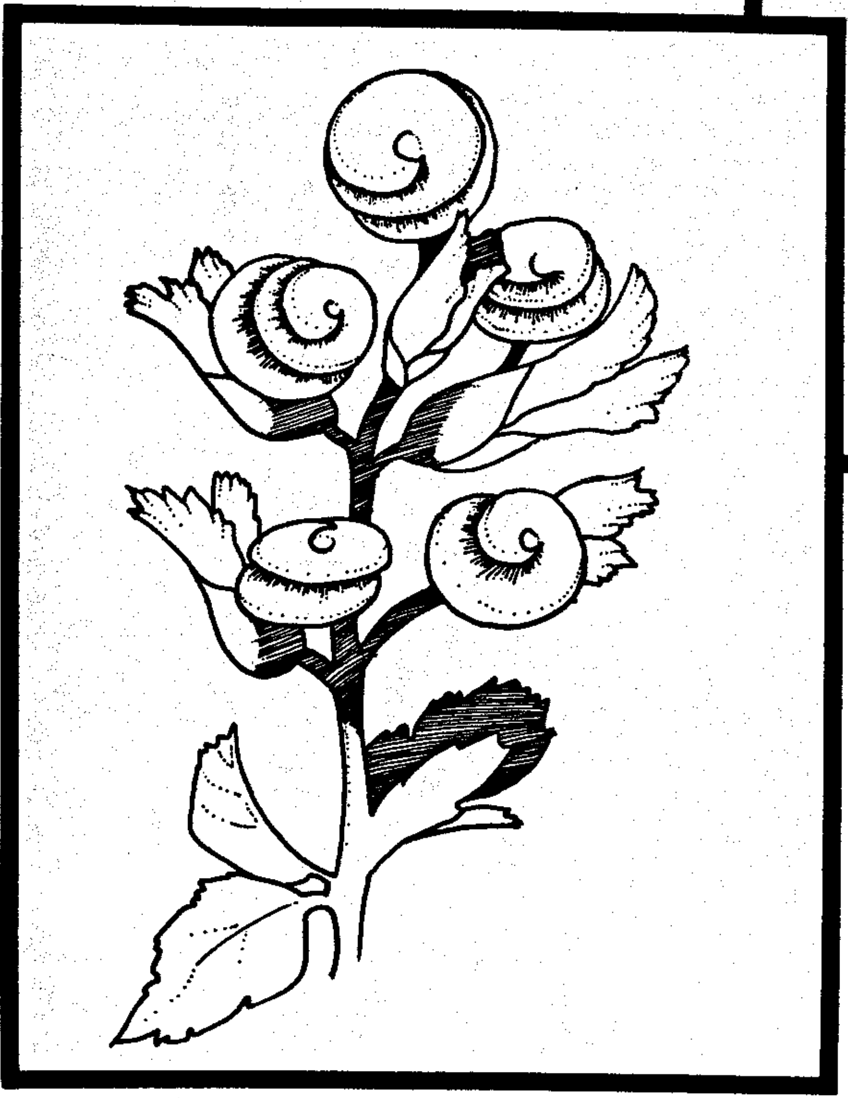
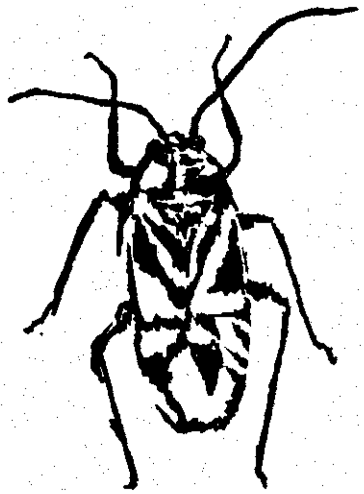
Sharon C. Mueller

A Progress Report of

INSECT STUDY RESULTS





SEED ALFALFA

1981

Acknowledgements

The work reported here was made possible by the financial support of seed growers and seed processors through the Alfalfa Seed Production Research Board. This support and that received from chemical companies is sincerely appreciated.

The assistance of grower cooperators and insecticide applicators who donated their time, equipment and fields to conduct these experiements is also deeply appreciated. Special thanks are due Bob and Ed Vance of Vance Ag Craft Inc. and Don Darnell for their interest and many hours of work with these and past experiments concerning insect control in seed alfalfa. This year's experiments were conducted in alfalfa seed fields of Ron Crevolin and Echeveste and Elizalde. We are grateful for the interest and cooperation of these cooperators in making it possible to conduct the experiments.

The assistance of students Tom Babb, Brad Bell, Allan Showler and the assistance of Ted Davis, Field Assistant, Cooperative Extension Service, Fresno County is sincerely appreciated. We also wish to acknowledge the important contributions derived from thesis research projects conducted by Graduate Students Don Swincer and Curtis Powell, Entomology, U.C. Davis.

Research on Insects Affecting
Seed Alfalfa 1981

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Introduction

Research objectives for 1981 were to 1) investigate potential resistance of alfalfa to lygus bugs, 2) investigate the effects of insecticides, Monitor® (methamidophos) and Orthene® (acephate), on the susceptibility to aphids of certain alfalfas supposedly resistant to the spotted alfalfa aphid, 3) study the effects of spider mites on production of seed alfalfa and to establish economic thresholds and 4) evaluate new insecticides, acaricides and combinations of these materials for control of lygus bugs, aphids and spider mites. Surveys were conducted at harvest in 51 commercial alfalfa seed fields in Fresno County to ascertain the percentages of seeds damaged by the alfalfa seed chalcid, lygus bugs and stink bugs.

We are awaiting the results of insecticide residue analyses from samples taken in 1980 of seeds, sprouts from seeds, chaff, straw and green regrowth following harvest.

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General Observations

Pest insect populations were generally low in San Joaquin Valley alfalfa seed fields during 1981. Honey bee activity and pollination was higher than in recent years which resulted in excellent seed yields. Blue alfalfa aphid populations were not monitored in 1981 but did not damage seed crops in West Fresno County.

Populations of the spotted alfalfa aphid appeared to be about as in 1980 with heavy populations occurring in certain fields planted to varieties susceptible to aphid attack. Lygus bug populations developed early with many fields receiving treatments in late May and early June. The beet armyworm occurred in certain seed fields on the west side of the San Joaquin Valley but did not appear to cause significant damage. Stink bug populations were assessed in 12 fields in the Firebaugh, Five Points and San Joaquin areas. Populations were extremely low, with bugs being found in only 6 of the 12 fields. Populations of the consperse stink bug and Says stink bug were in the ratio of approximately 2 to 1, respectively. Seed samples were hand stripped from 51 alfalfa seed fields on the west side of Fresno County for analysis of damage by the alfalfa seed chalcid. Although generally very low, chalcid damage was higher than in 1980 and continued a trend of overall increased damage starting in 1979. In 3 of the fields 11.2% to 13.0% of the seeds were infested with seed chalcid.

Spider mite populations were generally low.

Evaluation of alfalfa introductions for potential resistance to lygus bugs

An evaluation was made during 1981 of 16 alfalfa entries in replicated plantings on the Davis Campus for potential resistance to lygus bugs. Five of the entries had shown low lygus bug populations in 1980 and were reevaluated in 1981. The remainder of the entries were evaluated for potential lygus bug resistance under California conditions for the first time in 1981. Each entry was planted in a single row 15 feet long. Rows were spaced 60 inches apart and plots were separated by 5 foot alleys. Single row plantings of 3 commercial varieties, Vernal, Lahontan and CUF 101, were included in the experiment for comparison. Each entry, including the commercial varieties, was replicated 4 times. The entire experimental area was bordered with the variety Moapa 69.

Three types of evaluations were made. Each entry was sampled for lygus bugs by beating the top portion of plants over a white plastic pan 11" x 13" (28 x 34 cm). Four such subsamples were taken in each 15' row. Adults and nymphs were jarred into the pan but only the nymphs were counted. Adult lygus bugs are strong fliers and move readily from plant to plant. Nymphs are confined to the plants and it was believed that by considering only the nymph population a gross determination could be made of lygus bug populations actually developing on the various entries.

Evaluations were also made of the numbers of blasted buds on 10 randomly selected stems from each replicate and a count was made of numbers of seed pods on 10 randomly selected stems from each replicate.

The results of these studies are shown in Tables 1, 2 and 3. High lygus bug populations developed on all alfalfa entries. Statistically fewer nymphs occurred on entry 12, UCDS-A$(L)_2$, than on the other entries, Table 1, but it was obvious that lygus bugs were able to establish populations on all entries. In evaluating the percentages of blasted buds, Table 2, there were no statistical differences among the entries. Entry 12, UCDS-A$(L)_2$, which had the lowest nymph population sustained one of the highest levels of blasted buds.

An evaluation of numbers of seed pods per entry, Table 3, showed that Entry 12, UCDS-A$(L)_2$, had the

Table 1 - Population of lygus bugs on the alfalfa entries in the UC Davis lygus resistance screening plots. U.C. Davis, California, 1981.

Entry Numbers[1]		No. lygus bug nymphs per foot of row[2]			
		Sampling dates			Mean[3]
		July 13	July 20	July 27	
12	UCDS-A(L)$_2$	3.2	3.9	6.4	4.5 a
13	Lahontan	5.6	6.2	6.8	6.2 b
7	Ly-265	5.7	6.8	8.3	6.9 bc
18	UCNE-A(H)$_2$Reno	6.3	7.8	6.9	7.0 bc
15	CUF 101	5.6	6.9	9.0	7.2 bcd
5	73-178	6.8	6.8	8.1	7.2 bcd
19	UCNE-A(L)$_2$Reno	5.5	7.6	8.7	7.3 bcd
11	UCDS-A(H)$_2$	6.4	6.3	9.3	7.3 bcd
8	Ly 42-2	5.7	8.2	8.2	7.4 bcd
17	3399552 (inter)	6.1	7.6	8.6	7.4 bcd
1	173739	6.8	7.5	8.1	7.5 bcd
10	Ly LAB-17	6.1	8.4	8.9	7.8 bcde
14	Vernal	7.9	9.8	5.8	7.8 bcde
3	311455	7.0	8.6	8.8	8.1 bcde
16	Caliverde 65 (HSY)	6.9	9.9	8.7	8.5 cde
6	Ly-97	7.4	10.7	9.0	9.0 de
2	286360	8.6	8.8	10.8	9.4 e
4	399551	9.8	10.5	8.6	9.6 ef
9	73-149	10.6	11.2	12.0	11.3 f

[1] Plot size: 15 ft rows with 5 ft alleys and 60 inch spacing between rows. Each entry was replicated 4 times.

[2] 4-one foot beating pan samples per replication on each sampling date.

[3] Means followed by the same letter are not significantly different at the 1% level of probability by Duncan's multiple range test.

Table 2 - Percent of blasted buds on alfalfa entries in the UC Davis lygus resistance screening plots. U.C. Davis, California, 1981.

Entry Numbers[1]		Percent blasted buds per 10 stems[2]				
		Replications				
		1	2	3	4	Mean[3]
12	UCDS-A(L)$_2$	19.3	23.2	61.8	30.7	33.8
13	Lahontan	41.8	38.8	24.5	54.0	39.8
7	Ly-265	8.6	4.8	15.7	41.1	17.6
18	UCNE-A(H)$_2$Reno	37.8	4.8	67.7	43.4	38.4
15	CUF 101	35.5	17.7	36.5	55.9	36.4
5	73-178	42.3	30.1	18.1	20.2	27.7
19	UCNE-A(L)$_2$Reno	16.4	12.4	27.9	11.9	17.2
11	UCDS-A(H)$_2$	26.2	14.4	32.1	9.9	20.7
8	Ly 42-2	9.5	48.1	49.4	17.5	31.1
17	3399552	48.2	37.6	18.2	18.5	30.6
1	173739	40.5	25.4	39.2	52.2	39.3
10	Ly LAB-17	2.8	41.4	19.1	16.8	20.0
14	Vernal	19.6	31.1	15.4	21.8	21.9
3	311455	37.2	8.2	28.9	32.3	26.7
16	Caliverde 65 (HSY)	32.2	15.4	28.8	55.6	33.0
6	Ly-97	17.2	7.0	18.4	43.0	21.4
2	286360	35.6	10.3	21.7	22.0	22.4
4	399551	51.5	25.8	37.3	14.0	32.2
9	73-149	4.3	30.3	18.5	24.3	19.4

[1] Plot size: 15 ft rows with 5 ft alleys and 60 inch spacing between rows. Each entry was replicated 4 times.

[2] 10 randomly selected stems from each replicate were collected and examined in the laboratory.

[3] None of the means are significantly different at the 5% level of an F distribution test.

Table 3 - Number of seed pods on alfalfa entries in the UC Davis lygus bug resistance screening plots. U.C. Davis, California, 1981.

Entry Numbers[1]		No. of seed pods per 10 stems[2]				
		Replications				
		1	2	3	4	Mean[3]
12	UCDS-A(L)$_2$	0	6	0	10	4.0 a
13	Lahontan	20	22	36	29	26.8 b
7	Ly-265	22	52	50	35	39.8 b
18	UCNE-A(H)$_2$Reno	43	23	11	26	25.8 b
15	CUF 101	45	23	2	25	23.8 b
5	73-178	6	22	42	80	37.5 b
19	UCNE-A(L)$_2$Reno	11	28	18	24	20.3 b
11	UCDS-A(H)$_2$	18	83	28	30	39.8 b
8	Ly 42-2	39	35	9	44	31.8 b
17	3399552	0	15	29	67	27.8 b
1	173739	8	18	58	28	28.0 b
10	Ly LAB-17	41	21	23	32	29.3 b
14	Vernal	5	22	17	49	23.3 b
3	311455	39	35	56	34	41.0 b
16	Caliverde 65 (HSY)	7	27	31	49	28.5 b
6	Ly-97	36	143	20	19	54.5 b
2	286360	22	17	35	49	30.8 b
4	399551	9	38	27	54	32.0 b
9	73-149	33	75	121	111	85.0 b

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[1] Plot size: 15 ft rows with 5 ft alleys and 60 inch spacing between rows. Each entry was replicated 4 times.

[2] 10 randomly selected stems from each replicate were collected and examined in the laboratory.

[3] Means followed by the same letter are not significantly different at the 5% level of probability by Duncan's multiple range test.

fewest pods per 10 stems even though the smallest nymph populations occurred on this entry. In summary, there were no indications of resistance to lygus bugs among the entries tested and there were no differences between the numbered entries and the commercial varieties, Vernal, Lahontan and CUF 101.

Effects of Monitor (methamidophos) and Orthene (acephate) on resistance of alfalfas to the spotted alfalfa aphid

During 1981 a graduate student, Curtis Powell, completed a Master's degree thesis on "Plant-mediated effects on survival and fecundity of the spotted alfalfa aphid (*Therioaphis trifolii* Monell) on aphid-resistant alfalfa treated with two organophosphate insecticides." Experiments were performed to determine the effects of Monitor and Orthene on alfalfas supposedly resistant to the spotted alfalfa aphid. It was found that survival and reproduction of aphids on resistant varieties treated with Monitor were significantly higher than on those same varieties left untreated. Treatment with Orthene resulted in even greater aphid survival and reproduction than did the Monitor treatment. An experiment was conducted in which adult spotted alfalfa aphids were transferred from treated to untreated resistant plants. It was observed that the reproductive rate of the aphids was dependent on the plant upon which they were currently feeding, that is, there was no carry-over effect within the aphids from the treated to the untreated plants. This suggests that Monitor and Orthene affect the plant and not the aphid.

Mr. Powell is continuing his research to determine the mechanism(s) by which Monitor and Orthene affect resistance to the spotted alfalfa aphid. During the summer of 1981, foliage samples were collected from plots of treated and untreated seed alfalfa grown in the field at U.C. Davis. These samples will be chemically analyzed to determine differences between them. It is hoped that these experiments will provide information on how environmental factors, such as pesticide applications, affect insect-host plant relations.

Insecticide evaluation experiments

During 1981, 3 separate experiments were conducted in which 12 insecticides and 12 insecticide-acaricide combinations were evaluated for control of lygus bugs, the spotted alfalfa aphid, the pea aphid and spider mites. As in previous years, 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 experiment.

Lygus bugs

The results of the lygus bug studies are presented in Tables 4, 5 and 6. The following insecticides and combinations were evaluated for control of lygus bugs. Monitor®, Pounce®, Pydrin®, Cymbush®, Ammo®, Pay Off®, Advantage®, Nudrin®, Carzol®, Pounce + Plictran®, Pounce + Comite®, Pydrin + Plictran, Pydrin + Comite, Cymbush + Plictran, Cymbush + Comite, Ammo + Comite, Pay Off + Comite, Advantage + Comite, Thiodan + Nudrin. Plictran and Comite were included in the combinations to control spider mites. The Thiodan + Nudrin combination was applied to control the spotted alfalfa aphid, but was also evaluated for lygus bug control. The materials were all applied as foliar sprays by aircraft in early morning prior to 5:00 a.m.

The experiment shown in Tables 4 and 5 represents season-long programs with the various materials to control lygus bugs. The alfalfa variety used in this experiment (CW-8) was resistant to the spotted alfalfa aphid. The entire field was treated with a lygus bug clean up spray of Monitor, 0.5 lb. AI/acre on June 2. On June 19 either Plictran or Comite was applied to the experimental plot areas to control spider mites. Considering 8-10 lygus bugs per sweep as the recommended treatment level, the first application of Monitor (6-2) followed by Plictran or Comite (6-19) controlled lygus bugs for 28 days.

In the full season Monitor evaluation plot the second application (7-1) at 0.5 lb. AI/acre held lygus bug populations below pretreatment levels for 14 days. The third application (7-15) controlled lygus bugs for 21 days and the fourth application (8-5) gave excellent control for 14 days at which time the experiment was terminated. Monitor consistently reduced lygus bug populations 91% to 96% under pretreatment levels 7 days after application. In this program a total of 4 applications of Monitor at 0.5 lb. AI/acre per application provided full season control of lygus bugs.

Pounce was applied at 2 rates, 0.2 and 0.15 lb. AI/acre beginning on (7-1). Three applications were made at each dosage rate. At 7 days after the first application, lygus bug populations were reduced 82% and 97% under pretreatment levels for the 0.2 and 0.15 lb. AI/acre rates, respectively. With subsequent applications, 7 day post-treatment population reductions ranged from 24% to 55% for the 0.2 lb. AI/acre rate and 33% to 80% for the 0.15 lb. AI/acre rate. In no instance did Pounce hold lygus bug populations below pretreatment levels for more than 14 days. There were no differences in longevity of control between the 2 treatment rates. A total of 5 applications were required to control lygus bugs in the plots treated with Pounce which included 2 applications of Monitor (6-2 and 8-5).

In a second experiment, Table 6, Pounce was applied (8-19) at 2 rates, 0.20 lb. AI/acre and 0.10 lb. AI/acre. These treatments could only be evaluated for 6 days before the grower applied desiccants in preparation for harvest. At this time populations had only been reduced 73% and 69% under pretreatment levels by the 0.2 and 0.1 lb. AI/acre application rates, respectively.

Pydrin was applied at 2 rates, 0.20 and 0.10 lb. AI/acre beginning on (7-1). Three applications were made at each dosage rate. At 7 days after the first application lygus bug populations were reduced 85% and 97% under pretreatment levels for the 0.20 and 0.10 lb. AI/acre rates, respectively. With subsequent applications, 7 day post-treatment population reductions ranged from 0 to 72% for the 0.2 lb. AI/acre rate and 0 for the 0.10 lb. AI/acre rate. In most instances Pydrin did not hold populations below pretreatment levels for more than 14 days at the 0.2 lb. AI/acre rate and not more than 7 days at 0.10 lb. AI/acre. A total of 5 insecticide applications were required in the full season experiment to control lygus bugs in plots treated with Pydrin which included 2 applications of Monitor, one at the beginning of the season and one at the end.

Cymbush (cypermethrin) was applied at 2 rates, 0.12 and 0.06 lb. AI/acre, beginning on (7-1). Two applications were made at each dosage rate. At 7 days after the first application lygus bug populations were reduced 96% and 99% under pretreatment levels for the 0.12 and 0.06 lb. AI/acre rates, respectively. Lygus populations did not exceed economic levels for periods ranging from 14 to 28 days after treatments were applied. There did not appear to be any significant differences in effectiveness between the 2 application rates. A total of 4 insecticide applications were required in the full season experiments to control lygus bugs in the plots treated with Cymbush which included 2 applications of Monitor on (6-2) and (8-12).

In a second experiment, Table 6, Cymbush was applied (8-19) at 0.12 lb. AI/acre. An evaluation of this treatment 6 days after application did not indicate any reduction in the lygus population which was already low.

Ammo, which is also cypermethrin but under development by FMC Corporation, was applied at 0.10 lb. AI/acre beginning on (7-1). Two applications were made (7-1) and (7-29). This material performed about as effectively as Cymbush, holding lygus bug populations below economic levels for 14 to 28 days after application. A total of 4 insecticide applications were required in the full season experiment with Ammo to control lygus bugs including 2 Monitor treatments on (6-2) and (8-12).

Pay Off was applied 3 times at 0.06 lb. AI/acre per application beginning on (7-1). Seven days following the first application lygus bug populations were reduced approximately 90% under pretreatment levels. At 14 days populations exceeded pretreatment levels and economic levels. Subsequent applications of Pay Off resulted in population reductions of 37% and 54% seven days after application. Pay Off did not appear to be effective for more than about 7 days after application. Five insecticide applications were required in the full season experiment with Pay Off to control lygus bugs including 2 Monitor treatments on (6-2) and (8-12).

In a second experiment, Table 6, Pay Off was applied on (8-19) at 0.06 lb. AI/acre. This treatment did not result in any reduction of the lygus bug population when evaluated 6 days after application.

Advantage was applied once in the full season experiment to control lygus bugs at 0.5 lb. AI/acre. This treatment resulted in a reduction of approximately 58% under pretreatment levels 7 days after application. At 14 days the lygus bug population exceeded the pretreatment level and was about 2 times higher than the recommended economic level. In a second experiment, Table 6, Advantage was again applied at 0.50 lb. AI/acre on (8-19). When evaluated 6 days after treatment, the lygus bug population was approximately 78% under pretreatment level. No further evaluations could be made in this experiment because of impending harvest.

Nudrin was applied once at 0.75 lb. AI/acre and resulted in a population reduction of 61% under pretreatment levels 7 days after application.

Carzol was applied once on (7-1) at 0.75 lb. AI/acre. This treatment resulted in a population reduction of 85% under pretreatment level 7 days after application. The lygus bug population remained below pretreatment and economic levels for 14 days but exceeded both levels 21 days after treatment.

A Thiodan + Nudrin combination at 1.0 + 0.5 lb. AI/acre, respectively, was applied on (8-19). Two 5 acre plots were treated with this combination, Table 6. These treatments could not be evaluated beyond 6 days after application but they resulted in lygus bug population reductions of 86% and 88% under pretreatment levels.

Aphids

Data on control of aphids were obtained for all materials evaluated for lygus bug control. In one of the lygus bug experiments, Table 7, the variety of alfalfa was CW-8, highly resistant to the spotted alfalfa aphid. Thus although data were recorded in this experiment, spotted alfalfa aphids were so few that little information was obtained concerning the effects of the insecticides on SAA populations in these trials. The pea aphid was also present in such low numbers that little information could be obtained concerning the effects of the insecticides on this species.

One experiment was conducted to specifically evaluate aphicides. The alfalfa variety used in this experiment was Williamsburg, highly susceptible to the spotted alfalfa aphid. This experiment was initially begun on July 8 but the experimental area accidentally received an application of Lorsban 0.5 lb. AI/acre + Carzol 0.75 lb. AI/acre on July 13 when the remainder of the field was treated to control lygus bugs and aphids. As a result, the experiment was delayed until August 19 when SAA populations had again reached high levels in the field. The aphicides were applied but, because of the grower's desire to apply desiccants in preparation for an early harvest, only one evaluation was made 6 days after treatment. The results of this experiment are presented in Table 8. All of the insecticides were effective in reducing populations of the spotted alfalfa aphid and there did not appear to be significant differences among the materials. Percent population reductions over pretreatment counts 6 days after application were: Thiodan + Nudrin 1.0 + 0.5 lb. AI/acre, 98.9, 98.0; Pounce 0.2 lb. AI/acre, 99.7; Pounce 0.15 lb. AI/acre, 99.5; Advantage 0.50 lb. AI/acre, 99.1; Pay Off 0.06 lb. AI/acre, 98.0; Cymbush 0.12 lb. AI/acre, 96.2. Further information should be obtained on the effectiveness of these materials over longer periods of time.

Spider Mites

Four acaricides were evaluated in 1981 for control of spider mites on seed alfalfa. These materials were Plictran®, Comite®, UC 55248 and Carzol®. The acaricides were either applied following an insecticide application or in specific acaricide-insecticide combinations. Data on acaricides were obtained in two experiments. The first, Table 9, involved season-long trials with insecticides for lygus bug control. On June 19, following an early season clean up treatment of Monitor (6-2), all experimental plots were treated with either Plictran 0.75 lb. AI/acre or Comite 1.69 lb. AI/acre. It has been observed in past work that where synthetic pyrethroid compounds were applied, spider mite populations often develop more rapidly than in the absence of the pyrethroids. To prevent possible spider mite populations from affecting the lygus bug experiments, the synthetic pyrethroids, when applied for the first time, were combined with either Plictran or Comite. Thus these plots received two applications of the acaricides during the season. Plots treated with Monitor or Carzol in this experiment did not receive the second acaricide application in combination. The first application of Comite (6-19) following Monitor (6-2) appeared to be very slow in reducing spider mite and egg populations. The second application of Comite in combination with the pyrethroids (7-1) resulted in significant mite and egg population reductions and the populations remained extremely low for the rest of the season.

Plictran in this experiment appeared to provide a more rapid initial reduction of spider mite populations and, whether it was used alone or in combination, held spider mite populations to very low levels for the remainder of the season. There did not appear to be significant differences in the degree of control obtained with either of these acaricides. It would appear that an application of either Plictran or Comite early in the season, perhaps in combination with the first lygus bug treatment, would control spider mites for the remainder of the season.

In a second experiment, Table 10, Plictran 0.75 lb. AI/acre, UC 55248 0.50 lb. AI/acre and Comite 1.64 lb. AI/acre were applied (7-1) in combination with Carzol 0.75 lb. AI/acre. The combination was necessary because lygus bug populations were high and it was believed that Carzol would have less effect on spider mites than other insecticides. Carzol was also applied alone in this experiment as a control.

For 21 days after the application of the acaricide-Carzol combinations, no other insecticides were applied. After this time two applications of Monitor 0.5 lb. AI/acre were applied (7-22) and (8-5) to control lygus bugs. The plots were sampled each week for 8 weeks after treatment. Plictran and Comite in this experiment were both highly effective in reducing populations of spider mites and eggs, and populations were extremely low for the remainder of the season. UC 55248 appeared to be less effective than any of the other acaricides. Spider mite and egg populations had become well established 21 days after treatment and, although exhibiting fluctuations due to subsequent applications of Monitor, remained at moderately high levels for the rest of the season. Carzol alone was perhaps slightly more effective than UC 55248. Spider mite and egg populations were reestablished within 21 days after application and continued to maintain moderate populations for the remainder of the season.

Spider Mite Population Studies

An objective of the 1981 research on spider mites was to establish quantitative sampling procedures for spider mites in seed alfalfa in preparation for establishing economic thresholds. This research was conducted by Mr. Don Swincer, Graduate Student.

The results of these sampling experiments located at the West Side Field Station, Five Points, showed 3 species of mites to be present at all stages of the growing season. These species were the strawberry mite, *Tetranychus turkestani*, the pacific mite, *T. pacificus*, and the two-spotted spider mite, *T. urticae*. All species were identified by examining the male aedeagi. The fact that all three species are present at all stages in the growing season is an important one as previously it was thought that *T. pacificus* predominated in seed alfalfa.

Intensive sampling at 5 different sites revealed high levels of stratification of mite species within alfalfa seed fields and this fact in itself may account for the bias in previous sampling towards *T. pacificus*. The stratification of the three species appears to be related to their temperature and relative humidity preferences.

A further phenomenon was observed where Monitor sprayed at a rate of 1 1/2 pints per acre selectively killed 95% *T. turkestani*, but fewer than 10% of the combined *T. pacificus* and *T. urticae* population were killed. This fact may explain the differential levels of effectiveness of some organophosphates on mite populations in seed alfalfa observed by growers and researchers in the past.

The sampling technique selected as the most accurate and efficient and showing the least bias was a stratified trifoliate leaf technique and this will be used in next year's experiments to establish economic thresholds.

Effects of Insecticides on Beneficial Insect Species

Data were obtained in the full season experiment for lygus bug control and in the experiment for control of the spotted alfalfa aphid on the effects of the various insecticides on the following group of predatory and parasitic organisms: Orius (minute pirate bugs), Geocoris (big-eyed bugs), Nabis (damsel bugs), lacewings, syrphid flies, coccinellid beetles (lady beetles), collops beetles, parasitic wasps and spiders.

The field used for the lygus bug experiment was treated with Monitor 0.5 lb. AI/acre on (6-2). As a result, populations of parasitic and predaceous insects were relatively low when the first population counts were made 16 days after the Monitor application. As will be seen in Table 11, the populations of beneficial species increased progressively up to 28 days after the Monitor treatment when the various experimental insecticides were applied (7-1) to begin the insecticide evaluation study. Of the predatory insect species, the minute pirate bug, Orius, was the most abundant. The next most abundant species was Geocoris sp., followed by Nabis sp. All of the insecticides had an adverse impact on the predatory and parasitic insect populations. Those insecticides that appeared to exert the least adverse effects on the above 3 species were Pydrin, Cymbush, Pounce, Carzol and Pay Off. Spider populations were generally highest in plots treated with Monitor or Nudrin.

The data on parasitic and predaceous species in the SAA experiment are shown in Table 12. The counts of all species were extremely low and are probably not indicative of the effects of these aphicides on the beneficial species populations. The aphicides were applied late in the season, on August 19, and the field had received several prior insecticide applications to control lygus bugs and aphids which apparently virtually eliminated the populations of predatory and parasitic insects.

Stink Bug

Stink bug populations were measured on July 14 and 15 in 4 alfalfa seed fields near Firebaugh, in 4 fields in the Five Points area and in 4 fields near San Joaquin. Thus a total of 12 fields were surveyed in 1981. The stink bug populations were sampled using the "beating pan" technique whereby 25 feet of row were examined in each field on each sampling date. The results are shown in Table 13. The populations were very low. Stink bugs occurred in 6 fields but only a total of 31 individuals were found in the survey of which 27 were nymphs. Of the total, 20 were consperse stink bugs and 11 were Says stink bug. Populations in the infested fields numbered 22, 1, 2, 2, 2 and 2 per 25 feet of row.

Seed samples were hand stripped from each of the 12 fields included in the stink bug survey. The results of this survey are shown in Table 14. The percentages of good seeds in these fields ranged from 83.3 to 95.4. The percentages of seeds with damage attributed to stink bug ranged from 0.0 to 2.2 and averaged 0.3 for the three areas.

The Alfalfa Seed Chalcid

A survey was conducted in the Firebaugh, Five Points and San Joaquin areas to evaluate alfalfa seed chalcid infestations. Samples of seed pods were hand stripped, before commercial harvest from 51 fields, 11 in the Firebaugh area, 13 from the Five Points area and 27 from near San Joaquin. Four two quart samples of seed pods were taken from each field. The seeds were hand threshed and lightly cleaned with a clipper seed cleaner. An average of 2600 to 2800 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. The results are shown in Table 15. The quality of the seed was generally high (90% good seed) and seed chalcid injury was generally low but overall was higher than in 1980. The percentages of chalcid damaged seeds in individual fields ranged from 0 to 13. Three fields sustained 11.2, 12.0 and 13.0% injury; four fields had over 7% damage ranging from 7.9% to 9.4% and 10 fields had damage of over 4%, ranging from 4.4% to 6.9%. Overall, seed chalcid damage for the Firebaugh area averaged 3.3%, for Five Points 3.4% and for San Joaquin 4.0%. Seed chalcid damage for the three areas averaged 3.6%. This is in contrast to the three area average of 1.9% for 1980. The percentages of chalcid damaged seed for the three areas for the years 1976 through 1981 are shown graphically in Fig. 1.

Seeds showing lygus bug injury ranged from 1.5 to 15.1% and averaged 4.7% for the 51 fields. The percentages of seeds showing damage attributed to stink bug feeding ranged from 0 to 1.3 and averaged 0.2.

Summary and Conclusions

Pest insect populations were generally low in San Joaquin Valley alfalfa seed fields during 1981. Honey bee activity and pollination was higher than in recent years resulting in excellent seed yields.

Evaluations were made of 16 alfalfa entries in agronomy plantings on the Davis Campus for potential resistance to lygus bugs. Three types of evaluations were made. In one, the number of lygus bug nymphs present in 4 subsamples, each comprising one foot of row in each 15' replicate, was determined. Evaluations were also made of the numbers of blasted buds on 10 randomly selected stems and of the numbers of seed pods per 10 stems randomly selected from each replicate. High lygus bug populations occurred on all entries, although entry UCDS-A(L)$_2$ sustained a nymph population that was statistically lower than the other entries. There were no significant differences among the entries with respect to percentages of blasted buds or number of seed pods per 10 stems. In summary, there were no indications of resistance to lygus bugs

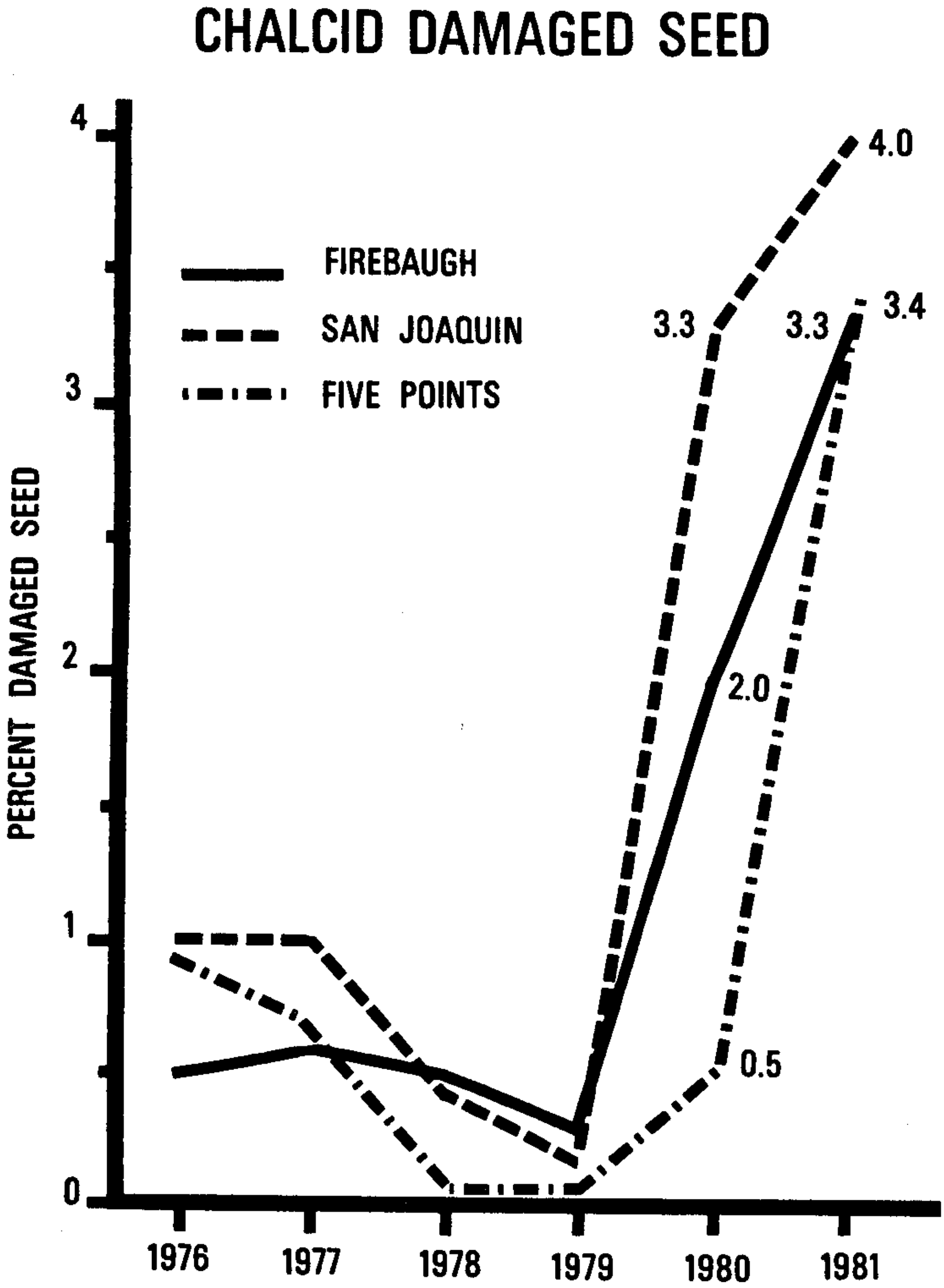

Fig. 1. Percentages of chalcid damaged seed from hand stripped samples taken from commercial alfalfa seed fields in the Firebaugh, San Joaquin and Five Points areas from 1976 to 1981.

among the entries tested and there were no differences between the numbered entries and the commercial varieties, Vernal, Lahontan and CUF 101.

Field plots were established in 1980 to obtain data on insecticide residues that might occur at harvest on seed, chaff and straw, on alfalfa sprouts from treated seed and on green regrowth after harvest. Insecticides included in this study were Monitor, Carzol, Lorsban and Comite. Although some progress has been made, final results from this study are not yet available.

During 1981, 3 separate experiments were conducted in which 12 insecticides and 12 insecticide-acaricide combinations were evaluated for control of lygus bugs, the spotted alfalfa aphid, the pea aphid and spider mites. Those materials that resulted in the most effective control of lygus bug were Monitor, Cymbush, and Ammo. Pounce and Pydrin were effective but appeared to have shorter residual toxicity than Monitor, Cymbush or Ammo. Applications of Monitor controlled lygus bugs for periods ranging from 14 to 28 days. Cymbush and Ammo controlled lygus bugs for approximately 21 days. Pounce resulted in control for approximately 14 days and control with Pydrin ranged from 7 to 14 days.

All of the insecticides evaluated specifically for aphid control reduced spotted alfalfa aphid populations 96% to 99% under pretreatment levels 6 days after application. The aphicides were Thiodan + Nudrin, used as a standard, Pounce, Advantage, Pay Off, and Cymbush. At the present time only Thiodan + Nudrin is registered and available for use. These aphicides were highly effective in controlling the pea aphid as were Monitor and all of the other materials evaluated for control of lygus bugs.

During 1981, Mr. Curtis Powell, a graduate student, completed a Master's degree thesis in which he reported on experiments performed to determine the effects of Monitor and Orthene on the resistance of alfalfas to the spotted alfalfa aphid. It was found that survival and reproduction of aphids on certain resistant varieties treated with Monitor were significantly higher than on those same varieties left untreated. Treatment with Orthene resulted in even greater aphid survival and reproduction than did the Monitor treatment. Mr. Powell is continuing his research for the Ph.D. degree to determine the mechanism(s) by which Monitor and Orthene affect plant resistance to the spotted alfalfa aphid.

Four acaricides were evaluated in 1981 for control of spider mites on seed alfalfa. These materials were Plictran, Comite, UC 55248 and Carzol. The most effective materials were Plictran and Comite. Applications made with the first lygus bug treatment controlled spider mites for the season. Comite is the only one of these materials presently registered for use on seed alfalfa.

Mr. Don Swincer, a graduate student, initiated research into the effects of spider mites on seed alfalfa production with an objective of establishing economic population thresholds. As a result of quantitative sampling procedures carried out in 1981, it has been shown that the strawberry mite, the pacific mite and the two-spotted mite are all present in San Joaquin Valley seed fields and that there are high levels of stratification of the mite species within the plants. This stratification of the species appears to be related to their temperature and relative humidity preferences. It was observed that a Monitor application selectively killed 95% of the strawberry mite, but fewer than 10% of the combined pacific and two-spotted mite populations were killed. This fact may explain the differential levels of effectiveness of some organophosphates on spider mite populations in seed alfalfa observed by growers and researchers in the past. Mr. Swincer will be continuing this work.

Stink bug populations were measured in 12 alfalfa seed fields in West Fresno County. Stink bugs were found in only six fields. Populations were very low and consisted of both the consperse stink bug and Says stink bug in a ratio of about 2 to 1, respectively. Populations in infested fields ranged from 1 to 22 per 25 feet of row. Percentages of seeds with damage attributed to stink bugs averaged 0.3.

Damage by the seed chalcid was assessed in 51 fields in West Fresno County. Seeds damaged by the seed chalcid were generally low, but the amount of damage was higher than in 1980 and continues a trend toward higher damage levels observed over the past 3 years. The percentages of chalcid damaged seeds in individual fields ranged from 0 to 13. Three fields sustained 11.2, 12.0 and 13.0% injury, four fields had over 7% damage ranging from 7.9% to 9.4% and 10 fields had over 4% damage ranging from 4.4% to 6.9%. Overall seed chalcid damage for the Firebaugh area averaged 3.3%, for Five Points 3.4% and for San Joaquin 4.0%. Seed chalcid damage for the three areas averaged 3.6%. This is in contrast to the three area average of 1.9% for 1980.

LYGUS

Table 4 - Lygus bug populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1981.

Treatment[1]			Number of lygus bugs per sweep[3]					
Insecticides[2]	AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
				Small	Medium	Large	Total	
Monitor (6-2)	0.50							
		8	0.2	0.4	0.0	0.0	0.4	0.6
		16	0.4	0.3	0.7	0.3	1.3	1.7
Plictran (6-19)	0.75	21	0.8	1.0	0.4	0.3	1.7	2.5
		28	1.3	3.1	1.9	1.6	6.6	7.9
Monitor (7-1)	0.50							
		7	0.3	0.0	0.0	0.2	0.2	0.5
		14	0.6	1.8	2.2	2.1	6.1	6.7
Monitor (7-15)	0.50							
		7	0.3	0.2	0.0	0.1	0.3	0.6
		14	0.4	0.7	4.4	0.0	5.1	5.5
		21	0.7	1.5	2.4	4.7	8.6	9.3
Monitor (8-5)	0.50							
		7	0.3	0.1	0.0	0.0	0.1	0.4
		14	0.1	1.3	0.4	0.0	1.7	1.8
Monitor (6-2)	0.50							
		8	0.1	0.3	0.1	0.0	0.4	0.5
		16	0.6	0.5	0.5	0.1	1.1	1.7
Plictran (6-19)	0.75	21	0.3	1.1	0.3	0.3	1.7	2.0
		28	1.4	3.4	1.5	1.0	5.9	7.3
Pounce + Plictran (7-1)	0.20 + 0.75							
		7	0.2	0.1	0.3	0.7	1.1	1.3
		14	1.6	3.3	1.4	0.5	5.2	6.8
Pounce (7-15)	0.20							
		7	0.6	0.3	0.8	3.5	4.6	5.2
		14	4.5	4.3	11.8	1.0	17.1	21.6
Pounce (7-29)	0.20							
		7	0.9	1.7	2.8	4.4	8.9	9.8
Monitor (8-5)	0.50							
		7	0.2	0.0	0.0	0.1	0.1	0.3

Table 4 - (continued)

Treatment[1]			Number of lygus bugs per sweep[3]					
Insecticides[2]	AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
				Small	Medium	Large	Total	
Monitor (6-2)	0.50							
		8	0.2	0.2	0.1	0.0	0.3	0.5
		16	0.2	0.1	0.5	0.1	0.7	0.9
Comite (6-19)	1.64	21	0.5	1.8	0.6	0.6	3.0	3.5
		28	1.2	3.0	2.7	1.4	7.1	8.3
Pounce + (7-1) Comite	0.15 + 1.64							
		7	0.0	0.1	0.0	0.1	0.2	0.2
		14	1.0	1.0	5.3	0.2	6.5	7.5
Pounce (7-15)	0.15							
		7	0.5	0.1	0.7	3.7	4.5	5.0
		14	1.8	2.7	6.8	0.3	9.8	11.6
Pounce + (7-29) Plictran	0.15 + 1.50							
		7	0.0	0.2	0.9	1.2	2.3	2.3
		14	2.5	0.5	4.3	2.4	7.2	9.7
Monitor (8-12)	0.50	-	-	-	-	-	-	-
Monitor (6-2)	0.50							
		8	0.2	0.1	0.0	0.0	0.1	0.3
		16	0.4	0.4	0.1	0.1	0.6	1.0
Plictran (6-19)	0.75	21	0.6	0.6	0.6	0.1	1.3	1.9
		28	0.9	3.5	1.3	1.1	5.9	6.8
Pydrin + (7-1) Plictran	0.20 + 0.75							
		7	0.0	0.2	0.1	0.7	1.0	1.0
		14	1.5	2.1	3.6	1.0	6.7	8.2
Pydrin (7-15)	0.20							
		7	1.1	0.3	2.2	6.2	8.7	9.8
Pydrin (7-22)	0.20							
		7	0.8	0.6	0.9	0.4	1.9	2.7
		14	0.3	1.4	1.4	1.8	4.6	4.9
		21	2.0	1.1	3.4	5.0	9.5	11.5
Monitor (8-12)	0.50	-	-	-	-	-	-	-

Table 4 - (continued)

Treatment[1]				Number of lygus bugs per sweep[3]					
Insecticides[2]		AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
					Small	Medium	Large	Total	
Monitor	(6-2)	0.50							
			8	0.2	0.2	0.1	0.0	0.3	0.5
			16	0.4	0.4	0.2	0.1	0.7	1.1
Comite	(6-19)	1.64	21	0.3	1.1	0.4	0.3	1.8	2.1
			28	0.7	2.9	2.6	1.2	6.7	7.4
Pydrin + Comite	(7-1)	0.10 + 1.64							
			7	0.1	0.0	0.1	0.0	0.1	0.2
			14	1.0	4.0	1.1	0.4	5.5	6.5
Pydrin	(7-15)	0.10							
			7	1.0	0.4	1.8	7.7	9.9	10.9
Pydrin	(7-22)	0.10							
			7	2.6	2.8	4.5	0.2	7.5	10.1
Monitor	(7-29)	0.50							
			7	0.3	0.4	0.2	0.2	0.8	1.1
			14	0.7	0.9	0.9	0.1	1.9	2.6
Monitor	(6-2)	0.50							
			8	0.3	0.3	0.0	0.0	0.3	0.6
			16	0.3	0.2	0.3	0.2	0.7	1.0
Plictran	(6-19)	0.75	21	0.2	1.1	0.5	0.7	2.3	2.5
			28	1.1	3.4	2.3	1.5	7.2	8.3
Cymbush + Plictran	(7-1)	0.12 + 0.75							
			7	0.0	0.1	0.1	0.1	0.3	0.3
			14	0.1	2.0	0.4	0.2	2.6	2.7
			21	1.7	0.3	2.5	9.9	12.7	14.4
Cymbush	(7-22)	0.12							
			7	0.2	0.5	0.5	0.1	1.1	1.3
			14	0.1	1.8	2.1	0.4	4.3	4.4
			21	0.7	0.5	1.9	5.5	7.9	8.6
Monitor	(8-12)	0.50	-	-	-	-	-	-	-

Table 4 - (continued)

Treatment[1]				Number of lygus bugs per sweep[3]					
Insecticides[2]		AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
					Small	Medium	Large	Total	
Monitor	(6-2)	0.50							
			8	0.1	0.1	0.0	0.0	0.1	0.2
			16	0.3	0.3	0.2	0.2	0.7	1.0
Comite	(6-19)	1.64	21	0.5	0.6	0.8	0.6	2.0	2.5
			28	1.4	3.3	2.7	2.6	8.6	10.0
Cymbush + Comite	(7-1)	0.06 + 1.64							
			7	0.0	0.1	0.0	0.0	0.1	0.1
			14	0.1	0.9	1.6	0.0	2.5	2.6
			21	0.3	1.0	1.0	4.0	6.0	6.3
			28	2.1	3.8	4.3	0.3	8.4	10.5
Cymbush	(7-29)	0.06							
			7	0.0	0.6	1.2	0.3	2.1	2.1
			14	0.4	2.4	9.4	3.4	15.2	15.6
Monitor	(8-12)	0.50	-	-	-	-	-	-	-
Monitor	(6-2)	0.50							
			8	0.2	0.1	0.1	0.0	0.2	0.4
			16	0.4	0.1	0.2	0.1	0.4	0.8
Comite	(6-19)	1.64	21	0.1	1.8	0.6	0.8	3.2	3.3
			28	1.2	3.0	3.2	2.0	8.2	9.4
Ammo + Comite	(7-1)	0.10 + 1.64							
			7	0.0	0.1	0.0	0.0	0.1	0.1
			14	0.1	1.8	0.2	0.1	2.1	2.2
			21	0.3	0.1	1.2	1.2	2.5	2.8
			28	2.8	4.9	1.6	0.7	7.2	10.0
Ammo	(7-29)	0.10							
			7	0.1	0.3	0.3	0.3	0.9	1.0
			14	0.3	1.8	4.1	2.2	8.1	8.4
Monitor	(8-12)	0.50	-	-	-	-	-	-	-

Table 4 - (continued)

Treatment[1]			Number of lygus bugs per sweep[3]					
Insecticides[2]	AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
				Small	Medium	Large	Total	
Monitor (6-2)	0.50							
		8	0.2	0.3	0.1	0.1	0.5	0.7
		16	0.5	0.4	0.1	0.1	0.6	1.1
Comite (6-19)	1.64	21	0.5	1.0	0.7	0.8	2.5	3.0
		28	0.9	4.9	2.8	2.1	9.8	10.7
Pay Off + (7-1) Comite	0.06 + 1.64							
		7	0.2	0.2	0.3	0.4	0.9	1.1
		14	1.9	2.2	7.4	0.4	10.0	11.9
Pay Off (7-15)	0.06							
		7	1.3	1.3	2.4	2.5	6.2	7.5
		14	4.9	13.4	5.5	1.7	20.6	25.5
Pay Off (7-29)	0.06							
		7	0.3	3.9	6.1	1.4	11.4	11.7
Monitor (8-5)	0.50							
		7	0.5	0.4	0.1	0.2	0.7	1.2
Monitor (6-2)	0.50							
		8	0.2	0.2	0.0	0.1	0.3	0.5
		16	0.6	0.3	0.3	0.4	1.0	1.6
Comite (6-19)	1.64	21	0.8	1.7	0.9	0.5	3.1	3.9
		28	2.0	7.7	4.1	2.0	13.8	15.8
Advantage + (7-1) Comite	0.50 + 1.64							
		7	3.4	0.1	0.6	2.6	3.3	6.7
		14	4.2	13.2	6.2	0.4	19.8	24.0
Nudrin (7-15)	0.75							
		7	3.0	3.9	0.7	1.8	6.4	9.4
Monitor (7-22)	0.50							
		7	2.3	2.9	0.4	0.1	3.4	5.7
		14	2.2	6.6	5.8	1.0	13.4	15.6
Monitor (8-5)	0.50	-	-	-	-	-	-	-

Table 4 - (continued)

Treatment[1]			Number of lygus bugs per sweep[3]					
Insecticides[2]	AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
				Small	Medium	Large	Total	
Monitor (6-2)	0.50							
		16	0.4	0.2	0.4	0.4	1.0	1.4
Comite (6-19)	1.64	21	0.4	1.2	1.2	0.6	3.0	3.4
		28	1.9	7.3	3.6	1.6	12.5	14.4
Carzol (7-1)	0.75							
		7	1.1	0.1	0.4	0.5	1.0	2.1
		14	2.2	6.7	1.4	0.5	8.6	10.8
		21	2.7	4.8	4.8	7.2	16.8	19.5
Monitor (7-22)	0.50							
		7	1.4	2.8	0.5	0.1	3.4	4.8
		14	1.0	4.5	4.8	1.1	10.4	11.4
Monitor (8-5)	0.50	-	-	-	-	-	-	-

[1] Plot size: Each treatment 5 acres (165' x 1320'). Plictran and Nudrin were wettable powders 50% and 90%, respectively. Carzol was a 92% soluble powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated in parentheses.

[2] The entire field was treated prior to the initiation of experimental programs, on June 2 and June 19 for lygus bug and spider mite control, respectively.

[3] Average of 20 sweeps (10-2 sweep samples) per treatment on each sampling date.

Table 5 - Lygus bug populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1981.

Treatment[1]			Number per 50 D-Vac Samples[3]									
			Adults			Nymphal Instars						Adults +
Insecticides[2]	AI/acre lb.	Days after treatment	♂	♀	Total	1	2	3	4	5	Total	Nymphs
Monitor (6-2)	0.50											
		16	1	2	3	1	1	5	1	3	11	14
Plictran (6-19)	0.75	21	6	6	12	6	8	0	1	1	16	28
		28	7	5	12	2	14	19	17	10	62	74
Monitor (7-1)	0.50											
		7	1	0	1	5	1	0	0	0	6	7
		14	7	14	21	13	8	10	6	1	38	59
Monitor (7-15)	0.50											
		7	5	2	7	9	0	0	0	0	9	16
		14	7	1	8	35	29	24	8	3	99	107
		21	1	1	2	18	16	8	10	16	68	70
Monitor (8-5)	0.50											
		7	0	2	2	4	1	0	1	1	7	9
		14	1	0	1	3	5	3	1	0	12	13
Monitor (6-2)	0.50											
		16	0	0	0	0	2	1	0	0	3	3
Plictran (6-19)	0.75	21	4	4	8	2	4	5	1	4	16	24
		28	7	7	14	10	5	15	7	10	47	61
Pounce + (7-1) Plictran	0.20 + 0.75											
		7	2	1	3	1	0	2	3	3	9	12
		14	36	15	51	33	17	13	7	15	85	136
Pounce (7-15)	0.20											
		7	4	5	9	3	1	6	6	18	34	43
		14	24	15	39	19	38	41	11	2	111	150
Pounce (7-29)	0.20											
		7	0	0	0	3	6	10	14	12	45	45
Monitor (8-5)	0.50											
		7	8	6	14	7	5	0	0	3	15	29

Table 5 - (continued)

Treatment[1]			Number per 50 D-Vac Samples[3]									
			Adults			Nymphal Instars						Adults + Nymphs
Insecticides[2]	AI/acre lb.	Days after treatment	♂	♀	Total	1	2	3	4	5	Total	
Monitor (6-2)	0.50											
		16	0	0	0	1	0	1	2	1	5	5
Comite (6-19)	1.64	21	0	2	2	12	4	3	1	5	25	27
		28	4	3	7	6	5	6	9	10	36	43
Pounce + (7-1) Comite	0.15 + 1.64											
		7	1	0	1	2	0	0	0	0	2	3
		14	11	8	19	21	17	13	6	6	63	82
Pounce (7-15)	0.15											
		7	4	5	9	3	0	3	6	8	20	29
		14	12	6	18	17	16	21	9	5	68	86
Pounce + (7-29) Plictran	0.15 + 1.50											
		7	1	3	4	2	0	7	7	6	22	26
		14	13	5	18	2	3	14	5	9	33	51
Monitor (8-12)	0.50	-	-	-	-	-	-	-	-	-	-	-
Monitor (6-2)	0.50											
		16	0	0	0	0	2	1	0	0	3	3
Plictran (6-19)	0.75	21	5	1	6	7	5	2	0	4	18	24
		28	3	4	7	4	8	4	5	5	26	33
Pydrin + (7-1) Plictran	0.20 + 0.75											
		7	0	0	0	1	0	0	0	0	1	1
		14	6	14	20	9	11	4	8	2	34	54
Pydrin (7-15)	0.20											
		7	8	4	12	7	0	1	6	23	37	49
Pydrin (7-22)	0.20											
		7	9	7	16	5	14	23	8	4	54	70
		14	4	0	4	2	2	3	3	2	12	16
		21	13	5	18	8	8	12	10	23	61	79
Monitor (8-12)	0.50	-	-	-	-	-	-	-	-	-	-	-

Table 5 - (continued)

Treatment[1]			Number per 50 D-Vac Samples[3]									
			Adults			Nymphal Instars						Adults +
Insecticides[2]	AI/acre lb.	Days after treatment	♂	♀	Total	1	2	3	4	5	Total	Nymphs
Monitor (6-2)	0.50											
		16	0	1	1	0	1	0	1	0	2	3
Comite (6-19)	1.64	21	1	0	1	9	5	2	0	0	16	17
		28	4	8	12	13	12	12	11	17	65	77
Pydrin + Comite (7-1)	0.10 + 1.64											
		7	0	0	0	0	1	1	0	1	3	3
		14	7	12	19	14	12	7	9	10	52	71
Pydrin (7-15)	0.10											
		7	7	7	14	5	2	3	13	23	46	60
Pydrin (7-22)	0.10											
		7	5	13	18	16	39	48	11	2	116	134
Monitor (7-29)	0.50											
		7	2	1	3	3	0	0	1	1	5	8
		14	2	2	4	15	5	9	3	3	35	39
Monitor (6-2)	0.50											
		16	1	0	1	1	2	0	0	2	5	6
Plictran (6-19)	0.75	21	4	0	4	5	4	0	0	4	13	17
		28	9	10	19	7	5	16	10	10	48	67
Cymbush + Plictran (7-1)	0.12 + 0.75											
		7	0	0	0	6	1	0	0	0	7	7
		14	2	4	6	19	7	4	3	2	35	41
		21	12	2	14	1	0	2	8	24	35	49
Cymbush (7-22)	0.12											
		7	0	0	0	9	8	4	0	1	22	22
		14	0	2	2	10	9	19	4	2	44	46
		21	8	4	12	1	4	17	10	41	73	85
Monitor (8-12)	0.50	-	-	-	-	-	-	-	-	-	-	-

Table 5 - (continued)

Treatment[1]				Number per 50 D-Vac Samples[3]									
Insecticides[2]		AI/acre lb.	Days after treatment	Adults			Nymphal Instars						Adults + Nymphs
				♂	♀	Total	1	2	3	4	5	Total	
Monitor	(6-2)	0.50											
			16	1	4	5	0	0	0	1	0	1	6
Comite	(6-19)	1.64	21	1	2	3	4	9	1	2	2	18	21
			28	3	2	5	1	6	6	4	8	25	30
Cymbush + Comite	(7-1)	0.06 + 1.64											
			7	0	0	0	0	0	0	0	0	0	0
			14	3	1	4	3	8	10	2	5	28	32
			21	3	5	8	2	0	3	10	15	30	38
			28	27	12	39	33	23	14	3	1	74	113
Cymbush	(7-29)	0.06											
			7	1	0	1	11	6	11	1	0	29	30
			14	4	4	8	8	24	55	41	24	152	160
Monitor	(8-12)	0.50	-	-	-	-	-	-	-	-	-	-	-
Monitor	(6-2)	0.50											
			16	1	0	1	1	0	1	3	0	5	6
Comite	(6-19)	1.64	21	4	1	5	5	7	10	1	2	25	30
			28	16	12	28	15	16	27	30	26	114	142
Ammo + Comite	(7-1)	0.10 + 1.64											
			7	0	0	0	2	0	0	0	0	2	2
			14	1	0	1	2	0	2	3	0	7	8
			21	3	3	6	0	0	2	8	8	18	24
			28	14	6	20	21	29	26	6	1	83	103
Ammo	(7-29)	0.10											
			7	0	0	0	10	6	3	1	0	20	20
			14	2	2	4	4	31	29	11	13	88	92
Monitor	(8-12)	0.50	-	-	-	-	-	-	-	-	-	-	-

Table 5 - (continued)

Treatment[1]			Number per 50 D-Vac Samples[3]									
			Adults			Nymphal Instars						Adults + Nymphs
Insecticides[2]	AI/acre lb.	Days after treatment	♂	♀	Total	1	2	3	4	5	Total	
Monitor (6-2)	0.50											
		16	0	1	1	0	2	0	2	1	5	6
Comite (6-19)	1.64	21	5	3	8	17	9	5	2	6	39	47
		28	13	8	21	20	27	21	14	13	95	116
Pay Off + Comite (7-1)	0.06 + 1.64											
		7	0	2	2	1	4	1	5	2	13	15
		14	6	19	25	16	18	8	2	2	46	71
Pay Off (7-15)	0.06											
		7	8	7	15	15	5	9	17	20	66	81
		14	24	14	38	29	37	63	16	7	152	190
Pay Off (7-29)	0.06											
		7	3	3	6	34	7	31	4	17	93	99
Monitor (8-5)	0.50											
		7	7	7	14	16	7	0	0	5	28	42
Monitor (6-2)	0.50											
		16	2	2	4	0	1	1	0	0	2	6
Comite (6-19)	1.64	21	7	5	12	5	2	2	3	8	20	32
		28	13	4	17	15	8	11	3	28	65	82
Advantage + Comite (7-1)	0.50 + 1.64											
		7	22	18	40	4	2	3	4	18	31	71
		14	60	29	89	36	55	38	11	3	143	232
Nudrin (7-15)	0.75											
		7	32	17	49	16	13	9	16	26	80	129
Monitor (7-22)	0.50											
		7	7	11	18	11	19	14	0	1	45	63
		14	17	7	24	17	47	55	17	3	139	163
Monitor (8-5)	0.50	-	-	-	-	-	-	-	-	-	-	-

Table 5 - (continued)

Treatment[1]		Number per 50 D-Vac Samples[3]											
			Adults			Nymphal Instars						Adults + Nymphs
Insecticides[2]	AI/acre lb.	Days after treatment	♂	♀	Total	1	2	3	4	5	Total	
Monitor (6-2)	0.50											
		16	0	2	2	2	0	2	4	2	10	12
Comite (6-19)	1.64	21	1	6	7	6	5	1	0	3	15	22
		28	11	9	20	29	11	20	13	39	112	132
Carzol (7-1)	0.75											
		7	0	1	1	2	3	0	6	1	12	13
		14	23	11	34	15	16	14	4	5	54	88
		21	20	6	26	41	23	22	21	29	136	162
Monitor (7-22)	0.50											
		7	13	5	18	33	5	0	0	0	38	56
		14	7	2	9	21	17	37	11	0	86	95
Monitor (8-5)	0.50	-	-	-	-	-	-	-	-	-	-	-

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Plictran and Nudrin were wettable powders 50% and 90%, respectively. Carzol was a 92% soluble powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated in parentheses.

[2] The entire field was treated, prior to the initiation of experimental programs, on June 2 and June 19 for lygus bug and spider mite control, respectively.

[3] 2-25 suck D-Vac samples per treatment on each sampling date.

Table 6 - Lygus bug populations in seed alfalfa plots treated by aircraft for aphid control. Firebaugh, California, 1981.

Treatment[1]			Number per 50 D-Vac Samples[3]									
			Adults			Nymphal Instars						
Insecticides	AI/acre lb.	Days after treatment[2]	♂	♀	Total	1	2	3	4	5	Total	Adults + Nymphs
Thiodan + Nudrin (8-19)	1.00 + 0.50	Pre	0	0	0	1	4	4	0	0	9	9
		Pre	0	0	0	0	8	15	7	7	37	37
		6	1	2	3	0	0	0	0	2	2	5
Pounce (8-19)	0.20	Pre	3	0	3	7	12	12	11	0	42	45
		Pre	4	4	8	1	9	12	2	5	29	37
		6	0	0	0	0	1	1	4	4	10	10
Pounce (8-19)	0.10	Pre	5	4	9	0	4	4	4	0	12	21
		Pre	6	2	8	2	5	9	6	2	24	32
		6	1	0	1	3	0	3	1	2	9	10
Advantage(8-19)	0.50	Pre	1	0	1	0	1	3	4	1	9	10
		Pre	6	1	7	2	1	1	1	6	11	18
		6	0	1	1	1	0	0	1	1	3	4
Pay Off (8-19)	0.06	Pre	0	0	0	0	0	4	2	2	8	8
		Pre	0	1	1	3	4	9	4	4	24	25
		6	0	1	1	9	6	9	4	6	34	35
Cymbush (8-19)	0.12	Pre	1	1	2	0	0	4	1	0	5	7
		Pre	0	1	1	0	3	3	4	0	10	11
		6	1	0	1	3	2	3	4	0	12	13

Table 6 - (continued)

Treatment[1]			Number per 50 D-Vac Samples[3]									
			Adults			Nymphal Instars						Adults + Nymphs
Insecticides	AI/acre lb.	Days after treatment[2]	♂	♀	Total	1	2	3	4	5	Total	
		Pre	0	4	4	0	3	1	0	0	4	8
		Pre	2	3	5	2	5	4	3	7	21	26
Thiodan	1.00											
+ (8-19)	+											
Nudrin	0.50											
		6	2	0	2	1	0	0	0	0	1	3

[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin was a 90% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated.

[2] Pretreatment counts were made on August 11 and 18.

[3] 2-25 suck D-Vac samples per treatment on each sampling date.

APHIDS

Table 7 - Aphid populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1981.

Treatment[1]				Number per 50 D-vac Sample[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	spotted alfalfa aphid[4]	pea aphid
Monitor	0.50	June 2			
			16	0	2
Plictran	0.75	June 19	21	0	1
			28	0	1
Monitor	0.50	July 1			
			7	0	1
			14	12	2
Monitor	0.50	July 15			
			7	1	5
			14	2	27
			21	3	12
Monitor	0.50	August 5			
			7	3	5
			14	15	5
Monitor	0.50	June 2			
			16	0	0
Plictran	0.75	June 19	21	0	0
			28	0	1
Pounce + Plictran	0.20 + 0.75	July 1			
			7	2	0
			14	0	3
Pounce	0.20	July 15			
			7	1	1
			14	1	6
Pounce	0.20	July 29			
			7	1	1
Monitor	0.50	August 5			
			7	0	0

Table 7 - (continued)

Treatment[1]				Number per 50 D-vac Sample[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	spotted alfalfa aphid[4]	pea aphid
Monitor	0.50	June 2			
			16	0	1
Comite	1.64	June 19	21	0	1
			28	0	0
Pounce	0.15				
+	+	July 1			
Comite	1.64				
			7	1	0
			14	8	0
Pounce	0.15	July 15			
			7	0	1
			14	1	0
Pounce	0.15				
+	+	July 29			
Plictran	0.75				
			7	1	0
			14	28	2
Monitor	0.50	June 2			
			16	0	0
Plictran	0.75	June 19	21	0	1
			28	0	3
Pydrin	0.20				
+	+	July 1			
Plictran	0.75				
			7	0	2
			14	0	0
Pydrin	0.20	July 15			
			7	0	2
Pydrin	0.20	July 22			
			7	1	0
			14	6	0
			21	4	0

Table 7 - (continued)

Treatment[1]				Number per 50 D-vac Sample[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	spotted alfalfa aphid[4]	pea aphid
Monitor	0.50	June 2			
			16	0	0
Comite	1.64	June 19	21	0	0
			28	1	0
Pydrin	0.10				
+	+	July 1			
Comite	1.64				
			7	0	0
			14	0	1
Pydrin	0.10	July 15			
			7	14	0
Pydrin	0.10	July 22			
			7	1	0
Monitor	0.50	July 29			
			7	1	0
			14	4	1
Monitor	0.50	June 2			
			16	0	0
Plictran	0.75	June 19	21	0	0
			28	0	3
Cymbush	0.12				
+	+	July 1			
Plictran	0.75				
			7	0	0
			14	2	0
			21	1	24
Cymbush	0.12	July 22			
			7	0	7
			14	0	3
			21	0	10

Table 7 - (continued)

Treatment[1]				Number per 50 D-vac Sample[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	spotted alfalfa aphid[4]	pea aphid
Monitor	0.50	June 2			
			16	0	0
Comite	1.64	June 19	21	0	2
			28	1	2
Cymbush + Comite	0.06 + 1.64	July 1			
			7	0	0
			14	0	0
			21	0	4
			28	10	40
Cymbush	0.06	July 29			
			7	97	24
			14	38	140
Monitor	0.50	June 2			
			16	0	0
Comite	1.64	June 19	21	1	1
			28	0	11
Ammo + Comite	0.10 + 1.64	July 1			
			7	0	0
			14	0	0
			21	0	10
			28	30	21
Ammo	0.10	July 29			
			7	3	14
			14	11	16

Table 7 - (continued)

Treatment[1]				Number per 50 D-vac Sample[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	spotted alfalfa aphid[4]	pea aphid
Monitor	0.50	June 2			
			16	0	1
Comite	1.64	June 19	21	0	3
			28	0	2
Pay Off + Comite	0.06 + 1.64	July 1			
			7	0	0
			14	0	1
Pay Off	0.06	July 15	7	0	2
			14	0	3
Pay Off	0.06	July 29	7	0	0
Monitor	0.50	August 5	7	1	3
Monitor	0.50	June 2			
			16	1	0
Comite	1.64	June 19	21	0	1
			28	0	5
Advantage + Comite	0.50 + 1.64	July 1			
			7	0	0
			14	3	11
Nudrin	0.75	July 15	7	0	15
Monitor	0.50	July 22	7	18	6
			14	0	43

Table 7 - (continued)

Treatment[1]				Number per 50 D-vac Sample[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	spotted alfalfa aphid[4]	pea aphid
Monitor	0.50	June 2			
			16	0	1
Comite	0.75	June 19	21	0	0
			28	0	4
Carzol	0.75	July 1			
			7	0	0
			14	0	41
			21	3	364
Monitor	0.50	July 22			
			7	1	79
			14	3	83

[1] Plot size: Each treatment 5 acres (165' x 1320'). Plictran and Nudrin were wettable powders 50% and 90%, respectively. Carzol was a 92% soluble powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated.

[2] The entire field was treated, prior to the initiation of experimental programs, on June 2 and June 19 for lygus bug and spider mite control, respectively.

[3] 2-25 suck D-Vac samples per treatment on each sampling date.

[4] Alfalfa variety CW-8 resistant to spotted alfalfa aphid.

Table 8 - Aphid populations in seed alfalfa plots treated by aircraft for aphid control. Firebaugh, California, 1981.[1]

Treatment[2]				Number per 50 D-vac Sample[4]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[3]	spotted alfalfa aphid	pea aphid
Thiodan + Nudrin	1.00 + 0.50	August 19	Pre	11,470	0
			Pre	62,571	0
			6	694	2
Pounce	0.20	August 19	Pre	3,169	0
			Pre	20,671	0
			6	65	0
Pounce	0.15	August 19	Pre	2,221	0
			Pre	31,340	8
			6	167	0
Advantage	0.50	August 19	Pre	30,898	0
			Pre	106,528	0
			6	943	0
Pay Off	0.06	August 19	Pre	25,176	1
			Pre	71,372	0
			6	1,446	1
Cymbush	0.12	August 19	Pre	23,936	0
			Pre	103,588	1
			6	3,905	0

Table 8 - (continued)

Treatment[2]				Number per 50 D-vac Sample[4]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[3]	spotted alfalfa aphid	pea aphid
			Pre	3,262	0
			Pre	18,899	0
Thiodan	1.00				
+	+	August 19			
Nudrin	0.50				
			6	383	0

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[1] Alfalfa variety Williamsburg susceptible to spotted alfalfa aphid.

[2] Plot size: Each treatment was 5 acres (165' x 1320'). Nudrin was a 90% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated.

[3] Pretreatment counts were made on August 11 and 18.

[4] 2-25 suck D-vac samples per treatment on each sampling date.

Table 9 - Spider mite populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1981.

Treatment[1]				Number per leaf[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	Mites	Eggs
Monitor	0.50	June 2	16	7.1	13.9
Plictran	0.75	June 19	3	2.0	4.7
			10	0.4	0.4
Monitor	0.50	July 1	7	0.1	0.6
			14	0.1	0.0
Monitor	0.50	July 15	7	0.3	1.5
			14	0.7	4.1
			21	3.8	17.2
Monitor	0.50	August 5	7	0.6	4.9
			14	1.7	9.6
Monitor	0.50	June 2	16	4.7	19.3
Plictran	0.75	June 19	3	1.0	3.3
			10	0.0	0.1
Pounce + Plictran	0.20 + 0.75	July 1	7	0.1	0.3
			14	0.0	0.1
Pounce	0.20	July 15	7	0.1	0.2
			14	0.3	2.7
Pounce	0.20	July 29	7	0.2	0.7
Monitor	0.50	August 5	7	2.6	4.5

Table 9 - (continued)

Treatment[1]				Number per leaf[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	Mites	Eggs
Monitor	0.50	June 2			
			16	13.9	37.5
Comite	1.64	June 19			
			3	38.2	26.0
			10	3.5	4.6
Pounce + Comite	0.15 + 1.64	July 1			
			7	0.3	0.5
			14	0.1	0.0
Pounce	0.15	July 15			
			7	0.0	0.1
			14	0.4	1.5
Pounce	0.15	July 29			
			7	0.1	0.2
			14	0.2	2.6
Monitor	0.50	June 2			
			16	9.7	20.3
Plictran	0.75	June 19			
			3	1.1	6.6
			10	0.0	0.1
Pydrin + Plictran	0.20 + 0.75	July 1			
			7	0.0	0.1
			14	0.0	0.0
Pydrin	0.20	July 15			
			7	0.1	0.4
Pydrin	0.20	July 22			
			7	0.1	0.2
			14	0.1	0.1
			21	0.2	0.8

Table 9 - (continued)

Treatment[1]					
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	Number per leaf[3] Mites	Eggs
Monitor	0.50	June 2			
			16	13.5	19.1
Comite	1.64	June 19			
			3	5.1	10.5
			10	4.3	5.6
Pydrin + Comite	0.10 + 1.64	July 1			
			7	0.4	1.0
			14	0.1	0.0
Pydrin	0.10	July 15			
			7	0.1	0.2
Pydrin	0.10	July 22			
			7	0.0	0.1
Monitor	0.50	July 29			
			7	1.6	2.9
			14	1.6	11.7
Monitor	0.50	June 2			
			16	11.3	27.5
Plictran	0.75	June 19			
			3	10.9	14.8
			10	1.8	1.8
Cymbush + Plictran	0.12 + 0.75	July 1			
			7	0.2	0.1
			14	0.0	0.0
			21	0.0	0.1
Cymbush	0.12	July 22			
			7	0.1	0.5
			14	1.0	1.8
			21	0.4	2.4

Table 9 - (continued)

Treatment[1]		Dates of application	Days after treatment	Number per leaf[3]	
Insecticides[2]	AI/acre lb.			Mites	Eggs
Monitor	0.50	June 2			
			16	10.3	28.0
Comite	1.64	June 19			
			3	12.9	15.1
			10	3.3	3.1
Cymbush	0.06				
+	+	July 1			
Comite	1.64				
			7	0.7	1.1
			14	0.1	0.2
			21	0.1	0.0
			28	0.0	0.0
Cymbush	0.06	July 29			
			7	0.1	0.3
			14	0.5	1.4
Monitor	0.50	June 2			
			16	23.7	39.9
Comite	1.64	June 19			
			3	7.4	21.3
			10	5.0	5.5
Ammo	0.10				
+	+	July 1			
Comite	1.64				
			7	1.1	1.4
			14	0.7	0.6
			21	0.0	0.0
			28	0.1	0.1
Ammo	0.10	July 29			
			7	0.5	0.8
			14	2.1	6.9

Table 9 - (continued)

Treatment^1					
Insecticides^2	AI/acre lb.	Dates of application	Days after treatment	Number per leaf^3	
				Mites	Eggs
Monitor	0.50	June 2	16	22.9	48.3
Comite	1.64	June 19	3	25.4	41.1
			10	10.4	11.4
Pay Off + Comite	0.06 + 1.64	July 1	7	1.1	1.7
			14	0.2	0.9
Pay Off	0.06	July 15	7	0.5	0.3
			14	0.6	1.4
Pay Off	0.06	July 29	7	4.3	2.4
Monitor	0.50	August 5	7	1.1	4.1
Monitor	0.50	June 2	16	11.8	27.7
Comite	1.64	June 19	3	12.7	23.8
			10	9.5	15.8
Advantage + Comite	0.50 + 1.64	July 1	7	1.0	2.0
			14	0.5	2.8
Nudrin	0.75	July 15	7	1.5	2.0
Monitor	0.50	July 22	7	0.3	1.4
			14	3.7	6.7

Table 9 - (continued)

Treatment[1]				Number per leaf[3]	
Insecticides[2]	AI/acre lb.	Dates of application	Days after treatment	Mites	Eggs
Monitor	0.50	June 2			
			16	10.0	26.7
Comite	1.64	June 19			
			3	11.8	30.0
			10	7.1	7.4
Carzol	0.75	July 1			
			7	2.2	2.9
			14	0.3	0.9
			21	4.7	9.5
Monitor	0.50	July 22			
			7	1.5	7.3
			14	3.0	19.7
Monitor	0.50	August 5			
			7	5.8	9.8
			14	4.6	8.7
			21	2.1	3.1

---

[1] Plot size: Each treatment 5 acres (165' x 1320'). Plictran and Nudrin were wettable powders 50% and 90%, respectively. Carzol was a 92% soluble powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated.

[2] The entire field was treated prior to the initiation of experimental programs, on June 2 and June 19 for lygus bug and spider mite control, respectively.

[3] 50 trifoliate leaves showing mite damage were examined from each treatment on each sampling date.

Table 10 - Spider mite populations in seed alfalfa plots treated by aircraft for spider mite and lygus bug control. Firebaugh, California, 1981.

Treatment[1]				Number per leaf[3]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Mites	Eggs
			Pre	9.2	4.6
Carzol + Plictran	0.75 + 0.75	July 1			
			7	0.2	2.5
			14	0.3	1.7
			21	0.0	0.0
Monitor	0.50	July 22	28	1.4	1.8
			35	0.2	1.5
Monitor	0.50	August 5	42	1.7	1.2
			49	1.6	4.9
			56	0.6	1.4
			Pre	11.2	6.2
Carzol + UC 55248	0.75 + 0.50	July 1			
			7	1.0	1.8
			14	0.6	1.3
			21	4.4	8.5
Monitor	0.50	July 22	28	2.1	8.2
			35	4.2	15.5
Monitor	0.50	August 5	42	11.2	5.7
			49	3.9	4.3
			56	5.1	7.9
			Pre	20.1	9.2
Carzol + Comite	0.75 + 1.64	July 1			
			7	0.1	0.3
			14	0.2	0.3
			21	0.0	0.2
Monitor	0.50	July 22	28	1.1	7.4
			35	0.2	0.2
Monitor	0.50	August 5	42	0.0	0.1
			49	0.2	0.9
			56	0.3	0.6

Table 10 - (continued)

Treatment[1]				Number per leaf[3]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Mites	Eggs
			Pre	5.5	2.8
Carzol + Comite	0.75 + 1.64	July 1			
			7	0.1	0.2
			14	0.4	0.2
			21	0.0	0.0
Monitor	0.50	July 22	28	0.1	0.0
			35	0.2	0.1
Monitor	0.50	August 5	42	0.1	1.3
			49	0.4	0.6
			56	0.2	0.7
			Pre	7.1	7.4
Carzol	0.75	July 1			
			7	2.2	2.9
			14	0.3	0.9
			21	4.7	9.5
Monitor	0.50	July 22	28	1.5	7.3
			35	3.0	19.7
Monitor	0.50	August 5	42	5.8	9.8
			49	4.6	8.7
			56	2.1	3.1

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Carzol was a 92% soluble powder, while Plictran was a 50% wettable powder. UC 55248 and Comite were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated.

[2] Pretreatment counts were made on June 30.

[3] 50 trifoliate leaves showing mite damage were examined from each treatment on each sampling date.

PREDATORS & PARASITES

Table 11 - Predator and parasite populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1981.

Treatment[1]		AI/ acre lb.	Days after treat- ment	Number per 50 D-Vac Samples[3]															
										Lacewings									
Insecticides[2]				Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
Monitor	(6-2)	0.50																	
			16	32	18	4	12	26	4	1	0	3	8	0	0	0	0	118	116
Plictran	(6-19)	0.75	21	9	2	7	8	61	24	1	0	1	7	0	0	0	3	97	123
			28	13	6	12	13	174	125	1	0	0	4	0	0	1	0	119	103
Monitor	(7-1)	0.50																	
			7	1	12	1	6	11	2	0	0	0	0	0	0	0	6	45	43
			14	3	14	0	0	60	14	6	2	0	0	0	0	2	2	111	82
Monitor	(7-15)	0.50																	
			7	7	2	0	0	6	1	0	0	1	1	0	0	1	0	43	120
			14	4	0	0	0	3	6	0	0	5	0	0	0	0	1	26	39
			21	0	1	0	2	31	11	0	0	0	1	0	0	0	0	33	7
Monitor	(8-5)	0.50																	
			7	2	2	0	0	5	1	0	0	1	1	0	0	0	0	28	11
			14	0	1	0	0	5	6	0	0	0	0	0	0	0	0	13	8
Monitor	(6-2)	0.50																	
			16	6	3	3	8	13	4	0	0	1	21	0	0	0	0	76	104
Plictran	(6-19)	0.75	21	6	4	8	11	79	38	1	2	1	15	0	0	0	1	87	177
			28	6	23	3	8	126	125	0	0	1	3	0	0	2	2	81	63
Pounce		0.20																	
+	(7-1)	+																	
Plictran		0.75																	
			7	2	14	0	4	85	42	0	0	0	1	0	0	0	1	12	29
			14	9	68	4	5	193	33	0	0	2	2	0	0	2	1	124	70
Pounce	(7-15)	0.20																	
			7	18	17	0	4	48	8	0	0	0	1	0	0	0	0	62	24
			14	5	13	0	3	33	23	0	0	0	0	0	0	0	1	18	8
Pounce	(7-29)	0.20																	
			7	0	5	0	3	22	9	0	0	0	1	0	0	0	0	3	4
Monitor	(8-5)	0.50																	
			7	0	9	0	0	16	5	0	0	0	2	0	0	0	0	9	20

Table 11 - (continued)

Treatment[1]		AI/ acre lb.	Days after treat- ment	Number per 50 D-Vac Samples[3]															
										Lacewings									
				Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
Insecticides[2]				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
Monitor	(6-2)	0.50																	
			16	1	5	2	5	11	5	0	0	1	19	1	0	0	0	83	67
Comite	(6-19)	1.64	21	14	5	5	11	43	13	0	0	3	15	1	0	0	0	89	154
			28	7	10	9	27	104	139	0	4	0	10	0	0	1	0	89	199
Pounce + Comite	(7-1)	0.15 + 1.64																	
			7	0	5	0	0	27	13	0	0	0	6	0	0	0	5	10	19
			14	9	27	0	13	179	58	0	0	0	9	0	0	0	0	66	66
Pounce	(7-15)	0.15																	
			7	11	16	1	2	59	14	0	0	3	0	0	0	0	2	32	8
			14	7	16	0	0	46	37	0	0	1	1	0	0	0	0	6	17
Pounce + Plictran	(7-29)	0.15 + 1.50																	
			7	4	9	0	0	11	14	0	0	0	2	0	0	0	0	2	5
			14	9	3	1	0	25	11	0	0	0	1	0	0	0	0	10	16
Monitor	(8-12)	0.50																	
Monitor	(6-2)	0.50																	
			16	4	2	3	5	19	12	0	0	0	15	1	0	0	1	91	
Plictran	(6-19)	0.75	21	5	4	8	5	95	18	1	0	2	15	0	0	1	1	105	112
			28	11	11	7	22	138	297	1	1	0	14	0	0	1	0	124	160
Pydrin + Plictran	(7-1)	0.20 + 0.75																	
			7	3	15	0	1	87	74	0	0	0	7	0	0	0	1	39	19
			14	8	34	0	5	136	37	0	0	1	3	0	0	0	5	102	40
Pydrin	(7-15)	0.20																	
			7	25	37	0	0	127	97	0	0	0	0	0	0	0	1	44	15
Pydrin	(7-22)	0.20																	
			7	8	9	0	0	115	44	0	0	0	1	0	0	0	1	11	7
			14	2	12	0	0	36	23	0	0	3	1	0	0	0	0	16	8
			21	4	61	1	2	63	99	0	0	0	4	0	0	0	0	23	19
Monitor	(8-12)	0.50																	

Table 11 - (continued)

Treatment[1]		AI/ acre lb.	Days after treat-ment	Number per 50 D-Vac Samples[3]															
										Lacewings									
Insecticides[2]				Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
Monitor	(6-2)	0.50																	
			16	1	3	6	1	18	4	1	0	0	8	0	0	0	0	57	132
Comite	(6-19)	1.64	21	1	5	5	9	42	8	3	1	0	19	1	0	0	0	75	165
			28	9	9	8	27	114	114	0	6	0	15	0	0	2	1	83	118
Pydrin + Comite	(7-1)	0.10 + 1.64																	
			7	1	5	1	1	45	25	0	0	0	2	0	0	0	0	14	59
			14	6	24	0	7	151	27	1	0	3	6	0	0	0	1	78	77
Pydrin	(7-15)	0.10																	
			7	11	8	0	1	105	97	0	0	0	0	0	0	0	0	66	43
Pydrin	(7-22)	0.10																	
			7	10	16	0	0	63	90	0	0	0	4	0	0	0	0	7	32
Monitor	(7-29)	0.50																	
			7	0	6	0	0	9	4	0	0	0	0	0	0	0	0	5	11
			14	0	0	0	0	21	19	0	0	0	5	0	0	0	0	6	13
Monitor	(6-2)	0.50																	
			16	1	4	1	4	15	7	0	0	0	15	0	0	0	0	66	119
Plictran	(6-19)	0.75	21	7	1	11	4	66	10	1	0	1	11	0	0	1	0	98	108
			28	6	19	2	20	120	201	0	0	1	16	0	0	1	0	116	135
Cymbush + Plictran	(7-1)	0.12 + 0.75																	
			7	1	20	0	1	65	21	0	0	1	1	0	0	0	5	21	6
			14	8	22	0	0	155	17	0	0	6	9	0	0	0	2	128	23
			21	14	13	0	2	40	19	0	0	0	1	0	0	1	1	52	27
Cymbush	(7-22)	0.12																	
			7	6	12	0	0	30	35	0	0	1	0	0	0	1	0	7	2
			14	1	12	0	0	54	11	0	0	2	1	0	0	0	0	14	23
			21	5	50	0	0	25	31	0	0	1	2	0	0	0	0	14	23
Monitor	(8-12)	0.50																	

Table 11 - (continued)

Treatment[1]			Days after treat- ment	Number per 50 D-Vac Samples[3]															
										Lacewings									
										Brown		Green							
Insecticides[2]		AI/ acre lb.		Geocoris A	Geocoris N	Nabis A	Nabis N	Orius A	Orius N	A	L	A	L	Coccinellidae A	Coccinellidae L	Collops A	Collops L	Parasitic wasps	Spiders
Monitor	(6-2)	0.50																	
			16	1	9	1	6	8	7	0	0	2	8	0	0	1	1	123	105
Comite	(6-19)	1.64	21	11	3	11	13	58	11	0	9	4	20	0	0	2	0	142	297
			28	3	5	2	17	41	60	0	0	0	8	0	0	1	0	83	118
Cymbush + Comite	(7-1)	0.06 + 1.64																	
			7	0	7	0	0	1	0	0	1	0	2	0	0	0	0	28	13
			14	3	19	0	1	68	4	0	0	2	3	0	0	2	0	64	81
			21	16	16	0	2	48	10	0	0	3	5	0	0	1	0	71	53
			28	13	12	0	1	24	311	0	0	0	0	0	0	0	0	12	44
Cymbush	(7-29)	0.06																	
			7	3	7	0	0	39	26	0	0	3	3	0	0	0	1	4	11
			14	3	60	0	0	73	10	0	0	0	2	0	0	0	0	9	20
Monitor	(8-12)	0.50																	
Monitor	(6-2)	0.50																	
			16	4	9	5	6	11	7	2	0	3	15	0	0	1	2	105	135
Comite	(6-19)	1.64	21	9	20	8	12	34	11	1	3	4	22	0	0	0	3	167	213
			28	12	14	5	19	93	54	0	1	2	29	0	0	1	1	145	189
Ammo + Comite	(7-1)	0.10 + 1.64																	
			7	0	1	0	0	3	3	0	0	0	1	0	0	0	0	16	17
			14	3	8	0	0	29	0	0	0	3	4	0	0	0	2	45	63
			21	7	6	0	0	39	5	0	0	3	0	0	0	1	1	84	50
			28	4	3	0	0	11	104	0	0	1	2	0	0	1	0	8	62
Ammo	(7-29)	0.10																	
			7	2	4	0	0	8	10	0	0	1	5	0	0	0	1	4	17
			14	3	4	0	1	46	9	0	0	2	2	0	0	0	0	7	19
Monitor	(8-12)	0.50																	

Table 11 - (continued)

Treatment[1]				Number per 50 D-Vac Samples[3]															
										Lacewings									
		AI/ acre	Days after treat-	Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic	
Insecticides[2]		lb.	ment	A	N	A	N	A	N	A	L	A	L	A	L	A	L	wasps	Spiders
Monitor	(6-2)	0.50																	
			16	5	7	3	2	10	6	3	0	2	8	0	0	1	2	121	155
Comite	(6-19)	1.64	21	4	4	1	11	44	10	2	1	3	18	0	0	0	2	203	184
			28	4	8	9	20	99	55	0	0	0	24	0	0	0	0	183	301
Pay Off + Comite	(7-1)	0.06 + 1.64																	
			7	0	7	0	3	34	42	0	0	0	0	0	0	0	2	21	70
			14	3	20	0	3	89	18	0	0	2	4	0	0	0	1	49	206
Pay Off	(7-15)	0.06																	
			7	7	11	0	0	105	30	0	0	4	2	0	0	0	0	78	94
			14	8	2	0	0	48	44	0	0	6	2	0	0	0	0	12	145
Pay Off	(7-29)	0.06																	
			7	2	5	0	0	41	22	0	0	2	5	0	0	0	0	0	8
Monitor	(8-5)	0.50																	
			7	1	1	0	0	17	1	0	0	2	4	0	0	0	1	19	206
Monitor	(6-2)	0.50																	
			16	3	4	2	1	10	14	3	2	4	8	0	0	0	1	189	174
Comite	(6-19)	1.64	21	5	7	5	2	47	2	6	3	6	21	0	0	1	0	109	210
			28	14	11	5	14	126	63	2	4	0	22	0	0	0	1	127	173
Advantage + Comite	(7-1)	0.50 + 1.64																	
			7	0	8	0	4	13	6	0	0	2	6	0	0	0	2	29	235
			14	3	7	1	2	1	28	0	0	3	3		1	1	1	49	291
Nudrin	(7-15)	0.75																	
			7	16	11	0	1	41	4	0	0	17	1	0	1	0	0	20	261
Monitor	(7-22)	0.50																	
			7	5	3	0	0	2	5	0	0	3	4	0	0	0	0	7	234
			14	0	1	0	0	3	0	0	0	9	4	0	0	0	0	29	223
Monitor	(8-5)	0.50																	

Table 11 - (continued)

Treatment[1]	AI/ acre lb.	Days after treatment	Number per 50 D-Vac Samples[3]															
									Lacewings									
			Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
Insecticides[2]			A	N	A	N	A	N	A	L	A	L	A	L	A	L		
Monitor (6-2)	0.50																	
		16	2	3	4	6	12	6	3	0	8	6	1	1	0	2	184	170
Comite (6-19)	1.64	21	3	9	7	18	70	15	1	4	1	11	0	0	1	0	249	127
		28	8	6	9	21	147	71	1	4	0	14	2	0	0	0	186	512
Carzol (7-1)	0.75																	
		7	0	1	0	0	21	16	0	0	1	0	0	0	0	1	17	20
		14	3	8	0	1	34	22	0	0	3	2	0	0	2	3	54	278
		21	20	1	0	0	67	6	0	0	2	3	0	2	4	0	37	120
Monitor (7-22)	0.50																	
		7	4	0	0	0	26	17	0	0	3	7	0	0	1	1	28	75
		14	0	0	0	0	3	2	0	0	1	1	0	0	0	0	26	60
Monitor (8-5)	0.50																	
		7	1	1	0	0	17	1	0	0	2	4	0	0	0	1	19	206

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Plictran and Nudrin were wettable powders 50% and 90%, respectively. Carzol was a 92% soluble powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated in parentheses.

[2] The entire field was treated, prior to the initiation of experimental programs, on June 2 and June 19 for lygus bug and spider mite control, respectively.

[3] 2-25 suck D-Vac samples per treatment on each sampling date.

Table 12 - Predator and parasite populations in seed alfalfa plots treated by aircraft for aphid control. Firebaugh, California, 1981.

Treatment[1]				Number per 50 D-Vac Samples[3]															
										Lacewings									
		AI/ acre	Days after treat-	Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic	
Insecticides		lb.	ment[2]	A	N	A	N	A	N	A	L	A	L	A	L	A	L	wasps	Spiders
			Pre	0	1	1	0	2	1	0	0	1	10	0	2	0	3	9	3
			Pre	7	0	1	1	13	2	0	0	2	4	1	30	2	1	17	3
Thiodan + Nudrin	(8-19)	1.00 + 0.50																	
			6	0	0	0	0	8	1	0	0	0	2	0	4	0	0	12	1
			Pre	5	2	4	4	15	1	0	0	0	10	0	4	2	27	17	6
			Pre	1	2	1	6	6	3	0	0	2	4	0	8	1	1	20	0
Pounce	(8-19)	0.20																	
			6	1	4	0	0	5	2	0	0	0	5	0	1	0	3	6	0
			Pre	3	0	0	0	0	0	0	0	1	3	0	3	2	9	6	4
			Pre	4	1	2	1	12	2	0	0	1	5	0	9	2	10	14	0
Pounce	(8-19)	0.15																	
			6	0	6	1	8	15	16	0	0	1	0	0	0	0	0	10	1
			Pre	0	0	0	0	8	0	0	0	0	3	0	6	2	9	7	3
			Pre	4	2	0	2	17	0	0	0	0	1	2	7	2	0	15	3
Advantage	(8-19)	0.50																	
			6	1	2	1	1	11	2	0	0	0	0	0	1	0	0	11	3

Table 12 - (continued)

Treatment[1]		AI/ acre lb.	Days after treatment[2]	Number per 50 D-Vac Samples[3]															
										Lacewings									
				Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
Insecticides				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
			Pre	1	1	0	0	0	0	0	0	1	9	0	1	0	7	7	4
			Pre	2	2	0	0	0	0	0	0	0	5	0	8	0	2	8	6
Pay Off	(8-19)	0.06	6	4	15	1	4	40	9	0	0	1	3	0	2	0	1	16	2
			Pre	2	0	1	1	7	0	0	0	0	1	0	0	2	8	10	3
			Pre	0	0	0	4	7	2	0	0	3	1	0	6	0	0	5	0
Cymbush	(8-19)	0.12	6	0	2	0	2	30	19	0	0	3	8	0	0	0	1	9	0
			Pre	1	0	0	0	4	0	0	0	0	2	0	2	0	7	4	7
			Pre	0	2	1	2	6	22	2	0	0	1	0	4	2	3	8	1
Thiodan + Nudrin	(7-19)	1.00 + 0.50	6	1	2	0	0	2	1	0	0	0	2	0	0	0	0	10	5

[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin was a 90% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 5:00 a.m. on the dates indicated.

[2] Pretreatment counts were made on August 11 and 18.

[3] 2-25 suck D-Vac samples per treatment on each sampling date.

Table 13 - Stink bug populations in 12 commercial seed alfalfa fields. Fresno County, California, 1981.

Field Number and Location	Variety	Number per 25 ft of row[1]					
		Consperse stink bug			Says stink bug		
		Adult	Nymph	Total	Adult	Nymph	Total
1 Firebaugh[2]	CW-8	0	11	11	1	10	11
2 Firebaugh[2]	Mesa Sirsa	0	1	1	0	0	0
3 Firebaugh[2]	Moapa 69	2	0	2	0	0	0
4 Firebaugh[2]	Peak	1	1	2	0	0	0
5 Five Points[2]	CUF 101	0	2	2	0	0	0
6 Five Points[2]	Moapa 69	0	0	0	0	0	0
7 Five Points[3]	Moapa 69	0	0	0	0	0	0
8 Five Points[3]	Moapa 69	0	0	0	0	0	0
9 San Joaquin[3]	CW-67	0	2	2	0	0	0
10 San Joaquin[3]	Expo-NAPB 74	0	0	0	0	0	0
11 San Joaquin[3]	ARC	0	0	0	0	0	0
12 San Joaquin[3]	CUF 101	0	0	0	0	0	0
Total		3	17	20	1	10	11

[1] Five beating pan samples from each field. Samples were examined in the laboratory after 24-hour berlese funnel separation.

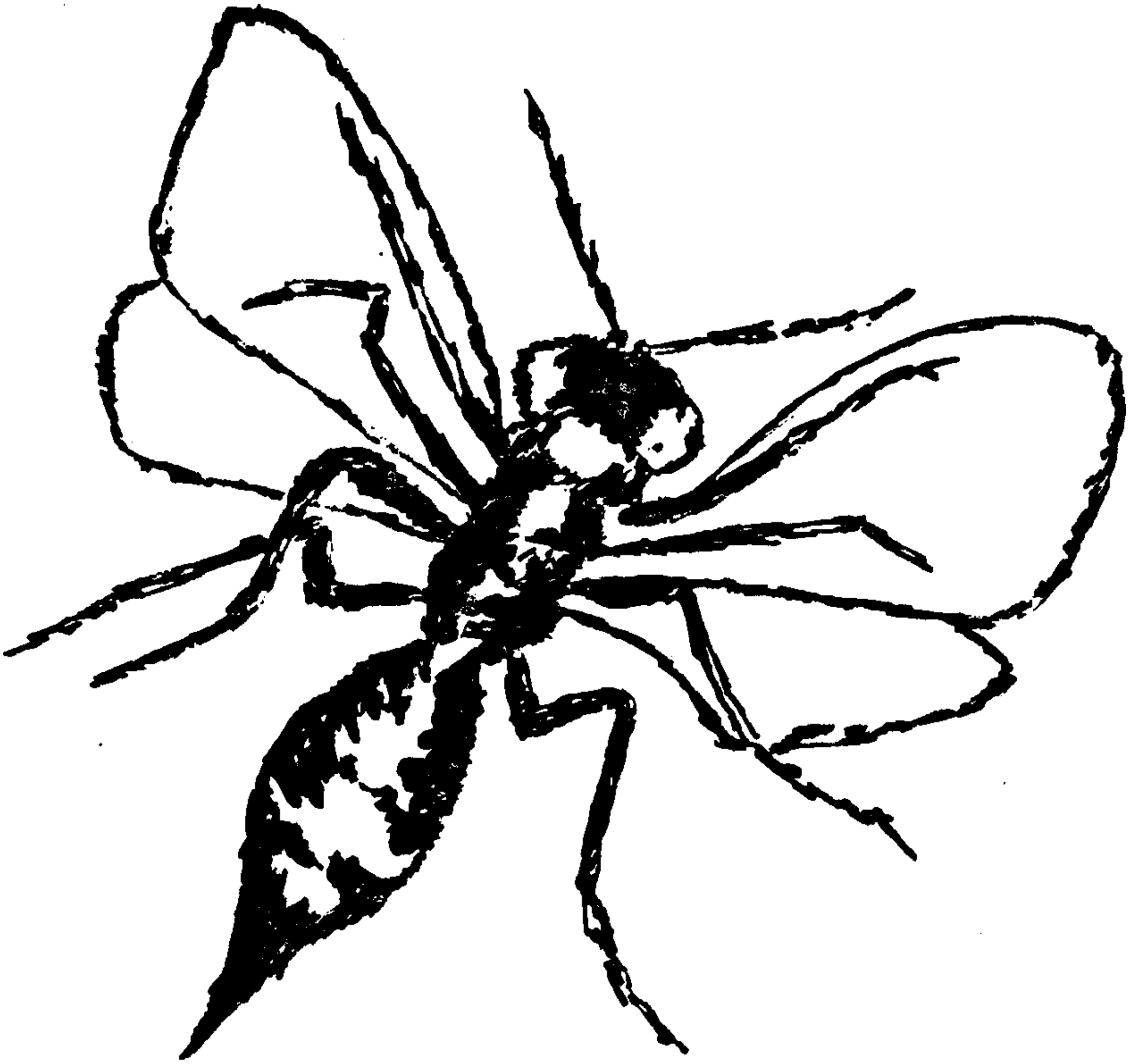
[2] Samples collected July 14, 1981.

[3] Samples collected July 15, 1981.

Table 14 - Percentages of good and defective seeds in samples from 12 commercial seed alfalfa fields surveyed for stink bug damaged seed. Fresno County, California, 1981.

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Firebaugh	CW-8	2953	92.1	1.6	2.4	2.2	0.8	0.9	0.0
2 Firebaugh	Mesa Sirsa	2349	90.8	4.7	3.2	0.4	0.3	0.4	0.2
3 Firebaugh	Moapa 69	2214	92.9	2.4	3.5	0.4	0.2	0.5	0.1
4 Firebaugh	Peak	2878	84.2	2.6	11.7	0.1	0.3	1.1	0.0
--- Average	---	2599	90.0	2.8	5.2	0.8	0.4	0.7	0.1
1 Five Points	CUF 101	2485	88.6	3.8	6.0	0.0	0.3	1.3	0.0
2 Five Points	Moapa 69	2675	93.7	2.5	2.6	0.0	0.2	1.0	0.0
3 Five Points	Moapa 69	3106	93.9	2.3	2.6	0.0	0.6	0.6	0.0
4 Five Points	Moapa 69	2726	93.2	1.3	2.9	0.0	1.8	0.8	0.0
--- Average	---	2748	92.4	2.5	3.5	0.0	0.7	0.9	0.0
1 San Joaquin	CW-67	2915	88.4	5.6	4.5	0.2	0.5	0.6	0.2
2 San Joaquin	Expo-NAPB 74	2802	83.3	11.2	3.7	0.0	0.4	1.4	0.0
3 San Joaquin	ARC	3144	95.4	0.7	3.3	0.0	0.1	0.6	0.0
4 San Joaquin	CUF 101	2483	92.1	1.0	3.2	0.0	0.8	2.9	0.0
--- Average	---	2836	89.8	4.5	3.6	0.1	0.5	1.4	0.1
3 Area Average	---	2728	90.7	3.3	4.1	0.3	0.5	1.0	0.1

[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.



CHALCID

Table 15 - Percentages of good and defective seeds in samples from 51 commercial seed alfalfa fields surveyed for chalcid damaged seed. Fresno County, California, 1981.

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Firebaugh	K-3651	2838	78.5	8.6	9.7	0.6	0.4	1.6	0.6
2 Firebaugh	Williamsburg	2586	86.5	6.2	3.4	0.0	0.4	3.5	0.0
3 Firebaugh	Mesa Sirsa	2349	90.8	4.7	3.2	0.4	0.3	0.4	0.2
4 Firebaugh	---	2490	87.6	4.7	6.2	0.6	0.0	0.7	0.3
5 Firebaugh	Peak	2878	84.2	2.6	11.7	0.1	0.3	1.1	0.0
6 Firebaugh	Moapa 69	2214	92.9	2.4	3.5	0.4	0.2	0.5	0.1
7 Firebaugh	K3-650	2710	94.6	2.1	2.3	0.1	0.2	0.7	0.0
8 Firebaugh	Answer	3148	92.8	1.8	4.3	0.1	0.0	1.0	0.0
9 Firebaugh	CW-8	2953	92.1	1.6	2.4	2.2	0.8	0.9	0.0
10 Firebaugh	Blazer	2448	94.4	1.3	2.5	0.0	0.2	1.0	0.6
11 Firebaugh	K7-706	2445	95.7	0.6	3.3	0.0	0.2	0.2	0.0
--- Average	---	2642	90.0	3.3	4.7	0.4	0.3	1.1	0.2
1 Five Points	Common	3165	82.0	12.0	5.2	0.0	0.1	0.6	0.1
2 Five Points	Classic (C.T.)	3422	85.8	9.4	3.2	0.0	0.4	1.1	0.1
3 Five Points	Moapa 69	2415	91.6	4.4	2.7	0.0	0.6	0.7	0.0
4 Five Points	CUF 101	2485	88.6	3.8	6.0	0.0	0.3	1.2	0.1
5 Five Points	Classic	2942	93.1	3.1	2.3	0.2	0.0	1.0	0.3
6 Five Points	Moapa 69	2675	93.7	2.5	2.6	0.0	0.2	1.0	0.0
7 Five Points	Moapa 69	2892	90.7	2.4	4.7	0.6	1.1	0.5	0.0
8 Five Points	Moapa 69	3106	93.7	2.3	2.6	0.0	0.6	0.6	0.0
9 Five Points	Weevlchek	2850	82.5	1.9	14.2	0.0	0.2	1.2	0.0
10 Five Points	Moapa 69	2726	93.2	1.3	2.9	0.0	1.8	0.8	0.0
11 Five Points	120	2683	94.4	1.0	3.2	0.0	0.8	0.6	0.0
12 Five Points	CW-9	3117	95.5	0.2	2.8	0.3	0.0	0.8	0.4
13 Five Points	Apollo 678	3012	91.2	0.0	7.0	0.5	0.0	1.2	0.1
--- Average	---	2884	90.5	3.4	4.6	0.1	0.5	0.8	0.1

Table 15 - (continued)

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 San Joaquin	CUF 101	2601	71.4	13.0	12.7	0.6	0.2	1.8	0.3
2 San Joaquin	Expo-NAPB 74	2802	83.3	11.2	3.7	0.0	0.4	1.4	0.0
3 San Joaquin	---	2418	82.4	8.7	6.8	0.0	1.0	1.1	0.0
4 San Joaquin	5551	2760	77.1	7.9	13.9	0.1	0.1	0.6	0.3
5 San Joaquin	CUF 101	2895	87.3	6.9	4.5	0.1	0.5	0.7	0.0
6 San Joaquin	Moapa 69	2818	88.2	6.7	3.3	0.3	0.8	0.7	0.0
7 San Joaquin	CW-67	2915	88.4	5.6	4.5	0.2	0.5	0.6	0.2
8 San Joaquin	Vertus	2664	85.3	5.4	4.1	0.0	1.3	3.9	0.0
9 San Joaquin	CW-67	3192	89.0	4.9	4.7	0.3	0.6	0.5	0.0
10 San Joaquin	524	2687	91.0	4.8	2.5	0.1	0.6	1.0	0.0
11 San Joaquin	K3-650	3052	79.8	3.5	15.1	0.0	0.7	0.9	0.0
12 San Joaquin	CW-9	2679	91.4	3.4	3.7	0.0	0.4	1.1	0.0
13 San Joaquin	Expo-NAPB 74	3148	92.6	3.3	2.9	0.0	0.7	0.5	0.0
14 San Joaquin	Trident	2939	91.5	3.0	4.2	0.0	0.3	0.9	0.0
15 San Joaquin	Franken Nev	2743	86.6	2.9	7.8	0.9	0.7	0.9	0.2
16 San Joaquin	NAPB-74	2774	93.4	2.4	2.1	0.1	1.5	0.5	0.0
17 San Joaquin	C-731	2530	92.3	2.4	2.8	0.0	0.4	2.1	0.0
18 San Joaquin	Mesa Sirsa	2978	94.3	2.3	2.2	0.0	0.6	0.6	0.0
19 San Joaquin	CW-9	2312	91.6	2.3	5.6	0.0	0.1	0.3	0.1
20 San Joaquin	ARC	2513	94.1	1.9	3.1	0.0	0.5	0.4	0.0
21 San Joaquin	FM-129	2621	93.6	1.7	3.2	0.5	0.1	0.9	0.0
22 San Joaquin	CW-67	2727	94.0	1.5	3.7	0.0	0.1	0.3	0.4
23 San Joaquin	K-3651	2680	95.4	1.0	3.2	0.0	0.1	0.3	0.0
24 San Joaquin	CUF 101	2483	92.1	1.0	3.2	0.0	0.8	2.9	0.0
25 San Joaquin	ARC	3144	95.4	0.7	3.3	0.0	0.1	0.6	0.0
26 San Joaquin	Vertus	2822	96.7	0.3	2.1	0.0	0.5	0.4	0.0
27 San Joaquin	Classic	2774	97.3	0.0	1.5	0.2	0.4	0.4	0.2
--- Average	---	2766	89.5	4.0	4.8	0.1	0.5	1.0	0.1
3 Area Average	---	2764	90.0	3.6	4.7	0.2	0.4	1.0	0.1

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[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 by 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:

Advantage®
Ammo®
Carzol®
Comite®
Cymbush®
Lorsban®
Monitor®
Nudrin®
Pay Off®
Plictran®
Pounce®
Pydrin®
Thiodan®
UC 55248

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