugh area, 25 in the San Joaquin area and 19 in the Five Points area. Four one-quart samples of seed pods were taken from each field. The samples were hand threshed and lightly cleaned in a clipper seed cleaner. An average of approximately 1500 seeds were examined from each field for seed chalcid damage. In addition, the seeds were examined for lygus bug and stink bug injury and for water damaged, green and shriveled seeds. Seed chalcid injury was very low. The percent of chalcid damaged seed in individual fields ranged from 0 to 4.9. Of the 57 fields, 41 sustained less than 1 percent injury, ten fields had more than 1 percent, but less than 2 percent injury, five fields had more than 2 percent, but less than 3 percent injury, and one field had 4.9 percent chalcid infested seeds. The average percent of chalcid infested seeds in the 57 fields was 0.74.

Seeds showing lygus bug injury ranged from 1.5 to 19.1 percent and averaged 5.2 percent for the 57 fields. The percentages of seeds showing damage attributed to stink bug feeding ranged from 1.3 to 6.0 and averaged 3.1.

Effects of insecticides on beneficial insect species.

Data were obtained in all experiments on the effects of the various insecticides and acaricides on the following groups of predatory and parasitic organisms, Orius (minute pirate bugs), Geocoris (big-eyed bugs - 3 species), Nabis (damselfly bugs), lacewings, syrphid flies, coccinellid beetles (lady beetles), collops beetles, spiders and parasitic wasps. The data indicate that all of the insecticides used in the 1977 trials reduced predator and parasite populations. Of the insecticides used, those having the least drastic effect on predator and parasite populations were Ambush, UC 21865 and Pydrin. The acaricides, Comite, Malanoben and PP-199 did not appear to

adversely affect the beneficial species. Data obtained with Plictran are too meager to formulate definite conclusions, but there were indications that this acaricide may have reduced parasite and predator populations.

Summary and conclusions

Of the eight insecticides evaluated for control of insects affecting seed alfalfa, those that were most promising for control of lygus bugs were Monitor, Orthene, Ambush and Pydrin. These insecticides held lygus bugs below pretreatment levels for 14 plus days after application. Combinations of Monitor + Comite, Monitor + Plictran, Orthene + Comite, Pydrin + Comite and Ambush + PP-199 appear promising for control of lygus bugs and spider mites.

Studies conducted from 1973 through 1976 indicate that lygus bug populations above 6 to 8 bugs per sweep are likely to be economically significant and that treatments should be timed to coincide with hatching and nymphal development. To be most effective, the insecticides should be applied after a hatch and before the nymphs reach the fourth and fifth instars. In 1977, Carzol, Pydrin, Orthene and Monitor were applied to coincide with hatching and nymphal development of lygus bugs and according to average lygus population levels of 4 to 8 bugs per 180° sweep with a standard insect sweeping net. The insecticides were first applied on June 30 when populations averaged slightly over 4 bugs per sweep and plots were retreated when populations reached levels of 6 to 8 bugs per sweep. Under this program, two applications of each insecticide were required to hold the lygus bug populations below 6 to 8 bugs per sweep for the growing period of this crop which was terminated on July 30 because of dry conditions within the field.

Aphid populations were so low in the areas where tests were conducted, that data obtained on aphid control with new insecticides were inconclusive. Additional experiments should be conducted with Pydrin and Ambush.

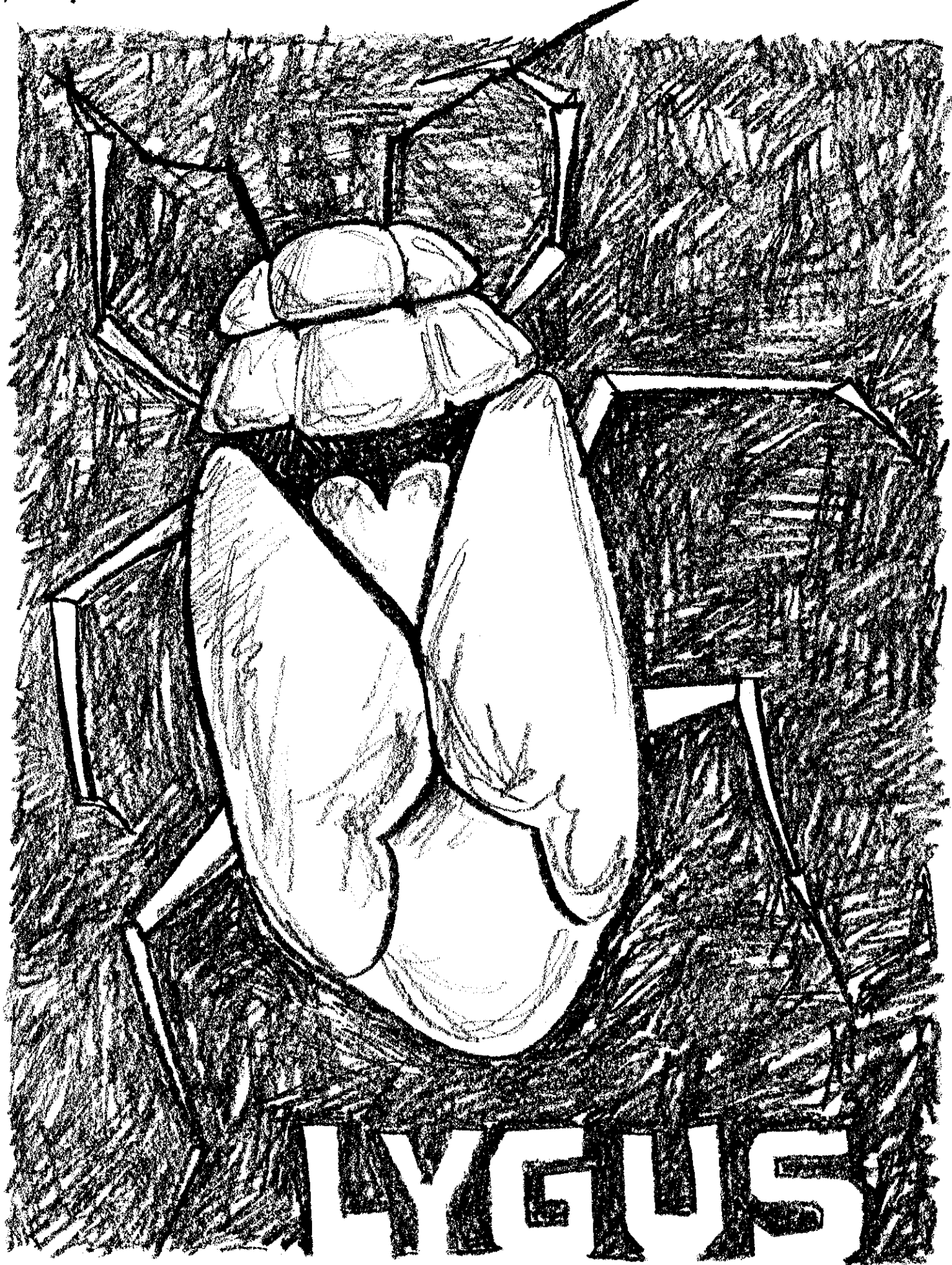
Weekly surveys from March 8 through April 18 in 11 untreated alfalfa seed fields showed the blue alfalfa aphid present in all fields and averaging 94 per cent of the combined blue alfalfa and pea aphid populations. In general, the aphid populations were low, the blue alfalfa aphid populations peaked in the majority of these fields on March 23, although peaks occurred in a few fields on March 8 and April 5.

In general, spider mite populations were high in those seed fields where studies were conducted. Of the specific acaricides tested, those resulting in the best spider mite control were Comite and Plictran. PP-199 appeared promising in combination with Ambush, but was not highly effective when used alone. Kelthane in one test resulted in a temporary reduction of spider mite populations, but did not prevent populations from increasing 14 and 21 days after application. Malanoben and Zardex did not reduce populations of adult mites or eggs.

Stink bug populations were measured in 15 alfalfa seed fields in the Firebaugh-San Joaquin areas from July 14 to August 11. The consperse stink bug occurred in 12 of the 15 fields, but populations were extremely low ranging from 1 to 6 bugs per 25 feet of row. A total of only 34 consperse stink bugs and 7 Says stink bugs were collected in samples from all of the fields.

A survey was conducted in 57 alfalfa seed fields in the Firebaugh, San Joaquin and Five Points areas to evaluate damage caused by the alfalfa seed chalcid. In addition, data were obtained on percentages of seeds showing feeding injury attributed to lygus bugs and stink bugs. The percent of chalcid damaged seed in individual fields ranged from 0 to 4.9 and averaged 0.74. Seeds showing lygus bug injury ranged from 1.5 to 19.1 percent and averaged 5.2 percent for the 57 fields. The percentages of seeds showing damage attributed to stink bug feeding ranged from 1.3 to 6.0 and averaged 3.1.

All of the insecticides used in the trials adversely affect predatory and parasitic arthropods. Those insecticides appearing to have the least drastic affect on predator and parasite populations were Ambush, UC 21865 and Pydrin. The acaricides, Comite, Malanoben and PP-199 did not appear to adversely affect the beneficial species. Data obtained with Plictran are too meager to formulate definite conclusions, but there were indications that this acaricide may have reduced parasite and predator populations.



Lygus bug populations in seed alfalfa plots treated by
aircraft for lygus bug control. Firebaugh, California.
1977.

Treatment ^{1/}		Days after treat- ment ^{2/}	Number of lygus bugs per sweep ^{3/}					Adults & Nymphs
Insecticides	AI/acre lb.		Adults	Nymphs			Total	
				Small	Medium	Large		
Orthene	1.0	Pre	0.40	3.80	4.45	1.55	9.80	10.20
		7	0.20	0.05	0.00	0.05	0.10	0.30
		14	0.50	0.50	0.10	0.00	0.60	1.10
		21	0.85	0.75	0.90	0.80	2.45	3.30
Orthene	0.5	Pre	0.45	4.30	5.25	1.05	10.60	11.05
		7	0.15	0.00	0.05	0.00	0.05	0.20
		14	0.55	0.85	0.25	0.05	1.15	1.70
		21	0.90	0.50	0.70	1.20	2.40	3.30
Ambush	0.2	Pre	0.65	5.55	7.30	1.60	14.45	15.10
		7	0.05	0.20	1.75	0.95	2.90	2.95
Carzol (6/22)	0.75	14	2.70	3.10	1.55	2.20	6.85	9.55
		21	2.20	0.55	0.75	0.85	2.15	4.35
Ambush	0.1	Pre	0.85	3.70	6.75	1.35	11.80	12.65
		7	0.20	0.65	4.80	1.50	6.95	7.15
Carzol (6/22)	0.75	14	2.85	4.85	2.55	2.65	10.05	12.90
		21	4.00	0.60	0.55	1.50	2.65	6.65
Ambush + PP-199	0.2 + 0.2	Pre	0.45	2.30	5.35	0.90	8.55	9.00
		7	0.10	0.10	1.65	0.60	2.35	2.45
		14	1.35	1.15	0.40	1.00	2.55	3.90
		21	4.15	1.20	0.95	1.95	4.10	8.25
UC 21865	1.0	Pre	0.30	0.70	2.95	0.60	4.25	4.55
		7	0.20	0.05	0.95	0.85	1.85	2.05
		14	1.35	0.35	0.15	0.35	0.85	2.20
		21	1.95	1.25	1.30	1.90	4.45	6.40
Carzol	0.75	Pre	0.15	1.50	3.70	1.10	6.30	6.45
		7	0.45	0.00	0.70	0.45	1.15	1.60
		14	1.20	0.45	0.80	0.85	2.10	3.30
		21	1.75	1.05	1.20	2.05	4.30	6.05

^{1/}Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. UC 21865 and Orthene were 75% wettable powders, Carzol was a 92% soluble powder, PP-199 was a colloidal suspension while the others were emulsifiable concentrates. Plots were treated June 8 from 1:00 A.M. to 5:30 A.M.

^{2/}Pretreatment counts were made on June 7. The 2 Ambush plots were retreated on June 22 with Carzol. (between the 14 and 21 day counts).

^{3/}Average of 20 sweeps (10-2 sweep samples) per treatment on each sampling date.

Lygus bug populations in seed alfalfa plots treated by
aircraft for lygus bug control. Firebaugh, California,
1977.

Treatment ^{1/}		Days after treat- ment ^{2/}	Number per 50 D-Vac Samples ^{3/}									
Insecticides	AI/ acre lb.		Adults			Nymphal Instars						Adults + Nymphs
			♂	♀	Total	1	2	3	4	5	Total	
Orthene	1.0	Pre	2	1	3	26	31	24	16	12	109	112
		7	0	1	1	1	0	0	0	0	1	2
		14	5	2	7	9	0	0	0	0	9	16
		21	5	2	7	9	5	4	10	8	36	43
Orthene	0.5	Pre	6	3	9	16	51	30	13	8	118	127
		7	1	0	1	2	0	1	0	3	6	7
		14	6	1	7	3	7	0	0	0	10	17
		21	5	3	8	3	6	0	1	10	20	28
Ambush	0.2	Pre	2	6	8	11	29	23	7	11	81	89
		7	0	0	0	1	8	17	9	4	39	39
Carzol (6/22)	0.75	14	9	8	17	9	15	15	8	5	52	69
		21	30	11	41	1	0	0	3	6	10	51
Ambush	0.1	Pre	4	2	6	4	18	20	11	17	70	76
		7	1	1	2	5	18	17	9	4	53	55
		14	6	10	16	2	17	5	8	7	39	55
Carzol (6/22)	0.75	21	19	2	21	1	0	4	3	0	8	29
		Pre	1	2	3	15	26	21	5	2	69	72
Ambush + PP-199	0.2	7	2	0	2	4	14	14	14	3	49	51
		14	12	10	22	5	10	7	8	4	34	56
		21	19	14	33	7	6	1	8	5	27	60
UC 21865	1.0	Pre	2	6	8	4	8	17	10	10	49	57
		7	4	0	4	2	5	4	3	4	18	22
		14	10	16	26	9	11	1	2	1	24	50
		21	19	5	24	11	4	14	8	14	51	75
Carzol	0.75	Pre	2	0	2	7	11	10	14	19	66	68
		7	2	1	3	0	4	9	4	7	24	27
		14	15	6	21	2	0	8	3	7	20	41
		21	19	12	31	11	10	12	8	2	43	74

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. UC 21865 and Orthene were 75% wettable powders, Carzol was a 92% soluble powder, PP-199 was a colloidal suspension while the others were emulsifiable concentrates. Plots were treated June 8 from 1:00 A.M. to 4:30 A.M.

^{2/} Pretreatment counts were made on June 7. The 2 Ambush plots were retreated on June 22 with Carzol (between the 14 and 21 day counts).

^{3/} 2-25 suck D-Vac samples per treatment on each sampling date.

Populations of Lygus hesperus and Lygus elisus in seed
alfalfa plots treated by aircraft for lygus bug control.
Firebaugh, California. 1977.

Treatment ^{1/}			Number per 50 D-Vac Samples ^{4/}					
Insecticides ^{2/}	AI/acre lb.	Days after treatment ^{3/}	<u>Lygus hesperus</u>			<u>Lygus elisus</u>		
			Adults	Nymphs	Total	Adults	Nymphs	Total
Orthene	1.0	Pre	3	70	73	0	13	13
		7	1	0	1	0	0	0
		14	5	0	5	2	0	2
		21	7	27	34	0	0	0
Orthene	0.5	Pre	7	90	97	2	12	14
		7	1	8	9	0	0	0
		14	4	7	11	3	0	3
		21	8	17	25	0	0	0
Ambush	0.2	Pre	7	66	73	1	4	5
		7	0	38	38	0	0	0
		14	17	43	60	0	0	0
Carzol (6/22)	0.75	21	38	9	47	3	0	3
Ambush	0.1	Pre	6	65	71	0	1	1
		7	2	48	50	0	0	0
		14	15	37	52	1	0	1
Carzol (6/22)	0.75	21	15	7	22	6	0	6
Ambush +	0.2 +	Pre	1	50	51	2	4	6
		7	2	45	47	0	0	0
		14	21	29	50	1	0	1
PP-199	0.2	21	29	20	49	4	0	4
UC 21865	1.0	Pre	8	45	53	0	0	0
		7	4	16	20	0	0	0
		14	26	15	41	0	0	0
		21	24	40	64	0	0	0
Carzol	0.75	Pre	2	50	52	0	4	4
		7	1	23	24	2	1	3
		14	21	17	38	0	1	1
		21	23	32	55	8	0	8

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. UC 21865 and Orthene were 75% wettable powders, Carzol was a 92% soluble powder, PP-199 was a colloidal suspension while the others were emulsifiable concentrates. Plots were treated June 8 from 1:00 A.M. to 4:30 A.M.

^{2/} The 2 Ambush plots were retreated on June 22 with Carzol (between the 14 and 21 day counts).

^{3/} Pretreatment counts were made on June 7.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Lygus bug populations in seed alfalfa plots where insecticides were applied at a count of 4-8 lygus ^{1/} bugs per sweep. Firebaugh, California. 1977.

Treatment ^{2/}			Number of lygus bugs per sweep ^{4/}					
Insecticides	AI/acre lb.	Days after treatment ^{3/}	Adults	Nymphs			Total	Adults + Nymphs
				Small	Medium	Large		
Carzol (6/30)	0.75	Pre	0.55	0.45	1.10	0.60	2.15	2.70
		Pre	0.90	0.30	0.65	0.15	1.10	2.00
		Pre	0.90	1.55	1.10	0.55	3.20	4.10
		6	0.65	0.40	0.25	0.40	1.05	1.70
		13	1.35	0.95	0.80	0.60	2.35	3.70
Comite (7/13)	1.69	20	1.20	1.20	0.90	2.30	4.40	5.60
Carzol (7/20)	0.75	7	0.90	0.20	0.30	1.00	1.50	2.40
Pydrin (6/30)	0.20	Pre	0.15	0.40	0.80	0.15	1.35	1.50
		Pre	0.80	0.15	0.10	0.10	0.35	1.15
		Pre	1.15	1.25	0.95	0.20	2.40	3.55
		6	0.00	0.25	0.15	0.10	0.50	0.50
		13	1.15	3.15	1.40	1.00	5.55	6.70
Pydrin (7/13)	0.20	7	0.00	0.10	0.00	0.15	0.25	0.25
+ Comite	+ 1.69	14	0.75	1.60	1.15	0.25	3.00	3.75
Orthene (6/30)	0.5	Pre	0.15	0.15	0.30	0.25	0.70	0.85
		Pre	0.35	0.15	0.40	0.25	0.80	1.15
		Pre	0.85	1.00	0.65	0.25	1.90	2.75
		6	0.50	0.40	0.05	0.15	0.60	1.10
		13	1.25	2.15	2.10	0.55	4.80	6.05
Orthene (7/13)	0.5	7	0.45	0.40	0.05	0.35	0.80	1.25
+ Comite	+ 1.69	14	0.40	0.85	1.45	0.60	2.90	3.30
Monitor (6/30)	0.5	Pre	0.85	0.60	1.70	2.70	5.00	5.85
		Pre	0.45	1.25	1.85	1.80	4.90	8.35
		Pre	2.30	1.25	1.65	0.60	3.50	5.80
		6	0.15	0.00	0.00	0.00	0.00	0.15
		13	0.50	1.55	1.80	0.10	3.55	4.05
Comite (7/13)	1.69	20	1.25	0.25	4.50	1.95	6.70	7.95
Monitor (7/20)	0.5	7	0.30	0.75	0.10	0.15	1.00	1.30

^{1/} Plot size: Each treatment consisted of 1-10 acre plot.

^{2/} Applications were made by aircraft at 10 GPA prior to 5:00 A.M.

^{3/} Pretreatment counts were made on June 14, 21, 28.

^{4/} Average of 20 sweeps (10-2 sweep samples) per treatment on each sampling date.

Lygus bug populations in seed alfalfa plots where insecticides were applied at a count of 4-8 lygus ^{1/} bugs per sweep. Firebaugh, California. 1977.

Treatment ^{2/}			Number per 50 D-Vac Samples ^{4/}									
Insecticides	AI/acre lb.	Days after treatment ^{3/}	Adults			Nymphal instars					Adults + Nymphs	
			♂	♀	Total	1	2	3	4	5	Total	
Carzol (6/30)	0.75	Pre	1	2	3	0	4	4	8	7	23	26
		Pre	11	9	20	0	2	5	3	6	16	36
		Pre	9	5	14	8	10	4	8	1	31	39
		6	5	5	10	0	0	8	2	5	15	25
		13	17	6	23	9	9	7	5	7	37	60
Comite (7/13)	1.69	20	18	8	26	15	27	26	19	25	112	138
Carzol (7/20)	0.75	7	8	2	10	2	2	1	3	3	11	21
Pydrin (6/30)	0.20	Pre	4	1	5	1	0	2	2	1	6	11
		Pre	2	4	6	2	4	2	2	1	11	17
		Pre	4	2	6	6	4	0	7	0	17	23
		6	0	0	0	2	8	2	1	0	13	13
		13	7	9	16	7	31	4	4	6	52	68
Pydrin (7/13)	0.20	7	0	0	0	0	0	0	0	1	1	1
+ Comite	+ 1.69	14	2	2	4	0	2	9	4	1	16	20
Orthene (6/30)	0.50	Pre	2	0	2	0	3	3	1	4	11	13
		Pre	3	3	6	2	4	1	3	2	12	18
		Pre	6	7	13	4	7	8	8	3	30	43
		6	9	5	14	5	8	4	3	6	26	40
		13	32	6	38	1	32	36	10	1	80	118
Orthene (7/13)	0.50	7	3	2	5	9	7	0	2	0	18	23
+ Comite	+ 1.69	14	3	1	4	9	15	23	8	2	57	61
Monitor (6/30)	0.50	Pre	6	7	13	1	7	14	19	8	49	62
		Pre	15	6	21	5	15	10	5	5	40	61
		Pre	20	17	37	9	16	18	14	10	67	104
		6	3	1	4	1	1	0	0	2	4	8
		13	13	6	19	15	47	9	0	0	71	90
Comite (7/13)	1.69	20	12	6	18	23	23	17	11	4	78	96
Monitor (7/20)	0.50	7	2	2	4	23	4	0	0	0	27	31

^{1/} Plot size: Each treatment consisted of 1-10 acre plot.

^{2/} Applications were made by aircraft at 10 GPA prior to 5:00 A.M.

^{3/} Pretreatment counts were made on June 14, 21, 28.

^{4/} 2-25 suck D-Vac samples on each sampling date.

Populations of Lygus hesperus and Lygus elisus in seed alfalfa plots where insecticides were applied at a count of 4-8 lygus ^{1/} bugs per sweep. Firebaugh, California. 1977.

Treatment ^{2/}			Number per 50 D-Vac Samples ^{4/}					
Insecticide	AI/acre lb.	Days after treatment ^{3/}	<u>Lygus hesperus</u>			<u>Lygus elisus</u>		
			Adults	Nymphs	Total	Adults	Nymphs	Total
Carzol (6/30)	0.75	Pre	2	23	25	2	0	2
		Pre	19	16	35	1	0	1
		Pre	14	23	37	0	0	0
		6	0	11	11	0	0	0
		13	23	28	51	0	0	0
Comite (7/13)	1.69	20	18	80	98	8	17	25
Carzol (7/20)	0.75	7	8	8	16	2	1	3
Pydrin (6/30)	0.20	Pre	5	5	10	0	0	0
		Pre	6	9	15	0	0	0
		Pre	12	26	38	1	0	1
		6	0	11	11	0	0	0
		13	16	45	61	0	0	0
Pydrin (7/13)	0.20							
+	+	7	0	1	1	0	0	0
Comite	1.69	14	4	13	17	0	3	3
Orthene (6/30)	0.50	Pre	2	11	13	0	0	0
		Pre	6	10	16	0	0	0
		Pre	13	25	38	0	1	1
		6	14	21	35	0	0	0
		13	36	79	115	2	0	2
Orthene (7/13)	0.50							
+	+	7	5	9	14	0	0	0
Comite	1.69	14	3	40	43	1	8	9
Monitor (6/30)	0.50	Pre	12	48	60	1	0	1
		Pre	20	35	55	1	0	1
		Pre	35	58	93	2	0	2
		6	4	3	7	0	0	0
		13	16	56	72	3	0	3
Comite (7/13)	1.69	20	17	50	67	1	5	6
Monitor (7/20)	0.50	7	4	4	8	0	0	0

^{1/} Plot size: Each treatment consisted of 1-10 acre plot.

^{2/} Applications were made by aircraft at 10 GPA prior to 5:00 A.M.

^{3/} Pretreatment counts were made June 14, 21, 28.

^{4/} 2-25 suck D-Vac samples on each sampling date.

Lygus bug populations in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California. 1977.

<u>Treatment</u> ^{1/}		<u>Number of lygus bugs per sweep</u> ^{4/}						
<u>Insecticides</u> ^{2/}	<u>AI/acre lb.</u>	<u>Days after treatment</u> ^{3/}	<u>Adults</u>	<u>Nymphs</u>			<u>Total</u>	<u>Adults + Nymphs</u>
		Pre	1.75	1.40	1.65	1.90	4.95	6.70
Comite	1.69	7	5.65	3.65	0.45	0.95	5.05	10.70
Toxaphene	4.00							
+	+	7	2.30	1.15	1.35	1.55	4.05	6.35
Comite	1.69							
		Pre	1.50	0.00	0.75	1.50	2.25	3.75
PP-199	0.10	7	4.40	2.35	0.45	0.35	3.15	7.55
Toxaphene	4.00							
+	+	7	3.10	0.90	0.30	1.00	2.20	5.30
Comite	1.69							
		Pre	1.05	0.00	0.85	1.60	2.45	3.50
PP-199	0.20	7	3.10	1.70	0.25	0.35	2.30	5.40
		14	1.70	4.35	4.05	1.20	9.60	11.30
		Pre	1.45	0.05	1.30	1.30	2.65	4.10
Carzol	0.75	7	0.70	0.00	0.00	0.00	0.00	0.70
Comite	1.69	7	1.75	0.35	0.35	0.00	0.70	2.45
		Pre	1.30	0.00	0.25	0.85	1.10	2.40
UC 21865	1.00	7	0.85	1.05	0.00	0.15	1.20	2.05
Comite	1.69	7	1.40	2.60	0.85	0.20	3.65	5.05
		Pre	1.25	0.05	0.35	1.05	1.45	2.70
Malanoben	1.00	7	2.45	1.95	0.10	0.25	2.30	4.70
Comite	1.69	7	1.45	6.70	3.05	1.05	10.80	12.20

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. All applications were made from 2:00 A.M. to 4:30 A.M. on July 6.

^{2/} Comite and Toxaphene were emulsifiable concentrates, PP-199 was a colloidal suspension, Carzol was a 92% soluble powder, UC 21865 was a 75% wettable powder.

^{3/} Pretreatment counts were made on July 5.

^{4/} Average of 20 sweeps (10-2 sweep samples) per treatment on each sampling date.

Lygus bug populations in seed alfalfa plots treated by
aircraft for spider mite control. Firebaugh, California.
1977.

Insecticides	Treatment ^{1/}	Days after treat- ment ^{2/}	Number per 50 D-Vac Samples ^{3/}									
	AI/ acre lb.		Adults			Nymphal Instars						Adults + Nymphs
			♂	♀	Total	1	2	3	4	5	Total	
Comite	1.69	Pre	14	18	32	4	2	24	28	0	58	90
		7	54	29	83	5	96	16	2	0	119	202
Toxaphene + Comite	4.00 + 1.69	7	50	10	60	1	28	42	26	0	97	157
PP-199	0.10	Pre	7	10	17	0	4	16	30	0	50	67
		7	60	24	84	4	70	7	7	0	88	172
Toxaphene + Comite	4.00 + 1.69	7	58	20	78	1	19	52	19	0	91	179
PP-199	0.20	Pre	15	8	23	3	1	14	30	0	48	71
		7	50	17	67	1	57	7	4	0	69	136
		14	32	14	46	2	123	75	12	0	212	258
Carzol	0.75	Pre	16	12	28	0	1	14	13	2	30	58
		7	18	6	24	0	2	0	0	0	2	26
Comite	1.69	7	21	7	28	0	44	13	0	0	57	85
UC 21865	1.00	Pre	9	18	27	1	0	12	20	0	33	60
		7	14	6	20	0	15	0	2	0	17	37
Comite	1.69	7	34	8	42	0	77	28	1	0	106	148
Malanoben	1.00	Pre	8	7	15	3	1	17	17	0	38	53
		7	12	14	26	0	24	1	1	0	26	52
Comite	1.69	7	26	9	35	0	201	110	6	0	317	352

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. All applications were made from 2:00 A.M. to 4:30 A.M. on July 6.

^{2/} Comite and Toxaphene were emulsifiable concentrates, PP-199 was a colloidal suspension, Carzol was a 92% soluble powder, UC 21865 was a 75% wettable powder.

^{3/} Pretreatment counts were made on July 5.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Population of Lygus hesperus and Lygus elisus in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}			Number per 50 D-Vac Samples ^{4/}					
Insecticides ^{2/}	AI/acre lb.	Days after treatment ^{3/}	<u>Lygus hesperus</u>			<u>Lygus elisus</u>		
			Adults	Nymphs	Total	Adults	Nymphs	Total
Comite	1.69	Pre	26	54	80	6	0	6
		7	76	114	190	7	0	7
Toxaphene + Comite	4.00 + 1.69	7	60	96	156	0	0	0
PP-199	0.10	Pre	15	50	65	2	0	2
		7	76	84	160	8	0	8
Toxaphene + Comite	4.00 + 1.69	7	78	90	168	0	0	0
PP-199	0.20	Pre	19	45	64	4	0	4
		7	66	68	134	1	0	1
		14	46	210	256	0	0	0
Carzol	0.75	Pre	22	30	52	6	0	6
		7	23	2	25	1	0	1
Comite	1.69	7	28	57	85	0	0	0
UC 21865	1.00	Pre	13	32	45	14	0	14
		7	20	17	37	0	0	0
Comite	1.69	7	42	106	148	0	0	0
Malanoben	1.00	Pre	11	35	46	4	0	4
		7	26	26	52	0	0	0
Comite	1.69	7	35	317	352	0	0	0

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. All applications were made from 2:00 A.M. to 4:30 A.M. on July 6.

^{2/} Comite and toxaphene were emulsifiable concentrates, PP-199 was a colloidal suspension, Carzol was a 92% soluble powder, UC 21865 was a 75% wettable powder.

^{3/} Pretreatment counts were made on July 5.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Lygus bug populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}		Days after treat- ment ^{3/}	Number of Lygus bugs per sweep ^{4/}					
Insecticides ^{2/}	AI/acre lb.		Adults	Nymphs				Adults & Nymphs
				Small	Medium	Large	Total	
		Pre	1.20	3.60	7.75	1.60	12.95	14.15
Monitor +	0.50 +	7	1.05	0.80	0.00	0.10	0.90	1.95
Comite	1.69	14	0.15	1.55	0.15	0.05	1.75	1.90
		Pre	1.90	0.55	1.35	0.50	2.40	4.30
Monitor +	0.50 +	7	0.05	0.80	0.00	0.05	0.85	0.90
Plictran	0.75	14	0.10	1.45	0.35	0.00	1.80	1.90
		Pre	2.70	0.80	2.35	0.60	3.75	6.45
Plictran	0.75	7	2.60	6.50	3.55	2.10	12.15	14.75
		14	-	-	-	-	-	-

^{1/} Plot size: Each treatment consisted of 1-5 acre plot (165' x 1320'). Sprays were applied at 10 GPA. Plictran was a 50% wettable powder while Monitor and Comite were emulsifiable concentrates.

^{2/} Application was made between 2:00 A.M. and 4:00 A.M. on July 20.

^{3/} Pretreatment count was made July 19.

^{4/} Average of 20 sweeps (10-2 sweep samples) per treatment on each sampling date.

Lygus bug populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California. 1977.

Insecticides ^{2/}	Treatment ^{1/} AI/acre lb.	Days after treat- ment ^{3/}	Number per 50 D-Vac Samples ^{4/}										Adults & Nymphs
			Adults			Nymphal instars					Total		
			♂	♀	Total	1	2	3	4	5			
Monitor + Comite	0.50 + 1.69	Pre	39	7	46	32	64	77	97	57	327	373	
		7	9	6	15	11	45	16	3	5	80	95	
		14	1	0	1	3	30	22	1	0	56	57	
Monitor + Plictran	0.50 + 0.75	Pre	28	7	35	12	21	22	35	27	117	152	
		7	2	2	4	12	1	0	0	0	13	17	
		14	1	3	4	21	46	28	0	0	95	99	
Plictran	0.75	Pre	42	22	64	23	25	25	2	0	75	139	
		7	2	0	2	10	14	2	1	0	27	29	
		14	48	21	69	32	296	251	102	30	711	780	

^{1/} Plot size: Each treatment consisted of 1-5 acre plot (165' x 1320'). Sprays were applied at 10 GPA. Plictran was a 50% wettable powder while Monitor and Comite were emulsifiable concentrates.

^{2/} Application was made between 2:00 A.M. and 4:00 A.M. on July 20.

^{3/} Pretreatment count was made July 19.

^{4/} 2-25 Suck D-Vac samples per treatment on each sampling date.

Populations of Lygus hesperus and Lygus elisus in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California. 1977.

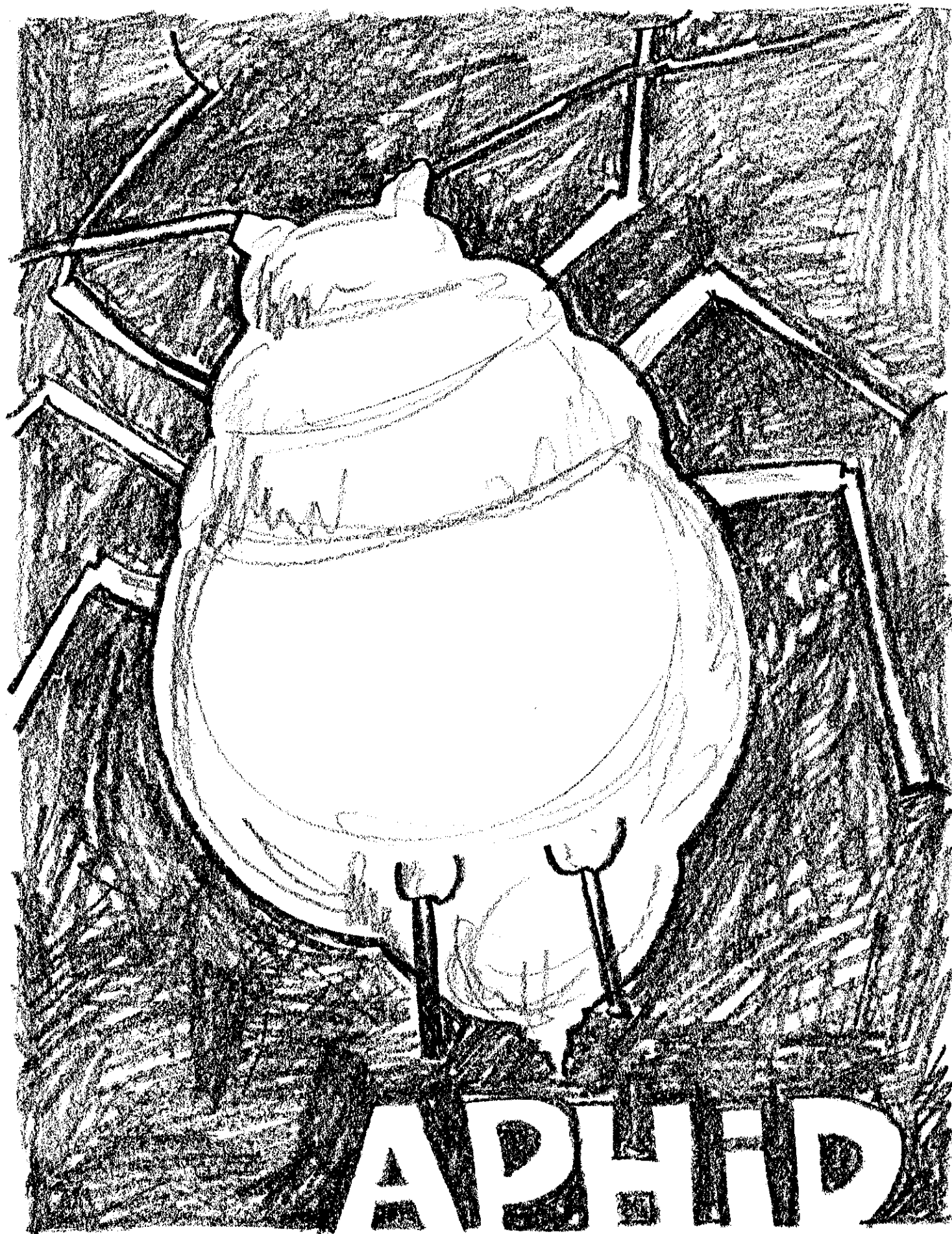
Treatment ^{1/}			Number per 50 D-Vac Samples ^{4/}					
Insecticides ^{2/}	AI/acre lb.	Days after treatment ^{3/}	<u>Lygus hesperus</u>			<u>Lygus elisus</u>		
			Adults	Nymphs	Total	Adults	Nymphs	Total
Monitor	0.50	Pre	43	280	323	3	15	18
+	+	7	11	69	80	4	0	4
Comite	1.69	14	1	52	53	0	1	1
Monitor	0.50	Pre	35	105	140	0	0	0
+	+	7	4	1	5	0	0	0
Plictran	0.75	14	3	71	74	1	3	4
Plictran	0.75	Pre	48	49	97	16	3	19
		7	1	17	18	1	0	1
		14	62	679	741	7	0	7

^{1/} Plot size: Each treatment consisted of 1-5 acre plot (165' x 1320'). Sprays were applied at 10 GPA. Plictran was a 50% wettable powder while Monitor and Comite were emulsifiable concentrates.

^{2/} Application was made between 2:00 A.M. and 4:00 A.M. on July 20.

^{3/} Pretreatment count was made July 19.

^{4/} 2-25 Suck D-Vac samples per treatment on each sampling date.



Spotted alfalfa aphid populations in seed alfalfa plots treated by aircraft for lygus control. Firebaugh, California. 1977.

Treatment ^{1/}		Number of Aphids per 50 D-Vac Samples ^{2/}			
Insecticides	AI/acre lb.	June 7 Pre	June 14 7 days	June 21 14 days	June 28 21 days
Orthene	1.0	69	25	16	73
Orthene	0.5	16	15	7	6
Ambush	0.2	6	2	3	0
Ambush	0.1	13	2	7	5
Ambush + PP-199	0.2 + 0.2	30	2	2	3
UC 21865	1.0	13	37	17	5
Carzol	0.75	37	57	17	3

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. UC 21865 and Orthene were 75% wettable powders, Carzol was a 92% soluble powder, PP-199 was a colloidal suspension while the others were emulsifiable concentrates. Plots were treated June 8 from 1:00 A.M. to 4:30 A.M.

^{2/} 2-25 suck D-Vac samples per treatment on each sampling date.

Pea aphid populations in seed alfalfa plots treated by aircraft for lygus bug control. Firebaugh, California, 1977.

Treatment ^{1/}		Number of Aphids per 50 D-Vac Samples ^{2/}			
Insecticides	AI/acre lb.	June 7 Pre	June 14 7 days	June 21 14 days	June 28 21 days
Orthene	1.0	2	0	0	0
Orthene	0.5	3	1	2	0
Ambush	0.2	3	3	1	0
Ambush	0.1	2	0	0	0
Ambush + PP-199	0.2 + 0.2	1	1	0	1
UC 21865	1.0	1	0	3	0
Carzol	0.75	4	4	0	0

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. UC 21865 and Orthene were 75% wettable powders, Carzol was a 92% soluble powder, PP-199 was a colloidal suspension while the others were emulsifiable concentrates. Plots were treated June 8 from 1:00 A.M. to 4:30 A.M.

^{2/} 2-25 suck D-Vac samples per treatment on each sampling date.

Aphid populations in seed alfalfa plots where insecticides were applied at a count of 4-8 lygus bugs per sweep. Firebaugh, California. ^{1/} 1977.

Treatment ^{2/}		Number per 50 D-Vac Samples ^{4/}			
Insecticides	AI/acre lb.	Dates of application	Days after treatment ^{3/}	Spotted alfalfa aphid	Pea aphid
Carzol	0.75	June 30	Pre	0	10
			Pre	0	6
			Pre	1	1
			6	0	4
			13	1	19
Comite	1.69	July 13	20	23	146
Carzol	0.75	July 20	7	0	8
Pydrin	0.20	June 30	Pre	0	14
			Pre	1	8
			Pre	0	3
			6	0	2
			13	0	3
Pydrin + Comite	+ 1.69	July 13	7	0	0
			14	0	0
Orthene	0.50	June 29	Pre	0	9
			Pre	0	4
			Pre	0	4
			7	1	9
			14	0	3
Orthene + Comite	+ 1.69	July 13	7	0	1
			14	2	15
Monitor	0.50	June 30	Pre	10	15
			Pre	0	3
			Pre	0	5
			6	0	0
			13	0	6
Comite	1.69	July 13	20	0	3
Monitor	0.50	July 20	7	8	0

^{1/} Plot size: Each treatment consisted of 1-10 acre plot.

^{2/} Applications were made by aircraft at 10 GPA prior to 5:00 A.M.

^{3/} Pretreatment counts were made on June 14, 21, 28.

^{4/} 2-25 suck D-Vac samples on each sampling date.

Aphid populations in seed alfalfa plots treated by aircraft
for spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per 50 D-Vac Samples ^{4/}	
Insecticides	AI/acre lb.			Spotted alfalfa aphid	Pea aphid
Comite	1.69	July 6	Pre 7	0 0	6 0
Toxaphene + Comite	4.00 + 1.69	July 13	7	0	0
PP-199	0.10	July 6	Pre 7	0 0	1 0
Toxaphene + Comite	4.00 + 1.69	July 13	7	0	0
PP-199	0.20	July 6	Pre 7 14	0 0 1	0 0 0
Carzol	0.75	July 6	Pre 7	0 0	2 1
Comite	1.69	July 13	7	0	2
UC 21865	1.00	July 6	Pre 7	0 0	0 1
Comite	1.69	July 13	7	0	0
Malanoben	1.00	July 6	Pre 7	0 0	0 2
Comite	1.69	July 13	7	0	0

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. All applications were made from 2:00 A.M. to 4:30 A.M.

^{2/} UC 21865 was a 75% wettable powder, Carzol was a 92% soluble powder, PP-199 was a colloidal suspension, Malanoben was a flowable liquid, while the others were emulsifiable concentrates.

^{3/} Pretreatment counts were made on July 5.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Aphid populations in seed alfalfa plots treated by aircraft for
lygus bug and spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per 50 D-Vac Samples	
Insecticides	AI/acre lb.			Spotted alfalfa aphid	Pea aphid
Monitor	0.50	July 20	Pre	0	6
+	+		7	0	53
Comite	1.69		14	1	1
Monitor	0.50	July 20	Pre	0	216
+	+		7	0	4
Plictran	0.75		14	1	2
Plictran	0.75	July 20	Pre	0	214
			7	0	60
			14	0	43

^{1/} Plot size: Each treatment consisted of 1-5 acre plot (165' x 1320'). Sprays were applied at 10 GPA. Plictran was a 50% wettable powder while Monitor and Comite were emulsifiable concentrates.

^{2/} Application was made between 2:00 A.M. and 4:00 A.M.

^{3/} Pretreatment count was made on July 19.

^{4/} 2-25 Suck D-Vac samples per treatment on each sampling date.

Aphid populations in 13 seed alfalfa fields.¹
Fresno County, California. 1977.

Field location Variety	Date Sampled	Blue alfalfa aphid		Pea aphid		Spotted alfalfa aphid	
		Wingless	Winged	Wingless	Winged	Wingless	Winged
		Total	Total	Total	Total	Total	Total
1 Firebaugh DeKalb 185	March 8	1020	40	60	18	78	12
	March 23	256	28	88	0	88	0
	April 5	40	16	4	0	4	0
	April 18	0	0	1	0	1	0
2 Firebaugh ARC	March 8	27	10	1	4	5	1
	March 23	172	16	33	3	36	7
	April 5	528	22	36	8	44	21
	April 18	9	45	2	34	36	1
3 Firebaugh Luna	March 8	447	28	13	3	16	142
	March 23	252	24	89	0	89	72
	April 5	19	2	3	1	4	8
	April 18	0	0	0	0	0	0
4 Firebaugh Luna	March 8	336	12	18	2	20	712
	March 23	2880	544	176	33	209	368
	April 5	1756	96	128	17	145	192
	April 18	3	3	1	3	4	1
5 Firebaugh U.C. Cargo	March 8	324	18	11	0	11	1
	March 23	436	376	56	6	62	0
	April 5	532	86	49	17	66	0
	April 18						

1/ Counts based on 50 D-Vac samples in each field on each sampling date.

2/ Treated by aircraft at 5 GPA April 7 with Lorsban 0.5 lb. AI/A.

Aphid populations in 13 seed alfalfa fields. 1/
Fresno County, California. 1977.

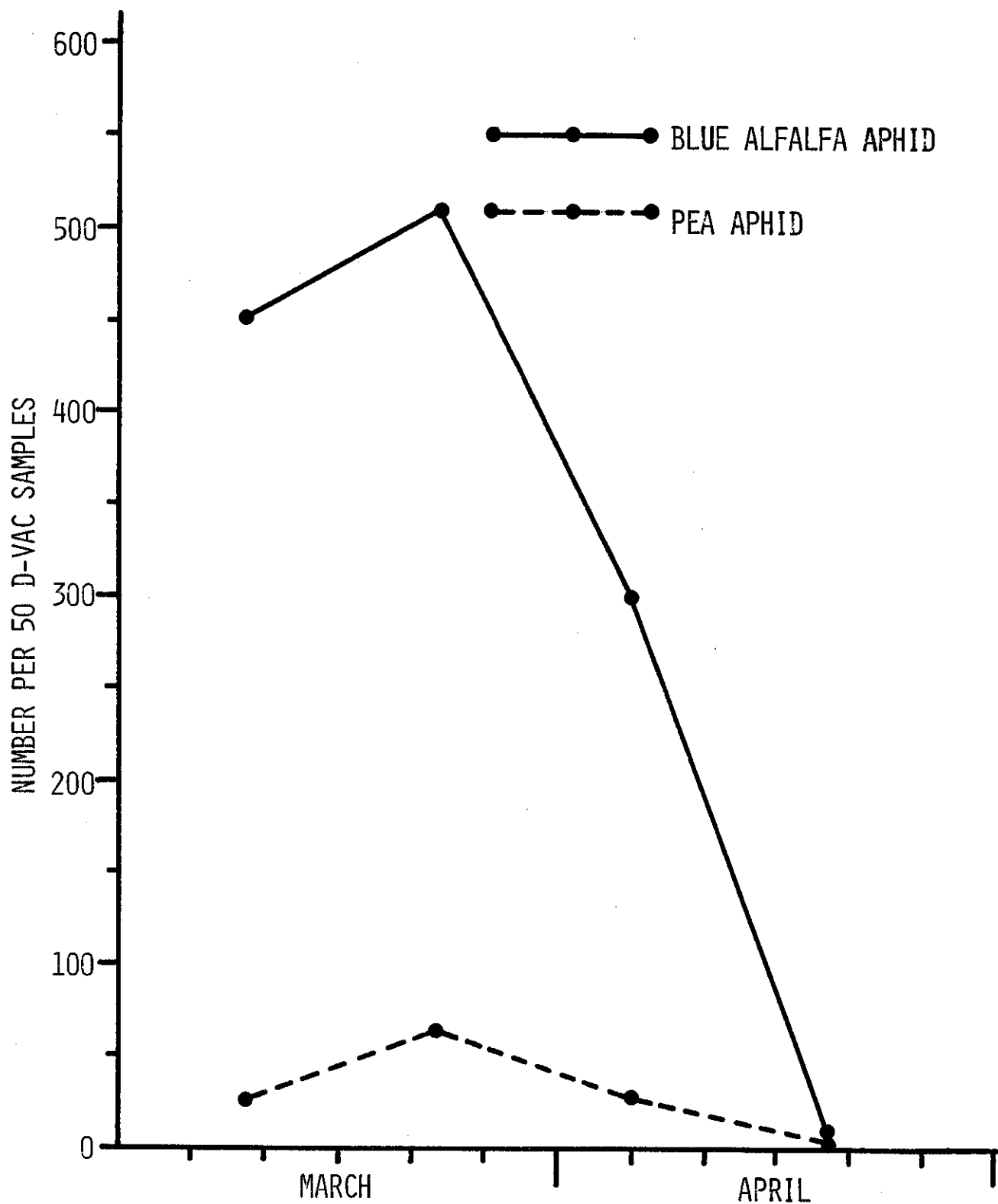
Field location Variety	Date Sampled	Blue alfalfa aphid			Pea aphid			Spotted alfalfa aphid		
		Wingless	Winged	Total	Wingless	Winged	Total	Wingless	Winged	Total
6 Firebaugh DeKalb 131	March 8	164	7	171	7	0	7	0	0	0
	March 23	272	152	424	88	8	96	0	0	0
	April 5	89	7	96	16	0	16	4	0	4
	April 18	1	1	2	4	0	4	0	1	1
7 Firebaugh U.C. Cargo	March 8	296	15	311	24	1	25	0	0	0
	March 23	41	9	50	17	6	23	0	0	0
	April 5	2	1	3	2	0	2	0	0	0
	April 18	3	0	3	0	0	0	0	0	0
8 Firebaugh Tempo	March 8	524	40	564	28	0	28	16	0	16
	March 23	1140	140	1280	104	7	111	28	9	37
	April 5	592	56	648	42	12	54	0	0	0
	April 18	2	0	2	0	2	2	0	10	10
9 Firebaugh Tempo	March 8	632	48	680	12	0	12	0	0	0
	March 23	460	76	536	24	0	24	4	0	4
	April 5	94	38	132	4	0	4	0	0	0
	April 18	0	4	4	2	2	4	0	1	1
10 San Joaquin Tempo	March 8	29	4	33	4	2	6	60	6	66
	March 23	460	60	520	160	48	208	1008	44	1052
	April 5	1268	90	1358	250	32	282	96	31	127
	April 18	3	0	3	5	2	7	20	1	21

1/ Counts based on 50 D-Vac samples in each field on each sampling date.

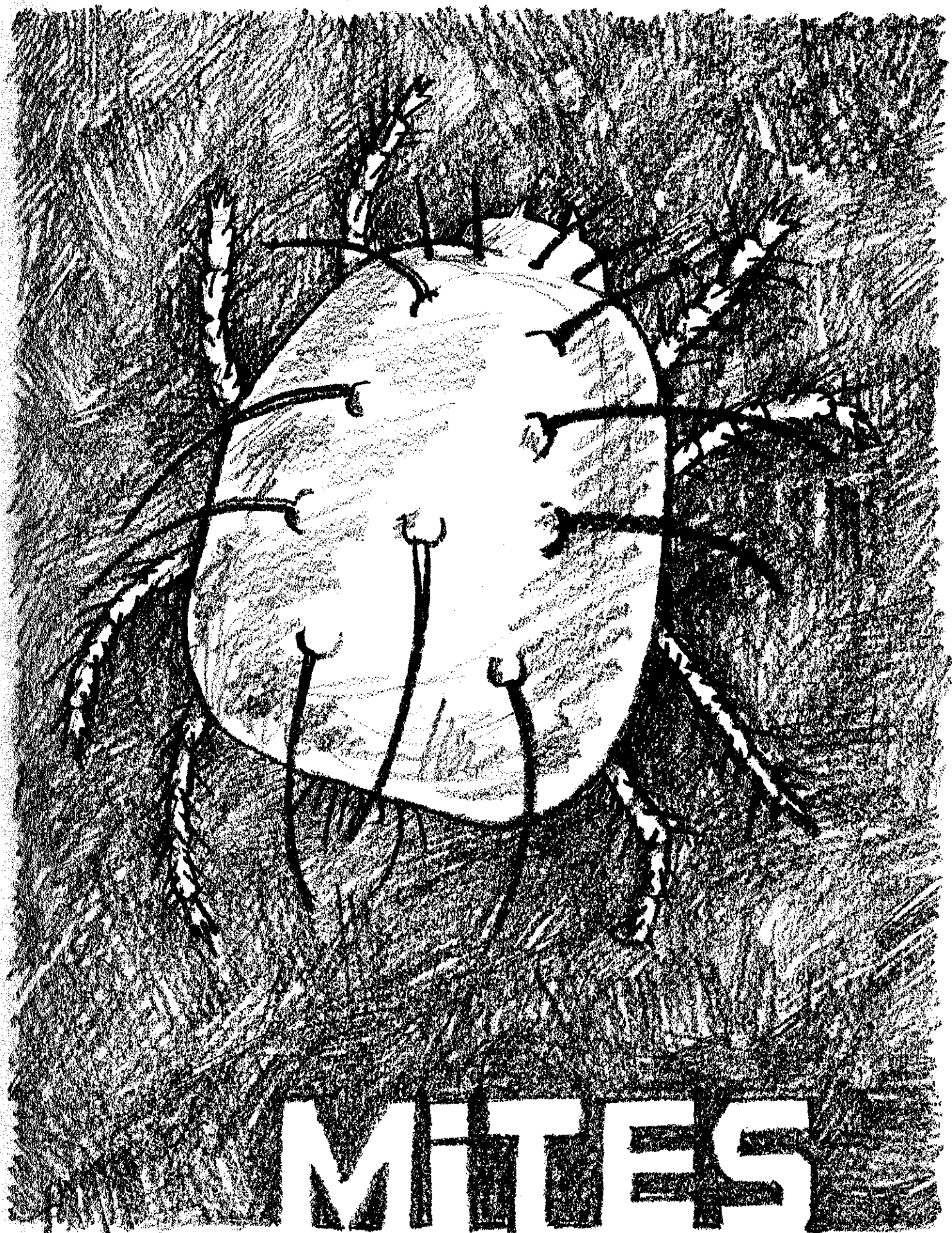
Aphid populations in 13 seed alfalfa fields.^{1/}
Fresno County, California. 1977.

Field location Variety	Date Sampled	Blue alfalfa aphid			Pea aphid			Spotted alfalfa aphid		
		Wingless	Winged	Total	Wingless	Winged	Total	Wingless	Winged	Total
11 San Joaquin DeKalb 123	March 9	25696	832	26528	320	32	352	256	0	256
	March 23	3680	168	3848	138	7	145	21	2	23
	April 5	-	-	-	-	-	-	-	-	-
	April 18	3	1	4	5	0	5	0	0	0
12 San Joaquin Hayden	March 9	8160	210	8370	128	16	144	64	0	64
	March 23	4392	309	4701	448	64	512	0	10	10
	April 5	32	12	44	12	4	16	0	0	0
	April 18	10	1	11	13	1	14	0	0	0
13 San Joaquin Tempo	March 9	4000	256	4256	141	0	141	1328	0	1328
	March 23	59	27	86	32	10	42	87	8	95
	April 5	12	6	18	4	0	4	32	12	44
	April 18	-	-	-	-	-	-	-	-	-

^{1/} Counts based on 50 D-Vac samples in each field on each sampling date.



MEAN APHID POPULATIONS FOR 7 UNTREATED SEED ALFALFA FIELDS IN THE FIREBAUGH AREA. FRESNO COUNTY, CALIFORNIA. 1977.



MITES

Spider mite populations in seed alfalfa plots treated by
aircraft. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per leaf ^{4/}	
Insecticides	AI/acre lb.			Mites	Eggs
Orthene	1.0	June 8	-	15.30	13.98
			Pre	12.84	11.76
			7	23.22	11.14
Comite	1.69	June 22	14		
Carzol	0.75		6	4.78	1.66
+	+				
Lorsban	0.50	June 29	7	10.80	3.50
Comite	1.69	July 12	7	0.20	0.76
Orthene	0.5	June 8	-	14.98	11.34
			Pre	14.26	11.88
			7	21.34	13.74
Comite	1.69	June 22	14		
Carzol	0.75		6	7.84	2.08
+	+				
Lorsban	0.50	June 29	7	9.3	2.1
Comite	1.69	July 6	7	0.0	0.12
Ambush	0.2	June 8	-	20.58	14.66
			Pre	17.16	20.64
			7	23.66	11.16
Carzol	0.75	June 22	14		
Carzol	0.75		6	14.18	2.64
+	+				
Lorsban	0.50	June 29	7	20.7	4.6
Comite	1.69	July 6	7	0.04	0.20

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Orthene was a 75% wettable powder, Carzol was a 92% soluble powder, Comite, Lorsban and Ambush were emulsifiable concentrates.

^{2/} All applications were made from 1:00 A.M. to 4:30 A.M.

^{3/} Pretreatment count was made on June 7.

^{4/} 50 trifoliate leaves were examined from each treatment on each sampling date.

Spider mite populations in seed alfalfa plots treated by
aircraft. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per leaf ^{4/}	
Insecticides	AI/acre lb.			Mites	Eggs
Ambush	0.1	June 8	-	10.14	6.90
			Pre	10.18	8.58
			7	15.44	7.08
Carzol	0.75	June 22	14		
Carzol +	0.75 +	June 29	6	14.58	6.74
			7	21.80	6.00
Lorsban	0.50				
Comite	1.69	July 6	7	0.60	0.96
<hr/>					
Ambush	0.2	June 8	-	7.28	6.26
			Pre		
			7	2.48	5.12
PP-199	0.2		14	5.94	4.16
			21	1.54	1.78
Carzol +	0.75 +	June 29			
			7	3.40	4.70
Lorsban	0.50				
Comite	1.69	July 6	7	0.52	0.60
<hr/>					
UC 21865	1.0	June 8	-	11.20	8.12
			Pre		
			7	11.12	6.76
Comite	1.69	June 22	14	14.64	7.14
			6	3.80	3.02
Carzol	0.75				
Carzol +	0.75 +	June 29	7	3.70	0.60
Lorsban	0.50				
Comite	1.69	July 6	7	1.20	0.52

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Ambush, Lorsban and Comite were emulsifiable concentrates, PP-199 was a colloidal suspension, Carzol was a 92% soluble powder, UC 21865 was a 75% wettable powder.

^{2/} All applications were made from 1:00 A.M. to 4:30 A.M.

^{3/} Pretreatment count was made on June 7.

^{4/} 50 trifoliate leaves were examined from each treatment on each sampling date.

Spider mite populations in seed alfalfa plots treated by
aircraft. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per leaf ^{4/}	
Insecticides	AI/acre lb.			Mites	Eggs
Carzol	0.75	June 8	Pre	13.84	10.20
			7	6.52	3.76
			14	10.66	5.20
			21	11.50	7.06
Carzol +	0.75 +	June 29	7	12.20	3.20
Lorsban	0.50				
Comite	1.69	July 6	7	0.08	0.08

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Carzol was a 92% soluble powder, Lorsban and Comite were emulsifiable concentrates.

^{2/} All applications were made from 1:00 A.M. to 4:30 A.M.

^{3/} Pretreatment count was made on June 7.

^{4/} 50 trifoliate leaves were examined from each treatment on each sampling date.

Spider mite populations in seed alfalfa plots where insecticides were applied at a count of 4-8 lygus ^{1/} bugs per sweep. Firebaugh, California. 1977

Treatment ^{2/}		Number per leaf ^{4/}			
Insecticides	AI/acre lb.	Dates of application	Days after treatment ^{3/}	Mites	Eggs
Carzol	0.75	June 30	Pre	4.12	4.60
			Pre	5.34	7.40
			Pre	8.50	7.90
			6	7.80	11.60
			13	12.12	20.86
Comite	1.69	July 13	20	7.24	3.14
Carzol	0.75	July 20	7	0.50	0.54
Pydrin	0.20	June 30	Pre	3.78	7.32
			Pre	3.96	5.30
			Pre	5.62	10.62
			6	9.70	12.30
			13	13.02	14.62
Pydrin + Comite	0.20 + 1.69	July 13	7 14	7.34 0.22	2.10 0.32
Orthene	0.50	June 29	Pre	3.44	7.30
			Pre	4.96	2.94
			Pre	5.52	11.34
			7	12.90	13.90
			14	11.48	14.76
Orthene + Comite	0.50 + 1.69	July 13	7 14	3.32 0.50	3.38 0.40
Monitor	0.50	June 30	Pre	6.42	7.74
			Pre	5.10	4.48
			Pre	11.28	15.54
			6	8.80	7.60
			13	9.32	8.76
Comite	1.69	July 13	20	2.92	3.82
Monitor	0.50	July 20	7	0.52	0.44

^{1/} Plot size: Each treatment consisted of 1-10 acre plot.

^{2/} Applications were made by aircraft at 10 GPA prior to 5:00 A.M.

^{3/} Pretreatment counts were made on June 14, 21, 28.

^{4/} 50 trifoliate leaves showing mite injury were examined on each sampling date.

Spider mite populations in seed alfalfa plots treated by aircraft
for spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per leaf ^{4/}	
Insecticides	AI/acre lb.			Mites	Eggs
Comite	1.69	July 6	Pre 7	12.40 16.56	14.70 11.82
Toxaphene + Comite	4.0 + 1.69	July 13	7 14	0.62 4.34	1.78 5.10
PP-199	0.1	July 6	Pre 7	12.40 11.20	15.80 12.68
Toxaphene + Comite	4.0 + 1.69	July 13	7	5.18	4.98
PP-199	0.2	July 6	Pre 7 14	7.90 7.82 9.00	9.10 16.52 19.56
Toxaphene	4.0	July 20	21	7.42	21.26
Carzol	0.75	July 6	Pre 7	12.40 17.28	11.30 17.58
Comite	1.69	July 13	7	4.77	4.20
UC 21865	1.0	July 6	Pre 7	9.80 14.70	11.30 16.04
Comite	1.69	July 13	7	10.70	6.42

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Comite and Toxaphene were emulsifiable concentrates, PP-199 was a colloidal suspension, Carzol was a 92% soluble powder, UC 21865 was a 75% wettable powder.

^{2/} All applications were made from 2:00 A.M. to 4:30 A.M.

^{3/} Pretreatment counts were made on July 5.

^{4/} 50 trifoliate leaves were examined from each treatment on each sampling date.

Spider mite populations in seed alfalfa plots treated by aircraft
for spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per leaf ^{4/}	
Insecticides	AI/acre lb.			Mites	Eggs
Malanoben	1.0	July 6	Pre	9.50	10.30
			7	21.80	31.50
Comite	1.69	July 13	7	3.50	3.72
Malanoben	0.5	July 6	Pre	17.90	16.50
			7	15.88	35.18
Comite	1.69	July 13	7	8.52	4.52
Zardex	1.0	July 6	Pre	10.20	13.30
			7	9.06	23.42
			14	16.66	25.72
			21	38.94	61.94
Kelthane	1.0	July 6	Pre	8.60	10.70
			7	2.80	13.96
			14	8.32	9.86
			21	10.84	35.22
Plictran	0.75	July 6	Pre	16.50	14.30
			7	3.06	4.38
			14	3.92	4.94
			21	11.78	8.94

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Comite, Kelthane and Zardex were emulsifiable concentrates, Malanoben was a flowable liquid (4 lb./gallon), Plictran was a 50% wettable powder.

^{2/} All applications were made from 2:00 A.M. to 4:30 A.M.

^{3/} Pretreatment counts were made on July 5.

^{4/} 50 trifoliate leaves were examined from each treatment on each sampling date.

Spider mite populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}		Dates of application ^{2/}	Days after treatment ^{3/}	Number per leaf ^{4/}	
Insecticides	AI/acre lb.			Mites	Eggs
Monitor	0.50	July 20	Pre	9.66	38.18
+	+		7	3.90	2.04
Comite	1.69		14	0.00	0.00
Monitor	0.50	July 20	Pre	12.96	30.40
+	+		7	2.70	3.32
Plictran	0.75		14	0.04	0.22
Plictran	0.75	July 20	Pre	13.12	29.06
			7	4.00	4.58
			14	0.86	3.68

^{1/} Plot size: Each treatment consisted of 1-5 acre plot (165' x 1320'). Sprays were applied at 10 GPA. Plictran was a 50% wettable powder. Monitor and Comite were emulsifiable concentrates.

^{2/} Application was made between 2:00 A.M. and 4:00 A.M.

^{3/} Pretreatment count was made on July 19.

^{4/} 50 trifoliate leaves were examined from each treatment on each sampling date.

Populations of 3 species of Geocoris in seed alfalfa plots treated by aircraft for Lygus bug control. Firebaugh, California. 1977.

Treatment ^{1/}			Number per 50 D-Vac Samples ^{4/}					
Insecticides ^{2/}	AI/acre lb.	Days after treatment ^{3/}	<u>atricolor</u>		<u>Geocoris pallens</u>		<u>punctipes</u>	
			Adults	Nymphs	Adults	Nymphs	Adults	Nymphs
Orthene	1.0	Pre	4	1	382	324	1	1
		7	0	0	4	25	0	0
		14	0	1	3	17	0	0
		21	0	1	17	4	0	0
Orthene	0.5	Pre	4	7	357	364	0	0
		7	0	0	6	28	0	0
		14	0	0	12	9	0	0
		21	1	0	47	12	0	0
Ambush	0.2	Pre	6	3	343	263	1	0
		7	2	2	32	138	0	0
Carzol (6/22)	0.75	14	6	0	161	166	0	0
		21	0	0	12	7	0	0
Ambush	0.1	Pre	0	7	246	548	1	0
		7	1	5	68	193	0	0
Carzol (6/22)	0.75	14	2	1	120	218	0	1
		21	0	3	14	33	0	0
Ambush	0.2	Pre	1	4	269	739	1	1
		7	1	4	56	176	0	0
+ PP-199	+ 0.2	14	7	2	197	245	0	0
		21	4	10	420	601	0	0
UC 21865	1.0	Pre	2	7	261	514	0	1
		7	1	5	65	147	0	0
		14	0	6	18	46	0	0
		21	1	3	154	184	0	0
Carzol	0.75	Pre	4	5	340	1175	0	1
		7	0	5	20	98	0	0
		14	0	6	45	70	0	0
		21	0	1	60	59	0	0

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Orthene and UC 21865 were 75% wettable powders, Ambush was an emulsifiable concentrate, Carzol was a 92% soluble powder, PP-199 was a colloidal suspension. Plots were treated June 8 from 1:00 A.M. to 4:30 A.M.

^{2/} The 2 Ambush plots were retreated on June 22 with Carzol. (between the 14 and 21 day count.

^{3/} Pretreatment counts were made on June 7.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Predator and parasite populations in seed alfalfa plots treated by aircraft for lygus bug control. Firebaugh, California. 1977.

Treatment ^{1/}		Days after treat- ment ^{3/}	Number per 50 D-Vac Samples ^{4/}																Parasitic Wasps	Spiders
Insecticides ^{2/}	AI/ acre lb.		Cocci-																	
			Geocoris		Nabis		Orius		Lacewing		Syrphid		nellidae		Collops					
			A	N	A	N	A	N	A	L	A	L	A	L	A	L				
Orthene	1.0	Pre	387	326	15	101	97	141	11	2	0	0	0	7	31	2	1	722	105	
		7	4	25	1	0	5	3	17	0	0	0	0	0	0	0	1	102	118	
		14	3	18	3	4	1	0	9	1	0	0	0	0	0	1	0	149	139	
		21	17	5	1	2	25	1	2	2	0	0	0	0	0	1	1	201	115	
Orthene	0.5	Pre	361	371	13	141	75	109	12	6	0	1	2	4	2	0	0	324	130	
		7	6	28	2	2	0	0	37	0	0	0	0	0	0	0	0	114	274	
		14	12	9	2	8	10	1	11	0	0	0	0	0	0	1	0	155	199	
		21	48	12	3	0	13	2	0	3	0	0	0	0	0	0	0	117	125	
Ambush + PP-199	0.2	Pre	271	744	16	182	66	81	2	0	0	0	2	5	2	0	0	172	120	
		7	57	180	6	87	111	30	4	4	0	0	0	0	0	0	0	69	98	
		14	204	247	17	200	119	15	2	1	0	0	0	0	0	0	0	156	67	
		21	424	611	24	97	82	114	0	4	0	0	0	0	2	0	0	79	63	
UC 21865	1.0	Pre	263	522	22	203	84	59	2	1	1	1	2	7	0	0	0	135	120	
		7	66	152	4	36	31	18	7	0	0	0	4	0	1	2	74	222		
		14	90	162	12	88	86	37	18	1	0	0	3	0	1	1	133	315		
		21	155	187	8	43	222	66	0	3	0	0	0	0	2	0	0	104	95	

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Orthene and UC 21865 were 75% wettable powders, Ambush was an emulsifiable concentrate, PP-199 was a colloidal suspension.

^{2/} Plots were treated June 8 from 1:00 A.M. to 4:30 A.M. The 2 Ambush plots were retreated on June 22 with Carzol (between the 14 and 21 day counts).

^{3/} Pretreatment counts were made on June 7.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Predator and parasite populations in seed alfalfa plots treated by aircraft for lygus bug control. Firebaugh, California. 1977.

Insecticides ^{2/}	lb.	Days after treatment ^{3/}	Treatments ^{1/}	Number per 50 D-Vac Samples ^{4/}																Parasitic Spiders	
				Coccinellidae												Collops		Wasps			
				Geocoris		Nabis		Orius		Lacewing		Syrphid		nelliidae		A	L				
				A	N	A	N	A	N	A	L	A	L	A	L	A	L				
Ambush	0.2	Pre		350	266	16	133	102	52	5	2	0	0	0	0	6	9	2	0	196	99
		7		34	140	2	77	65	28	9	3	0	0	0	0	0	0	0	0	83	153
		14		167	166	23	204	242	10	8	8	0	0	0	0	0	0	1	0	181	88.
Carzol (6/22)	0.75	21		12	7	3	13	8	20	1	2	0	0	0	0	0	0	1	0	28	48
		Pre		247	555	12	203	64	70	2	0	0	0	0	0	4	5	2	0	148	114
		7		69	198	8	104	118	17	6	1	0	0	0	0	0	0	1	0	69	151
Carzol (6/22)	0.75	14		122	220	29	170	90	12	1	1	0	1	0	1	0	0	3	0	100	64
		21		14	36	11	19	20	56	2	3	0	0	0	0	0	0	3	1	105	52
		Pre		344	1181	11	162	32	55	11	1	0	0	0	0	6	5	4	1	250	81
Carzol	0.75	7		20	103	0	43	16	7	9	0	0	0	0	5	2	1	0	58	294	
		14		45	76	7	66	43	19	5	2	0	0	0	0	0	1	1	0	103	210
		21		60	60	6	31	287	67	0	3	0	0	0	2	3	2	0	61	103	

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. Ambush was an emulsifiable concentrate, Carzol was a 92% soluble powder.

^{2/} Plots were treated June 8 from 1:00 A.M. to 4:30 A.M. The 2 Ambush plots were retreated on June 22 with Carzol (between the 14 and 21 day counts).

^{3/} Pretreatment counts were made on June 7.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Populations of three species of Geocoris in seed alfalfa plots where insecticides were applied at a count of 4-8_{1/} lygus bugs per sweep. Firebaugh, California. 1977

Treatment ^{2/}			Number per 50 D-Vac Samples ^{4/}					
Insecticide	AI/acre lb.	Days after treatment ^{3/}	<u>atricolor</u>		<u>Geocoris pallens</u>		<u>punctipes</u>	
			Adults	Nymphs	Adults	Nymphs	Adults	Nymphs
Carzol (6/30)	0.75	Pre	0	3	175	181	0	1
		Pre	2	1	67	49	1	0
		Pre	10	0	201	176	1	3
		6	0	0	12	6	0	0
		13	0	0	3	11	0	0
Comite (7/13)	1.69	20	2	3	9	7	0	0
Carzol (7/20)	0.75	7	0	0	0	1	0	0
Pydrin (6/30)	0.20	Pre	4	0	117	145	1	0
		Pre	0	0	85	54	1	0
		Pre	1	1	177	139	1	0
		6	1	2	11	11	0	0
		13	1	0	30	17	0	0
Pydrin (7/13)	0.20							
+	+	7	0	5	1	0	0	0
Comite	1.69	14	0	1	0	4	0	0
Orthene (6/30)	0.50	Pre	0	2	112	117	0	0
		Pre	0	0	80	54	5	0
		Pre	2	2	172	153	2	0
		6	0	0	3	12	0	0
		13	0	3	3	16	0	0
Orthene (7/13)	0.50							
+	+	7	0	1	1	3	0	0
Comite	1.69	14	1	0	0	3	0	0
Monitor (6/30)	0.50	Pre	4	1	106	97	0	0
		Pre	7	5	97	59	2	0
		Pre	5	4	207	175	2	0
		6	0	0	0	3	0	0
		13	0	0	5	11	0	0
Comite (7/13)	1.69	20	0	0	4	1	0	0
Monitor (7/20)	0.50	7	0	0	0	2	0	0

^{1/} Plot size: Each treatment consisted of 1-10 acre plot.

^{2/} Applications were made by aircraft at 10 GPA prior to 5:00 A.M.

^{3/} Pretreatment counts were made June 14, 21, 28.

^{4/} 2-25 suck D-Vac samples on each sampling date.

Predator and parasite populations in seed alfalfa plots where insecticides were applied at a count of 4-8 lygus bugs per sweep. Firebaugh, California. 1/ 1977.

Treatment 2/ AI/ lb.		Days after treat- ment	Number per 50 D-Vac Samples 4/ Cocci																Parasitic Wasps	Spiders
Insecticides	acre	3/ ment	Geocoris		Nabis		Orius		Lacewing		Syrphid		nellidae		Collops					
			A	N	A	N	A	N	A	L	A	L	A	L	A	L				
Carzol (6/30)	0.75	Pre	175	185	11	168	256	167	26	2	0	0	0	6	0	7	11	585	172	
		Pre	70	50	7	135	173	56	24	3	0	0	0	5	0	2	2	290	113	
		Pre	212	179	28	112	427	240	4	0	0	0	0	5	0	5	2	381	99	
		6	12	6	0	4	74	22	1	0	0	0	0	2	0	1	4	71	116	
		13	3	11	0	9	58	19	2	3	0	0	0	3	0	5	0	77	162	
Comite (7/13)	1.69	20	11	10	1	5	109	30	0	8	0	0	0	3	9	8	66	109		
Carzol (7/20)	0.75	7	0	1	0	0	8	18	1	4	0	0	0	2	6	1	4	7		
Pydrin (6/30)	0.20	Pre	122	145	14	147	122	78	60	1	0	0	0	10	0	1	17	356	186	
		Pre	86	54	11	229	168	39	35	6	0	0	0	4	0	1	5	267	119	
		Pre	179	140	24	193	437	201	1	0	0	0	0	1	0	4	0	276	51	
		6	12	13	5	13	114	36	0	0	0	0	0	0	0	0	2	89	69	
		13	31	17	5	23	282	52	2	4	0	0	0	0	0	4	0	138	70	
Pydrin (7/13)	0.20	7	1	5	0	0	26	10	0	2	0	0	0	0	0	1	20	28		
+ Comite	1.69	14	0	5	0	0	50	28	0	0	0	0	0	0	0	0	9	5		

1/ Plot size: Each treatment consisted of 1-10 acre plot.

2/ Applications were made by aircraft at 10 GPA prior to 5:00 A.M.

3/ Pretreatment counts were made June 14, 21, 28.

4/ 2-25 suck D-Vac samples on each sampling date.

Populations of 3 species of Geocoris in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}			Number per 50 D-Vac Samples ^{4/}					
Insecticide ^{2/}	AI/acre lb.	Days after treatment ^{3/}	<u>atricolor</u>		<u>Geocoris pallens</u>		<u>punctipes</u>	
			Adults	Nymphs	Adults	Nymphs	Adults	Nymphs
Comite	1.69	Pre	0	0	0	1	0	0
		7	1	0	4	0	0	0
Toxaphene + Comite	4.00 + 1.69	7	0	0	2	0	0	0
PP-199	0.10	Pre	0	0	0	0	0	0
		7	0	0	4	0	0	0
Toxaphene + Comite	4.00 + 1.69	7	1	0	3	0	0	0
PP-199	0.20	Pre	0	0	0	0	0	0
		7	0	0	0	0	0	0
		14	0	0	2	1	0	0
Carzol	0.75	Pre	0	0	1	0	0	0
		7	0	0	2	1	0	0
Comite	1.69	7	0	0	1	3	0	0
UC 21865	1.00	Pre	0	0	1	0	0	0
		7	0	0	1	3	0	0
Comite	1.69	7	0	3	0	0	0	1
Malanoben	1.00	Pre	0	0	0	4	0	0
		7	0	0	2	3	0	0
Comite	1.69	7	0	0	0	0	0	0

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. All applications were made from 2:00 A.M. to 4:30 A.M.

^{2/} Comite and Taxaphene were emulsifiable concentrates, PP-199 was a colloidal suspension, Carzol was a 92% soluble powder, UC 21865 was a 75% wettable powder.

^{3/} Pretreatment counts were made on July 5.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Predator and parasite populations in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}		Days after treat ^{3/} ment	Number per 50 D-Vac Samples ^{4/}																Parasitic Wasps	Spiders
Insecticides ^{2/}	AI/ acre lb.		Cocci-																	
			Geocoris		Nabis		Orius		Lacewing		Syrphid		nellidae		Collops					
			A	N	A	N	A	N	A	L	A	L	A	L	A	L				
Comite	1.69	Pre 7	0	1	1	4	9	37	1	2	0	0	0	0	3	2	8	212		
			5	0	3	5	83	5	0	7	0	0	1	0	3	9	50	284		
Toxaphene + Comite	4.00 + 1.69	7	2	0	1	0	27	11	0	2	0	0	0	0	1	7	25	29		
PP-199	0.10	Pre 7	0	0	3	2	21	30	0	1	0	0	0	0	0	2	9	188		
			4	0	3	2	69	0	1	6	0	0	0	0	4	0	30	260		
Toxaphene + Comite	4.00 + 1.69	7	4	0	1	0	28	9	0	12	0	0	0	0	5	7	21	36		
PP-199	0.20	Pre 7 14	0	0	3	1	24	24	0	1	0	0	0	0	2	2	11	152		
			0	0	1	1	39	3	2	8	0	0	0	0	1	3	32	241		
			2	1	1	0	37	10	1	3	0	0	0	0	3	25	46	41		
Carzol Comite	0.75 1.69	Pre 7 7	1	0	2	4	16	13	0	0	0	0	0	0	1	5	4	82		
			2	1	0	0	1	0	0	8	0	0	1	0	6	3	19	351		
			1	3	0	0	5	0	2	6	0	0	0	0	7	26	35	87		

- 1/ Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. All applications were made from 2:00 A.M. to 4:30 A.M.
- 2/ Comite and Toxaphene were emulsifiable concentrates, PP-199 was a colloidal suspension, Carzol was a 92% soluble powder.
- 3/ Pretreatment counts were made on July 5.
- 4/ 2-25 suck D-Vac samples per treatment on each sampling date.

Predator and parasite populations in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California. 1977.

Insecticides ^{2/}	Treatment ^{1/} AI/ acre lb.	Days after treat ^{3/} ment	Number per 50 D-Vac Samples ^{4/}															
			Cocci-												Parasitic			
			Geocoris		Nabis		Orius		Lacewing		Syrphid		nellidae		Collops		Wasps	
A	N	A	N	A	N	A	N	A	L	A	L	A	L	A	L	A	L	
UC 21865	1.00	Pre	1	0	3	0	18	11	1	0	0	0	0	0	0	0	2	11
		7	1	3	0	0	11	0	1	3	0	0	1	0	2	6	38	548
Comite	1.69	7	3	0	1	1	14	3	0	7	0	0	0	0	3	24	40	89
Malanoben	1.00	Pre	0	4	0	1	21	10	1	2	0	0	0	0	0	2	5	180
		7	2	3	1	0	37	3	1	6	0	0	0	0	2	3	17	336
Comite	1.69	7	0	0	2	1	29	8	0	9	0	0	0	0	3	4	45	69

^{1/} Plot size: Each treatment 5 acres (165' x 1320'). Sprays were applied at 10 GPA. All applications were made from 2:00 A.M. to 4:30 A.M.

^{2/} UC 21865 was a 75% wettable powder, Comite was an emulsifiable concentrate, Malanoben was a flowable liquid.

^{3/} Pretreatment counts were made on July 5.

^{4/} 2-25 suck D-Vac samples per treatment on each sampling date.

Populations of 3 species of Geocoris in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California. 1977.

Treatment ^{1/}			Number per 50 D-Vac Samples ^{4/}					
Insecticides ^{2/}	AI/acre lb.	Days after treatment ^{3/}	<u>atricolor</u>		<u>Geocoris pallens</u>		<u>punctipes</u>	
			Adults	Nymphs	Adults	Nymphs	Adults	Nymphs
Monitor	0.50	Pre	0	0	0	0	0	0
+	+	7	0	0	0	0	0	0
Comite	1.69	14	0	1	0	0	0	0
Monitor	0.50	Pre	1	0	0	0	0	0
+	+	7	0	0	0	0	0	0
Plictran	0.75	14	0	0	2	3	0	0
Plictran	0.75	Pre	0	0	10	0	0	0
		7	0	0	0	2	0	0
		14	1	0	1	0	0	0

^{1/} Plot size: Each treatment consisted of 1-5 acre plot (165' x 1320'). Sprays were applied at 10 GPA. Plictran was a 50% wettable powder while Monitor and Comite were emulsifiable concentrates.

^{2/} Application was made between 2:00 A.M. and 4:00 A.M.

^{3/} Pretreatment count was made July 19.

^{4/} 2-25 Suck D-Vac samples per treatment on each sampling date.

Predator and parasite populations in seed alfalfa plots treated by aircraft for lygus and spider mite control. Firebaugh, California, 1977.

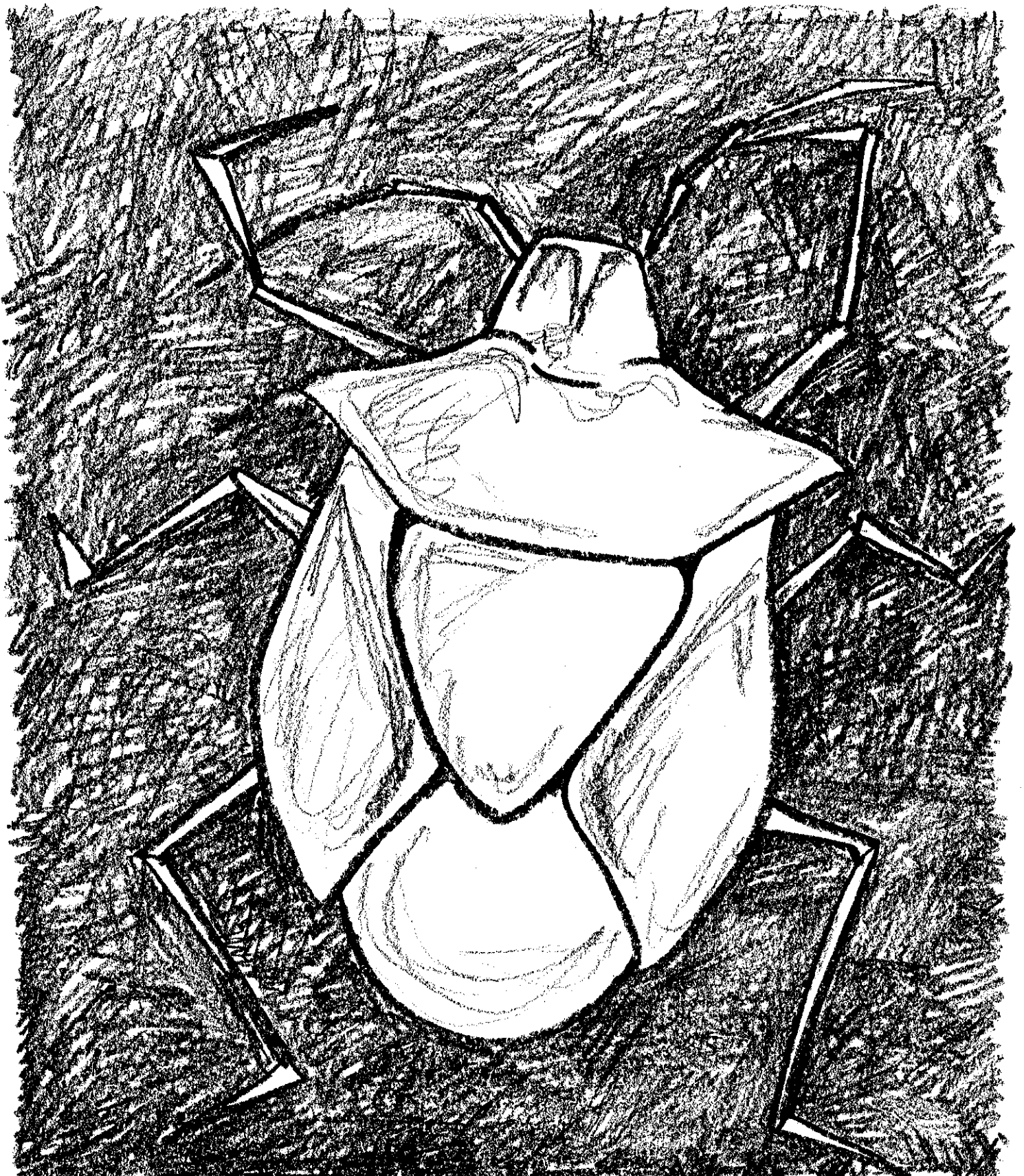
Treatment ^{1/}		Days after treatment ^{3/}	Number per 50 D-Vac Samples ^{4/}															
Insecticides ^{2/}	AI/ acre lb.		Geocoris				Nabis				Orius				Lacewing			
			A	N	A	N	A	N	A	N	A	N	A	N	A	L	A	L
			Coccinellidae				Syrphid				Collops				Parasitic Wasps			
			A	L	A	L	A	L	A	L	A	L	A	L	A	L	A	L
Monitor + Comite	0.50 + 1.69	Pre 7 14	0	0	2	5	32	29	3	3	0	0	1	0	0	2	92	135
			0	0	0	0	8	22	3	31	0	0	0	0	0	27	11	49
			1	0	0	0	12	6	0	13	0	0	0	0	2	1	23	41
Monitor + Plictran	0.50 + 0.75	Pre 7 14	1	0	3	1	52	12	3	5	0	0	2	0	3	1	31	91
			0	0	0	0	0	0	4	14	0	0	0	0	1	16	3	36
			2	3	0	1	16	7	0	13	0	0	0	0	2	1	10	44
Plictran	0.75	Pre 7 14	10	0	2	0	41	4	1	5	0	0	1	2	0	9	74	141
			0	2	0	5	2	3	2	7	0	0	0	4	0	6	7	27
			2	0	1	15	79	140	0	13	0	0	0	1	0	3	27	60

1/ Plot size: Each treatment consisted of 1-5 acre plot (165' x 1320'). Sprays were applied at 10 GPA. Plictran was a 50% wettable powder while Monitor and Comite were emulsifiable concentrates.

2/ Application was made between 2:00 A.M. and 4:00 A.M.

3/ Pretreatment count was made July 19.

4/ 2-25 suck D-Vac samples per treatment on each sampling date.



STINKBUG

Stinkbug populations in 15 seed alfalfa fields.
Fresno County, California. 1977.

Field number and location	Number per 25' of row ^{1/}					
	Consperser stink bug			Says stink bug		
	Adults	Nymphs	Total	Adults	Nymphs	Total
1 Firebaugh ^{2/}	4	2	6	-	-	-
2 Firebaugh ^{2/}	1	1	2	-	-	-
3 Firebaugh ^{2/}	1	0	1	-	-	-
4 Firebaugh ^{2/}	0	0	0	-	-	-
5 Firebaugh ^{2/}	0	4	4	-	-	-
6 Firebaugh ^{2/}	2	1	3	-	-	-
7 Firebaugh ^{2/}	0	4	4	1	3	4
8 Firebaugh ^{2/}	2	0	2	-	-	-
9 Firebaugh ^{2/}	3	0	3	-	-	-
10 Helm ^{3/}	0	0	0	-	-	-
11 Helm ^{3/}	0	3	3	-	-	-
12 San Joaquin ^{3/}	1	2	3	0	1	1
13 San Joaquin ^{3/}	0	0	0	1	0	1
14 San Joaquin ^{4/}	1	0	1	1	0	1
15 Helm ^{4/}	0	2	2	-	-	-
Total	15	19	34	3	4	7

^{1/} Five beating pan samples in each field. Samples were examined in the laboratory after 24-hour berlese funnel separation.

^{2/} Samples collected July 14.

^{3/} Samples collected August 3.

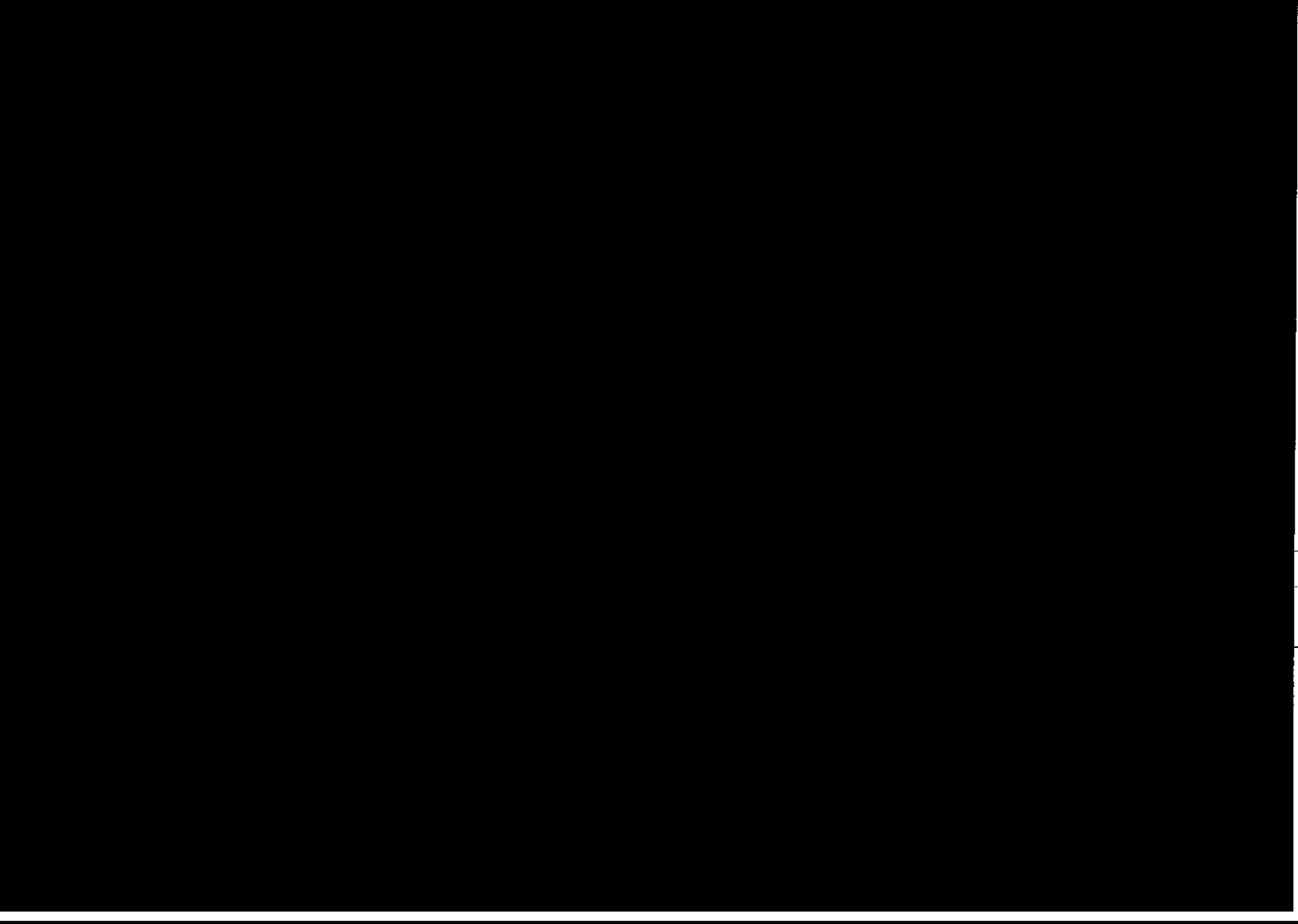
^{4/} Samples collected August 11.

Percentages of good and defective seeds in samples from 15 seed fields surveyed for consperse stink bug. Fresno County, California. 1977.

Field number and location	Date sampled	Total seeds examined ^{1/}	Good seed	Defective seed			
				Chalcid	Lygus	Stink bug	Water damage
1 Firebaugh	August 16	1691	86.52	0.00	6.44	4.08	1.30
2 Firebaugh	August 9	1326	84.16	0.08	8.22	4.00	1.36
3 Firebaugh	August 30	1487	90.59	0.40	4.71	2.62	0.67
4 Firebaugh	August 16	1456	88.53	0.62	5.42	3.30	0.89
5 Firebaugh	August 2	1458	92.39	0.41	3.70	1.78	0.55
6 Firebaugh	Not sampled ^{2/}	-	-	-	-	-	-
7 Firebaugh	August 16	1607	88.80	0.56	5.10	3.61	1.06
8 Firebaugh	August 9	1459	91.57	0.27	4.39	1.58	0.41
9 Firebaugh	August 30	1472	89.74	2.72	4.14	2.24	0.82
10 Helm	August 31	1591	92.96	0.00	1.95	2.45	1.38
11 Helm	August 17	1564	91.82	0.19	3.26	3.13	1.34
12 San Joaquin	August 31	1493	86.07	1.20	7.34	4.09	0.80
13 San Joaquin	August 30	1750	90.74	1.31	2.57	2.69	1.89
14 San Joaquin	August 30	1480	84.87	2.70	4.80	4.93	2.16
15 Helm	Not sampled ^{2/}	-	-	-	-	-	-

^{1/} Four 2-quart samples of pods were hand stripped from plants prior to commercial harvest. Samples were hand threshed and lightly cleaned in a clipper seed cleaner. Counts are based on four sub-samples from each of the threshed 2-quart samples.

^{2/} Field was harvested before samples could be taken.



Percentages of good and defective seeds in samples from 13 seed alfalfa fields surveyed for chalcid damaged seed. Firebaugh, California. 1977.

Field number	Date clipped back	Variety	Total seeds examined ^{1/}	Good seed	Defective seeds					
					Chalcid	Lygus	Stink bug	Shriveled	Water damage	Green
1	none	U.C. Cargo	1458	92.39	0.41	3.74	1.78	0.21	0.55	0.96
10	none	U.C. Cargo	1347	84.63	0.59	5.27	4.97	0.08	1.63	2.38
11	none	U.C. Cargo	1405	81.92	0.29	6.19	5.34	0.14	1.35	4.56
12	none	U.C. Cargo	1430	85.45	0.70	4.54	4.34	0.07	2.66	1.89
13	none	U.C. Cargo	1264	83.31	0.16	1.82	4.03	0.48	6.09	3.64
29	none	Williamsberg	1607	88.80	0.56	5.10	3.61	0.00	1.06	0.62
30	Feb. 5	Luna	1456	88.53	0.62	5.42	3.30	0.00	0.89	1.24
9	March 1	F-350	1459	91.59	0.27	4.39	1.58	0.00	0.41	1.03
38	March 1	Luna	1487	90.59	0.40	4.71	2.62	0.00	0.67	1.01
28	March 15	DeKalb 185	1691	86.52	0.00	6.44	4.08	0.00	1.30	0.83
8	March 15	U.C. Cargo	1326	84.16	0.08	8.22	4.00	0.00	1.36	2.11
39	April 20	Tempo	1472	89.74	2.72	4.14	2.24	0.00	0.82	0.27
31	April 20	DeKalb 131	1738	91.48	0.17	3.11	2.36	0.00	2.07	0.81

^{1/} Four 2-quart samples of pods were hand stripped from plants prior to commercial harvest. Samples were hand threshed and lightly cleaned in a clipper seed cleaner. Counts are based on four subsamples from each of the threshed 2-quart samples.

Percentages of good and defective seed in samples from 25 seed alfalfa fields surveyed for chalcid damaged seed. San Joaquin, California. 1977.

Field number	Date clipped back	Variety	Total seeds examined ^{1/}	Good seed	Defective seeds					
					Chalcid	Lygus	Stink bug	Shriveled	Water damage	Green
3	-	-	1875	92.85	0.11	1.49	2.56	0.00	1.07	1.76
45	none	CUF-101	1412	90.02	0.99	3.05	4.39	0.00	1.13	0.28
46	none	Lew	1441	87.92	1.11	3.54	5.97	0.00	0.90	0.35
57	Dec.	Bonus	1842	92.07	0.27	3.86	2.17	0.00	1.30	0.33
19	Dec. 15	71-9 (Calwest)	1501	72.49	0.93	19.12	4.53	0.07	2.06	0.67
41	March 1	CUF-101	1372	91.33	0.36	3.57	3.21	0.00	1.31	0.22
44	March 10	Chimo	1782	84.40	4.94	2.53	4.54	0.00	2.13	1.46
48	March 20	DeKalb 123	1591	92.96	0.00	1.95	2.45	0.00	1.38	0.57
55	March 29	U.C. Cargo	1536	90.89	0.65	5.01	1.69	0.00	1.04	0.72
2	April 1	Tempo	1598	91.30	0.63	3.63	2.31	0.00	0.75	1.19
51	April 6	C.W. 76	1481	88.86	1.15	5.54	2.29	0.00	1.42	0.74
43	April 10	Tempo	1750	90.74	1.31	2.57	2.69	0.00	1.89	0.94
34	April 10	Weevilchek	1564	91.82	0.19	3.26	3.13	0.00	1.34	0.26
27	April 12	Sonora 70	1770	83.79	0.62	7.06	4.86	0.00	2.37	0.96
53	April 13	U.C. Cargo	1438	86.58	2.09	6.88	2.85	0.00	1.18	0.42
52	April 14	CUF-101	1491	95.17	0.27	1.54	1.74	0.00	0.94	0.34
58	April 14	U.C. Cargo	1531	90.27	0.33	3.92	2.94	0.00	1.76	0.78
37	April 14	Tempo	1713	87.33	1.58	4.73	2.16	0.00	2.33	1.40

^{1/} Four 2-quart samples of pods were hand stripped from plants prior to commercial harvest. Samples were hand threshed and lightly cleaned in a clipper seed cleaner. Counts are based on four subsamples from each of the threshed 2-quart samples.

The contents of this report should not be interpreted as recommendations of the University of California. Insect control recommendations are published by the University of California and can be obtained free of charge from any Cooperative Extension Office.

Common and/or manufacturer's names of insecticides are used in this report instead of the less familiar chemical terms, but no endorsement of products mentioned is intended. The rates of insecticides applied per acre are all expressed as active material per treated acre. Some of the chemicals included in the experiments reported are not registered for commercial use on seed alfalfa at this time.

The common and/or manufacturer's names of insecticides mentioned in this report are as follows:

Ambush®	Orthene®
Carzol®	Plictran®
Comite®	PP-199
Kelthane®	Pydrin®
Lorsban®	Toxaphene®
Malanoben®	UC 21865
Monitor®	Zardex®

These experiments were conducted in the San Joaquin Valley where the honeybee is the principal pollinator. We have no information concerning the effects of these insecticides and programs on leafcutting or alkali bees.

CO-OPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS, U. S. Department of Agriculture and University of California co-operating.

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