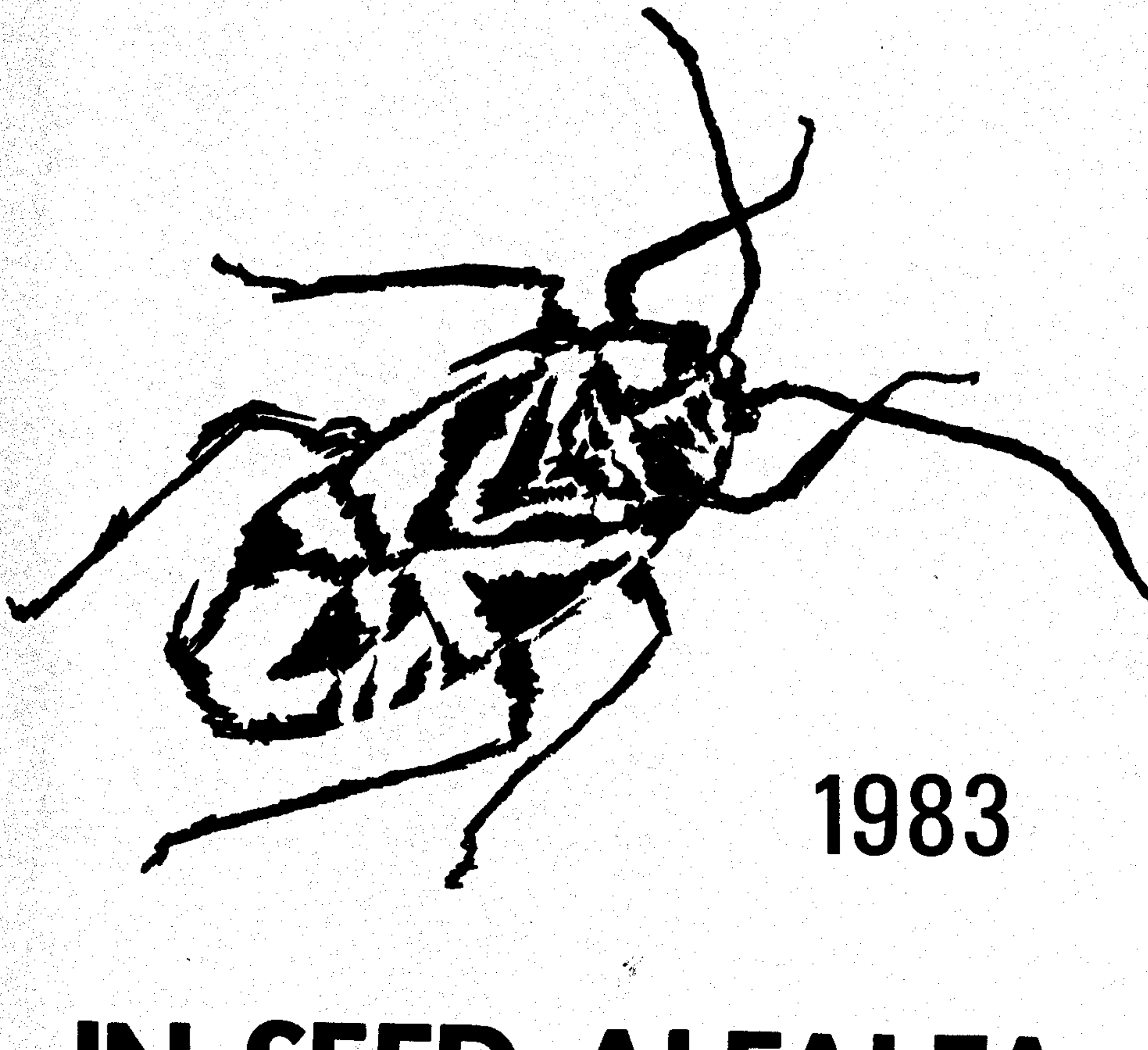
A PROGRESS REPORT OF

Sharon C. Mueller

INSECT STUDY RESULTS



1983

IN SEED ALFALFA

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Research on Insects Affecting

Seed Alfalfa 1983

O. G. Bacon[1], R. H. James[2], W. R. Sheesley[3] and E. T. Natwick[4]

Introduction

Research objectives for 1983 were to 1) continue to investigate the factors involved in the effects of Monitor on the susceptibility of certain alfalfas resistant to the spotted alfalfa aphid, and 2) to evaluate new and currently used insecticides, acaricides and combinations of these materials for control of lygus bugs, aphids and spider mites.

Surveys were conducted in 106 commercial alfalfa seed fields in Fresno and Kings Counties and in 16 fields in Imperial County to ascertain the percentages of seeds damaged by the alfalfa seed chalcid, lygus bugs and stink bugs.

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

Mr. Curtis Powell, a graduate student, continued his research into why certain alfalfa varieties lose their resistance to spotted alfalfa aphid when treated with Monitor insecticide. Two large field experiments were conducted this summer at Davis to investigate this phenomenon. In one experiment, plots

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of K4-120 alfalfa, a variety known to lose its resistance when treated with Monitor, were subjected to one of seven treatments: 1) treated with Monitor and grown for seed; 2) treated with Monitor and grown for hay; 3) not treated and grown for seed; 4) not treated and grown for hay; 5) grown for seed and treated with a mixture of Carzol and Lorsban, a treatment known to kill predators and parasites but not affect spotted alfalfa aphids; 6) treated with Carzol, Lorsban and Monitor; and 7) Monitor treatments interspersed with Carzol treatments. The data collected in this experiment are still being analyzed, but several generalizations can be made thus far: All plots, whether grown for seed or for hay, that were treated with Monitor, either alone or in combination with other insecticides had much higher populations of spotted alfalfa aphids than the plots that were not treated with Monitor. The plot treated with Carzol and Lorsban had no predators or parasites, but the spotted alfalfa populations remained low. This indicates that the destruction of predators or parasites is not a significant factor in causing the spotted alfalfa aphid outbreaks that have been experienced with this variety.

In another experiment performed this summer, 53 varieties of alfalfa were sampled for loss of resistance to spotted alfalfa aphid following Monitor treatment. A similar experiment is being performed in the greenhouse this winter. It is hoped that the data gained from these experiments will enable us to forecast which alfalfa varieties are prone to lose their resistance following Monitor treatment.

The investigation is continuing into the biochemical nature of resistance loss. An attempt is being made to extract phloem sap in order to analyze it for levels of free amino acids. It is hypothesized that Monitor may act by stressing the alfalfa plant, resulting in higher levels of free amino acids in the phloem, the tissue where the spotted alfalfa aphid feeds. Phloem extraction is a difficult procedure, though, and progress has been slow.

Insecticide evaluation experiments

During 1983, 3 separate experiments were conducted in which 10 insecticides, 3 acaricides, 5 insecticide combinations and 4 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 1 and 2. The following insecticides and combinations were evaluated for control of lygus bugs. Pounce® (permethrin), Ammo® (cypermethrin), Carzol® (formetanate), Mavrik® (fluvalinate), Vydate® (oxamyl), Monitor® (methamidophos), Pay Off® (flucythrinate), Larvin® (thiodicarb), Zectran® (mexacarbate), Lorsban® (chlorpyrifos), Vydate + Comite® (propargite), Vydate + Lorsban, Pay Off + Comite, Ammo + Thiodan® (endosulfan), Ammo + Comite, Carzol + Comite + Lorsban, Methomyl + Thiodan, Pounce + Thiodan, Larvin + Thiodan. Comite was included in the combinations to control spider mites. The Ammo + Thiodan, Methomyl + Thiodan, Pounce + Thiodan, and Larvin + Thiodan combinations were applied to control the spotted alfalfa aphid, but were also evaluated for lygus bug control. The materials were all applied as foliar sprays at 10 gallons per acre by aircraft in early morning prior to 5:00 a.m.

The experiment shown in Table 1 represents season-long programs with the various materials to control lygus bugs. The alfalfa variety used in this experiment (Mesa Sirsa) was resistant to the spotted alfalfa aphid. With the exception of Zectran which was applied on June 22, the insecticides were all applied for the first time on June 8 when lygus bug populations ranged from 3.4 to 5.6 bugs per sweep and averaged approximately 4.4. Pounce, Ammo, Pay Off and Mavrik are synthetic pyrethroids that were again being evaluated to determine their effectiveness in controlling lygus bugs and to observe the effects of repeated applications on populations of non-target organisms, both harmful and beneficial.

Pounce was applied at 0.1 and 0.2 lb AI/acre on June 8. Comite was applied to both Pounce treatments at 1.69 lb AI/acre on June 22. The first application of Pounce at 0.1 lb AI/acre resulted in 84% reduction of the lygus bug population 7 days after application and held populations below pretreatment level for 14 days and below a treatment level of 8-10 bugs/sweep for 21 days. The second application (6-29) at the 0.1 lb AI/acre rate resulted in a population reduction of 67% and populations were at the treatment level of 8-10 bugs per sweep 14 days after application. Third and fourth applications (7-13) (7-20) at this rate gave little or no control of lygus bugs.

The first application of Pounce (6-8) at 0.2 lb AI/acre resulted in 85% reduction of the lygus bug population 7 days after application and held populations below pretreatment levels for 28 days and below the treatment level of 8-10 bugs/sweep for 35 days. The second application (7-13) at the 0.2 lb AI/acre rate resulted in a population reduction of only 67% and populations exceeded the treatment level of 8-10 bugs/sweep 14 days after application. Third and fourth applications gave 40% and 74% population reductions, respectively, but were not effective for more than 7 days after application.

In summary, there was little difference between the 0.1 and 0.2 lb AI/acre rates in controlling lygus bugs when population pressures were high, i.e. during late June, July and early August. The effectiveness of the material declined as the season advanced.

The first application of Ammo (6-8) was at 0.1 lb AI/acre. This was followed with an application of Comite (6-22) at 1.69 lb AI/acre. The first application of Ammo resulted in initial lygus bug population reductions of 95% under pretreatment levels 7 days after application and held populations below pretreatment levels for 35 days after application. Because of a pea aphid infestation, Thiodan, 1.0 lb AI/acre was combined with Ammo, 0.1 lb AI/acre for the second application (7-13). This treatment resulted in 96% reduction of the lygus population and held populations within the treatment level of 8-10 bugs/sweep for 21 days. A third application of Ammo at 0.1 lb AI/acre resulted in 94% reduction of the lygus bug population. This program was terminated on August 16, 14 days after the third application, because of drying conditions in the field. At that time the lygus population was below the treatment level of 8-10 bugs/sweep. No additional applications were required for the remainder of the season.

In summary, Ammo appears to be an effective material for lygus bug control at the 0.1 lb AI/acre rate. It would appear that in commercial practice season-long control might be achieved with no more than 3 applications.

Pay Off was applied at 0.08 lb AI/acre 4 times during the season. The first application was made on 6-8, the second on 7-6, the third on 7-27 and the fourth on 8-10. Comite was applied alone on 6-22 and in combination with Pay Off at the fourth application on 8-10 to control spider mites. The first application of Pay Off held lygus bug populations below pretreatment levels for 21 days and below treatment levels of 8-10 bugs/sweep for 28 days. The second application held lygus bug populations below 8-10 bugs per sweep for 21 days. The third and fourth applications resulted in only 46% to 56% population reductions and retreatments were required within 14 days after application.

Mavrik was applied 3 times during the season at 0.15 lb AI/acre. This material was not received in time to be used when initial lygus bug populations required treatment on 6-8, so Carzol at 0.75 lb AI/acre was applied for the first application. Carzol held lygus bug populations below pretreatment levels for 21 days. The first application of Mavrik following Carzol was applied on 6-29. This treatment resulted in a 46% reduction of the lygus bug population 7 days after application and held populations below the treatment level of 8-10 bugs/sweep for 21 days. The second and third applications of Mavrik were made on 7-20 and 8-10 respectively. The application on 7-20 resulted in a 69% reduction of the lygus bug population and held populations below the 8-10 bugs/sweep level for 21 days. The third application resulted in 59% reduction of the lygus bug population 7 days after application and only held the population below the 8-10 bugs/sweep level for 14 days.

Vydate was applied 3 times during the season at 0.50 lb AI/acre per application. The first application was made on 6-8, the second on 7-13 and the third on 7-27. Comite was applied on 6-22 and combined with Vydate on 7-13 at 1.69 lb AI/acre to control spider mites. Lorsban was combined with Vydate on 7-27 at 0.5 lb AI/acre to control a pea aphid infestation. The first application of Vydate resulted in an 85% reduction of the lygus bug population and held the population below the pretreatment level for 21 days. The lygus population remained below the treatment level of 8-10 bugs/sweep for 35 days.

The second application of Vydate controlled lygus bugs for 14 days. The third application was only evaluated for 14 days after treatment. At that time, August 9, the population reduction was 72% under the previous treatment level.

Larvin was first applied (6-8) at 1.0 lb AI/acre. This treatment resulted in 54% reduction of the lygus bug population 7 days after application. Fourteen days after treatment the lygus bug population exceeded the pretreatment level and at 21 days, retreatment was required. The second application of Larvin was applied (6-29) at 0.6 lb AI/acre. This treatment did not control lygus bugs; the population 7 days after application was approximately 75% higher than when the second application was made. Monitor at 0.5 lb AI/acre was applied (7-6) to bring the infestation in this plot under control.

Zectran was applied only once (6-22) at 0.2 lb AI/acre. This treatment did not appear to significantly affect the lygus bugs and the populations increased progressively each week for 3 weeks when the infestation was controlled with an application of Vydate, 1.0 lb AI/acre + Comite 1.64 lb AI/acre. This treatment resulted in 98% reduction of the lygus bug population 7 days after application. Vydate was applied over this plot at a rate of 1.0 lb AI/acre for the purpose of obtaining residue information. This is double the normal rate of 0.5 lb AI/acre.

Monitor was evaluated in 2 programs. In the first, Monitor was applied alone at 0.5 lb AI/acre on 6-8 and 7-13. Comite was applied on 6-22 between the 2 Monitor treatments to control spider mites. The first application of Monitor (6-8) reduced the lygus population 97% 7 days after application. The population remained below pretreatment level for 28 days and did not reach the treatment level of 8-10 bugs/sweep for 35 days. The second application also reduced the lygus bug population 97% 7 days after application and 28 days later the population was still below pretreatment level. This experiment was terminated on August 9 because the crop was maturing and drying. This program required only 2 treatments for lygus bug control for the season.

The second Monitor program was the one followed by the grower on his commercial acreage. The first treatment consisted of Monitor applied alone on 6-9 at 0.5 lb AI/acre. This application reduced the lygus bug population 97% 7 days after application and the population reached pretreatment level 27 days after application.

The second treatment applied by the grower on 7-8 consisted of a combination of Carzol 0.75 lb + Comite 1.69 lb + Lorsban 0.5 lb AI/acre. The Carzol was applied to control lygus bugs, the Comite for spider mites and Lorsban to control pea aphids. This combination reduced the lygus bug population 92% 4 days after application and held the population below treatment level for 25 days after application. The final treatment on 8-5 for the season was a combination of Monitor 0.5 lb + Comite 1.69 lb AI/acre. The lygus population remained below treatment levels for 18 days when field monitoring was terminated on 8-23.

The second experiment, Table 2, was established to evaluate treatments for control of the spotted alfalfa aphid but data were also obtained on the effects of the treatments on lygus bug populations. Sampling was done with the D-Vac sampler.

Of the treatments shown in Table 2, Ammo 0.1 lb AI/acre and Ammo 0.1 lb AI/Acre + Thiodan 1.0 lb AI/acre reduced lygus bug populations 97% under pretreatment levels and provided effective control for 14 to 21 days. Mavrik 0.15 lb AI/acre and Pounce 0.2 lb AI/acre reduced lygus bug populations 91% under pretreatment levels and resulted in control for approximately 14 days.

Methomyl 0.5 + Thiodan 1.0 lb AI/acre and Pounce 0.1 lb AI/acre + Thiodan 1.0 lb AI/acre reduced lygus bug populations approximately 84% and controlled lygus bugs for 14 days.

<u>Lygus bug study in Imperial County</u>

During 1983 lygus bug populations were monitored at weekly intervals in six alfalfa seed fields in Imperial County. This was a joint effort in which

Pest Control Advisors and growers were provided with population data and they in return provided information on insecticide treatments in the respective fields. When the fields were mature, four 2-quart samples of seed pods were hand stripped from plants in each field prior to commercial harvest. Samples were hand threshed and lightly cleaned in a clipper seed cleaner. Four sub-samples of seeds were examined from each of the threshed 2-quart samples, an average of 1787 seeds were examined per field. The seeds were examined for seed chalcid damage, lygus bug and stink bug injury and for water damaged, green and shriveled seeds. The results are presented in Table 3. Five different insecticides (applied separately) and 5 insecticide combinations were reported as having been used. The insecticides were Malathion®, Monitor®, Di-Syston®, Carzol®, and Phosdrin®. The combinations were Carzol + Thiodan, Malathion + Parathion + Methyl Parathion, Monitor + Methyl Parathion, Methyl Parathion + Phosdrin, and Supracide + Carzol. The number of insecticide applications per individual field ranged from 2 to 5.

In examining the data in Table 3 it appears that the treatments were generally effective for approximately 14 days. Exceptions were noted in Field #2 where a hatch of nymphs occurred within 4 to 8 days following applications of Methyl Parathion combined with either Monitor or Phosdrin. An application of Malathion (7-29) did not significantly reduce the lygus bug population although a later application (8-4) was effective for about 8 days. In Field #5 an application of Di-Syston 15G, 6.5 lb AI/acre, did not control lygus bugs and Phosdrin alone at 0.5 lb AI/acre did not substantially reduce the lygus bug population.

Depending upon the individual field, treatment intervals generally ranged from 8 to 28 days. Conditions varied among the fields but generally lygus populations exceeded treatment levels of 8-10 bugs/sweep 14 to 20 days after application. Some high counts were recorded, i.e. 24, 17, 36, 22, 21, 28, 57, and 48 bugs per sweep. Large numbers of adults in many instances accounted for the high counts and apparently resulted from the mass movements of individuals from cut hay fields to nearby seed fields.

An analysis of seeds from the various fields, with the exception of two fields, showed moderate percentages of lygus bug damaged seed. The percentages of lygus bug damaged seed for the six fields were 1.2, 10.4, 3.8, 5.0, 2.9 and 10.5. The overall average percentage of lygus damaged seed for the 6 fields was 5.6. Percentages of seeds damaged by the seed chalcid for the 6 fields were 0.4, 9.5, 3.0, 1.0, 1.2 and 2.0. The overall average of chalcid damaged seeds for the 6 fields was 2.9%

Yields of clean seed from these fields ranged from 124 lbs/acre to 482 lbs/acre. There did not appear to be any strong correlation between yields and observed insect populations in these fields. Although insect damage probably contributed to yield reductions, it appeared that other factors were major contributors to the yield differences.

Hand stripped seed samples were taken prior to harvest from 9 additional seed fields in Imperial County. Percentages of lygus bug damaged seeds in these fields ranged from 1.8 to 25.7 and averaged 6.9. The number of insecticide applications in these fields ranged from 2 to 8 and averaged 4. Seed yields from these fields ranged from 79 to 625 lbs of cleaned seed per acre and averaged 419. Three of the low yielding fields (79, 124 and 337 lbs of seed/acre) had high percentages of lygus bug damaged seed (25.7%, 10.4%, and 10.5%, respectively), but the data would indicate that it was likely that other factors were also responsible for the low yields in these fields.

Aphids

Data on control of aphids were obtained for all materials evaluated for lygus bug control. In the full season lygus bug control experiment, Table 4, the variety of alfalfa was Mesa Sirsa, highly resistant to the spotted alfalfa aphid (SAA), but susceptible to the pea aphid. Although occasional SAA were taken in samples, populations of this species did not develop in any of the experimental plots. However, pea aphid populations were generally prevalent throughout the experimental area. Following the first application of the experimental insecticides for lygus bug control on 6-8, pea aphid populations increased in all the treatments through July 12. Certain of the treatments had much higher populations than others. Those in which very high populations occurred were Vydate, Pounce, Ammo and Larvin. With the exception of Larvin, 35 days elapsed between the first and second applications of these materials for lygus bug control. The severe increase in pea aphids occurred beginning 28 days after the first application of these chemicals and reached high levels 35 days after treating. The long intervals between applications was probably responsible for the high pea aphid populations. Pounce, Ammo and Vydate effectively reduced pea aphid populations when the second application was made for lygus bug control.

Pea aphid populations were lowest in the plots treated with Pay Off and Zectran. Monitor, Lorsban and Mavrik were also effective in controlling the pea aphid.

One experiment was conducted to specifically evaluate aphicides. The alfalfa variety used in this experiment was La Rocca, highly susceptible to SAA. This experiment was begun on July 26 when moderate populations of SAA were present. The results of this experiment are presented in Table 5. The aphicides evaluated were Ammo 0.1 lb AI/acre, Ammo 0.1 + Thiodan 1.0 lb AI/acre, Mavrik 0.15 lb AI/acre, Pounce 0.1 lb AI/acre, Pounce 0.1 + Thiodan 1.0 lb AI/acre, Pounce 0.2 lb AI/acre, Methomyl 0.5 + Thiodan 1.0 lb AI/acre, Larvin 0.6 + Thiodan 1.0 lb AI/acre and Thiodan 1.0 lb AI/acre. Methomyl + Thiodan was the standard treatment against which the other materials were compared. It was also the treatment used by the grower to control the SAA infestation in the field outside of the experiments.

In this experiment Methomyl + Thiodan appeared to be the most effective of the materials tested for control of SAA. This combination was applied twice in the experimental series, July 27 and August 17. Seven days after the July 27 application SAA populations were 97% below pretreatment levels. In the grower program and where the combination was used to retreat plots where the experimental chemicals failed to control the SAA, the percent reductions under pretreatment levels ranged from 92 to 97% 7 days after application and, although SAA populations again increased, they remained within tolerable levels for 21 days.

Pounce 0.2 lb AI/acre was applied 3 times, July 27, August 10 and August 24. The first application reduced the SAA population 93% under pretreatment level. At 14 days the population was 33% under pretreatment level but required retreatment. The second application of Pounce 0.2 lb AI/acre reduced the SAA population 67% and thereafter the population continued downward. A third application on August 24 reduced the SAA population 91%.

Pounce at 0.1 lb AI/acre was applied once in the experiment on July 27. This treatment only reduced the SAA population 53% under pretreatment level and the population exceeded the pretreatment level by 10-fold 14 days after the application. Pounce 0.1 lb + Thiodan 1.0 lb AI/acre was applied twice on July 27 and August 17. This combination was more effective than Pounce at 0.1 lb AI/acre alone. The combination reduced the SAA population 94% under pretreatment level 7 days after application. However, the population exceeded the pretreatment level 14 days after application and was retreated

21 days after application. The second application was more effective than the first reducing the population 96%, and it continued to hold at this level for 14 days after application.

Ammo at 0.1 lb AI/acre was applied once on July 27. This material reduced the SAA population approximately 74% under pretreatment levels but the population increased rapidly and was approximately double the pretreatment level 14 days after application.

Ammo 0.1 + Thiodan 1.0 lb AI/acre was applied twice on July 27 and August 17. The first application reduced the SAA population 92% under pretreatment level 7 days after application. The population equalled the pretreatment level 14 days after application and was approximately 5 times that of the pretreatment level 21 days after application. The second application of the Ammo-Thiodan combination on August 17 reduced the SAA population 93% 7 days after application and the population was still 68% below pretreatment level 14 days after this application.

Mavrik 0.15 lb AI/acre was applied 3 times, July 27, August 10 and August 24. SAA populations were reduced 71 and 74% under pretreatment levels 7 days after treatment with the first and second applications respectively. Populations exceeded pretreatment levels 14 days after application and required retreatment.

Larvin 0.6 + Thiodan 1.0 lb AI/acre was applied once on July 27. This combination reduced the SAA population only 30% under pretreatment level 7 days after application and the population exceeded the pretreatment level approximately 15-fold 14 days after application. Thiodan 1.0 lb AI/acre applied alone on August 10 reduced the SAA population only 5% 7 days after application.

In summary, the Methomyl + Thiodan combination and Pounce 0.2 lb AI/acre were the only materials that effectively controlled the SAA. The combining of Thiodan with Pounce and Ammo resulted in better control of SAA than either Pounce or Ammo alone. Thiodan alone resulted in virtually no control of the SAA.

Pea aphid populations were controlled with all of the aphicides evaluated in this experiment. Initial population reductions 7 days after application ranged from 95 to 100% and all the insecticides were effective for 14 to 21 days after application.

Spider Mites

Five compounds were evaluated in 1983 for control of spider mites on seed alfalfa. These materials were Carzol®, Mitac®, Zectran®, Comite®, and Monitor®. Data on acaricides were obtained in two experiments. The first, Table 6, involved season-long trials with insecticides for lygus bug control. Many of the insecticides used in this experiment were synthetic pyrethroid compounds. 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 pyrethroids.

The first application of all insecticides in the season-long lygus bug control experiment was made on 6-8. Spider mite populations were monitored in pretreatment samples and at 7 and 14 days after the insecticides were applied. On June 22, 15 days after the first insecticide application, Comite 1.69 lb AI/acre was applied to the plots treated with Vydate, Pounce 0.1 lb AI/acre, Pounce 0.2 lb AI/acre, Pay Off, Ammo, Larvin and Monitor. The data presented in Table 6 show that with the exception of the Monitor treatment, populations of active mites and and eggs greatly increased during the 14 day period after application of the insecticides. Those treatments with the highest spider mite population increases (active mites and eggs) over the 14 day period were Larvin 7.5X, Ammo 7.5X, Pay Off, 6.4X, Pounce 0.2 lb AI/acre 4.0X, Carzol 3.4X, and Pounce 0.1 lb AI/acre 2.1X. There was only a slight increase of 6% to 8% in the spider mite population in plots treated with Monitor and a 34% increase in the plot treated with Vydate.

Mavrik was applied for the first time on 6-29 following Carzol. Seven days after the application of Mavrik active spider mite and egg populations were reduced 85 and 88% respectively. However, the reduction was short-lived for mite and egg populations increased 3-fold 14 days after Mavrik was applied and approximately 6-fold 21 days after application. Comite applied later, either in combination with a lygacide or separately, resulted in significant mite and egg population reductions. Both active mite and egg populations were reduced within 7 days after application of Comite, but maximum reductions occurred at about 14 days after application.

In a second experiment, Table 7, Mitac 1.00 lb AI/acre, Zectran 0.2 lb AI/acre, and Comite 1.69 lb AI/acre were evaluated. The acaricides were applied on 6-22 and the plots were sampled each week for 3 weeks after treatment. None of the treatments were effective in reducing the spider mite population. An application of either Monitor 0.5 + Comite 1.69 lb AI/acre or Vydate 1.0 + Comite 1.69 lb AI/acre on 7-13 over these treatments significantly reduced but did not eliminate the spider mite population.

The remainder of the field had been treated commercially on 6-9 with Monitor 0.5 lb AI/acre. Spider mite populations were apparently suppressed by this treatment for there were no increases in active mites and only modest increases in eggs over a 28 day period. The Monitor treatment was followed by a Carzol + Comite + Lorsban combination on 7-8. The mite population was under control 11 days after this application.

Over the past two years we have observed instances of poor control of spider mites with Comite. We may be seeing the selection of populations resistant to Comite.

Effects of Insecticides on Predatory and Parasitic Species

Data were obtained in the full season experiment for lygus bug control and in the experiment for control of SAA on the effects of the various insecticides on the following group of predatory and parasitic organisms: *Geocoris* (big-eyed bugs), *Nabis* (damsel bugs), *Orius* (minute pirate bugs), lacewings, lady beetles, collops beetles, parasitic wasps and spiders. Unfortunately, it was not possible to obtain pretreatment counts of predatory and parasitic species before the insecticides were applied in the lygus bug control experiment, Table 8. However, samples were taken 7 days after the first applications were made and at weekly intervals thereafter throughout the season. There appear to be differences in the effects of the various insecticides on the complex of beneficial species in this experiment. As will be seen in Table 8, of the predatory insect species the minute pirate bug, *Orius*, was the most abundant. The next most abundant species were *Nabis* and *Geocoris*. Parasitic wasps and spiders were also present in moderate numbers. Populations of lacewings, lady beetles and collops beetles were very low.

Larvin and the synthetic pyrethroids, Mavrik and Pay Off, appeared to have the least damaging effect on *Orius*, parasitic wasps and spiders. Populations of *Geocoris*, *Orius* and *Nabis* survived the first application of Pounce and Ammo but repeated applications of these pyrethroids severely reduced populations of these predatory species. Pounce at 0.2 lb AI/acre was more lethal to the predators than Pounce at 0.1 lb AI/acre. The first application of Vydate did not appear to severely affect populations of *Orius*, parasitic wasps and spiders. However, the second application severely reduced populations of these beneficial species.

Monitor and Zectran appeared to have a strong adverse impact in reducing the complex of predatory insects; however, spiders appeared to be less affected by Monitor than by the other materials.

It is difficult to evaluate the impact of the insecticides used in the SAA control experiment on predatory and parasitic insect populations, Table 9, because the field had been treated twice commercially for lygus bug control before the aphid control experiment was begun. Surviving Orius populations were more numerous than other predaceous insects. It appeared that Mavrik had the least adverse effect on the Orius population. Orius continued to survive in low numbers at about equal levels in the other treatments for control of SAA. However, overall the beneficial insect populations were devastated.

Stink Bug

Stink bug populations were measured on July 12 and 13 in 4 alfalfa seed fields near Firebaugh, in 4 fields in the San Joaquin area and in 4 fields near Five Points. Thus a total of 12 fields were surveyed in 1983. 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 10. The populations were very low. Stink bugs occurred in 6 fields but only a total of 43 individuals were found in the survey of which 38 were nymphs. Of the total, 33 were Says' stink bugs and 10 were consperse stink bugs. Populations in infested fields numbered 2, 3, 33, 1, 1 and 3 per 25 feet of row. The largest number of infested fields and stink bugs were found in the Firebaugh area.

Seed samples were hand stripped from each of the 12 fields included in the stink bug survey. The results of the survey are shown in Table 11. The percentages of good seeds in these fields ranged from 85.5 to 95.7. The percentages of seeds with damage attributed to stink bug ranged from 0.0 to 0.7 and averaged 0.2 for the 3 areas.

The Alfalfa Seed Chalcid

Surveys were conducted in eight areas -- Firebaugh, Mendota, Coalinga, Tranquility, San Joaquin, Five Points, Corcoran and Imperial County to evaluate alfalfa seed chalcid infestations. Samples of seed pods were hand stripped before commercial harvest from 121 fields, 5 in the Firebaugh area, 9 from Mendota, 2 from Coalinga, 10 from Tranquility, 33 near San Joaquin, 28 from the Five Points area, 19 from the Corcoran area and 15 from Imperial County. Four two quart samples of seed pods were taken from each field. The seeds were hand threshed and lightly cleaned in a clipper seed cleaner. An average of 1500 to 1800 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 12. Seed chalcid injury was generally low and in the Firebaugh, Five Points, and San Joaquin areas was lower overall than in 1982. The percentages of chalcid damaged seeds in individual fields ranged from 0 to 9.5. Only 5 fields out of the 121 sustained chalcid damage levels of more than 6%. Overall seed chalcid damage for the Firebaugh area averaged 1.7%, for Mendota 1.6%, for Tranquility 0.5%, for San Joaquin 1.4%, for Five Points 1.1%, for Coalinga 1.6%, for Corcoran 1.2% and for Imperial County 1.8%. Seed chalcid damage for the eight areas averaged 1.4%. The percentages of chalcid damaged seed for the Firebaugh, San Joaquin and Five Points areas for the years 1976 through 1983 are shown graphically in Fig. 1.

Seeds from individual fields showing lygus bug injury ranged from 1.0 to 36.8%. Although Imperial County had the largest number of fields showing high lygus damage, the field with the highest percentage of lygus damaged seed was

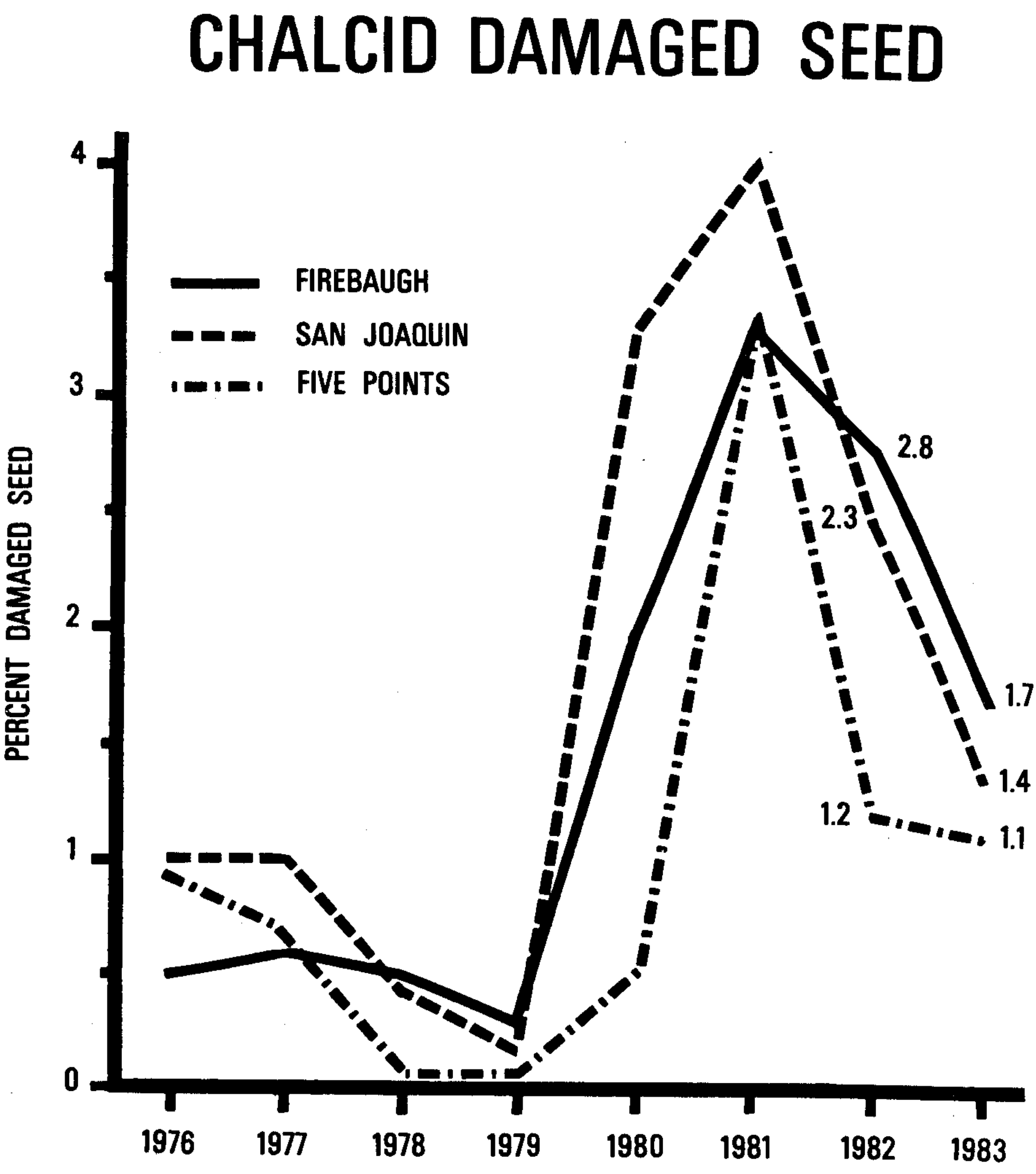

Fig. 1. Percentages of chalcid damaged seed from hand stripped samples taken from commercial alfalfa seed fields in the Firebaugh, San Joaquin and Five Points areas from 1976 to 1983.

in the Five Points Area. In Imperial County damage in 4 of the 15 fields ranged from 10.4 to 25.7%. Overall percentage of lygus damaged seed from Imperial County averaged 6.0% in the 15 fields surveyed. This represents a 50% reduction in lygus damaged seed in Imperial County from that observed in 1982.

In general the percentages of seeds showing lygus bug damage were lower in the San Joaquin Valley in 1983 than in 1982, but were slightly higher than in 1981. In the Firebaugh, San Joaquin and Five Points areas overall percentages of seeds damaged by lygus bugs in 1983 were 5.6, 5.5 and 5.4 respectively. These percentages compare with 9.4, 9.4 and 5.4 for 1982 and with 4.7, 4.7 and 4.6 for 1981.

Summary and Conclusions

During 1983, 3 separate experiments were conducted in which 10 insecticides, 3 acaricides, 5 insecticide combinations and 4 insecticide-acaricide combinations were evaluated for control of lygus bugs, the spotted alfalfa aphid, the pea aphid and spider mites. In season-long trials the most effective materials evaluated for lygus bug control were Monitor and Ammo. Applications of Monitor at 0.5 lb AI/acre controlled lygus bugs for periods ranging from 21 to 35 days. Early season applications of Monitor resulted in the longest residual control but, in mid season, populations were held below treatment levels for 21 days after application. A season-long program in the insecticide evaluation experiments of 2 applications of Monitor on 6-8 and 7-13 interspersed with an application of Comite on 6-22 provided full season control of lygus bugs, spider mites and pea aphids.

In commercial practice the grower whose field was used in the experiment applied Monitor 0.5 lb AI/acre (6-9) before honey bees were introduced. This treatment controlled lygus bugs for 27 days. The second application, on 7-8 during peak bloom and seed set, was a combination of Carzol 0.75 lb AI/acre + Comite 1.69 lb AI/acre + Lorsban 0.5 lb AI/acre. This treatment controlled lygus bugs, spider mites and pea aphids for 25 days. The third and final grower treatment on 8-5 consisted of Monitor 0.5 lb AI/acre + Comite 1.69 lb AI/acre. This program was highly effective and resulted in a total of three insecticide applications to control the pest complex in a variety of seed alfalfa that was highly resistant to the SAA.

Ammo at 0.1 lb AI/acre was about as effective as Monitor for lygus bug control. Ammo is not currently registered on seed alfalfa but if it were to be used, it would appear that season-long control might be achieved with no more than 3 applications. An effective acaricide should be included with this material.

Vydate at 0.5 lb AI/acre resulted in lygus bug control for 14 to 21 days. Pounce controlled lygus bug populations more effectively in early season applications than in mid to late season applications. The latter controlled lygus bug populations for 7 to 14 days. There was little difference in lygus bug control resulting from rates of 0.1 and 0.2 lb AI/acre of Pounce when population pressures were high, i.e. during late June, July, and early August. Pay Off and Mavrik controlled lygus bugs for 14 to 21 days. Larvin and Zectran were the least effective of the materials evaluated for lygus bug control.

Of the insecticides evaluated specifically for control of the spotted alfalfa aphid on La Rocca, a highly susceptible alfalfa variety, the most effective materials were Methomyl + Thiodan and Pounce alone at 0.2 lb AI/acre. Pounce at 0.1 lb AI/acre did not effectively control SAA. Ammo at 0.1 lb AI/acre likewise was not effective in controlling SAA. The combining of Thiodan with Pounce and Ammo resulted in better control of SAA than either Pounce or Ammo alone. Thiodan alone resulted in virtually no control of the

SAA. There appears to be a synergistic effect resulting from the combination of Methomyl, Pounce and Ammo with Thiodan, the mechanism of which is unexplained, but the results are real. A Larvin + Thiodan combination was the least effective of the materials evaluated for control of SAA.

Five compounds were evaluated in 1983 for control of spider mites in seed alfalfa. These materials were Carzol, Monitor, Comite, Mitac and Zectran. Comite is the only one of these materials presently registered for use on seed alfalfa. In the full season lygus control experiment Comite, either combined with the insecticides or applied alone, resulted in good control of spider mites. The effect of Comite in reducing spider mite populations was not immediate. Maximum population reductions occurred approximately 14 days after application. Carzol had little effect in reducing mite populations, in fact populations increased progressively following Carzol application. Monitor, on the other hand, although not controlling spider mites, appeared to have a suppressing effect on the populations.

In the acaricide trial, Comite, Mitac and Zectran were evaluated. None of these materials gave good control of the mites. Over the past two years we have observed that Comite does not eliminate the spider mite populations and in certain situations control has been poor. We may be observing the selection of spider mite poulations that are resistant to Comite.

Stink bug populations were measured in 12 alfalfa seed fields in West Fresno County. Stink bugs occurred in six fields. Populations were very low and in infested fields ranged from 1 to 33 bugs per 25 feet of row. Percentages of seeds with damage attributed to stink bugs averaged 0.2.

Damage by the seed chalcid was assessed in 106 fields in the San Joaquin Valley and in 15 fields in Imperial County in 1983. Seeds damaged by the seed chalcid were generally low and the amount of damage in West Fresno County fields was lower overall than in 1982. The percentages of chalcid damaged seeds in individual fields in the San Joaquin Valley ranged from 0 to 7.7. In the Imperial Valley the range was from 0.4 to 9.5. The overall average percentage of chalcid damaged seeds in the San Joaquin Valley was 1.3 and in the Imperial Valley was 1.8.

Table 1 - Lygus bug populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1983.

Treatment[1] Insecticides[2]		AI/ acre lb.	Days after treatment	Number of lygus bugs per sweep[3] Adults	Nymphs Small	Medium	Large	Total	Adults + Nymphs	% Reduct.
			Pre	1.1	1.2	1.1	1.1	3.4	4.5	
Pounce	(6-8)	0.10								
			7	0.2	0.0	0.2	0.3	0.5	0.7	84.4
			14	1.3	0.6	0.4	0.7	1.7	3.0	33.3
Comite	(6-22)	1.69								
			21	1.5	0.2	1.5	2.2	3.9	5.4	0.0
Pounce	(6-29)	0.10								
			7	0.9	0.4	0.1	0.4	0.9	1.8	66.7
			14	2.2	2.9	2.6	0.9	6.4	8.6	0.0
Pounce	(7-13)	0.10								
			7	0.3	0.8	1.9	4.8	7.5	7.8	9.3
Pounce	(7-20)	0.10								
			7	2.4	2.0	3.0	3.7	8.7	11.1	0.0
Monitor	(7-27)	0.50								
			7	1.0	0.0	0.1	0.3	0.4	1.4	87.4
			14	0.2	0.1	0.0	0.0	0.1	0.3	97.3
Comite	(8-10)	1.69								
			21	0.1	0.2	0.2	0.4	0.8	0.9	91.9
			Pre	0.7	1.0	1.9	1.2	4.1	4.8	
Pounce	(6-8)	0.20								
			7	0.2	0.0	0.2	0.3	0.5	0.7	85.4
			14	1.3	0.6	0.4	0.7	1.7	3.0	37.5
Comite	(6-22)	1.69								
			21	0.9	0.0	0.3	0.9	1.2	2.1	56.3
			28	2.4	0.5	0.5	0.4	1.4	3.8	20.8
			35	1.0	2.0	2.4	0.9	5.3	6.3	0.0
Pounce	(7-13)	0.20								
			7	0.6	0.1	0.4	1.0	1.5	2.1	66.7
			14	3.2	4.3	5.3	2.7	12.3	15.5	0.0
Pounce	(7-27)	0.20								
			7	2.4	0.1	1.2	5.6	6.9	9.3	40.0
Pounce	(8-3)	0.20								
			7	1.5	0.4	0.3	0.2	0.9	2.4	74.2
Monitor	(8-10)	0.50								

Pounce evaluation terminated with Monitor treatment to protect crop for remainder of season.

Table 1 - (continued)

Treatment[1] Insecticides[2]		AI/ acre lb.	Days after treatment	Number of lygus bugs per sweep[3] Adults	Nymphs Small	Medium	Large	Total	Adults + Nymphs	% Reduct.
			Pre	0.6	0.7	2.0	2.3	5.0	5.6	
Ammo	(6-8)	0.10								
			7	0.0	0.0	0.2	0.1	0.3	0.3	94.6
			14	0.3	0.3	0.1	0.4	0.8	1.1	80.4
Comite	(6-22)	1.69								
			21	0.5	0.1	0.3	0.6	1.0	1.5	73.2
			28	1.1	0.1	0.4	1.0	1.5	2.6	53.6
			35	1.1	1.6	1.4	0.7	3.7	4.8	14.3
Ammo + Thiodan	(7-13)	0.10 + 1.00								
			7	0.0	0.0	0.1	0.1	0.2	0.2	95.8
			14	0.1	1.5	1.3	0.2	3.0	3.1	35.4
			21	1.1	0.8	4.0	4.2	9.0	10.1	0.0
Ammo	(8-3)	0.10								
			7	0.2	0.1	0.1	0.2	0.4	0.6	94.1
Comite	(8-10)	1.69								
			14	0.2	0.6	1.3	0.9	2.8	3.0	70.3
			Pre	1.2	0.8	1.5	1.9	4.2	5.4	
Pay Off	(6-8)	0.08								
			7	0.0	0.1	0.1	0.1	0.3	0.3	94.4
			14	0.3	0.1	0.1	0.3	0.5	0.8	85.2
Comite	(6-22)	1.69								
			21	1.0	0.1	1.2	1.0	2.3	3.3	38.9
			28	3.2	1.8	0.8	0.8	3.4	6.6	0.0
Pay Off	(7-6)	0.08								
			7	0.2	0.7	0.7	0.5	1.9	2.1	68.2
			14	0.4	0.4	1.2	2.0	3.6	4.0	39.4
			21	2.3	0.7	2.7	2.5	5.9	8.2	0.0
Pay Off	(7-27)	0.08								
			7	1.6	0.8	0.8	1.2	2.8	4.4	46.3
			14	1.2	1.6	5.0	2.9	9.5	10.7	0.0
Pay Off + Comite	(8-10)	0.08 + 1.69								
			7	0.3	0.4	0.8	3.2	4.4	4.7	56.1
			14	3.8	2.4	5.4	1.7	9.5	13.3	0.0

Table 1 - (continued)

Treatment[1] Insecticides[2]		AI/ acre lb.	Days after treat- ment	Number of lygus bugs per sweep[3] Adults	Nymphs Small	Medium	Large	Total	Adults + Nymphs	% Reduct.
			Pre	0.5	1.2	1.5	1.1	3.8	4.3	
Carzol	(6-8)	0.75								
			7	0.5	0.0	0.1	0.3	0.4	0.9	79.07
			14	1.2	0.4	0.3	0.2	0.9	2.1	57.2
			21	1.7	0.2	0.9	1.1	2.2	3.9	9.3
Mavrik	(6-29)	0.15								
			7	0.5	0.2	0.5	0.9	1.6	2.1	46.15
			14	0.5	0.7	1.0	1.4	3.1	3.6	7.7
			21	1.7	0.7	1.9	1.9	4.5	6.2	0.0
Mavrik	(7-20)	0.15								
			7	0.6	0.1	0.6	0.6	1.3	1.9	69.35
Comite	(7-27)	1.69								
			14	1.5	0.8	2.2	1.1	4.1	5.6	9.68
			21	2.5	1.3	2.8	3.2	7.3	9.8	0.0
Mavrik	(8-10)	0.15								
			7	0.6	0.7	1.2	1.5	3.4	4.0	59.18
			14	1.8	2.6	3.2	3.0	8.8	10.6	0.0
			Pre	0.3	0.6	1.5	1.0	3.1	3.4	
Vydate	(6-8)	0.50								
			7	0.4	0.0	0.0	0.1	0.1	0.5	85.3
			14	0.3	0.3	0.1	0.1	0.5	0.8	76.5
Comite	(6-22)	1.69								
			21	0.4	0.2	0.4	0.6	1.2	1.6	52.9
			28	1.1	1.8	1.4	0.6	3.8	4.9	0.0
			35	0.8	1.7	2.0	1.5	5.2	6.0	0.0
Vydate + Comite	(7-13)	0.50 + 1.69								
			7	1.0	0.0	0.0	0.4	0.4	1.4	76.7
			14	0.2	1.9	2.5	0.8	5.2	5.4	10.0
Vydate + Lorsban	(7-27)	0.50 + 0.50								
			7	0.2	0.0	0.0	0.5	0.5	0.7	87.0
			14	0.4	0.2	0.5	0.4	1.1	1.5	72.2

Table 1 - (continued)

Treatment[1] Insecticides[2]		AI/ acre lb.	Days after treat-ment	Number of lygus bugs per sweep[3] Adults	Nymphs Small	Medium	Large	Total	Adults + Nymphs	% Reduct.
			Pre	0.9	1.1	1.4	1.2	3.7	4.6	
Larvin	(6-8)	1.00								
			7	0.8	0.2	0.6	0.5	1.3	2.1	54.3
			14	2.4	0.5	1.0	1.2	2.7	5.1	0.0
Comite	(6-22)	1.69								
			21	3.5	0.6	2.3	3.1	6.0	9.5	0.0
Larvin	(6-29)	0.60								
			7	3.2	1.9	3.9	5.7	11.5	14.7	0.0
Monitor	(7-6)	0.50								
			7	0.4	0.0	0.0	0.4	0.4	0.8	94.6
			14	0.1	0.0	0.0	0.1	0.1	0.2	98.6
			21	0.2	0.1	0.4	0.1	0.6	0.8	94.6
Lorsban	(7-27)	0.50								
			28	0.5	0.5	0.1	0.1	0.7	1.2	91.8
			35	0.3	0.2	0.6	2.5	3.3	3.6	75.5
Comite	(8-10)	1.69								
			42	1.0	0.3	0.8	1.8	2.9	3.9	73.5
			48	5.0	0.8	5.6	3.0	9.4	14.4	0.0
			Pre	0.6	0.4	0.2	0.0	0.6	1.2	
Zectran	(6-22)	0.20								
			7	0.2	0.4	0.5	0.4	1.3	1.5	0.0
			14	1.2	1.8	7.2	0.9	9.9	11.1	0.0
			21	1.7	3.9	12.8	10.5	27.2	28.9	0.0
Vydate + Comite	(7-13)	1.00 + 1.64								
			7	0.4	0.0	0.0	0.1	0.1	0.5	98.3
			Pre	0.5	0.8	1.7	0.7	3.2	3.7	
Monitor	(6-8)	0.50								
			7	0.1	0.0	0.0	0.0	0.0	0.1	97.3
			14	0.3	0.3	0.2	0.0	0.5	0.8	78.5
Comite	(6-22)	1.69								
			21	0.2	0.1	0.4	0.6	1.1	1.3	64.9
			28	1.3	0.7	0.5	0.4	1.6	2.9	21.6
			35	0.6	1.7	1.6	1.8	5.1	5.7	0.0
Monitor	(7-13)	0.50								
			7	0.2	0.0	0.0	0.0	0.0	0.2	96.5
			14	0.5	0.7	0.3	0.0	1.0	1.5	73.4
			21	0.2	0.3	0.5	1.8	2.6	2.8	50.9
			28	0.7	0.1	0.8	1.1	2.0	2.7	52.6

Table 1 - (continued)

Treatment[1]		Days after treatment	Number of lygus bugs per sweep[3]						
Insecticides[2]	AI/ acre lb.		Adults	Nymphs				Adults + Nymphs	% Reduct.
				Small	Medium	Large	Total		
			Grower Program						
		Pre	0.4	0.9	1.7	0.7	3.3	3.7	
Monitor (6-9)	0.50								
		6	0.0	0.0	0.0	0.1	0.1	0.1	97.3
		13	0.2	0.3	0.0	0.1	0.4	0.6	83.8
		20	0.3	0.1	0.7	0.5	1.3	1.6	56.8
		27	0.9	1.7	0.8	0.5	3.0	3.9	0.0
Carzol + Comite (7-8) + Lorsban	0.75 + 1.69 + 0.50								
		4	0.1	0.0	0.1	0.1	0.2	0.3	92.3
		11	0.2	0.2	0.2	0.1	0.5	0.7	82.1
		18	0.6	1.5	2.0	0.2	3.7	4.3	0.0
		25	3.1	1.4	4.0	5.7	11.1	14.2	0.0
Monitor + (8-5) Comite	0.50 + 1.69								
		4	1.5	0.0	0.1	1.3	1.4	2.9	79.6
		11	0.4	0.2	0.1	0.0	0.3	0.7	95.1
		18	0.1	0.0	0.1	0.1	0.2	0.3	97.9

[1] Plot size: Each treatment 5 acres (165' x 1320'). Larvin was an 80% dispersible powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. All plots were treated before 5:00 a.m. on the dates indicated in parentheses.

[2] Pretreatment counts were made in all plots on June 7 with the exception of the Zectran plot which had a pretreatment count on June 21.

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

Table 2 - Lygus bug populations in seed alfalfa plots treated by aircraft for aphid control. Firebaugh, California, 1983.

Treatment[1] Insecticides		AI/acre lb.	Days after treatment[2]	Number per 50 D-Vac Samples[3] Adults		Adults Total	Nymphal Instars 1	2	3	4	5	Total	Adults + Nymphs	% Reduct.
			Pre	15	13	28	6	48	33	21	9	117	145	
Ammo	(7-27)	0.10												
			7	0	0	0	0	1	2	1	0	4	4	96.5
			14	1	1	2	0	2	6	1	0	9	11	92.4
Methomyl + Thiodan	(8-10)	0.50 + 1.00												
			7	4	1	5	0	0	0	0	4	4	9	18.2
			14	8	1	9	0	4	4	0	0	8	17	0.0
			21	1	3	4	4	28	5	0	1	38	42	0.0
			Pre	9	4	13	12	19	12	2	4	49	62	
Ammo + Thiodan	(7-27)	0.10 + 1.00												
			7	0	1	1	0	0	0	1	0	1	2	96.8
			14	1	2	3	0	4	6	1	0	11	14	77.4
			21	6	5	11	1	1	3	3	20	28	39	37.1
Ammo + Thiodan	(8-17)	0.10 + 1.00												
			7	0	0	0	0	1	1	1	0	3	3	92.3
			14	1	2	3	1	7	15	1	0	24	27	56.5
			Pre	56	25	81	1	28	50	22	21	122	203	
Mavrik	(7-27)	0.15												
			7	1	2	3	2	2	1	6	4	15	18	91.1
			14	14	8	22	1	9	30	10	6	56	78	61.6
Mavrik	(8-10)	0.15												
			7	2	2	4	2	4	2	2	7	17	21	73.1
			14	19	8	27	0	6	3	4	2	15	42	46.2
Mavrik	(8-24)	0.15												
			7	1	0	1	0	1	7	0	1	9	10	76.2

Table 2 - (continued)

Treatment[1] Insecticides		AI/acre lb.	Days after treatment[2]	Adults		Adults Total	Nymphal Instars 1	2	3	4	5	Nymphal Total	Adults + Nymphs	% Reduct.
			Pre	13	16	29	7	36	14	12	6	75	104	
Pounce	(7-27)	0.10												
			7	2	3	5	1	4	5	8	6	24	29	72.1
			14	9	23	32	3	14	40	19	5	81	113	0.0
Methomyl + Thiodan	(8-10)	0.50 + 1.00												
			7	14	11	25	0	3	1	1	15	20	45	60.2
			14	13	4	17	2	23	33	1	0	59	76	32.7
			21	8	1	9	1	30	32	15	6	84	93	17.7
			Pre	38	15	53	2	20	41	15	14	92	145	
Pounce	(7-27)	0.20												
			7	0	0	0	0	2	7	2	2	13	13	91.0
			14	5	5	10	0	1	15	0	6	22	32	77.9
Pounce	(8-10)	0.20												
			7	2	0	2	0	4	5	2	10	21	23	28.1
			14	10	11	21	0	1	3	1	1	6	27	15.6
Pounce	(8-24)	0.20												
			7	1	2	3	0	3	4	0	1	8	11	59.3
			Pre	19	21	40	12	33	26	9	2	82	122	
Pounce + Thiodan	(7-27)	0.10 + 1.00												
			7	5	4	9	0	5	1	2	3	11	20	83.6
			14	8	10	18	8	65	83	11	1	168	186	0.0
			21	22	15	37	5	67	58	13	33	176	213	0.0
Pounce + Thiodan	(8-17)	0.20 + 1.00												
			7	11	3	14	0	3	5	1	1	10	24	88.7
			14	8	8	16	2	18	32	27	0	79	95	55.4

Number per 50 D-Vac Samples[3]

Table 2 - (continued)

Treatment[1] Insecticides		AI/acre lb.	Days after treatment[2]	Adults		Adults Total	Nymphal Instars 1	2	3	4	5	Total	Adults + Nymphs	% Reduct.
			Pre	7	19	26	2	28	23	6	10	69	95	
Methomyl + Thiodan	(7-27)	0.50 + 1.00												
			7	1	1	2	0	2	0	0	4	6	8	91.6
			14	3	1	4	0	8	52	8	1	69	73	23.2
			21	20	7	27	2	29	26	5	26	88	115	0.0
Methomyl + Thiodan	(8-17)	0.50 + 1.00												
			7	16	6	22	1	8	0	1	1	11	33	71.3
			14	6	1	7	0	9	41	16	0	66	73	36.5
			Grower Program											
			Pre	8	17	25	9	44	10	0	1	64	89	
Methomyl + Thiodan	(8-1)	0.50 + 1.00												
			1	2	2	4	1	0	1	4	5	11	15	83.1
			8	1	1	2	2	27	17	3	1	50	52	41.6
Methomyl + Thiodan	(8-10)	0.50 + 1.00												
			7	1	2	3	0	1	2	2	3	8	11	78.8
			14	11	4	15	2	11	9	2	0	24	39	25.0
			21	3	0	3	0	45	50	6	8	109	112	0.0
			Pre	26	10	36	1	32	52	13	5	103	139	
Larvin + Thiodan	(7-27)	0.60 + 1.00												
			7	11	9	20	0	5	1	0	11	17	37	73.4
			14	21	11	32	6	42	35	14	12	109	141	0.0
Thiodan	(8-10)	1.00												
			7	11	7	18	0	12	21	3	26	62	80	43.3
Methomyl + Thiodan	(8-17)	0.50 + 1.00												
			7	9	9	18	1	4	0	4	0	9	27	66.3
			14	8	2	10	0	6	23	25	0	54	64	20.0

Number per 50 D-Vac Samples[3]

Table 2 - (continued)

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1 Plot size: Each treatment 5 acres (165' x 1320'). Larvin and Methomyl were 80% dispersible powder and 90% water soluble powder respectively, 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 July 26.

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

Table 3 - Lygus bug populations and seed quality in 6 commercial seed alfalfa fields treated by aircraft for lygus bug control. Imperial County, California, 1983.

Field #1

Treatment: Insecticides		AI/acre lb.	Days after treatment	Number of lygus bugs per sweep[1]: Adults	Nymphs	Adults + Nymphs
			Pre	1.5	0.3	1.8
Carzol + Thiodan	(7-12)	0.74 + 1.00				
			3	0.2	0.0	0.2
			10	0.5	5.0	5.5
Carzol + Thiodan	(7-25)	0.95 + 0.98				
			4	0.4	0.6	1.0
			11	0.6	0.5	1.1
Malathion + Parathion + Methyl Parathion	(8-12)	1.50 + 0.32 + 0.53				
			1	0.3	0.2	0.5

Yield #1 Clean Seed 355 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Moapa 69	1976	90.0	0.4	1.2	0.2	7.9	0.1	0.2

Table 3 - (continued)

Field #2

Treatment			Number of lygus bugs per sweep[1]		
Insecticides	AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
		Pre	5.4	0.4	5.8
Monitor + Methyl Parathion (6-10)	0.70 + 0.63				
		1	0.5	0.0	0.5
		8	1.5	22.8	24.3
Methyl Parathion + Phosdrin (6-27)	0.63 + 0.32				
		4	3.1	13.8	16.9
Supracide + Carzol (7-1)	0.31 + 0.47				
		7	2.1	0.7	2.8
		14	0.8	1.3	2.1
		21	1.5	10.0	11.5
Malathion (7-29)	1.50				
		1	4.6	6.1	10.7
Malathion (8-4)	1.50				
		1	0.2	0.2	0.4
		8	3.2	0.5	3.7

Yield #1 Clean Seed 124 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF 101	1724	67.5	9.5	10.4	5.1	6.8	0.6	0.1

Table 3 - (continued)

Field #3

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Monitor	(6-4)	1.00				
			5	0.7	1.0	1.7
			13	0.8	6.5	7.3
			20	1.4	6.7	8.1
Carzol + Thiodan	(6-24)	0.75 + 0.75				
			7	1.8	0.2	2.0
			14	1.2	2.3	3.5
			21	3.4	33.0	36.4
			28	10.5	11.8	22.3

Yield #1 Clean Seed 470 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
UC Cargo	1851	87.7	3.0	3.8	1.6	3.7	0.1	0.1

Table 3 - (continued)

Field #4

Treatment: Insecticides		AI/acre lb.	Days after treatment	Number of lygus bugs per sweep[1]: Adults	Nymphs	Adults + Nymphs
Monitor	(6-4)	1.00				
			5	0.6	1.5	2.1
			13	0.7	8.8	9.5
			20	6.1	15.1	21.2
Carzol + Thiodan	(6-24)	0.75 + 0.75				
			7	1.8	0.1	1.9
			14	0.3	0.0	0.3
			21	1.9	8.3	10.2
			28	8.4	4.6	13.0

Yield #1 Clean Seed 482 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
UC Cargo	1787	89.3	1.0	5.0	0.7	2.5	1.5	0.0

Table 3 - (continued)

Field #5

Treatment			Number of lygus bugs per sweep[1]		
Insecticides	AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
		Pre	5.1	0.6	5.7
Di-Syston (6-9) 15G	6.50				
		8	3.4	7.2	10.6
Monitor (6-19)	0.85				
		5	0.6	2.4	3.0
		12	0.9	16.6	17.5
		19	12.5	15.6	28.1
Carzol (7-9)	0.96				
		6	4.1	0.4	4.5
		13	1.3	2.4	3.7
		20	4.4	52.7	57.1
Phosdrin (8-2)	0.50				
		3	18.0	30.0	48.0

Yield #1 Clean Seed 254 lbs/acre

			Percent Defective Seeds					
Variety	Number seeds Examined[2]	Percent good seed	Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF 101	1730	91.4	1.2	2.9	1.2	2.8	0.3	0.2

Table 3 - (continued)

Field #6

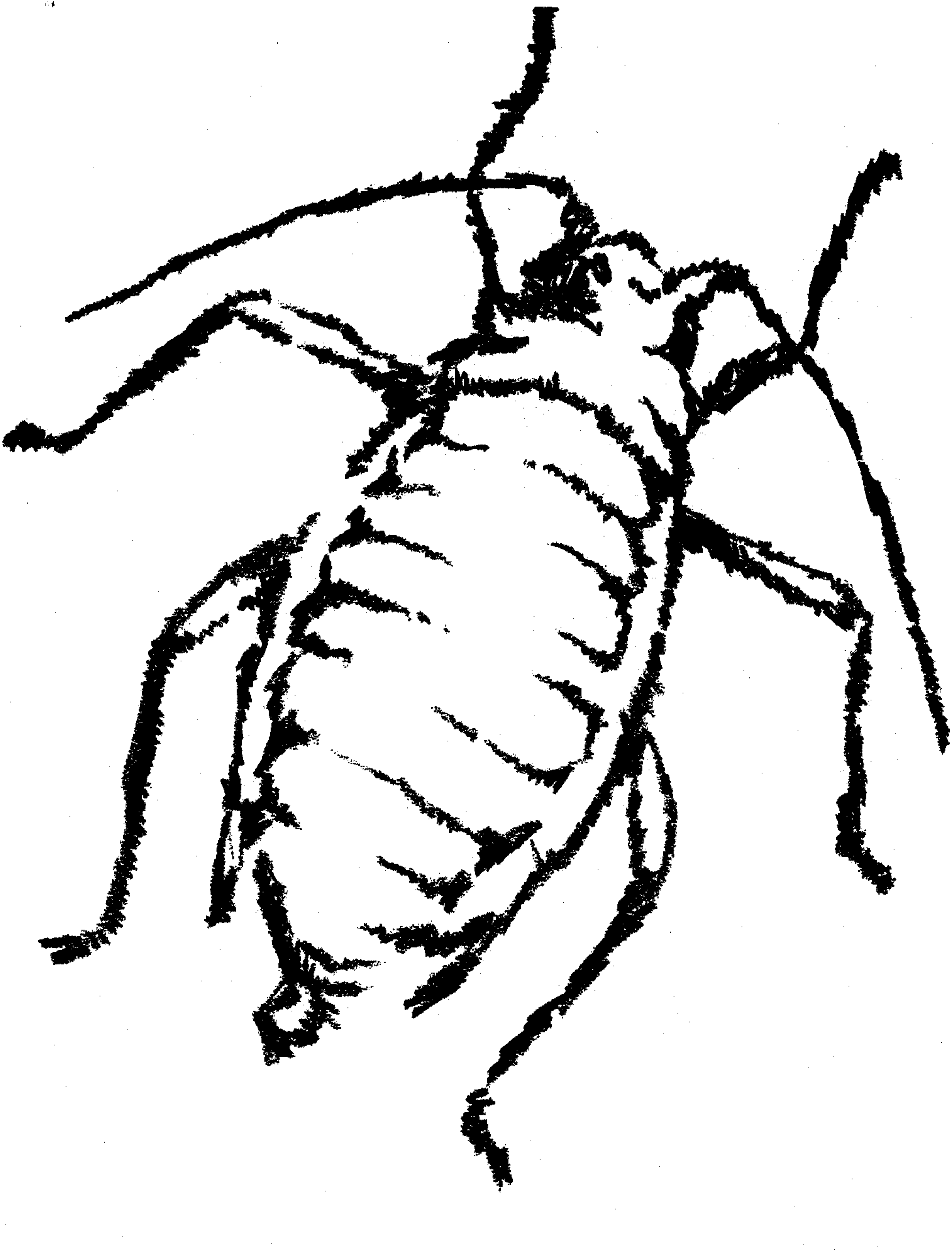
Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
				1.4	0.1	1.5
			Pre	6.9	11.3	18.2
Carzol	(6-22)	0.96				
			2	0.5	0.9	1.4
			7	0.5	1.3	1.8
			14	1.5	9.3	10.8
Carzol	(7-12)	0.58				
			3	2.5	4.4	6.9
			10	5.2	1.5	6.7
			17	0.7	1.0	1.7
			24	1.3	2.3	3.6
			31	6.1	2.1	8.2
Monitor	(8-13)	0.85				

Yield #1 Clean Seed 337 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF 101	1657	78.0	2.0	10.5	2.2	6.1	1.2	0.0

[1] Average of 20 sweeps (10-2 sweep samples) per field on each sampling site.

[2] 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.



APHIDS

Table 4 - Aphid populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1983.

Treatment[1]				Number per 50 D-vac Samples[3]		
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Spotted alfalfa aphid[4]	Pea aphid	% Reduct.
Pounce	0.10	June 8				
			7	0	40	
			14	2	256	
Comite	1.69	June 22				
			21	0	258	
Pounce	0.10	June 29				
			7	1	1144	0.0
			14	0	10,896	0.0
Pounce	0.10	July 13				
			7	10	1389	87.3
Pounce	0.10	July 20				
			7	1	176	87.3
Monitor	0.50	July 27				
			7	1	16	90.9
			14	2	46	73.9
Comite	1.69	August 10				
			21	2	21	88.1
Pounce	0.20	June 8				
			7	0	14	
			14	1	60	
Comite	1.69	June 22				
			21	0	163	
			28	0	5646	
			35	0	13,278	
Pounce	0.20	July 13				
			7	2	191	98.6
			14	0	73	99.5
Pounce	0.20	July 27				
			7	1	17	76.7
Pounce	0.20	August 3				
			7	0	31	0.0

Table 4 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per 50 D-vac Samples[3] Spotted alfalfa aphid[4]	Pea aphid	% Reduct.
Ammo	0.10	June 8				
			7	27	47	
			14	0	148	
Comite	1.69	June 22				
			21	0	806	
			28	0	6376	
			35	0	19,276	
Ammo + Thiodan	0.10 + 1.00	July 13				
			7	0	1	99.99
			14	0	11	99.9
			21	0	60	99.7
Ammo	0.10	August 3				
			7	0	13	78.3
Comite	1.69	August 10				
			14	1	20	66.7
Pay Off	0.08	June 8				
			7	0	6	
			14	0	17	
Comite	1.69	June 22				
			21	0	82	
			28	0	443	
Pay Off	0.08	July 6				
			7	0	47	89.4
			14	0	16	96.4
			21	0	28	93.7
Pay Off	0.08	July 27				
			7	6	21	25.0
			14	0	55	0.0
Pay Off + Comite	0.08 + 1.69	August 10				
			7	0	7	87.3
			14	0	145	0.0

Table 4 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per 50 D-vac Samples[3] Spotted alfalfa aphid[4]	Pea aphid	% Reduct.
Carzol	0.75	June 8				
			7	2	182	
			14	0	629	
			21	0	4264	
Mavrik	0.15	June 29				
			7	0	1255	70.6
			14	0	1116	73.8
			21	0	1035	75.7
Mavrik	0.15	July 20				
			7	0	150	85.5
Comite	1.69	July 27				
			14	1	197	81.0
			21	1	138	86.7
Mavrik	0.15	August 10				
			7	0	35	74.6
			14	1	333	0.0
Vydate	0.50	June 8				
			7	0	93	
			14	0	289	
Comite	1.69	June 22				
			21	0	220	
			28	0	4526	
			35	0	12,524	
Vydate + Comite	0.50 + 1.69	July 13				
			7	4	929	92.6
			14	0	1008	92.0
Vydate + Lorsban	0.50 + 0.50	July 27				
			7	0	61	93.9
			14	2	37	96.3

Table 4 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per 50 D-vac Samples[3] Spotted alfalfa aphid[4]	Pea aphid	% Reduct.
Larvin	1.00	June 8				
			7	0	106	
			14	0	408	
Comite	1.69	June 22				
			21	0	2563	
Larvin	0.60	June 29				
			7	0	13,996	0.0
Monitor	0.50	July 6				
			7	0	392	97.2
			14	0	569	95.9
			21	0	703	95.0
Lorsban	0.50	July 27				
			28	0	53	92.5
			35	0	88	87.5
Comite	1.69	August 10				
			42	0	64	90.9
			48	27	1088	0.0
			Pre	2	5	
Zectran	0.20	June 22				
			7	0	57	0.0
			14	0	76	0.0
			21	0	197	0.0
Vydate + Comite	1.00 + 1.69	July 13				
			7	2	3	98.5
Monitor	0.50	June 8				
			7	0	5	
			14	0	66	
Comite	1.69	June 22				
			21	0	37	
			28	0	1686	
			35	0	3257	
Monitor	0.50	July 13				
			7	2	656	79.9
			14	0	763	76.6
			21	2	590	81.9
			28	2	38	98.8

Table 4 - (continued)

Treatment[1]				Number per 50 D-vac Samples[3]		
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Spotted alfalfa aphid[4]	Pea aphid	% Reduct.
			Grower Program			
Monitor	0.50	June 9				
			6	0	18	
			13	2	52	
			20	0	293	
			27	0	2871	
Carzol + Comite + Lorsban	0.75 + 1.69 + 0.50	July 8				
			4	0	76	97.4
			11	3	284	90.1
			18	1	255	91.1
			25	1	3785	0.0
Monitor + Comite	0.50 + 1.69	August 5				
			4	0	73	98.1
			11	4	37	99.0
			18	0	47	98.8

[1] Plot size: Each treatment 5 acres (165' x 1320'). Larvin was an 80% dispersible 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] D-Vac samples were initiated on June 14.

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

[4] Alfalfa variety Mesa Sirsa resistant to spotted alfalfa aphids.

Table 5 - Aphid populations in seed alfalfa plots treated by aircraft for aphid control. Firebaugh, California, 1983.

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per 50 D-vac Samples[3] Spotted alfalfa aphid[4]	% Reduct.	Pea aphid	% Reduct.
			Pre	2291		4849	
Ammo	0.10	July 27					
			7	601	73.8	249	94.9
			14	4102	0.0	990	79.6
Methomyl + Thiodan	0.50 + 1.00	August 10					
			7	329	92.0	2	99.8
			14	1056	74.3	0	100
			21	2066	49.6	9	99.1
			Pre	1339		2296	
Ammo + Thiodan	0.10 + 1.00	July 27					
			7	109	91.9	4	99.83
			14	1368	0.0	26	98.9
			21	6170	0.0	29	98.7
Ammo + Thiodan	0.10 + 1.00	August 17					
			7	431	93.0	1	96.6
			14	2002	67.6	2	93.1
			Pre	2385		2883	
Mavrik	0.15	July 27					
			7	698	70.7	32	98.9
			14	6947	0.0	66	97.7
Mavrik	0.15	August 10					
			7	1790	74.2	8	87.9
			14	9294	0.0	8	87.9
Mavrik	0.15	August 24					
			7	464	95.0	5	60.0

Table 5 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per 50 D-vac Samples[3] Spotted alfalfa aphid[4]	% Reduct.	Pea aphid	% Reduct.
			Pre	1017		2564	
Pounce	0.10	July 27					
			7	477	53.1	244	90.5
			14	10,458	0.0	829	67.7
Methomyl + Thiodan	0.50 + 1.00	August 10					
			7	397	96.2	0	100
			14	3164	69.7	0	100
			21	3705	64.6	0	100
			Pre	5472		8772	
Pounce	0.20	July 27					
			7	406	92.6	38	99.6
			14	3643	33.4	159	98.2
Pounce	0.20	August 10					
			7	1202	67.0	18	88.7
			14	709	80.5	4	97.5
Pounce	0.20	August 24					
			7	66	90.7	2	50.00
			Pre	3086		3032	
Pounce + Thiodan	0.10 + 1.00	July 27					
			7	198	93.6	12	99.6
			14	9225	0.0	45	98.5
			21	7016	0.0	97	96.8
Pounce + Thiodan	0.10 + 1.00	August 17					
			7	290	95.9	0	100
			14	161	97.7	5	94.8

Table 5 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per 50 D-vac Samples[3] Spotted alfalfa aphid[4]	% Reduct.	Pea aphid	% Reduct.
			Pre	2257		986	
Methomyl + Thiodan	0.50 + 1.00	July 27					
			7	53	97.7	4	99.6
			14	962	57.4	8	99.2
			21	4659	0.0	60	93.9
Methomyl + Thiodan	0.50 + 1.00	August 17					
			7	1478	68.3	4	93.3
			14	2015	56.8	4	93.3
		Grower Program					
			Pre	2729		325	
Methomyl + Thiodan	0.50 + 1.00	August 1					
			1	89	96.7	5	98.5
			8	1358	50.2	13	96.0
Methomyl + Thiodan	0.50 + 1.00	August 9					
			7	165	87.8	0	100.0
			14	326	76.0	2	84.6
			21	2421	0.0	8	38.5
			Pre	1214		4059	
Larvin + Thiodan	0.60 + 1.00	July 27					
			7	853	29.7	3	99.9
			14	18,438	0.0	6	99.8
Thiodan	1.00	August 10					
			7	17,512	5.0	28	0.0
Methomyl + Thiodan	0.50 + 1.00	August 17					
			7	1957	88.8	12	57.1
			14	1143	93.5	5	82.1

Table 5 - (continued)

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Larvin and Methomyl were 80% dispersible powder and 90% water soluble powder respectively, 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 July 26.

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

[4] Alfalfa variety La Rocca susceptible to spotted alfalfa aphids.

Table 6 - Spider mite populations in seed alfalfa plots treated by aircraft for spider mite and lygus bug control. Firebaugh, California, 1983.

Treatment[1]				Number per leaf[3]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Mites	Eggs
			Pre	7.9	7.5
Pounce	0.10	June 8			
			7	8.9	27.6
			14	12.3	19.5
Comite	1.69	June 22			
			21	14.9	13.2
Pounce	0.10	June 29			
			7	0.5	1.1
			14	4.1	11.6
Pounce	0.10	July 13			
			7	5.2	12.7
Pounce	0.10	July 20			
			7	11.7	13.6
Monitor	0.50	July 27			
			7	4.6	28.6
			14	8.8	15.1
Comite	1.69	August 10			
			21	0.6	0.7
			Pre	4.0	8.5
Pounce	0.20	June 8			
			7	10.0	17.9
			14	11.2	38.1
Comite	1.69	June 22			
			21	15.4	4.1
			28	0.4	1.4
			35	2.2	12.5
Pounce	0.20	July 13			
			7	0.8	2.1
			14	7.7	11.9
Pounce	0.20	July 27			
			7	3.2	9.6
Pounce	0.20	August 3			
			7	3.5	3.0

Table 6 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per leaf[3] Mites	Eggs
			Pre	3.9	6.7
Ammo	0.10	June 8			
			7	8.1	29.4
			14	17.4	62.3
Comite	1.69	June 22			
			21	23.9	22.7
			28	1.7	9.7
			35	2.7	19.9
Ammo + Thiodan	0.10 + 1.00	July 13			
			7	1.5	1.6
			14	10.0	13.2
			21	11.8	113.7
Ammo	0.10	August 3			
			7	22.5	14.1
Comite	1.69	August 10			
			14	1.9	1.0
			Pre	5.2	6.0
Pay Off	0.08	June 8			
			7	8.3	23.9
			14	18.3	53.0
Comite	1.69	June 22			
			21	16.6	27.3
			28	1.2	3.0
Pay Off	0.08	July 6			
			7	1.7	3.7
			14	2.1	1.6
			21	3.8	7.1
Pay Off	0.08	July 27			
			7	3.7	9.8
			14	3.0	7.1
Pay Off + Comite	0.08 + 1.69	August 10			
			7	1.0	1.0

Table 6 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per leaf[3] Mites	Eggs
			Pre	5.5	4.7
Carzol	0.75	June 8			
			7	5.3	25.6
			14	8.2	26.1
			21	32.1	66.9
Mavrik	0.15	June 29			
			7	4.7	8.1
			14	13.3	29.2
			21	17.6	53.6
Mavrik	0.15	July 20			
			7	15.3	19.3
Comite	1.69	July 27			
			14	1.4	3.1
			21	1.3	3.5
Mavrik	0.15	August 10			
			7	0.1	0.3
			Pre	4.9	9.1
Vydate	0.50	June 8			
			7	4.5	13.4
			14	4.6	14.2
Comite	1.69	June 22			
			21	18.2	17.8
			28	0.8	7.1
			35	0.7	1.1
Vydate + Comite	0.50 + 1.69	July 13			
			7	0.4	0.6
			14	0.1	0.7
Vydate + Lorsban	0.50 + 0.50	July 27			
			7	0.3	0.3
			14	0.5	2.0

Table 6 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per leaf[3] Mites	Eggs
			Pre	3.2	4.0
Larvin	1.00	June 8			
			7	8.1	31.7
			14	11.2	43.4
Comite	1.69	June 22			
			21	13.4	10.3
Larvin	0.60				
			7	3.5	4.4
Monitor	0.50	July 6			
			7	3.0	3.0
			14	2.4	14.2
			21	3.1	17.9
Lorsban	0.50	July 27			
			28	4.6	14.6
			35	11.0	57.4
Comite	1.69	August 10			
			42	1.6	1.9
			Pre	7.6	13.2
Zectran	0.20	June 22			
			7	15.0	29.8
			14	10.1	23.7
			21	12.9	36.3
Vydate + Comite	1.00 + 1.69	July 13			
			7	3.2	1.6
			Pre	2.8	6.0
Monitor	0.50	June 8			
			7	2.4	6.9
			14	2.9	6.6
Comite	1.69	June 22			
			21	3.7	3.7
			28	1.6	4.8
			35	0.8	5.9
Monitor	0.50	July 13			
			7	1.8	2.2
			14	3.2	9.3
			21	10.2	30.6
			28	4.5	10.6

Table 6 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per leaf[3] Mites	Eggs
		Grower Program			
			Pre	5.2	4.0
Monitor	0.50	June 9			
			6	3.1	12.1
			13	1.9	7.1
			20	1.6	7.1
			27	3.4	18.2
Carzol + Comite + Lorsban	0.75 + 1.69 + 0.50	July 8			
			4	1.8	28.2
			11	1.2	1.3
			18	5.6	11.0
			25	6.4	30.6
Monitor + Comite	0.50 + 1.69	August 5			
			4	1.8	3.0
			11	2.8	7.0

[1] Plot size: Each treatment 5 acres (165' x 1320'). Larvin was an 80% dispersible powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. All plots were treated before 5:00 a.m. on the dates indicated.

[2] Pretreatment counts were made in all plots on June 7 with the exception of the Zectran plot which had a pretreatment count on June 21.

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

Table 7 - Spider mite populations in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California, 1983.

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per leaf[3] Mites	Eggs
			Pre	5.7	19.5
Mitac	1.00	June 22			
			7	9.1	16.1
			14	15.8	32.5
			21	15.9	16.2
Monitor + Comite	0.5 + 1.69	July 13			
			7	2.2	4.9
			Pre	7.6	13.2
Zectran	0.20	June 22			
			7	15.0	29.8
			14	10.1	23.7
			21	12.9	36.3
Vydate + Comite	1.00 + 1.69	July 13			
			7	3.2	1.6
			Pre	6.6	15.8
Comite	1.69	June 22			
			7	12.6	33.9
			14	9.3	22.4
			21	14.2	33.1
Monitor + Comite	0.50 + 1.69	July 13			
			7	1.7	3.8

Table 7 - (continued)

Treatment[1] Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Number per leaf[3] Mites	Eggs
		Grower Program			
			Pre	5.2	4.0
Monitor	0.50	June 9			
			6	3.1	12.1
			13	1.9	7.1
			21	1.6	7.1
			28	3.4	18.2
Carzol	0.75				
+	+				
Comite	1.69	July 8			
+	+				
Lorsban	0.50				
			4	1.8	28.2
			11	1.2	1.3

1 Plot size: Each treatment 5 acres (165' x 1320'). Carzol was a 92% soluble powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. All plots were treated before 5:00 a.m. on the dates indicated.

2 Pretreatment counts were made in all plots June 21 with the exception of the Monitor, Carzol plot which had a pretreatment count on June 7.

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

PREDATORS & PARASITES

Table 8 - Predator and parasite populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1983.

Treatment[1]			Days	Number per 50 D-Vac Samples[3]															
		AI/	after							Lacewings									
		acre	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
Pounce	(6-8)	0.10																	
			7	0	33	10	326	62	8	1	0	0	0	0	0	0	0	124	55
			14	2	15	5	198	69	9	0	0	1	1	0	0	0	0	111	40
Comite	(6-22)	1.69																	
			21	1	19	4	37	68	79	0	0	0	1	0	0	0	0	45	33
Pounce	(6-29)	0.10																	
			7	26	51	24	57	215	72	0	0	1	5	0	0	0	0	126	19
			14	22	20	38	50	290	11	0	0	3	0	0	0	0	0	88	21
Pounce	(7-13)	0.10																	
			7	3	18	1	18	188	13	0	0	0	0	0	0	0	0	121	25
Pounce	(7-20)	0.10																	
			7	5	37	3	13	61	6	0	0	0	1	0	0	0	0	24	16
Monitor	(7-27)	0.50																	
			7	0	2	0	0	24	3	0	0	1	1	0	0	2	0	16	8
			14	5	12	0	2	105	31	0	0	0	6	0	0	4	0	12	10
Comite	(8-10)	1.69																	
			21	3	43	0	1	53	109	0	0	0	1	0	0	2	0	10	20

Table 8 - (continued)

Treatment[1]			Days after treatment[2]	Number per 50 D-Vac Samples[3]															
										Lacewings									
		AI/ acre		Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic	
Insecticides		lb.		A	N	A	N	A	N	A	L	A	L	A	L	A	L	wasps	Spiders
Pounce	(6-8)	0.20																	
			7	1	20	3	187	42	4	1	0	1	0	0	0	0	1	73	81
			14	2	7	3	56	39	4	1	0	0	1	0	0	0	0	45	13
Comite	(6-22)	1.69																	
			21	4	14	0	22	21	22	0	2	0	1	0	0	0	0	21	11
			28	13	65	28	51	198	189	0	0	4	3	1	2	0	0	62	36
			35	34	52	21	40	276	52	0	0	0	1	0	1	0	0	52	16
Pounce	(7-13)	0.20																	
			7	0	7	0	4	43	1	0	0	0	0	0	0	0	0	50	8
			14	1	6	3	5	57	8	0	0	0	0	0	0	0	0	21	0
Pounce	(7-27)	0.20																	
			7	8	102	2	6	27	6	0	0	1	0	0	0	0	0	12	15
Pounce	(8-3)	0.20																	
			7	8	53	0	0	74	4	1	0	1	2	0	0	0	0	0	4

Table 8 - (continued)

Treatment[1]			Days	Number per 50 D-Vac Samples[3]																
		AI/	after							Lacewings									
		acre	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
Ammo	(6-8)	0.10																	
			7	3	15	1	105	28	3	1	0	0	3	0	0	0	3	91	107
			14	1	6	0	39	16	2	0	0	0	2	0	0	0	0	67	12
Comite	(6-22)	1.69																	
			21	3	11	0	8	45	13	0	0	0	2	0	0	0	0	30	115
			28	8	45	10	52	253	89	0	0	0	4	0	0	0	0	129	73
			35	17	10	9	8	233	60	0	0	4	1	0	1	1	0	55	11
Ammo + Thiodan	(7-13)	0.10 + 1.00																	
			7	0	0	0	0	15	4	0	0	0	0	0	0	0	0	100	9
			14	0	0	0	4	59	3	0	1	0	4	0	0	0	1	19	2
			21	0	0	0	5	46	16	0	0	0	1	0	0	0	0	7	1
Ammo	(8-3)	0.10																	
			7	1	2	0	3	38	7	0	0	1	2	0	0	1	0	1	0
Comite	(8-10)	1.69																	
			14	3	4	0	4	63	15	0	0	0	9	0	0	3	0	3	2

Table 8 - (continued)

Treatment[1]		AI/ acre lb.	Days after treatment[2]	Number per 50 D-Vac Samples[3]																
				Geocoris		Nabis		Orius		Lacewings Brown		Lacewings Green		Coccinellidae		Collops		Parasitic wasps	Spiders
Insecticides				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
Pay Off	(6-8)	0.08																	
			7	3	31	4	90	51	7	0	0	0	1	0	0	0	4	74	99
			14	1	14	1	44	64	4	0	0	0	1	0	0	0	1	103	53
Comite	(6-22)	1.69																	
			21	1	8	0	4	38	35	0	0	0	1	0	0	0	0	39	68
			28	30	30	17	68	308	394	1	0	0	4	0	0	0	0	70	60
Pay Off	(7-6)	0.08																	
			7	8	20	1	2	869	45	0	0	0	2	0	0	0	0	37	16
			14	0	7	2	2	351	22	0	0	1	1	0	0	0	0	20	13
			21	2	12	3	14	159	20	0	0	2	1	0	0	0	0	27	21
Pay Off	(7-27)	0.08																	
			7	6	73	0	3	181	61	0	0	0	1	0	0	0	2	31	14
			14	17	142	1	8	299	78	0	0	1	4	0	0	1	1	27	3
Pay Off + Comite	(8-10)	0.08 + 1.69																	
			7	22	45	0	1	236	16	0	0	0	2	0	0	1	0	4	7
			14	7	29	0	2	126	19	0	0	1	0	0	0	0	0	25	6

Table 8 - (continued)

Treatment[1] Insecticides		AI/ acre lb.	Days after treatment[2]	Number per 50 D-Vac Samples[3] Geocoris A	Geocoris N	Nabis A	Nabis N	Orius A	Orius N	Lacewings Brown A	Lacewings Brown L	Lacewings Green A	Lacewings Green L	Coccinellidae A	Coccinellidae L	Collops A	Collops L	Parasitic wasps	Spiders
Carzol	(6-8)	0.75																	
			7	1	15	4	73	10	7	1	0	0	0	1	0	0	6	91	161
			14	4	1	2	41	14	0	0	0	0	0	0	0	0	0	96	87
			21	3	0	4	12	35	21	0	0	0	0	0	14	0	0	64	72
Mavrik	(6-29)	0.15																	
			7	3	2	13	14	186	6	0	0	0	2	4	3	1	0	62	22
			14	9	4	3	18	182	7	0	0	2	5	1	3	2	0	30	14
			21	0	1	2	9	119	37	0	0	0	3	1	0	2	0	24	24
Mavrik	(7-20)	0.15																	
			7	0	1	0	6	64	10	1	0	5	0	0	0	0	0	10	5
Comite	(7-27)	1.69																	
			14	0	0	3	11	192	92	0	1	0	0	0	0	0	0	21	5
			21	9	57	1	7	147	126	0	0	0	0	0	0	8	0	12	10
Mavrik	(8-10)	0.15																	
			7	1	19	1	1	107	12	0	0	1	1	0	0	5	1	7	4
			14	0	12	2	0	122	15	0	0	3	0	0	0	2	1	23	11

Table 8 - (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		lb.	ment[2]	A	N	A	N	A	N	A	L	A	L	A	L	A	L	wasps	Spiders
Vydate	(6-8)	0.50																	
			7	0	17	3	75	10	4	0	0	0	0	1	0	0	1	89	205
			14	4	7	2	9	9	6	0	0	0	0	0	0	0	0	83	70
Comite	(6-22)	1.69																	
			21	1	7	6	3	36	5	0	0	0	1	0	14	1	0	29	142
			28	18	14	3	14	102	72	2	0	4	1	1	31	1	0	69	104
			35	14	18	3	6	185	99	0	0	5	2	1	44	4	0	31	32
Vydate + Comite	(7-13)	0.50 + 1.69																	
			7	3	12	0	1	65	28	0	0	1	3	1	7	0	0	30	6
			14	0	5	0	24	82	67	0	0	1	0	0	0	0	0	18	23
Vydate + Lorsban	(7-27)	0.50 + 0.50																	
			7	0	3	0	1	86	24	0	0	2	0	0	0	0	0	13	24
			14	5	4	0	2	87	34	0	0	4	5	0	0	0	0	26	21

Table 8 - (continued)

Treatment[1]			Days after treatment[2]	Number per 50 D-Vac Samples[3]														
										Lacewings								
		AI/ acre		Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic	
Insecticides		lb.		A	N	A	N	A	N	A	L	A	L	A	L	A	L	wasps	Spiders
Larvin	(6-8)	1.00																	
			7	3	46	8	208	111	11	0	0	0	1	1	0	0	1	105	148
			14	11	10	5	94	107	15	1	0	1	2	0	0	0	0	167	77
Comite	(6-22)	1.69																	
			21	3	9	1	42	92	138	0	0	0	1	0	0	0	0	97	48
Larvin	(6-29)	0.60																	
			7	11	64	24	64	421	315	0	1	5	1	0	10	0	0	77	45
Monitor	(7-6)	0.50																	
			7	3	21	1	2	55	7	0	0	0	1	0	0	1	0	37	26
			14	1	16	0	6	91	9	0	2	6	0	0	0	0	0	53	39
			21	0	5	0	1	37	7	0	0	0	1	0	0	0	0	12	15
			28	0	0	0	0	34	44	1	0	2	0	0	0	0	0	11	9
			35	8	3	2	1	205	150	2	0	0	6	0	0	6	0	12	21
Comite	(8-10)	1.69																	
			42	5	13	0	2	176	68	0	0	0	4	0	0	4	3	10	20
			49	9	70	1	5	145	78	0	0	4	1	0	0	0	9	18	29

Table 8 - (continued)

Treatment[1] Insecticides		AI/ acre lb.	Days after treat-ment[2]	Geocoris A	Geocoris N	Nabis A	Nabis N	Orius A	Orius N	Lacewings Brown A	Lacewings Brown L	Lacewings Green A	Lacewings Green L	Coccinellidae A	Coccinellidae L	Collops A	Collops L	Parasitic wasps	Spiders
				Number per 50 D-Vac Samples[3]															
			Pre	1	1	4	6	24	14	0	0	0	6	0	0	1	0	245	42
Zectran	(6-22)	0.20																	
			7	0	1	2	0	9	1	0	0	0	13	1	0	0	0	90	98
			14	14	3	11	14	85	26	1	0	2	6	3	1	0	0	136	84
			21	7	5	10	47	165	31	0	0	2	1	0	12	7	0	110	71
Vydate + Comite	(7-13)	1.00 + 1.69																	
			7	0	2	0	10	26	19	0	0	0	0	0	0	1	1	32	5
Monitor	(6-8)	0.50																	
			7	2	8	1	54	13	0	1	0	0	2	2	0	1	0	102	242
			14	0	1	2	2	1	4	0	0	0	1	0	0	0	0	76	172
Comite	(6-22)	1.69																	
			21	0	1	2	4	2	4	0	2	0	1	0	0	1	0	37	100
			28	9	2	5	11	65	4	3	0	0	2	0	5	1	0	125	56
			35	10	5	0	0	36	5	0	0	5	2	0	25	1	0	43	22
Monitor	(7-13)	0.50																	
			7	0	2	0	2	3	2	0	0	1	5	0	2	0	1	21	21
			14	0	0	0	0	4	5	0	0	10	8	0	0	0	0	9	15
			21	1	1	1	1	68	31	0	0	4	8	0	9	1	0	8	37
			28	1	2	0	0	126	27	0	0	2	12	0	3	1	0	8	19

Table 8 - (continued)

Treatment[1] Insecticides		AI/ acre lb.	Days after treatment[2]	Number per 50 D-Vac Samples[3] Geocoris A	Geocoris N	Nabis A	Nabis N	Orius A	Orius N	Lacewings Brown A	Lacewings Brown L	Lacewings Green A	Lacewings Green L	Coccinellidae A	Coccinellidae L	Collops A	Collops L	Parasitic wasps	Spiders
								Grower Program											
Monitor	(6-9)	0.50																	
			6	1	11	0	32	14	4	5	0	0	1	0	0	0	0	119	202
			13	0	3	1	6	4	1	1	1	0	2	0	0	0	0	109	157
			20	2	1	3	1	10	7	1	0	1	1	0	0	0	0	94	225
			27	8	2	3	4	72	5	2	0	5	2	2	25	1	0	117	147
Carzol + Comite + Lorsban	(7-8)	0.75 + 1.69 + 0.50																	
			4	1	0	0	0	2	0	0	0	3	9	0	0	0	0	10	13
			11	0	0	0	6	9	11	0	0	6	4	0	0	0	0	9	16
			18	1	1	0	1	9	11	0	0	3	1	0	0	0	1	14	11
			25	5	0	0	5	79	64	0	0	31	9	0	27	1	0	13	28
Monitor + Comite	(8-10)	0.50 + 1.69																	
			4	1	0	0	2	104	15	0	0	18	34	0	25	2	0	4	9
			11	1	0	0	1	46	22	0	0	13	12	0	0	0	0	5	4
			18	0	0	0	2	49	136	0	0	6	2	0	0	2	1	14	23

1 Plot size: Each treatment 5 acres (165' x 1320'). Larvin was an 80% dispersible 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 D-Vac samples were initiated on June 14.

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

Table 9 - Predator and parasite populations in seed alfalfa plots treated by aircraft for aphid control. Firebaugh, California, 1983.

Treatment[1]			Days after treat-ment[2]	Number per 50 D-Vac Samples[3]															
										Lacewings									
		AI/ acre		Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic	
Insecticides		lb.		A	N	A	N	A	N	A	L	A	L	A	L	A	L	wasps	Spiders
			Pre	0	4	1	18	43	70	0	0	1	1	1	9	0	4	27	120
Ammo	7-27	0.10																	
			7	0	0	0	4	8	0	0	0	0	1	0	0	1	3	28	13
			14	0	0	0	2	67	1	0	0	1	3	0	0	2	4	38	8
Methomyl + Thiodan	(8-10)	0.50 + 1.00																	
			7	1	0	0	0	6	0	0	0	0	3	0	0	6	1	13	7
			14	0	0	0	1	14	3	0	0	9	0	0	0	8	0	23	13
			21	0	0	0	1	13	31	0	0	4	0	0	0	0	0	37	0
			Pre	2	2	0	9	28	107	0	0	1	1	2	5	2	0	23	36
Ammo + Thiodan	(7-27)	0.10 + 1.00																	
			7	0	0	0	0	14	1	0	0	0	3	0	0	1	0	32	16
			14	0	0	0	1	37	3	0	0	0	1	0	0	4	0	23	5
			21	0	0	1	0	34	4	0	0	7	0	0	0	2	0	5	4
Ammo + Thiodan	(8-17)	0.10 + 1.00																	
			7	0	0	0	0	4	0	0	0	0	1	0	0	1	0	5	1
			14	0	0	0	0	66	1	0	0	0	1	0	0	0	0	16	3

Table 9 - (continued)

Treatment[1]			Days after treat-ment[2]	Number per 50 D-Vac Samples[3]																
										Lacewings										
				Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops				
Insecticides		AI/ acre lb.		A	N	A	N	A	N	A	L	A	L	A	L	A	L	Parasitic wasps	Spiders	
			Pre	1	1	1	13	36	51	0	0	2	1	4	13	3	0	26	87	
Pounce	(7-27)	0.10																		
			7	1	0	0	5	99	12	0	0	0	2	0	1	4	1	57	29	
			14	1	0	1	2	146	9	0	0	6	1	0	0	6	1	38	19	
Methomyl + Thiodan	(8-10)	0.50 + 1.00																		
			7	1	0	0	4	14	0	0	0	2	3	0	3	5	0	21	22	
			14	0	0	0	3	27	7	0	0	16	1	0	1	4	0	40	27	
			21	0	0	0	1	32	59	0	0	5	4	0	0	0	0	36	7	
			Pre	3	1	1	9	63	66	0	0	0	1	2	13	5	0	23	68	
Pounce	(7-27)	0.20																		
			7	0	0	0	4	38	7	0	0	0	1	0	0	1	0	24	14	
			14	0	0	0	3	87	0	0	0	0	0	0	1	2	0	22	0	
Pounce	(8-10)	0.20																		
			7	1	2	0	1	46	3	0	0	0	0	0	0	0	0	6	13	
			14	0	1	1	0	49	5	0	0	6	3	0	0	0	0	12	4	
Pounce	(8-24)	0.20																		
			7	1	1	0	0	37	2	0	0	0	1	0	0	0	1	12	0	

Table 9 - (continued)

Treatment[1]			Days after treat- ment[2]	Number per 50 D-Vac Samples[3]															
										Lacewings									
				Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops			
Insecticides		AI/ acre lb.		A	N	A	N	A	N	A	L	A	L	A	L	A	L	Parasitic wasps	Spiders
			Pre	0	2	1	13	56	78	0	0	2	1	1	8	2	0	28	52
Larvin + Thiodan	(7-27)	0.60 + 1.00																	
			7	1	0	0	2	39	2	0	0	2	5	0	0	1	4	42	118
			14	0	0	2	5	34	3	0	0	2	0	0	0	3	0	40	64
Thiodan	(8-10)	1.00																	
			7	1	0	2	4	23	10	0	0	8	5	0	0	5	0	55	8
Methomyl + Thiodan	(8-17)	0.50 + 1.00																	
			7	2	0	0	2	28	0	0	0	11	6	0	0	0	0	24	9
			14	1	0	0	2	36	11	0	0	1	3	0	0	0	0	20	12
			Pre	0	3	1	18	49	54	0	0	0	2	1	14	1	1	36	70
Pounce + Thiodan	(7-27)	0.10 + 1.00																	
			7	0	0	2	2	30	3	0	0	0	2	0	0	4	4	41	31
			14	0	0	1	9	69	3	0	0	1	3	0	0	6	0	60	23
			21	3	0	4	3	17	70	0	0	21	0	0	0	7	1	6	12
Pounce + Thiodan	(8-17)	0.10 + 1.00																	
			7	0	0	1	1	44	5	0	0	3	4	0	0	0	2	19	3
			14	4	0	2	13	69	4	0	0	4	0	0	0	1	0	43	8

Table 9 - (continued)

Treatment[1] Insecticides	AI/ acre lb.	Days after treatment[2]	Geocoris A	Geocoris N	Nabis A	Nabis N	Orius A	Orius N	Lacewings Brown A	Lacewings Brown L	Lacewings Green A	Lacewings Green L	Coccinellidae A	Coccinellidae L	Collops A	Collops L	Parasitic wasps	Spiders
		Pre	0	4	0	1	37	65	0	0	1	0	0	5	4	0	17	33
Methomyl + Thiodan (7-27)	0.50 + 1.00																	
		7	0	0	0	0	12	1	0	0	0	1	1	0	4	0	6	39
		14	0	0	0	0	17	0	0	0	3	0	0	0	9	1	60	30
		21	1	0	0	1	30	2	0	0	7	0	0	1	6	0	9	24
Methomyl + Thiodan (8-17)	0.50 + 1.00																	
		7	0	0	0	0	10	1	0	0	0	1	0	0	3	0	2	21
		14	4	1	0	6	21	16	0	0	1	2	0	0	3	0	28	10
Grower Program																		
		Pre	0	0	0	7	23	22	0	0	1	3	0	10	2	1	24	61
Methomyl + Thiodan (8-1)	0.50 + 1.00																	
		1	0	0	0	0	1	1	0	0	1	5	0	0	0	0	3	14
		8	0	0	0	1	25	0	0	0	0	0	0	0	1	0	24	21
Methomyl + Thiodan (8-10)	0.50 + 1.00																	
		7	0	0	0	0	6	0	0	0	3	3	0	0	4	0	4	12
		14	0	0	1	0	28	7	0	0	4	3	0	0	1	0	19	4
		21	3	0	0	4	20	73	0	0	7	3	0	1	0	0	39	7

Number per 50 D-Vac Samples[3]

Table 9 - (continued)

Treatment[1] Insecticides		AI/ acre lb.	Days after treatment[2]	Geocoris A	Geocoris N	Nabis A	Nabis N	Orius A	Orius N	Lacewings Brown A	Lacewings Brown L	Lacewings Green A	Lacewings Green L	Coccinellidae A	Coccinellidae L	Collops A	Collops L	Parasitic wasps	Spiders
				Number per 50 D-Vac Samples[3]															
			Pre	0	2	1	13	32	85	0	0	0	3	0	24	5	0	49	66
Mavrik	(7-27)	0.15																	
			7	0	0	0	3	56	9	0	0	3	0	0	0	6	0	42	9
			14	0	1	0	2	106	3	0	0	2	3	0	0	14	1	36	5
Mavrik	(8-10)	0.15																	
			7	1	0	0	1	41	2	0	0	3	1	0	0	13	0	4	4
			14	0	0	1	3	89	5	0	0	22	3	0	0	2	0	10	8
Mavrik	(8-24)	0.15																	
			7	0	1	0	4	46	8	0	0	3	2	0	0	0	0	26	2

1 Plot size: Each treatment 5 acres (165' x 1320'). Larvin and Methomyl were 80% dispersible powder and 90% water soluble powder respectively, 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 July 26.

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

STINKBUGS

Table 10 - Stink bug populations in 12 commercial seed alfalfa fields. Fresno County, California, 1983.

Field Number and Location[2]	Variety	Number per 25 ft of row[1]					
		Consperse stink bug			Says stink bug		
		Adult	Nymph	Total	Adult	Nymph	Total
1 Firebaugh	Mesa Sirsa	0	2	2	0	0	0
2 Firebaugh	Mesa Sirsa	0	0	0	1	2	3
3 Firebaugh	F-104	2	5	7	0	26	26
4 Firebaugh	La Rocca	0	0	0	0	1	1
5 San Joaquin	Riley	0	0	0	0	0	0
6 San Joaquin	CUF 101	1	0	1	0	0	0
7 San Joaquin	CW 8015	0	0	0	0	0	0
8 San Joaquin	CUF 101	0	0	0	0	0	0
9 Five Points	CW 69	0	0	0	0	0	0
10 Five Points	Apollo 2	0	0	0	0	0	0
11 Five Points	Blazer	0	0	0	1	2	3
12 Five Points	Peak	0	0	0	0	0	0
Total		3	7	10	2	31	33

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

[2] Samples collected July 12, July 13 and examined on July 15.

Table 11 - Percentages of good and defective seeds in samples from 12 commercial seed alfalfa fields surveyed for stink bug damaged seed. Fresno County, California, 1983.

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Firebaugh	Mesa Sirsa	1621	95.7	0.1	2.4	0.3	0.1	1.4	0.0
2 Firebaugh	Mesa Sirsa	1468	93.3	1.4	4.7	0.1	0.1	0.4	0.0
3 Firebaugh	F-104	1410	87.8	2.6	9.3	0.1	0.1	0.1	0.0
4 Firebaugh	La Rocca	1508	85.9	4.1	8.8	0.6	0.0	0.6	0.0
--- Average	---	1502	90.6	2.1	6.3	0.3	0.1	0.6	0.0
1 San Joaquin	Riley	1563	86.3	2.2	4.3	0.1	0.1	7.0	0.0
2 San Joaquin	CUF 101	1645	93.9	0.0	3.8	0.0	0.2	2.0	0.1
3 San Joaquin	CW 8015	1639	93.8	0.1	3.7	0.1	0.2	2.1	0.0
4 San Joaquin	CUF 101	1735	95.3	0.0	2.2	0.2	0.5	1.8	0.0
--- Average	---	1646	92.3	0.6	3.4	0.1	0.3	3.2	0.1
1 Five Points	CW 69	1909	93.9	0.5	4.2	0.2	0.1	1.1	0.0
2 Five Points	Apollo 2	1712	94.3	0.6	3.6	0.5	0.1	0.9	0.0
3 Five Points	Blazer	1586	85.5	3.7	8.8	0.7	0.0	1.3	0.0
4 Five Points	Peak	1536	93.2	0.7	3.8	0.2	0.0	1.8	0.3
--- Average	---	1686	91.7	1.4	5.1	0.3	0.1	1.3	0.1
3 Area Average	---	1611	91.5	1.4	4.9	0.2	0.2	1.7	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.

Table 12 - Percentages of good and defective seeds in samples from 121 commercial seed alfalfa fields surveyed for chalcid damaged seed. Fresno, Kings, and Imperial Counties, California, 1983.

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Firebaugh	Mesa Sirsa	1621	95.7	0.1	2.4	0.3	0.1	1.4	0.0
2 Firebaugh	Mesa Sirsa	1468	93.3	1.4	4.7	0.1	0.1	0.4	0.0
3 Firebaugh	Common	1662	95.4	0.5	2.7	0.0	0.2	1.2	0.0
4 Firebaugh	F-104	1410	87.8	2.6	9.3	0.1	0.1	0.1	0.0
5 Firebaugh	La Rocca	1508	85.9	4.1	8.8	0.6	0.0	0.6	0.0
--- Average	---	1534	91.7	1.7	5.6	0.2	0.1	0.7	0.0
1 Mendota	Moapa 69	1680	96.6	0.4	1.7	0.0	0.3	0.9	0.1
2 Mendota	Moapa 69	1539	87.1	3.3	5.8	0.1	0.1	3.5	0.1
3 Mendota	Moapa 69	1801	96.8	0.1	2.6	0.0	0.1	0.4	0.0
4 Mendota	Moapa 69	1489	95.6	0.1	3.0	0.2	0.1	1.0	0.0
5 Mendota	Moapa 69	1648	92.3	0.7	4.6	0.4	0.7	1.3	0.0
6 Mendota	Moapa 69	1716	67.9	6.4	12.6	0.5	0.3	12.1	0.2
7 Mendota	DK-187	1489	94.4	0.3	3.2	0.3	0.4	1.4	0.0
8 Mendota	CUF 101	1997	93.8	0.2	4.6	0.1	0.5	0.7	0.1
9 Mendota	NAPB 109	1688	81.3	3.3	9.0	5.4	0.0	0.8	0.2
--- Average	---	1672	89.5	1.6	5.2	0.8	0.3	2.5	0.1
1 Tranquility	Moapa 69	1909	93.0	0.2	5.5	0.4	0.1	0.8	0.0
2 Tranquility	Moapa 69	1677	96.1	1.4	2.0	0.0	0.2	0.3	0.0
3 Tranquility	Moapa 69	1597	94.3	0.2	3.6	0.3	0.3	1.3	0.0
4 Tranquility	Expo 74	1642	91.3	0.6	6.1	0.0	0.1	1.8	0.1
5 Tranquility	CW 69	1604	95.5	0.6	2.3	0.3	0.2	1.0	0.1
6 Tranquility	CUF 101	1924	93.7	0.2	4.5	0.4	0.4	0.8	0.0
7 Tranquility	CUF 101	1570	92.4	0.1	3.2	0.6	0.2	3.5	0.0
8 Tranquility	DK-187	1683	93.7	0.5	4.1	0.3	0.3	1.1	0.0

Table 12 - (continued)

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
9 Tranquility	Cimmarron	1568	92.2	0.7	5.5	0.3	0.1	1.2	0.0
10 Tranquility	167-R	1551	-95.8	0.6	2.1	0.5	0.3	0.7	0.0
---- Average	---	1673	93.7	0.5	3.9	0.3	0.2	1.3	0.1
1 San Joaquin	A-54	1703	88.2	3.9	4.6	2.6	0.1	0.5	0.1
2 San Joaquin	Riley	1563	86.3	2.2	4.3	0.1	0.1	7.0	0.0
3 San Joaquin	Trident	1851	89.1	0.1	6.3	1.4	0.9	2.1	0.1
4 San Joaquin	Armor	1548	84.0	1.6	12.7	0.0	0.0	1.6	0.1
5 San Joaquin	167-R	1621	87.2	0.3	9.0	0.6	0.2	2.7	0.0
6 San Joaquin	Vertus	1800	84.9	1.1	7.9	4.8	0.2	0.8	0.3
7 San Joaquin	Vertus	1629	88.6	2.2	6.6	1.0	0.5	0.4	0.7
8 San Joaquin	Apollo 2	1781	94.3	0.5	4.1	0.1	0.0	0.8	0.2
9 San Joaquin	Apollo 2	1746	94.1	1.4	3.1	0.3	0.1	1.0	0.0
10 San Joaquin	Apollo 2	1841	97.4	0.2	1.7	0.2	0.0	0.4	0.1
11 San Joaquin	CW 62	1650	89.8	1.5	5.9	2.2	0.2	0.1	0.3
12 San Joaquin	CW 8015	1639	93.8	0.1	3.7	0.1	0.2	2.1	0.0
13 San Joaquin	CW 8015	1536	88.2	2.7	4.8	3.5	0.3	0.4	0.1
14 San Joaquin	CW 8015	1510	85.7	4.4	9.0	0.5	0.1	0.3	0.0
15 San Joaquin	Moapa 69	1453	72.6	7.5	14.7	4.0	0.1	1.1	0.0
16 San Joaquin	Moapa 69	1488	91.3	4.0	2.6	1.1	0.3	0.3	0.4
17 San Joaquin	Moapa 69	1822	93.6	1.4	2.5	2.2	0.2	0.1	0.0
18 San Joaquin	Moapa 69	1769	97.6	0.2	1.4	0.2	0.4	0.1	0.1
19 San Joaquin	CUF 101	1666	92.7	3.7	2.5	0.4	0.2	0.3	0.2
20 San Joaquin	CUF 101	1666	96.4	0.2	3.1	0.1	0.1	0.1	0.0
21 San Joaquin	CUF 101	1674	95.3	0.1	3.1	0.1	0.6	0.8	0.0
22 San Joaquin	CUF 101	1645	93.9	0.0	3.8	0.0	0.2	2.0	0.1
23 San Joaquin	CUF 101	1644	95.3	0.1	2.4	0.3	0.1	1.6	0.2
24 San Joaquin	CUF 101	1692	89.4	0.6	9.3	0.0	0.1	0.6	0.0
25 San Joaquin	CUF 101	1673	90.5	1.4	6.0	0.4	0.3	1.4	0.0

Table 12 - (continued)

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
26 San Joaquin	CUF 101	1735	95.3	0.0	2.2	0.2	0.5	1.8	0.0
27 San Joaquin	CUF 101	1623	88.7	0.6	8.3	0.1	0.1	2.1	0.1
28 San Joaquin	CUF 101	1661	97.1	0.1	2.1	0.2	0.0	0.4	0.1
29 San Joaquin	CUF 101	1682	82.2	1.6	8.6	7.0	0.2	0.2	0.2
30 San Joaquin	Common	1658	91.4	0.4	3.1	0.0	0.1	4.9	0.1
31 San Joaquin	Common	1728	91.3	0.3	6.3	0.4	0.4	1.3	0.0
32 San Joaquin	Common	1684	92.6	0.6	5.1	0.3	0.2	1.2	0.0
33 San Joaquin	Common	1469	87.1	2.0	10.2	0.6	0.0	0.1	0.0
--- Average	---	1662	90.5	1.4	5.5	1.1	0.2	1.2	0.1
1 Five Points	Advantage	1800	97.3	0.0	1.9	0.2	0.4	0.2	0.0
2 Five Points	DeKalb 187	1583	80.6	1.3	16.4	0.4	0.2	1.1	0.0
3 Five Points	DeKalb 185	1937	95.9	0.0	3.1	0.0	0.0	0.9	0.1
4 Five Points	FM-129	1576	52.7	6.8	36.8	0.8	0.0	2.9	0.0
5 Five Points	Blazer	1586	85.5	3.7	8.8	0.7	0.0	1.3	0.0
6 Five Points	Blazer	1549	90.8	2.4	3.5	2.3	0.1	0.6	0.3
7 Five Points	CW 69	1909	93.9	0.5	4.2	0.2	0.1	1.1	0.0
8 Five Points	CW 69	1629	92.0	0.9	5.5	0.6	0.2	0.8	0.0
9 Five Points	CW 69	1668	93.0	1.6	3.5	1.6	0.1	0.2	0.0
10 Five Points	CW 69	1722	91.6	0.4	5.8	0.1	0.1	2.0	0.0
11 Five Points	CW 120	1620	95.0	0.3	2.4	1.6	0.3	0.3	0.1
12 Five Points	CW 120	1562	96.7	1.3	1.2	0.4	0.0	0.2	0.2
13 Five Points	Pioneer 532	1676	96.5	0.3	1.8	0.0	0.0	1.4	0.0
14 Five Points	Pioneer 532	1620	93.6	0.6	3.6	0.7	0.3	1.1	0.1
15 Five Points	Trident	2011	96.4	0.3	2.4	0.0	0.6	0.3	0.0
16 Five Points	Trident	1644	95.0	0.4	1.5	2.3	0.3	0.3	0.2
17 Five Points	Apollo 2	1712	94.3	0.6	3.6	0.5	0.1	0.9	0.0
18 Five Points	Apollo 2	1464	89.4	2.9	3.7	2.9	0.1	0.1	0.9
19 Five Points	Peak	1536	93.2	0.7	3.8	0.2	0.0	1.8	0.3

Table 12 - (continued)

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
20 Five Points	Peak	1736	86.7	0.8	11.7	0.2	0.0	0.5	0.1
21 Five Points	Peak	1713	95.7	0.4	3.2	0.3	0.1	0.3	0.0
22 Five Points	Peak	1597	92.5	0.4	6.1	0.2	0.2	0.6	0.0
23 Five Points	Moapa 69	1570	97.5	0.5	1.4	0.3	0.0	0.3	0.0
24 Five Points	Moapa 69	1648	96.5	0.2	1.7	0.9	0.2	0.3	0.2
25 Five Points	CUF 101	1600	96.1	0.0	2.1	0.6	0.2	0.9	0.1
26 Five Points	CUF 101	1671	92.2	0.5	5.6	0.2	0.1	1.3	0.1
27 Five Points	CUF 101	1629	96.0	0.2	2.1	0.0	0.2	1.2	0.3
28 Five Points	CUF 101	1486	94.7	1.3	2.6	0.3	0.0	1.1	0.0
--- Average	---	1659	91.7	1.1	5.4	0.7	0.1	0.9	0.1
1 Coalinga	Moapa 69	2026	94.3	0.7	3.7	0.3	0.0	1.0	0.0
2 Coalinga	Moapa 69	1802	89.2	2.5	4.6	0.3	0.2	3.2	0.0
--- Average	---	1914	91.7	1.6	4.2	0.3	0.1	2.1	0.0
1 Corcoran	Trumpetor	1720	84.0	7.7	5.1	1.6	1.1	0.5	0.0
2 Corcoran	NAPB 105	1612	94.3	0.2	5.2	0.1	0.0	0.2	0.0
3 Corcoran	Baron	1592	94.6	1.8	2.6	0.0	0.5	0.5	0.0
4 Corcoran	Eagle	1611	96.1	0.8	1.5	0.3	1.0	0.3	0.0
5 Corcoran	Magnum	1811	90.6	0.2	2.9	0.0	6.2	0.1	0.0
6 Corcoran	Magnum	1663	92.9	0.2	6.6	0.0	0.1	0.2	0.0
7 Corcoran	NK 78-115	1728	96.9	0.1	2.5	0.1	0.2	0.2	0.0
8 Corcoran	NK 78-115	1544	95.7	0.9	1.8	1.0	0.1	0.3	0.2
9 Corcoran	NK 3650	1539	96.5	0.6	1.0	0.9	0.1	0.8	0.1
10 Corcoran	PT 524	1746	91.3	0.2	2.2	0.1	5.3	0.9	0.0
11 Corcoran	WL 315	1558	92.9	1.7	3.8	0.1	1.2	0.3	0.0

Table 12 - (continued)

Field Number and Location[2]	Variety	Seed Exam[1]	Good Seed	Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
12 Corcoran	PI 532	1780	94.0	0.5	2.5	0.9	1.6	0.5	0.0
13 Corcoran	PI 532	1610	97.4	0.3	1.6	0.0	0.6	0.1	0.0
14 Corcoran	Moapa 69	1602	92.8	0.5	5.3	0.5	0.4	0.5	0.0
15 Corcoran	Moapa 69	1751	92.4	0.5	3.8	1.8	1.3	0.2	0.0
16 Corcoran	Moapa 69	1589	88.7	2.9	7.4	0.4	0.2	0.4	0.0
17 Corcoran	Moapa 69	1587	96.0	0.6	2.0	1.1	0.1	0.1	0.1
18 Corcoran	Moapa 69	1684	90.5	1.8	3.6	3.2	0.4	0.4	0.1
19 Corcoran	Moapa 69	1434	88.9	1.2	5.1	3.8	0.5	0.4	0.1
--- Average	---	1640	92.9	1.2	3.5	0.8	1.1	0.4	0.1
1 Imperial Co.	UC Cargo	1787	89.3	1.0	5.0	0.7	2.5	1.5	0.0
2 Imperial Co.	UC Cargo	1624	81.0	0.7	11.0	2.3	0.8	4.2	0.0
3 Imperial Co.	CUF 101	1575	81.8	1.8	3.8	3.5	9.0	0.1	0.0
4 Imperial Co.	Salton	1579	83.3	0.4	3.8	0.8	11.2	0.5	0.0
5 Imperial Co.	UC Cargo	1851	87.7	3.0	3.8	1.6	3.7	0.1	0.1
6 Imperial Co.	Moapa 69	1625	65.4	1.6	25.7	4.1	2.5	0.7	0.0
7 Imperial Co.	CUF 101	1769	95.3	0.1	2.9	0.4	0.8	0.5	0.0
8 Imperial Co.	Moapa 69	1952	92.0	2.0	4.0	0.7	0.5	0.8	0.0
9a Imperial Co.	CUF 101	1771	90.0	0.9	3.4	1.1	4.1	0.4	0.1
9b Imperial Co.	CUF 101	1688	92.9	1.5	2.4	1.2	1.4	0.3	0.3
10 Imperial Co.	CUF 101	1657	78.0	2.0	10.5	2.2	6.1	1.2	0.0
11 Imperial Co.	CUF 101	1796	91.1	1.9	2.8	2.1	1.2	0.6	0.3
12 Imperial Co.	Moapa 69	1894	94.4	0.8	1.8	1.4	1.5	0.0	0.1
13 Imperial Co.	CUF 101	1724	67.5	9.5	10.4	5.1	6.8	0.6	0.1
14 Imperial Co.	Moapa 69	1976	90.0	0.4	1.2	0.2	7.9	0.1	0.2
15 Imperial Co.	UC Cargo	1903	93.8	1.2	3.1	0.5	0.4	0.7	0.3
--- Average	---	1761	85.8	1.8	6.0	1.7	3.8	0.8	0.1

Table 12 - (continued)

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
8 Area Average	---	1689	91.1	1.4	4.8	0.7	0.7	1.2	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.

2 9a and 9b refer to 1 field, north and south sample areas, respectively.

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 from Cooperative Extension Offices.

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:

Ammo® (cypermethrin)	Mitac® (amitraz)
Carzol® (formetanate)	Monitor® (methamidophos)
Comite® (propargite)	Parathion
Di-Syston® (oxydisulfoton)	Pay Off® (flucythrinate)
Larvin® (thiodicarb)	Phosdrin® (mevinphos)
Lorsban® (chlorpyrifos)	Pounce® (permethrin)
Malathion	Supracide® (methidathion)
Mavrik® (fluvalinate)	Thiodan® (endosulfan)
Methyl Parathion	Vydate® (oxamyl)
Methomyl	Zectran® (mexacarbate)

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.

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