Anton G. Mueller

PROGRESS REPORT OF

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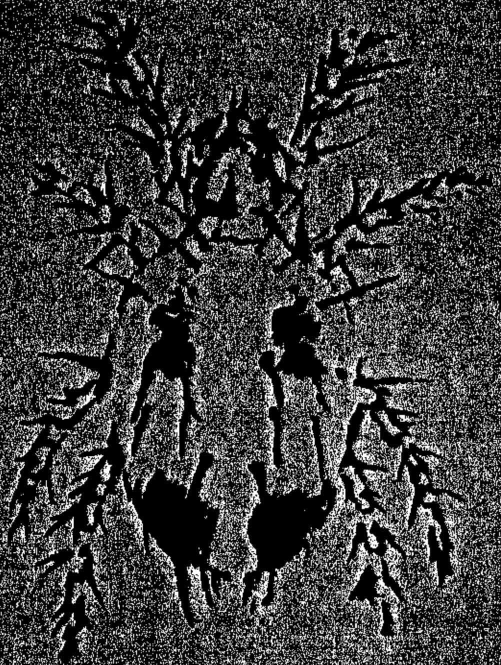

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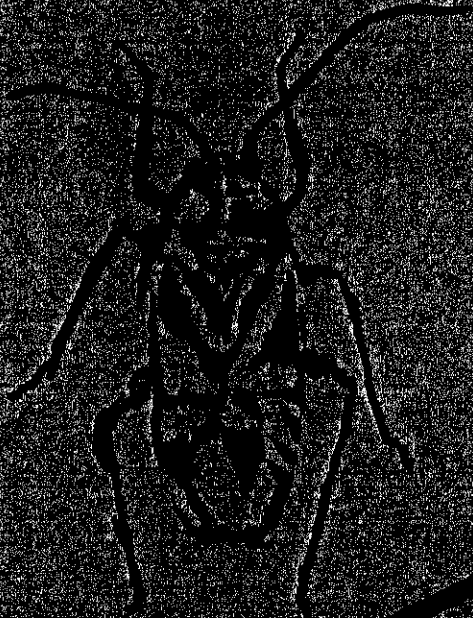

LYGUS

INSECT STUDY RESULTS in seed alfalfa

1982

Acknowledgements

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We wish to acknowledge the cooperation and assistance of growers in Imperial County in the surveys conducted in their fields and we sincerely appreciate the cooperation of Pest Control Advisers in Imperial County in helping to obtain treatment histories in the various fields utilized in the study. We also wish to acknowledge the important contributions derived from thesis research projects conducted by Graduate Students Don Swincer and Curtis Powell, Entomology, U.C. Davis.

Research on Insects Affecting
Seed Alfalfa 1982

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Introduction

Research objectives for 1982 were to 1) continue to investigate potential resistance of alfalfa to lygus bugs and possible cultural practices that may enhance seed production with reduced dependence on insecticides, 2) continue to investigate the factors involved in the effects of insecticides (Monitor-Orthene) on the susceptibility of certain alfalfas resistant to the spotted alfalfa aphid, 3) continue to study the effects of spider mites on the production of seed alfalfa and to establish economic thresholds and 4) to evaluate new insecticides, acaricides and combinations of these materials for control of lygus bugs, aphids and spider mites.

Surveys were conducted in 70 commercial alfalfa seed fields in Fresno and Kings Counties and in 11 fields in Imperial County to ascertain the percentages of seeds damaged by the alfalfa seed chalcid, lygus bugs and stink bugs.

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Evaluation of alfalfa introductions for potential resistance to lygus bugs

An evaluation was made during 1982 of 11 alfalfa entries in replicated plantings on the Davis Campus for potential resistance to lygus bugs. Six of the entries were evaluated in 1981 and were reevaluated in 1982. Four of the entries were hairy leaf types, UC-1319, UC-1320, UC-1321, UC-1322 (Table 1) that were evaluated for potential lygus bug resistance for the first time in 1982. Moapa 69 was included as a standard variety for comparison. Each entry consisted of 10 individual plants planted in single rows. Each entry was replicated 3 times. The entire experimental area was bordered with the variety Moapa 69.

Each entry was sampled for lygus bugs by beating the top portion of plants over a white plastic pan 11" x 13" (28 x 34 cm). Ten such subsamples were taken in each row (30 samples per entry on each sampling date). Plots were sampled on August 23, 30 and September 20. Adults and nymphs were jarred into the pan but only the nymphs were counted. Adult lygus bugs are strong fliers and move readily from plant to plant. Nymphs are confined to the plants and it was believed that by considering only the nymph population a gross determination could be made of lygus bug populations actually developing on the various entries.

The results of this study are shown in Table 1. Lygus bug populations developed on all of the alfalfa entries. Statistically fewer nymphs occurred on entry 311455 and on Moapa 69 than on the other entries, Table 1, but it was obvious that lygus bugs were able to establish populations on all entries. Entry 311455 is a very prostrate growing variety and this habit of growth may have been the predominant factor contributing to the low population. The four hairy leaf entries all supported high nymph populations and with the exception of entry 73-149, which was a smooth leaf type, nymph populations were

Table 1 - Population of lygus bugs on the alfalfa entries in the UC Davis lygus resistance screening plots. U.C. Davis, California, 1982.

	Number lygus bug nymphs per foot of row[2]			
	Sampling dates			
Entry Numbers[1]	August 23	August 30	September 20	Mean[3]
311455	3.0	4.4	2.1	3.2 a
Moapa 69	5.4	8.7	3.4	5.8 ab
Ly-265	7.6	10.5	5.5	7.9 bc
Ly-97	8.9	11.1	6.7	8.9 cd
286360	8.8	12.2	6.0	9.0 cd
3399552	8.5	11.7	7.7	9.3 cde
UC-1319	11.6	13.3	5.7	10.2 cdef
UC-1322	11.9	12.9	6.8	10.5 def
UC-1321	11.2	15.2	7.1	11.2 def
UC-1320	10.7	13.8	10.8	11.8 def
73-149	12.2	16.1	8.1	12.1 f

[1] Plot size: Each entry consisted of 10 individual plants replicated 3 times.

[2] 30-one foot beating pan samples per entry on each sampling date.

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

significantly higher on the hairy leaf varieties (at 1% level) than on the other entries included in the experiment.

In summary, there were no indications of resistance to lygus bugs among the entries tested but the data indicate that the hairy leaf condition may favor lygus bug development.

Because of the high lygus bug populations, very few floral racemes developed and little or no seed was produced on any of the plants in the lygus-host plant resistance experiment.

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

It was reported in 1981 that experiments conducted by Curtis Powell, a graduate student, had shown that survival and reproduction of spotted alfalfa aphids on certain aphid resistant alfalfas treated with Monitor or Orthene were significantly higher than on those same varieties left untreated. It appears that the chemicals in some way or ways affect and temporarily negate those factors in the plants responsible for the resistance.

Mr. Powell is continuing his studies aimed at elucidating the reasons for the breakdown of resistance in alfalfa treated with Monitor and Orthene. The results of these studies may provide clues to the factors that are responsible for resistance to the SAA in the various resistant alfalfas. To date, the resistance factors in the plants are unknown. Mr. Powell is pursuing two lines of investigation. One line of study is based on the hypothesis that insecticide applications stress resistant alfalfa plants resulting in the plant mobilizing nitrogen in the form of amino acids. The higher levels of amino acids result in increased nutritional quality of the alfalfa which allows the SAA to grow and reproduce in spite of the resistance present. He will attempt to correlate changes in the fecundity of SAA with changes in the amino acid content of the phloem.

He is also pursuing a line of investigation that involves a theory that varieties containing germ plasm of Flemish origin are more likely to undergo a breakdown in resistance. Varieties will be chosen which have various combinations of genetic origin, dormancy and initial resistance level. These varieties will be tested for resistance loss with and without applications of Monitor. He hopes to correlate the degree of resistance loss in an alfalfa variety with certain characteristics of that variety.

Insecticide evaluation experiments

During 1982, 3 separate experiments were conducted in which 7 insecticides, 3 acaricides, 2 insecticide combinations and 2 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 2 and 3. The following insecticides and combinations were evaluated for control of lygus bugs. Pounce® (permethrin), Ammo® (cypermethrin), Pay Off®, Lorsban® (chlorpyrifos), Monitor® (methamidophos), Mavrik® (fluvalinate), Advantage®, Pounce + Comite® (propargite), Ammo + Comite, Thiodan® (endosulfan) + Nudrin® (methomyl), Thiodan + Lannate® (methomyl). Comite was included in the combinations to control spider mites. The Thiodan + Nudrin and Thiodan + Lannate combinations were applied to control the spotted alfalfa aphid, but were also evaluated for lygus bug control. Lorsban was applied to control an infestation of the sugar beet armyworm and was incidentally evaluated for control of lygus bugs. The materials were all applied as foliar sprays at 10 gallons per acre by aircraft in early morning prior to 4:00 a.m.

The experiment shown in Table 2 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. The insecticides were all applied for the first time on June 23 when lygus populations ranged from 3.0 to 5.8 bugs per sweep and averaged approximately 4.0. Pounce, Ammo, Pay Off and Mavrik were synthetic pyrethroids and the objectives of this experiment were to evaluate the effectiveness of these pyrethroids 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 0.2 lb AI/acre in combination with Comite at 1.69 lb AI/acre and also without Comite. The first application (6-23) held lygus bug populations below pretreatment levels in both treatments for 27 days. There was no difference in lygus bug control between the Pounce-Comite combination and Pounce alone. Pounce was applied for the second time (7-28) 35 days after the first application. Comite was applied with Pounce in both treatments on this date because of increasing spider mite populations. Lygus bug populations remained below the treatment level of 8-10 bugs/sweep in both Pounce plots for 20 days. Pounce was applied for the third time to both plots on 8-18. This treatment again reduced lygus bug populations and held them below 8-10 bugs/sweep for 13 days.

Although the alfalfa variety in this experiment was resistant to the spotted alfalfa aphid, aphids became established in the plots treated with Pounce and reached population levels that required treatment. Thiodan-Nudrin was applied on 9-4 to control the spotted alfalfa aphid. This treatment also controlled lygus bugs for the remainder of the season.

Ammo was applied at 0.1 lb AI/acre in combination with Comite at 1.69 lb AI/acre and also without Comite. The first application (6-23) resulted in excellent control of lygus bugs for 41 days in both plots. There were no differences in lygus bug control between the Ammo-Comite combination and Ammo alone. Ammo was applied for the second time (8-4) 42 days after the first application. Comite was included in this treatment in both plots because of increasing spider mite populations. This application controlled lygus bugs in both plots for 34 days. Ammo was applied for the third time to both plots on 9-8. This treatment again reduced lygus bug populations and no additional applications were required for the remainder of the season.

Pay Off was applied at 0.08 lb AI/acre 3 times during the season. The first application was made on 6-23, the second on 7-28 and the third on 8-25. Comite was applied on 7-14 at 1.69 lb AI/acre to control spider mites. Lorsban was applied on 9-1 at 0.50 lb AI/acre to control an infestation of the sugar beet armyworm that was feeding on the floral racemes. The first application of Pay Off held lygus bug populations below pretreatment levels for 27 days. The second application held lygus bug populations below 8-10 bugs per sweep for 27 days. It was not possible to fully evaluate the residual effect of the third application because the Lorsban treatment for sugar beet armyworm controlled lygus bugs for the remainder of the season.

Mavrik was applied 3 times during the season at 0.20 lb AI/acre per application. The first application was made on 6-23, the second on 7-28 and the third on 8-25. Comite was applied on 7-14 at 1.69 lb AI/acre to control spider mites. Lorsban was applied on 9-1 at 0.50 lb AI/acre to control the sugar beet armyworm. The first application of Mavrik held lygus bug populations below pretreatment levels for 27 days. The second application held lygus bug populations below 8-10 bugs per sweep for 13 days. The third application resulted in a 79.4% reduction in the lygus bug populations, but it was not possible to evaluate this application of Mavrik beyond 6 days because of the Lorsban application to control beet armyworms which controlled lygus bugs for the remainder of the season.

Monitor was applied 3 times during the season at 0.50 lb AI/acre per application. The first application was made on 6-23, the second on 7-21 and the third on 8-25. Comite was applied on 7-14 at 1.69 lb AI/acre to control spider mites. Lorsban was applied on 9-1 at 0.5 lb AI/acre to control the sugar beet armyworm. The first application of Monitor held lygus bug populations below pretreatment levels for 20 days and below 8-10 bugs per sweep for 27 days. The second application held lygus bug populations below 8-10 bugs per sweep for 27 days. The third application of Monitor resulted in a 98.8% reduction in the lygus bug population, but it was not possible to evaluate this application for more than 6 days because of the Lorsban treatment to control beet armyworms.

The second experiment, Table 3, 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. Pretreatment populations of lygus bugs were very low in this experiment due to previous commercial treatments and they remained low throughout the course of this experiment. The insecticides were applied twice, on 6-24 and on 7-8 or 7-15. It is difficult to draw any valid conclusions from the data obtained in this experiment regarding control of lygus bugs. Populations were low but they exceeded pretreatment levels within 12 days after application in plots treated with Pounce, Pay Off, Advantage and Mavrik. Ammo appeared to provide longer residual control of lygus bugs than the other materials in this trial, with populations equalling pretreatment levels 19 days after the application of Ammo.

Lygus bug study in Imperial County

During 1982 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 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 subsamples of seeds were examined from each of the threshed 2-quart samples, an average of 1538 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 4. Seven different insecticides and 4 insecticide combinations were reported as having been used. The insecticides were Bidrin®, Phosdrin®, Carzol®, Monitor®, Lorsban®, Lannate® and Supracide®. The combinations were Parathion + Phosdrin, Dylox + Carzol, Thiodan + Parathion and Carzol + Supracide. The number of insecticide applications per individual field ranged from 3 to 6.

In examining the data in Table 4 it appears that the effectiveness of the treatments in general was short-lived. Depending upon the individual field, treatment intervals generally ranged from 6 to 14 days. There were two instances where treatment intervals of 19 and 29 days were reported. Lygus bug populations varied considerably among the fields but were frequently very high. For example, counts of 56, 49, 33, 27, 26, and 20 bugs per sweep were recorded. It was observed that in many instances the insecticides that were applied did not significantly reduce the lygus population or, if the population was reduced, it was only for a short time.

The area is primarily a hay producing area and many of the fields used for seed production are basically hay fields. Hay fields may be adjacent to or in the near vicinity of fields in which seed is being produced. Cutting of the hay fields results in mass movements of lygus bugs from these fields to surrounding fields so that even though a treatment may have controlled the lygus bug population, that field may be reinfested a short time later by migratory lygus bugs.

An analysis of seeds from the various fields in general showed a high incidence of lygus bug damaged seed. The percentages of lygus bug damaged seed for the six fields were 40.4, 5.3, 9.3, 23.4, 7.2 and 13.8. The overall average percentage of lygus damaged seed for the 6 fields was 16.6. Percentages of seeds damaged by the seed chalcid for the 6 fields were 3.2, 2.0, 1.8, 10.5, 3.4 and 2.7. The overall average of chalcid damaged seeds for the 6 fields was 3.9%

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 5, the variety of alfalfa was Mesa Sirsa, highly resistant to the spotted alfalfa aphid (SAA). Although the variety was aphid resistant, very small numbers of SAA were present on the plants when the insecticides were first applied on June 23. SAA populations began to increase in plots treated with Pounce at 0.2 lb AI/acre 13 days after the second application which was made on July 28. Aphid populations continued to increase in these plots for the succeeding 4 weeks. A third application of Pounce on August 18 did not reduce the aphid population. By August 31 aphid populations were so heavy in the Pounce plots that plants were losing lower leaves and the foliage was becoming sticky with honeydew. The Pounce plots were treated on

September 4 with Thiodan 1.0 + Nudrin 0.5 lb AI/acre which provided excellent control of SAA for the remainder of the season.

A similar, although much less severe, situation involving SAA occurred in plots treated with Ammo at 0.1 lb AI/acre. The SAA population began to increase following the second application of Ammo on August 4 and continued to increase for the next 4 weeks. The populations were much lower than those in the plots treated with Pounce and a third application of Ammo on September 8 effectively controlled the aphid population.

SAA populations did not increase in plots treated with Pay Off 0.08 lb AI/acre, Mavrik 0.2 lb AI/acre and Monitor 0.5 lb AI/acre. We have no explanation for the increase in SAA populations in plots treated with Pounce and Ammo. It appears that the chemicals may have altered the factor(s) causing resistance to the aphid in this alfalfa variety. In 1981, 3 applications of Pounce 0.2 lb AI/acre and Ammo 0.1 lb AI/acre were made to CW-8, another SAA resistant variety, without causing an increase in the aphid population.

Pea aphid populations in the plots treated with Pounce were virtually eliminated. However, pea aphid populations increased following the second application of Ammo (8-4), Pay Off (7-28), Mavrik (7-28) and Monitor (7-21). A third application of each of the preceding materials effectively controlled the pea aphid for the remainder of the season.

One experiment was conducted to specifically evaluate aphicides. The alfalfa variety used in this experiment was Vertus, highly susceptible to SAA. This experiment was begun on June 24 when high populations of SAA were present. The results of this experiment are presented in Table 6. The aphicides evaluated were Thiodan 1.0 + Nudrin 0.5 lb AI/acre, Pounce 0.2 lb AI/acre, Ammo 0.1 lb AI/acre, Pay Off 0.08 lb AI/acre, Advantage 0.5 lb AI/acre, Mavrik 0.2 lb AI/acre and Thiodan 1.0 + Lannate 0.5 lb AI/acre. Thiodan +

Lannate was used by the grower to control the SAA infestation in the field outside of the experiments.

In this experiment, Pounce appeared to be the most effective of the materials tested for control of SAA. Pounce was applied twice, June 24 and July 15. Five days after the June 24 application aphid populations were 96.4% below pretreatment levels. Twelve days after this application, populations declined to 98% under pretreatment levels, and 19 days after the June 24 application aphid populations were 96% below pretreatment levels. The second application on July 15 reduced the remaining population by 81%. Aphid populations in this treatment continued to decline and at 19 days after application were 87.5% below the July 15 levels.

Thiodan + Nudrin and Thiodan + Lannate were also highly effective in controlling SAA although Thiodan + Nudrin did not result in the degree of residual control obtained with Pounce. Aphid populations required retreatment at 19 days after application of Thiodan + Nudrin. Thiodan + Lannate resulted in longer residual control of SAA (control for approximately 30 days) than Thiodan + Nudrin. The reasons for this were not obvious. Lannate and Nudrin are both methomyl but are formulated by different companies. Possible differences in formulation may account for the differences in control.

The first application of Pay Off resulted in good initial reduction of the aphid population (96% under pretreatment levels). However, aphid populations rebounded and retreatment was required at 12 days after the first application. The second application of Pay Off only reduced the aphid population 55%.

Results with Mavrik were similar to those of Pay Off with a good initial reduction of the aphid population but a later resurgence that required retreatment 12 days after the first application. The second application of Mavrik, however, resulted in a 97% reduction of the aphid population.

Results with Ammo were also similar to those of Pay Off and Mavrik although initial population reductions were approximately 94% as compared with 96% for Pay Off and Mavrik. Aphid populations increased in the Ammo treatment following application and required retreatment 19 days after the initial Ammo application. This plot was retreated with Thiodan + Lannate which gave excellent control of the SAA.

Advantage was the least effective of the materials evaluated for control of SAA. Initial reduction of the aphid population was 75% below pretreatment level and within 12 days the population was only 17% below the pretreatment level. A second application of Advantage resulted in 57% reduction of the aphid population.

Pea aphid populations were effectively controlled with all of the aphicides evaluated in this experiment.

Spider Mites

Three acaricides were evaluated in 1982 for control of spider mites on seed alfalfa. These materials were Plictran®, Comite®, and Mitac®. Data on acaricides were obtained in two experiments. The first, Table 7, involved season-long trials with insecticides for lygus bug control. Most 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 the pyrethroids. To further evaluate the effects of the pyrethroids on spider mite populations Comite at 1.69 lb AI/acre was combined with Pounce and Ammo at the first application on 6-23. These treatments were compared with plots where Pounce and Ammo were applied without combining with Comite. Pay Off, Mavrik and Monitor were applied for the first time (6-23) without

Comite. A second application of Comite in combination with Pounce and Ammo was made on 7-28. Comite was also applied on 7-14 or 7-28 to those plots that did not receive Comite earlier. The data presented in Table 7 show that spider mite populations in those treatments not receiving the early application of Comite increased significantly over those where Comite was combined with the early treatments for lygus bug control. Comite applied later, either in combination with a lygacide or separately, resulted in significant mite and egg population reductions and populations remained extremely low for the remainder of the season. Both active mite and egg populations were reduced within 6 days after application of Comite and maximum reductions occurred at about 14 days after application.

In a second experiment, Table 8, Comite 1.69 lb AI/acre, Plictran 0.75 lb AI/acre and Mitac 1.00 lb AI/acre were evaluated. The acaricides were applied on 7-6 and the plots were sampled each week for 3 weeks after treatment. None of the treatments appeared to be highly effective in reducing the spider mite population. No reduction in either mites or eggs was observed 7 days after application in any of the treatments. At 14 days after application, mites and eggs were reduced in the Comite treatment, but at 21 days populations of both mites and eggs were higher than pretreatment levels. Egg populations 14 days after Plictran was applied were reduced, but the mites had increased over pretreatment levels and populations continued to increase 21 days after treatment. Mitac did not appear to reduce either mites or eggs. A small reduction in the number of eggs occurred 14 days after application, but at 21 days egg numbers exceeded pretreatment levels.

This field had very dense, rank growth which may have prevented penetration of the chemicals into the plants thus resulting in the poor performance of the acaricides. The remainder of the field was treated commercially with

Comite. This treatment also did not result in good control of the spider mites.

Spider Mite Population Studies

Studies conducted at the West Side Field Station and in the Firebaugh area by Mr. Don Swincer, a graduate student, have demonstrated that seed alfalfa grown in the San Joaquin Valley has a complex of spider mites associated with it (Table 9). Three species were found to be present at varying densities throughout the season. These species were the two-spotted mite, *Tetranychus urticae*, the pacific mite, *T. pacificus*, and the strawberry mite, *T. turkestani*. However, samples taken in the Imperial Valley in 1982 from both forage and seed alfalfa fields showed only one species, the two-spotted mite, to be present there.

It is not possible to distinguish the species by visual means in the field and, as a result, all counts were done in the laboratory. Two alternative identification techniques were used. The classical method of identification is to place the mites on microscope slides and examine the male reproductive organs (aedeagi). This technique is often inaccurate and only males can be used. Frequently only females or immatures are present in samples. A second method utilizing electrophoretic separation was developed and used which proved to be highly successful although it too is a laboratory procedure. Single mites of either sex can be used with this technique.

In 1982 studies at the West Side Field Station showed that each mite species seemed to predominate a particular region of the plant and this stratification of the three species was more apparent in the middle of the season when mite numbers were high.

To determine economic threshold data a randomized split plot design experiment was established at the West Side Field Station to test two alfalfa cultivars at three treatment levels plus a control and an untreated plot. The plots were sampled on a weekly basis throughout the entire season. The sampling technique chosen was a stratified random sample of 30 trifoliate leaves taken from the top, middle and bottom strata of the plant. Throughout the season this sampling plan was compared to the technique of selecting mite damaged leaves to monitor mite populations. Both sampling techniques gave accurate population trends although actual counts were orders of magnitude different.

In addition to the main experiment testing two alfalfa cultivars, a second plot containing several different cultivars was also monitored for spider mites, but this was not harvested for seed yield as was the main experiment.

The alfalfa varieties tested showed different responses to spider mites. Some varieties, e.g. WL 318, showed no significant damage was caused by mites whereas both CUF 101 and Moapa showed economic damage due to the presence of mites. Untreated CUF 101 plots suffered a 19% reduction in yield as did plots where mites reached 20 stadia (all stages of mites, i.e. eggs, nymphs, adults) per leaf. Plots with 10 mite stadia per leaf showed an 11% reduction in seed yield, but plots with 2 mite stadia per leaf showed only a 2% reduction in yield.

The results of the study indicate that if an acaricide is applied when mites reach 2 stadia per trifoliate leaf of a stratified sample of 30 trifoliate leaves, economic damage is not likely to occur. This treatment level of 2 mite stadia per leaf often corresponds with the first treatment for lygus bugs. Applying the acaricide at this time in combination with the insecticide will result in savings of application costs. Data obtained in 1982 and in other years have shown than an effective acaricide applied with the first lygus bug treatment will control spider mites for the remainder of the season in seed alfalfa.

Effects of Insecticides on Predatory and Parasitic Species

Data were obtained in the full season experiment for lygus bug control, in the experiment for control of SAA and in the specific acaricide evaluations 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. As will be seen in Tables 10, 11, and 12, of the predatory insect species, the minute pirate bug, *Orius*, was the most abundant. The next most abundant species were *Geocoris* and *Nabis*. Parasitic wasps and spiders were also present in large numbers. Populations of lacewings, lady beetles and collops beetles were very low.

The first application of the pyrethroids, Pounce, Ammo, Pay Off and Mavrik for control of lygus bugs, Table 10, appeared to have relatively little effect on populations of *Geocoris* and *Orius*, but these chemicals appeared to significantly reduce populations of *Nabis*. Parasitic wasps and spiders appeared to survive the first applications of the pyrethroids in this experiment.

However, the second application of the pyrethroids on 7-28 or 8-4 had a strong adverse impact in reducing the complex of beneficial species. Ammo appeared to have the least drastic effect on *Geocoris* and *Orius* of the materials evaluated.

All of the insecticides, including the pyrethroids, used in the SAA control experiment, Table 11, had an adverse impact on the predatory and parasitic insect populations.

In contrast to the insecticide evaluations, the acaricides, Comite, Plictran and Mitac, Table 12, had little or no adverse impact on the parasitic and predaceous insect complex.

Stink Bug

Stink bug populations were measured on July 14 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 1982. The stink bug populations were sampled using the "beating pan" technique whereby 25 feet of row were examined in each field on each sampling date. The results are shown in Table 13. The populations were very low. Stink bugs occurred in 6 fields but only a total of 47 individuals were found in the survey of which 41 were nymphs. Of the total, 46 were consperse stink bugs and 1 was Says' stink bug. Populations in infested fields numbered 3, 8, 26, 5, 4 and 1 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 this survey are shown in Table 14. The percentages of good seeds in these fields ranged from 67.8 to 94.8. The percentages of seeds with damage attributed to stink bug ranged from 0.0 to 0.8 and averaged 0.2 for the 3 areas.

The Alfalfa Seed Chalcid

Surveys were conducted in seven areas -- Firebaugh, Mendota, San Joaquin, Five Points, Coalinga, Corcoran and Imperial County to evaluate alfalfa seed chalcid infestations. Samples of seed pods were hand stripped before commercial harvest from 81 fields, 6 in the Firebaugh area, 5 from Mendota, 17 from near San Joaquin, 19 from the Five Points area, 8 from near Coalinga, 15 from the Corcoran area and 11 from Imperial County. Four two quart samples of seed pods were taken from each field. The seeds were hand threshed and lightly cleaned with a clipper seed cleaner. An average of 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 15. Seed chalcid injury was generally low and in the Five Points, San Joaquin and Firebaugh areas was lower overall than in 1981. The percentages of chalcid damaged seeds in individual fields ranged from 0 to 11.5. Only two fields out of 81 sustained chalcid damage levels of 11.5% and 10.5%. Overall seed chalcid damage for the Firebaugh area averaged 2.8%, for Mendota 1.8%, for San Joaquin 2.3%, for Five Points 1.2%, for Coalinga 3.0%, for Corcoran 0.9% and for Imperial County 3.7%. Seed chalcid damage for the seven areas averaged 2.3%. The percentages of chalcid damaged seed for the Firebaugh, San Joaquin and Five Points areas for the years 1976 through 1982 are shown graphically in Fig. 1.

Seeds from individual fields showing lygus bug injury ranged from 1.6 to 40.4%. Samples from Imperial County showed the highest percentages of lygus injured seeds. Damage in 4 of 11 fields ranged from 13.8 to 40.4%. Overall percentage of lygus damaged seed from Imperial County averaged 12.3% in the 11 fields surveyed.

In general the percentages of seeds showing lygus bug damage were higher in the San Joaquin Valley in 1982 than in 1980 and 1981. In the Firebaugh, San Joaquin and Five Points areas overall percentages of seeds damaged by lygus bugs in 1982 were 9.4, 9.4 and 5.4 respectively. These percentages compare with 4.7, 4.7 and 4.6 for 1981. We do not know the reasons for the increase in lygus damage but it appears that perhaps growers are using less effective insecticides against lygus bugs or are perhaps allowing higher populations to develop between applications in order to protect honey bees and enhance their pollinating activities.

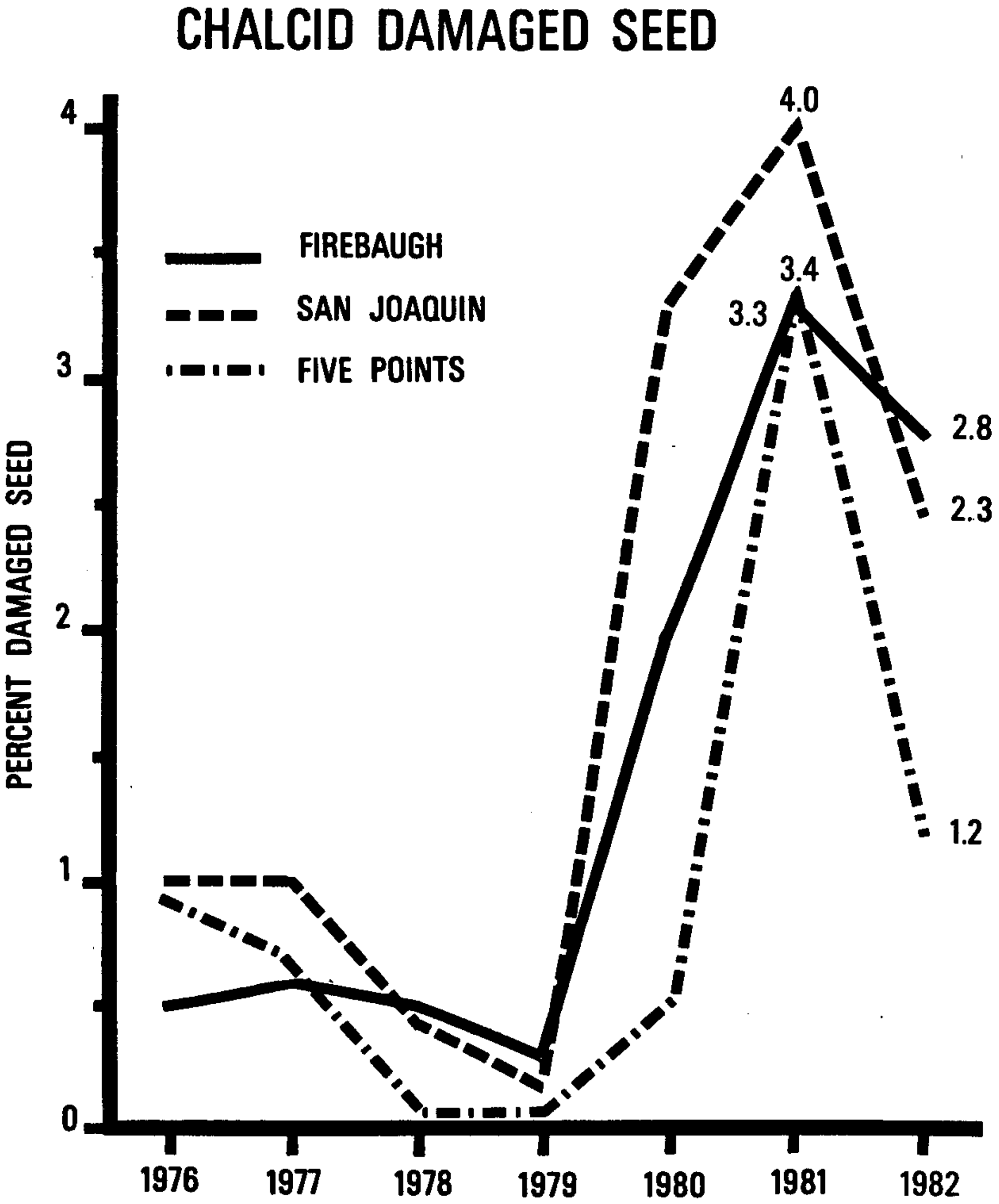


Fig. 1. Percentages of chalcid damaged seed from hand stripped samples taken from commercial alfalfa seed fields in the Firebaugh, San Joaquin and Five Points areas from 1976 to 1982.

Summary and Conclusions

Evaluations were made of 11 alfalfa entries in agronomy plantings on the Davis Campus for potential resistance to lygus bugs. Evaluations were made by counting the number of lygus bug nymphs present in 10 subsamples each comprising one foot of row in each of 3 replications (30 samples per entry) on each of 3 sampling dates. Lygus bug nymphs occurred on all entries, although entry 311455 and Moapa 69 sustained nymph populations that were statistically lower than the other entries. Entry 311455 is a prostrate growing type and this habit of growth may have contributed to the low lygus bug populations. Four hairy leaf entries all supported high nymph populations that were significantly higher than the other entries included in the experiment with the exception of entry 73-149, a smooth leaf type. In summary, there were no indications of resistance to lygus bugs among the entries tested but the data indicate that the hairy leaf condition may favor lygus bug development.

Mr. Curtis Powell, a graduate student, is continuing studies aimed at elucidating the reasons for the breakdown of resistance to the spotted alfalfa aphid in alfalfa treated with Monitor and Orthene. He is pursuing two lines of investigation; in one he is attempting to correlate changes in fecundity of the aphid with changes in the amino acid content of the phloem. He also hopes to correlate the degree of resistance loss in an alfalfa variety with certain characteristics of that variety having to do with its genetic origin.

During 1982, 3 separate experiments were conducted in which 7 insecticides, 3 acaricides, 2 insecticide combinations and 2 insecticide-acaricide combinations were evaluated for control of lygus bugs, the spotted alfalfa aphid, the pea aphid and spider mites. In season-long trials Ammo gave better control of lygus bugs than the other materials evaluated. Applications of Ammo controlled lygus bugs for periods ranging from 34 to 41 days. Monitor and Pay Off were also highly effective, controlling lygus bugs for 27 days. Monitor may have been slightly more effective than Pay Off in late season applications. Pounce controlled lygus bugs for periods ranging from 13 to 27 days. Mavrik also gave control of lygus bugs for 13 to 27 days but appeared to be less effective in late season applications than in early applications.

The alfalfa variety used in the lygus bug control evaluations was Mesa Sirsa, highly resistant to the SAA. Although this variety was aphid resistant, SAA became established in the plots treated with Pounce and continued to increase even following Pounce applications. This aphid eventually reached population levels in plots treated with Pounce that required treatment with Thiodan-Methomyl. A similar although much less severe situation involving population increases of SAA occurred in plots treated with Ammo. However, later applications of Ammo ultimately controlled the aphid. SAA populations did not increase in plots treated with Pay Off, Mavrik or Monitor.

Of the insecticides evaluated specifically for control of the spotted alfalfa aphid on Vertus, a highly susceptible variety, the most effective materials were Pounce and Thiodan + Methomyl (Lannate or Nudrin). Pay Off, Mavrik and Ammo all resulted in good initial population reductions but aphid populations required retreatment within 12 days following application. Ammo appeared to give longer residual control with plots requiring retreatment 19 days after the initial application. Advantage was the least effective of the materials evaluated for control of SAA.

No data were obtained on honey bee visitation in the plots included in the insecticide trials, but it was observed that there was very little bee activity in the experimental area for prolonged periods after the application of chemicals. There were virtually no bees present in plots treated with

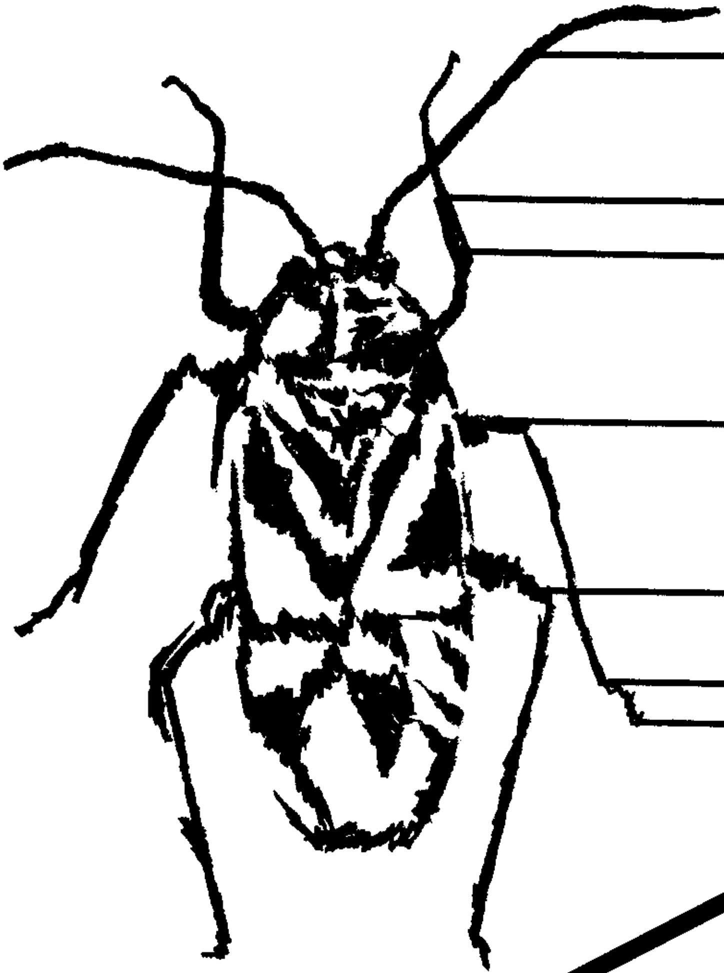
Pounce after these treatments began. We are not certain that the reduced bee activity was related to the Pounce treatments. There may have been other factors attracting the bees away from the seed fields but prolonged absence of bees was observed in areas that were treated with Pounce.

Three acaricides were evaluated in 1982 for control of spider mites in seed alfalfa. These materials were Comite, Plictran and Mitac. 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 excellent control of spider mites. In the acaricide trial neither Comite, Plictran or Mitac gave good control of the mites. The field utilized in the trial had very dense, rank growth which may have prevented penetration of the acaricides into the plants, thus resulting in their poor performance.

Mr. Don Swincer, a graduate student, continued his research on the spider mite complex affecting seed alfalfa. As in 1981, three species were found to be present at varying densities throughout the season in the San Joaquin Valley. These species were the two-spotted mite, the pacific mite, and the strawberry mite. In samples taken in the Imperial Valley from both forage and seed alfalfa, only the two-spotted mite was found to be present. Improved identification techniques and a system of stratified random sampling of mite populations was developed by Mr. Swincer. Studies at the West Side Field Station showed that each mite species seemed to predominate a particular region of the plant and this stratification of the three species was more apparent in the middle of the season when mite numbers were high. His studies also showed that alfalfa varieties differ in responses to spider mites. WL 318 showed no significant damage caused by mites, whereas both CUF 101 and Moapa showed economic damage due to mite presence. The results of his economic level study indicate that if an acaricide is applied when mites reach 2 stadia (all stages of mites, i.e. eggs, nymphs, adults) per trifoliate leaf of a stratified sample of 30 trifoliate leaves, economic damage is not likely to occur. This treatment level of 2 mite stadia per leaf often corresponds with the first treatment for lygus bugs. Applying the acaricide at this time in combination with the insecticide will result in savings of application costs. Data obtained in 1982 and in other years have shown that an effective acaricide applied with the first lygus bug treatment will control spider mites for the remainder of the season in seed alfalfa.

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 the infested fields ranged from 3 to 26 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 70 fields in the San Joaquin Valley and in 11 fields in Imperial County in 1982. Seeds damaged by the seed chalcid were generally low, and the amount of damage in West Fresno County fields was slightly lower than in 1981. The percentages of chalcid damaged seeds in individual fields in the San Joaquin Valley ranged from 0 to 11.5. In the Imperial Valley the range was from 1.1 to 10.5. The overall average percentage of chalcid damaged seeds in the San Joaquin Valley was 2.0 and in the Imperial Valley was 3.7.



LYGUS

Table 2 - Lygus bug populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1982.

Treatment[1]				Number of lygus bugs per sweep[3]					
Insecticides[2]		AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
					Small	Medium	Large	Total	
			Pre	1.6	1.2	1.4	1.6	4.2	5.8
Pounce + Comite	(6-23)	0.20 + 1.69	6	0.0	0.1	0.1	0.1	0.3	0.3
			13	0.2	0.4	0.2	0.1	0.7	0.9
			20	1.7	0.4	0.5	1.4	2.3	4.0
			27	2.0	1.0	0.4	0.0	1.4	3.4
			34	1.0	10.3	7.1	0.7	18.1	19.1
Pounce + Comite	(7-28)	0.20 + 1.69	6	0.0	0.3	0.3	0.5	1.1	1.1
			13	0.3	3.6	1.6	1.1	6.3	6.6
			20	3.3	0.3	5.6	3.1	9.0	12.3
Pounce	(8-18)	0.20	6	0.1	0.7	0.6	0.2	1.5	1.6
			13	0.5	3.2	4.3	1.7	9.2	9.7
Thiodan + Nudrin	(9-4)	1.00 + 0.50	3	0.4	0.0	0.1	0.3	0.4	0.8
			10	0.2	0.0	0.0	0.0	0.0	0.2
			Pre	1.2	1.5	1.6	0.9	4.0	5.2
Pounce	(6-23)	0.20	6	0.1	0.0	0.2	0.1	0.3	0.4
			13	0.1	0.1	0.3	0.1	0.5	0.6
			20	0.7	0.3	0.7	1.0	2.0	2.7
			27	2.8	0.8	0.6	0.0	1.4	4.2
			34	1.0	9.1	5.2	1.1	15.4	16.4
Pounce + Comite	(7-28)	0.20 + 1.69	6	0.0	0.3	0.1	0.1	0.5	0.5
			13	0.2	2.4	2.2	1.2	5.8	6.0
			20	2.2	0.5	5.7	5.6	11.8	14.0
Pounce	(8-18)	0.20	6	0.0	0.4	0.0	0.0	0.4	0.4
			13	0.1	1.6	2.3	0.3	4.2	4.3
Thiodan + Nudrin	(9-4)	1.00 + 0.50	3	0.5	0.1	0.1	0.6	0.8	1.3
			10	0.8	0.0	0.0	0.0	0.0	0.8

Table 2 - (continued)

Treatment[1]				Number of lygus bugs per sweep[3]					
				Adults	Nymphs				Adults + Nymphs
Insecticides[2]		AI/acre lb.	Days after treatment		Small	Medium	Large	Total	
			Pre	1.4	0.5	1.2	1.1	2.8	4.2
Ammo + Comite	(6-23)	0.10 + 1.69							
			6	0.0	0.0	0.0	0.0	0.0	0.0
			13	0.0	0.1	0.1	0.0	0.2	0.2
			20	0.4	0.1	0.2	0.0	0.3	0.7
			27	0.7	0.2	0.1	0.1	0.4	1.1
Comite	(7-28)	1.69	34	0.9	2.8	1.0	0.1	3.9	4.8
			41	0.5	3.0	2.3	1.5	6.8	7.3
Ammo	(8-4)	0.10							
			6	0.0	0.3	0.2	0.0	0.5	0.5
			13	0.1	0.0	0.6	0.4	1.0	1.1
			20	0.2	0.1	0.0	0.2	0.3	0.5
			27	0.1	0.5	0.2	0.1	0.8	0.9
			34	0.3	0.4	0.1	0.3	0.8	1.1
Ammo	(9-8)	0.10							
			6	0.0	0.0	0.0	0.0	0.0	0.0
			Pre	0.5	0.5	1.4	0.9	2.8	3.3
Ammo	(6-23)	0.10							
			6	0.0	0.0	0.0	0.1	0.1	0.1
			13	0.0	0.0	0.2	0.0	0.2	0.2
			20	0.2	0.1	0.2	0.2	0.5	0.7
			27	1.1	0.1	0.1	0.0	0.2	1.3
Comite	(7-28)	1.69	34	0.6	3.6	1.1	0.3	5.0	5.6
			41	0.2	4.3	3.1	2.3	9.7	9.9
Ammo	(8-4)	0.10							
			6	0.1	0.4	0.4	0.1	0.9	1.0
			13	0.2	0.2	0.7	0.8	1.7	1.9
			20	0.4	0.0	0.0	0.0	0.0	0.4
			27	0.3	0.0	0.6	0.0	0.6	0.9
			34	0.1	2.4	1.9	1.2	5.5	5.6
Ammo	(9-8)	0.10							
			6	0.0	0.1	0.2	0.3	0.6	0.6

Table 2 - (continued)

Treatment[1]			Number of lygus bugs per sweep[3]					
Insecticides[2]	AI/acre lb.	Days after treatment	Adults	Nymphs				Adults + Nymphs
				Small	Medium	Large	Total	
		Pre	0.8	0.7	1.2	1.0	2.9	3.7
Pay Off (6-23)	0.08							
		6	0.0	0.0	0.1	0.0	0.1	0.1
		13	0.1	0.1	0.2	0.0	0.3	0.4
Comite (7-14)	1.69	20	0.4	0.1	0.4	0.7	1.2	1.6
		27	1.7	0.1	0.2	0.2	0.5	2.2
		34	1.3	6.9	1.7	0.4	9.0	10.3
Pay Off (7-28)	0.08							
		6	0.1	0.7	0.7	0.9	2.3	2.4
		13	0.1	1.6	1.0	0.5	3.1	3.2
		20	0.4	2.3	3.6	3.5	9.4	9.8
		27	4.6	1.9	1.0	0.2	3.1	7.7
Pay Off (8-25)	0.08							
		6	0.1	1.3	1.7	0.3	3.3	3.4
Lorsban (9-1)	0.50							
		6	0.4	0.4	0.1	0.4	0.9	1.3
		13	0.1	0.8	0.3	0.1	1.2	1.3
		Pre	0.4	0.2	1.2	1.2	2.6	3.0
Mavrik (6-23)	0.20							
		6	0.0	0.0	0.1	0.1	0.2	0.2
		13	0.1	0.5	0.3	0.1	0.9	1.0
Comite (7-14)	1.69	20	0.2	0.1	0.3	0.8	1.2	1.4
		27	1.7	0.7	0.3	0.1	1.1	2.8
		34	0.6	5.4	1.6	0.3	7.3	7.9
Mavrik (7-28)	0.20							
		6	0.1	0.7	0.4	0.4	1.5	1.6
		13	0.4	3.3	1.5	0.7	5.5	5.9
		20	1.8	3.0	5.9	3.8	12.7	14.5
		27	7.0	7.9	1.4	0.7	10.0	17.0
Mavrik (8-25)	0.20							
		6	0.3	1.2	1.7	0.3	3.2	3.5
Lorsban (9-1)	0.50							
		6	0.5	0.1	0.1	0.1	0.3	0.8
		13	0.4	0.0	0.1	0.1	0.2	0.6

Table 2 - (continued)

Treatment[1]			Number of lygus bugs per sweep[3]					
			Adults	Nymphs				Adults + Nymphs
Insecticides[2]	AI/acre lb.	Days after treatment		Small	Medium	Large	Total	
		Pre	1.1	0.5	1.4	0.8	2.7	3.8
Monitor (6-23)	0.50							
		6	0.1	0.0	0.0	0.0	0.0	0.1
		13	0.0	0.4	0.1	0.0	0.5	0.5
Comite (7-14)	1.69	20	0.3	1.1	1.6	1.3	4.0	4.3
		27	2.3	1.5	2.9	1.0	5.4	7.7
Monitor (7-21)	0.50							
		6	0.8	0.7	0.1	0.2	1.0	1.8
		13	0.1	1.6	0.7	0.4	2.7	2.8
		20	0.2	2.3	1.3	0.0	3.6	3.8
		27	1.5	2.0	3.2	2.4	7.6	9.1
		34	7.0	7.9	1.4	0.7	10.0	17.0
Monitor (8-25)	0.50							
		6	0.1	0.0	0.0	0.1	0.1	0.2
Lorsban (9-1)	0.50							
		6	0.2	0.0	0.0	0.0	0.0	0.2
		13	0.2	0.1	0.1	0.1	0.3	0.5

[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin was a 90% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. All plots were treated before 4:00 a.m. on the dates indicated in parentheses.

[2] Pretreatment counts were made on June 22.

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

Table 3 - Lygus bug populations in seed alfalfa plots treated by aircraft for aphid control. Helm, California, 1982.

Treatment[1]				Number per 50 D-Vac Samples[3]									
				Adults			Nymphal Instars						Adults + Nymphs
Insecticides		AI/acre lb.	Days after treatment[2]	♂	♀	Total	1	2	3	4	5	Total	
			Pre	0	1	1	0	0	1	4	0	5	6
Thiodan + Nudrin	(6-24)	1.00 + 0.50											
			5	1	0	1	0	0	0	0	0	0	1
			12	1	1	2	2	2	3	0	0	7	9
			19	5	2	7	3	2	3	3	6	17	24
Thiodan + Nudrin	(7-15)	1.00 + 0.50											
			5	2	2	4	2	0	0	0	1	3	7
			12	3	1	4	0	0	0	0	0	0	4
			19	1	0	1	1	0	1	0	0	2	3
			Pre	1	0	1	0	0	0	1	2	3	4
Pounce	(6-24)	0.20											
			5	0	0	0	0	1	0	0	0	1	1
			12	0	2	2	2	4	3	0	0	9	11
			19	3	3	6	1	2	1	1	4	9	15
Pounce	(7-15)	0.20											
			5	0	3	3	0	0	0	0	0	0	3
			12	0	0	0	0	0	0	1	0	1	1
			19	1	0	1	0	0	0	0	0	0	1
			Pre	3	0	3	0	0	0	1	0	1	4
Ammo	(6-24)	0.10											
			5	0	0	0	0	0	0	0	0	0	0
			12	0	0	0	1	0	1	0	0	2	2
			19	0	1	1	0	0	1	0	2	3	4
Thiodan + Lannate	(7-15)	1.00 + 0.50											
			5	0	0	0	0	0	0	0	0	0	0
			12	0	0	0	0	0	0	0	0	0	0
			19	0	0	0	0	0	1	0	0	1	1

Table 3 - (continued)

Treatment[1]			Number per 50 D-Vac Samples[3]									
			Adults			Nymphal Instars						Adults +
Insecticides	AI/acre lb.	Days after treatment[2]	♂	♀	Total	1	2	3	4	5	Total	Nymphs
		Pre	1	1	2	1	2	2	1	1	7	9
Pay Off (6-24)	0.08											
		5	0	0	0	0	0	1	0	0	1	1
		12	0	0	0	5	6	1	0	0	12	12
Payoff (7-8)	0.08											
		5	0	0	0	0	0	0	4	8	12	12
Thiodan + (7-15) Lannate	1.00 + 0.50											
		5	1	1	2	0	0	0	0	0	0	2
		12	0	0	0	0	0	0	0	0	0	0
		19	0	1	1	0	0	0	0	0	0	1
		Pre	2	0	2	0	0	1	2	1	4	6
Advantage(6-24)	0.50											
		5	0	0	0	0	0	2	0	0	2	2
		12	1	2	3	4	3	3	0	0	10	13
Advantage(7-8)	0.50											
		5	2	1	3	0	0	1	0	5	6	9
Thiodan + (7-15) Lannate	1.00 + 0.50											
		5	1	1	2	0	0	0	0	0	0	2
		12	0	1	1	1	0	1	1	0	3	4
		19	0	2	2	1	5	9	1	1	17	19
		Pre	0	3	3	2	0	1	1	1	5	8
Mavrik (6-24)	0.20											
		5	0	0	0	1	0	1	0	0	2	2
		12	0	0	0	4	5	9	0	0	18	18
Mavrik (7-8)	0.20											
		5	0	0	0	0	0	1	0	0	1	1
Pounce (7-15)	0.20											
		5	1	0	1	0	0	0	0	0	0	1
		12	0	0	0	0	0	0	0	0	0	0
		19	0	0	0	0	0	0	0	0	0	0

Table 3 - (continued)

Treatment[1]				Number per 50 D-Vac Samples[3]									
				Adults			Nymphal Instars						Adults + Nymphs
Insecticides		AI/acre lb.	Days after treatment[2]	♂	♀	Total	1	2	3	4	5	Total	
			Pre	0	1	1	0	0	0	0	3	3	4
Thiodan		1.00											
+	(6-24)	+											
Lannate		0.50											
			5	0	0	0	0	0	0	0	0	0	0
			12	0	1	1	1	0	1	0	0	2	3
			19	1	2	3	0	0	0	0	1	1	4
			26	0	0	0	1	0	0	0	0	1	1
			33	0	0	0	0	0	1	2	0	3	3
			40	0	0	0	0	0	4	1	1	6	6

[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin and Lannate were 90% wettable powders, while the other insecticides were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 3:00 a.m. on the dates indicated.

[2] Pretreatment counts were made on June 22.

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

Table 4 - Lygus bug populations and seed quality in 6 commercial seed alfalfa fields treated by aircraft for lygus bug control. Imperial County, California, 1982.

Field #1

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
				7.3	5.6	12.9
Bidrin	(6-10)	1.00				
Bidrin	(6-16)	1.00				
			4	0.7	0.0	0.7
			9	1.2	15.0	16.2
Carzol		0.75				
+	(6-29)	+				
Supracide		0.33				
			3	0.4	12.7	13.1
Phosdrin	(7-7)	0.50				
			2	22.1	2.1	24.2
Phosdrin	(7-13)	0.50				
			3	4.3	5.3	9.6
			9	3.6	45.1	48.7
Phosdrin	(7-27)	0.50				
			2	19.0	37.0	56.0

Seed Quality

			Percent Defective Seeds					
Variety	Number seeds Examined[2]	Percent good seed	Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF 101 row planted	1565	55.4	3.2	40.4	0.1	0.3	0.0	0.6

Table 4 - (continued)

Field #2

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
				1.9	0.6	2.5
Carzol	(6-9)	1.00				
			1	0.6	0.6	1.2
			8	0.9	6.1	7.0
Carzol	(6-20)	-				
			5	1.1	3.4	4.5
Monitor	(6-28)	0.75				
			4	4.5	2.7	7.2
			11	1.9	0.3	2.2
			18	0.6	0.8	1.4
			24	0.5	0.7	1.2
			31	0.7	0.1	0.8

Seed Quality

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF 101 row planted	1586	91.4	2.0	5.3	0.0	0.2	0.8	0.3

Table 4 - (continued)

Field #3

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
				7.6	12.5	20.1
Monitor	(6-8)	1.00				
			3	3.8	1.7	5.5
Monitor	(6-17)	1.00				
			1	3.4	1.5	4.9
			8	1.1	0.6	1.7
			15	1.1	25.7	26.8
Carzol	(7-6)	0.92				
			3	4.9	0.9	5.8
Monitor	(7-13)	1.00				
			3	2.2	0.1	2.3
			9	1.6	4.2	5.8
Lorsban	(7-27)	1.00				
			2	1.0	24.0	25.0

Seed Quality

			Percent Defective Seeds					
Variety	Number seeds Examined[2]	Percent good seed	Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Moapa 69 row planted	1607	84.4	1.8	9.3	0.2	0.3	3.9	0.1

Table 4 - (continued)

Field #4

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
				23.0	4.6	27.6
Monitor	(6-11)	0.50				
			1	0.5	1.9	2.4
			7	0.5	0.0	0.5
			13	1.5	0.1	1.6
Monitor	(6-25)	0.25				
			6	3.4	0.4	3.8
Lannate	(7-3)	0.90				
			5	2.3	7.6	9.9
Dylox + Carzol	(7-11)	0.50 + 0.50				
				5.7	19.0	24.7
Supracide	(7-17)	3.00				
			5	6.0	0.0	6.0
			12	2.8	18.0	20.8
Thiodan + Parathion	(8-15)	1.50 + 0.50				

Seed Quality

			Percent Defective Seeds					
Variety	Number seeds Examined[2]	Percent good seed	Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF 101 row planted	1425	59.6	10.5	23.4	0.6	1.1	0.9	3.9

Table 4 - (continued)

Field #5

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
				2.1	11.2	13.3
Monitor	(6-19)	0.50				
			5	1.2	0.5	1.7
			12	2.6	2.4	5.0
			19	4.3	5.4	9.7
			26	6.0	11.0	17.0
Parathion + Phosdrin	(7-17)	0.50 + 0.50				
			5	6.5	7.5	14.0
Bidrin	(7-24)	1.00				
			5	4.5	6.9	11.4
Bidrin	(8-2)	1.00				

Seed Quality

			Percent Defective Seeds					
Variety	Number seeds Examined[2]	Percent good seed	Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Moapa solid planted	1582	87.2	3.4	7.2	0.7	0.3	1.1	0.1

Table 4 - (continued)

Field #6

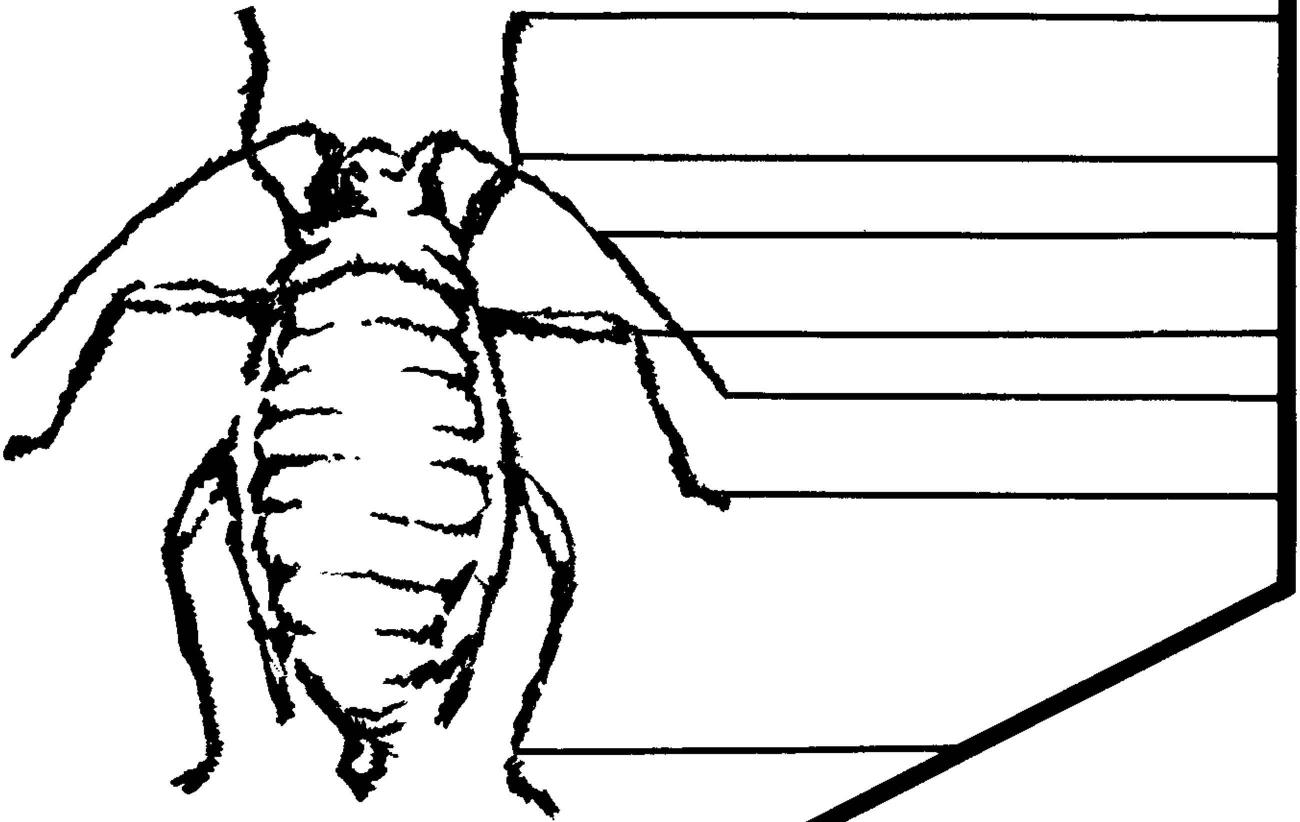
Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Monitor	(5-22)	1.00				
Phosdrin	(6-4)	0.25				
			14	10.6	12.4	23.0
			21	8.4	25.5	33.9
Parathion	(7-2)	1.00				
			27	11.0	1.5	12.5

Seed Quality

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF 101 solid planted	1464	79.8	2.7	13.8	0.1	1.8	1.7	0.1

[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

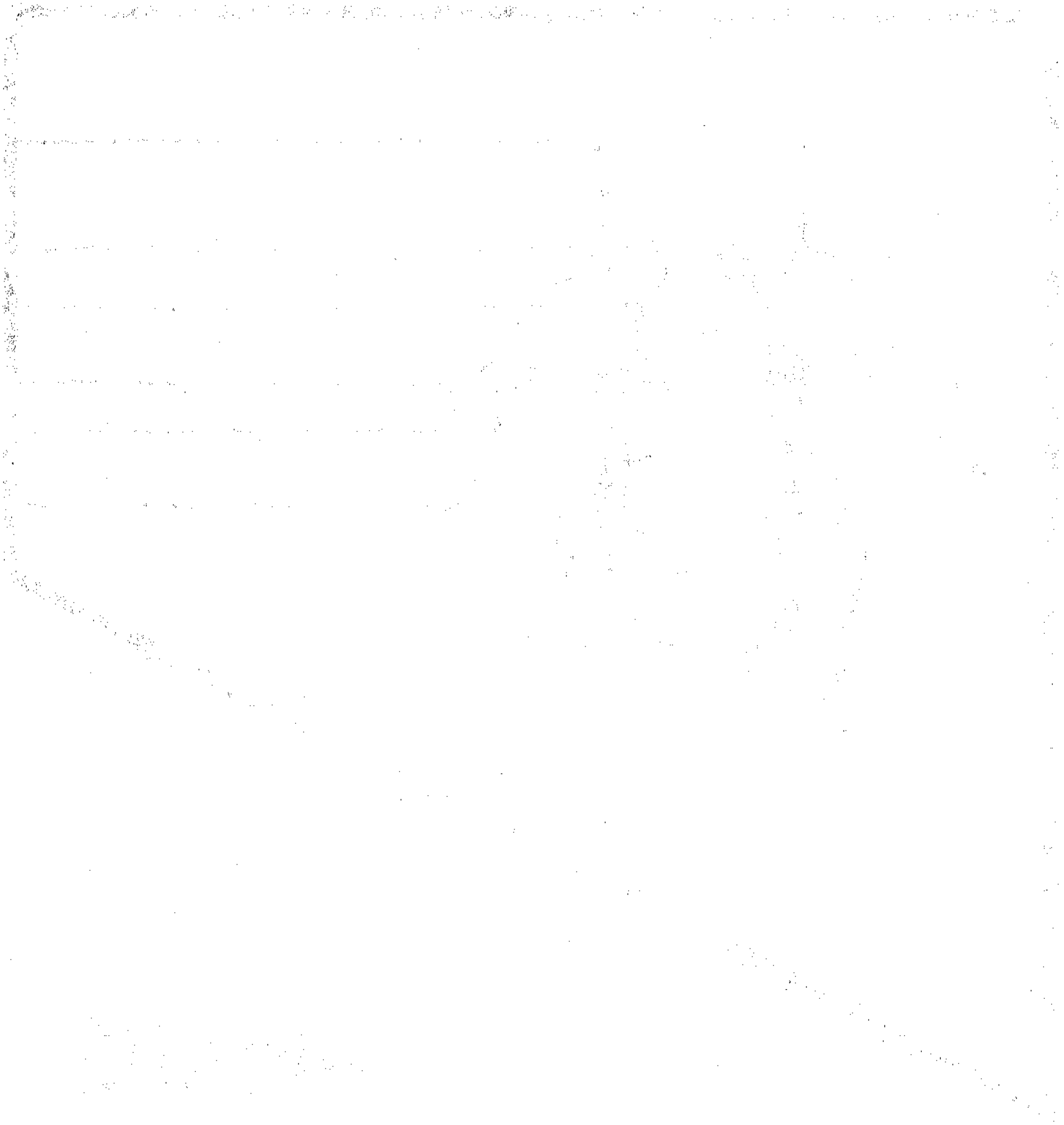


Table 5 - Aphid populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1982.

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
			Pre	0	0
Pounce + Comite	0.20 + 1.69	June 23			
			6	11	0
			13	2	0
			20	8	0
			27	0	0
			34	5	16
Pounce + Comite	0.20 + 1.69	July 28			
			6	0	0
			13	125	2
			20	265	0
Pounce	0.20	August 18			
			6	716	0
			13	3969	0
Thiodan + Nudrin	1.00 + 0.50	September 4			
			3	1	0
			10	0	0
			Pre	24	0
Pounce	0.20	June 23			
			6	89	0
			13	3	1
			20	2	0
			27	0	3
			34	1	3
Pounce + Comite	0.20 + 1.69	July 28			
			6	0	0
			13	446	0
			20	180	0
Pounce	0.20	August 18			
			6	547	0
			13	3363	4
Thiodan + Nudrin	1.00 + 0.50	September 4			
			3	4	0
			10	0	0

Table 5 - (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
			Pre	4	0
Ammo + Comite	0.10 + 1.69	June 23			
			6	24	0
			13	53	5
			20	3	1
			27	13	9
Comite	1.69	July 28	34	0	13
			41	0	9
Ammo	0.10	August 4			
			6	3	23
			13	300	27
			20	320	48
			27	987	159
			34	144	27
Ammo	0.10	September 8			
			6	14	1
			Pre	2	0
Ammo	0.10	June 23			
			6	17	0
			13	3	2
			20	2	6
			27	1	7
Comite	1.69	July 28	34	0	127
			41	1	17
Ammo	0.10	August 4			
			6	7	72
			13	38	290
			20	12	572
			27	29	1523
			34	481	1638
Ammo	0.10	September 8			
			6	54	2

Table 5 - (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
			Pre	4	0
Pay Off	0.08	June 23			
			6	47	0
			13	4	0
Comite	1.69	July 14	20	3	5
			27	0	9
			34	4	21
Pay Off	0.08	July 28			
			6	0	1
			13	1	40
			20	0	100
			27	6	252
Pay Off	0.08	August 25			
			6	0	12
Lorsban	0.50	September 1			
			6	0	1
			13	1	3
			Pre	0	2
Mavrik	0.20	June 23			
			6	52	0
			13	17	4
Comite	1.69	July 14	20	5	0
			27	0	4
			34	0	24
Mavrik	0.20	July 28			
			6	0	0
			13	0	43
			20	0	115
			27	1	220
Mavrik	0.20	August 25			
			6	0	4
Lorsban	0.50	September 1			
			6	0	0
			13	0	0

Table 5 - (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
			Pre	0	0
Monitor	0.50	June 23			
			6	6	0
			13	20	1
Comite	1.69	July 14	20	0	2
			27	1	40
Monitor	0.50	July 21			
			6	0	24
			13	0	9
			20	0	248
			27	0	1023
			34	1	3385
Monitor	0.50	August 25			
			6	3	23
Lorsban	0.50	September 1			
			6	0	0
			13	0	1

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin was a 90% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 4:00 a.m. on the dates indicated.

[2] Pretreatment counts were made on June 22.

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

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

Table 6 - Aphid populations in seed alfalfa plots treated by aircraft for aphid control. Helm, California, 1982.[1]

Treatment[2]				Number per 50 D-vac Samples[4]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[3]	spotted alfalfa aphid	pea aphid
			Pre	23,020	210
Thiodan + Nudrin	1.00 + 0.50	June 24			
			5	710	0
			12	870	1
			19	2,416	2
Thiodan + Nudrin	1.00 + 0.50	July 15			
			5	324	0
			12	3,885	0
			19	10,942	0
			Pre	24,920	448
Pounce	0.20	June 24			
			5	887	4
			12	320	3
			19	890	3
Pounce	0.20	July 15			
			5	170	0
			12	114	0
			19	111	0
			Pre	34,444	664
Ammo	0.10	June 24			
			5	2,200	8
			12	3,515	35
			19	9,204	26
Thiodan + Lannate	1.00 + 0.50	July 15			
			5	58	0
			12	58	0
			19	187	0

Table 6 - (continued)

Treatment[2]				Number per 50 D-vac Samples[4]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[3]	spotted alfalfa aphid	pea aphid
			Pre	23,064	804
Pay Off	0.08	June 24			
			5	972	1
			12	6,403	8
Pay Off	0.08	July 8			
			5	2,870	0
Thiodan + Lannate	1.00 + 0.50	July 15			
			5	14	0
			12	6	0
			19	2	0
			Pre	21,804	588
Advantage	0.50	June 24			
			5	5,492	21
			12	18,204	48
Advantage	0.50	July 8			
			5	7,863	0
Thiodan + Lannate	1.00 + 0.50	July 15			
			5	63	1
			12	30	0
			19	740	0
			Pre	28,888	556
Mavrik	0.20	June 24			
			5	1,405	0
			12	6,707	63
Mavrik	0.20	July 8			
			5	227	0
Pounce	0.20	July 15			
			5	39	0
			12	1	0
			19	12	0

Table 6 - (continued)

Treatment[2]				Number per 50 D-vac Samples[4]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[3]	spotted alfalfa aphid	pea aphid
			Pre	7,844	232
Thiodan + Lannate	1.00 + 0.50	June 24			
			5	199	0
			12	51	4
			19	184	0
			26	303	0
			33	493	0
			40	4,142	0

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

[2] Plot size: Each treatment was 5 acres (165' x 1320'). Nudrin and Lannate were 90% wettable powders, while the other insecticides were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 3:00 a.m. on the dates indicated.

[3] Pretreatment counts were made on June 22.

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

MITES

Table 7 - Spider mite populations in seed alfalfa plots treated by aircraft for spider mite and lygus bug control. Firebaugh, California, 1982.

Treatment[1]				Number per leaf[3]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Mites	Eggs
			Pre	2.7	7.6
Pounce	0.20				
+	+	June 23			
Comite	1.69				
			6	3.6	4.2
			13	2.2	1.7
			20	2.2	6.3
			27	6.6	14.7
			34	9.3	9.1
Pounce	0.20				
+	+	July 28			
Comite	1.69				
			6	1.5	0.6
			13	3.2	5.6
			20	1.8	3.1
Pounce	0.20	August 18	27	3.9	1.1
			34	4.8	3.1
Thiodan	1.00				
+	+	September 4			
Nudrin	0.50				
			3	4.5	1.3
			10	1.0	0.1
			Pre	3.6	8.9
Pounce	0.20	June 23			
			6	9.8	6.5
			13	4.5	5.7
			20	3.6	19.0
			27	11.1	27.3
			34	26.2	26.4
Pounce	0.20				
+	+	July 28			
Comite	1.69				
			6	0.7	0.6
			13	1.0	0.6
			20	0.5	1.3
Pounce	0.20	August 18	27	1.7	0.8
			34	6.2	5.3
Thiodan	1.00				
+	+	September 4			
Nudrin	0.50				
			3	9.0	3.4
			10	6.8	0.5

Table 7 - (continued)

Treatment[1]				Number per leaf[3]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Mites	Eggs
			Pre	3.6	10.9
Ammo	0.10				
+	+	June 23			
Comite	1.69				
			6	2.4	2.9
			13	0.4	1.4
			20	2.5	12.7
			27	9.9	15.7
			34	11.6	28.4
Comite	1.69	July 28			
			6	1.3	0.8
Ammo	0.10	August 4	13	0.8	0.2
			20	0.2	0.9
			27	0.7	2.3
			34	3.9	3.4
Ammo	0.10	September 8	41	5.4	5.6
			48	4.2	0.1
			Pre	5.9	7.7
Ammo	0.10	June 23			
			6	4.7	10.7
			13	6.1	8.4
			20	5.8	46.8
			27	19.9	43.8
			34	43.7	68.8
Comite	1.69	July 28			
Ammo	0.10	August 4	6	2.1	1.6
			13	0.1	0.2
			20	0.1	0.1
			27	0.4	0.9
			34	3.6	4.2
Ammo	0.10	September 8	41	4.0	1.8
			48	3.3	0.1

Table 7 - (continued)

Treatment[1]		Dates of application	Days after treatment[2]	Number per leaf[3]	
Insecticides	AI/acre lb.			Mites	Eggs
			Pre	4.1	9.9
Pay Off	0.08	June 23			
			6	7.7	11.6
			13	4.3	5.0
			20	12.9	79.5
Comite	1.69	July 14			
			6	8.6	5.6
			13	1.5	1.6
Pay Off	0.08	July 28	20	0.3	0.5
			27	0.1	0.1
			34	0.2	0.2
Pay Off	0.08	August 25	41	0.4	0.2
			48	2.6	0.2
Lorsban	0.50	September 1	55	3.0	2.3
			62	5.4	5.0
			Pre	3.4	12.9
Mavrik	0.20	June 23			
			6	6.3	3.6
			13	3.3	3.6
			20	8.2	62.8
Comite	1.69	July 14			
			6	8.4	8.4
Mavrik	0.20	July 28	13	0.5	2.4
			20	0.1	0.4
			27	0.6	0.3
			34	0.7	2.0
Mavrik	0.20	August 25	41	3.0	2.9
Lorsban	0.50	September 1	48	1.6	0.2
			55	0.4	0.3
			62	2.0	1.5

Table 7 - (continued)

Treatment[1]				Number per leaf[3]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Mites	Eggs
			Pre	5.3	10.8
Monitor	0.50	June 23			
			6	5.8	17.1
			13	9.7	34.1
			20	13.1	90.5
Comite	1.69	July 14			
			6	9.2	6.9
Monitor	0.50	July 21	13	3.5	4.9
			20	0.1	0.3
			27	0.5	0.2
			34	1.5	5.0
Monitor	0.50	August 25	41	3.5	1.7
Lorsban	0.50	September 1	48	7.5	1.0
			55	1.6	0.1
			62	2.3	3.1

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin was a 90% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 4:00 a.m. on the dates indicated.

[2] Pretreatment counts were made on June 22.

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

Table 8 - Spider mite populations in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California, 1982.

Treatment[1]				Number per leaf[3]	
Insecticides	AI/acre lb.	Dates of application	Days after treatment[2]	Mites	Eggs
			Pre	5.2	21.7
Comite	1.69	July 6			
			7	6.3	26.3
			14	3.1	3.6
			21	9.9	35.2
			Pre	6.3	27.5
Plictran	0.75	July 6			
			7	6.9	17.3
			14	12.0	6.9
			21	10.7	19.5
			Pre	11.7	21.5
Mitac	1.00	July 6			
			7	12.5	31.4
			14	13.3	19.5
			21	11.1	30.2

[1] Plot size: Each treatment 5 acres (165' x 1320'). Plictran was a 50% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated 11:30 p.m. on the date indicated.

[2] Pretreatment counts were made on July 6.

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

Table 9 - Populations of 3 species of *Tetranychus* in seed alfalfa plots treated by aircraft for the control of Lygus and spider mites. Firebaugh, CA, 1982.

Collection Dates[1]	Percent of Total Population		
	T. turkestani	*T. pacificus*	*T. urticae*[2]
June 8	0	96	4
June 15	0	100	0
June 22	3	79	18
July 6	14	59	27
July 13	23	43	34
July 20	32	30	38
July 27	16	36	48

[1] Sample area consisted of seven-5 acre plots. Comite was applied at the standard rate to the plots on June 23, July 14.

[2] Species identification was based on an average of 40 randomly selected males on each collection date.

[redacted]

Table 10 - Predator and parasite populations in seed alfalfa plots treated by aircraft for lygus bug and spider mite control. Firebaugh, California, 1982.

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
			Pre	3	55	1	28	141	160	2	0	0	0	0	1	0	0	173	41
Pounce + Comite	(6-23)	0.20 + 1.69																	
			6	5	82	0	1	234	83	0	0	0	0	0	0	0	1	63	94
			13	51	116	5	4	339	20	0	0	0	1	0	0	0	1	78	42
			20	167	90	4	3	109	67	1	0	1	0	0	0	1	0	70	15
			27	28	26	0	2	68	125	0	0	0	0	0	0	0	0	52	15
			34	164	224	0	57	121	94	0	0	0	1	0	0	6	3	131	39
Pounce + Comite	(7-28)	0.20 + 1.69																	
			6	7	50	0	0	17	8	0	0	0	0	0	0	0	0	42	10
			13	2	74	0	2	22	14	0	0	0	1	0	0	0	0	167	12
			20	4	50	1	5	17	23	0	0	0	0	0	0	0	0	112	5
Pounce	(8-18)	0.20																	
			6	13	45	0	5	41	2	0	0	0	0	0	0	0	1	24	2
			13	51	60	1	21	31	2	0	0	0	0	0	0	0	0	29	1
Thiodan + Nudrin	(9-4)	1.00 + 0.50																	
			3	3	1	0	0	4	2	0	0	0	0	0	0	0	0	9	3
			10	0	0	0	11	8	0	0	0	0	9	0	0	0	0	31	5

Table 10 - (continued)

Treatment[1]			Days after treat-ment[2]	Number per 50 D-Vac Samples[3]															
										Lacewings									
Insecticides		AI/ acre lb.		Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
			Pre	5	72	4	53	112	86	0	0	0	0	0	0	0	3	118	79
Pounce	(6-23)	0.20																	
			6	20	126	1	2	227	67	0	0	1	0	0	0	0	0	53	110
			13	86	211	1	12	293	15	0	0	0	0	0	0	1	1	111	82
			20	156	61	6	5	62	42	0	0	0	0	0	0	2	1	46	8
			27	102	97	0	9	63	104	0	0	0	1	0	0	3	0	11	45
			34	188	182	9	88	114	53	0	0	0	0	0	0	5	0	93	28
Pounce + Comite	(7-28)	0.20 + 1.69																	
			6	10	83	0	0	9	3	0	0	0	0	0	0	0	0	22	9
			13	7	95	2	6	29	10	0	0	0	0	0	0	0	0	76	5
			20	4	31	0	2	32	17	0	0	0	1	0	0	1	2	31	9
Pounce	(8-18)	0.20																	
			6	4	21	0	2	38	9	0	0	0	0	0	0	0	0	12	1
			13	13	45	0	11	67	6	0	0	0	2	0	0	0	7	27	1
Thiodan + Nudrin	(9-4)	1.00 + 0.50																	
			3	3	4	0	2	5	3	0	0	0	3	0	8	0	0	14	1
			10	0	1	0	11	11	0	0	0	0	9	0	0	0	1	37	1

Table 10 - (continued)

Treatment[1]			Days after treatment[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	6	52	2	90	86	125	0	0	1	0	0	0	0	2	102	109
Ammo + Comite	(6-23)	0.10 + 1.69																	
			6	0	91	1	0	188	36	0	0	0	2	0	0	0	1	38	74
			13	24	127	0	0	100	0	0	0	1	0	0	0	0	0	89	91
			20	143	118	1	3	98	15	0	0	1	0	0	0	1	3	64	21
			27	107	91	1	1	33	242	0	0	0	0	0	0	0	0	8	20
Comite	(7-28)	1.69	34	118	215	0	26	196	74	0	0	0	0	0	0	2	2	83	22
			41	9	67	0	2	36	5	0	0	0	0	0	0	0	0	20	2
Ammo	(8-4)	0.10																	
			6	5	103	0	0	5	0	0	0	0	0	0	0	0	1	72	9
			13	4	26	0	0	17	1	0	0	0	0	0	0	0	0	26	7
			20	0	6	0	0	13	5	0	0	0	2	0	0	0	0	9	1
			27	15	29	0	0	28	97	0	0	0	5	0	0	0	0	8	5
			34	16	23	0	1	99	88	0	0	0	1	0	0	0	0	15	3
Ammo	(9-8)	0.10																	
			6	0	11	0	0	3	6	0	0	2	6	0	0	0	0	21	8

Table 10 - (continued)

Treatment[1]			Days after treatment[2]	Number per 50 D-Vac Samples[3]															
										Lacewings									
Insecticides		AI/ acre lb.		Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
			Pre	5	64	8	183	124	112	5	0	0	0	2	0	0	1	189	142
Ammo	(6-23)	0.10																	
			6	15	242	0	14	138	41	0	0	0	2	0	0	0	1	80	167
			13	38	135	1	12	93	8	0	0	2	0	0	0	0	0	101	144
			20	214	255	1	8	89	18	0	0	0	1	0	0	0	1	91	28
			27	110	76	1	8	23	240	0	0	0	3	0	0	0	0	15	33
Comite	(7-28)	1.69	34	211	190	4	56	236	86	2	0	0	0	0	0	1	0	32	59
			41	104	428	1	6	86	23	0	0	0	0	0	0	0	2	28	14
Ammo	(8-4)	0.10																	
			6	25	237	0	1	7	5	0	0	0	0	0	0	0	0	99	16
			13	2	66	0	0	18	0	0	0	0	0	1	0	0	0	50	3
			20	3	41	0	0	44	0	0	0	0	0	1	0	0	0	25	6
			27	27	48	0	3	117	48	0	1	0	1	0	0	0	0	8	1
			34	71	56	0	1	70	115	0	0	0	4	0	0	0	3	19	1
Ammo	(9-8)	0.10																	
			6	21	63	0	1	6	4	0	0	1	5	0	0	0	0	16	16

Table 10 - (continued)

Treatment[1]		Days after treat-ment[2]	Number per 50 D-Vac Samples[3]															
									Lacewings									
Insecticides	AI/ acre lb.		Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
			A	N	A	N	A	N	A	L	A	L	A	L	A	L		
		Pre	9	188	1	143	111	69	4	0	2	0	0	0	0	2	262	187
Pay Off (6-23)	0.08																	
		6	10	75	1	14	91	36	2	1	0	0	0	0	0	3	55	85
		13	54	145	2	37	222	13	0	2	2	5	0	0	1	0	95	95
Comite (7-14)	1.69	20	163	148	8	37	86	79	0	0	0	2	0	0	0	3	40	28
		27	61	103	0	13	135	227	0	0	0	0	0	0	0	0	22	29
		34	141	190	4	39	154	72	0	0	0	0	0	0	5	0	104	37
Pay Off (7-28)	0.08																	
		6	10	37	0	0	13	6	0	0	0	0	0	0	1	0	11	11
		13	11	58	0	4	31	7	0	0	1	0	0	0	0	3	88	8
		20	0	48	0	2	38	9	0	0	0	2	0	0	0	0	74	12
		27	7	29	0	1	25	81	0	0	1	5	0	0	0	0	17	2
Pay Off (8-25)	0.08																	
		6	5	15	0	1	57	16	0	0	0	6	0	0	0	0	12	2
Lorsban (9-1)	0.50																	
		6	5	5	0	4	23	2	0	0	1	5	0	0	1	1	11	12
		13	1	10	0	1	20	2	0	0	0	5	0	0	0	1	9	4

Table 10 - (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
		Pre	16	97	4	172	100	83	6	0	6	0	2	0	0	0	133	162
Mavrik (6-23)	0.20																	
		6	6	80	2	22	65	22	0	0	1	4	0	0	0	1	27	79
		13	17	78	3	42	118	16	0	0	0	3	0	0	1	1	55	44
Comite (7-14)	1.69	20	54	105	4	42	126	101	0	0	0	0	0	0	2	0	66	12
		27	43	58	2	45	77	116	0	0	1	1	0	0	0	0	7	12
		34	60	132	5	44	226	119	0	0	2	0	0	0	10	1	26	41
Mavrik (7-28)	0.20																	
		6	2	14	0	1	8	5	0	0	0	0	0	0	2	1	7	9
		13	0	5	1	5	20	11	0	0	0	0	0	0	1	6	43	7
		20	2	12	1	2	15	7	0	0	2	0	0	0	0	0	39	1
		27	1	2	0	1	6	4	0	0	0	1	0	0	0	0	9	0
Mavrik (8-25)	0.20																	
		6	0	5	1	3	19	3	0	0	0	1	0	0	0	4	17	1
Lorsban (9-1)	0.50																	
		6	0	0	0	10	11	0	0	0	0	4	0	0	1	0	10	2
		13	1	1	0	3	10	1	0	0	0	3	0	0	0	0	7	2

Table 10 - (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
		Pre	12	80	1	147	141	51	9	0	1	0	0	1	1	3	212	168
Monitor (6-23)	0.50																	
		6	5	71	3	4	32	12	0	0	0	2	0	0	0	1	45	142
		13	12	35	2	21	76	13	0	0	3	9	0	0	1	1	74	119
Comite (7-14)	1.69	20	25	44	3	2	295	49	0	1	1	2	0	0	0	5	57	44
		27	29	69	3	23	118	684	0	1	0	1	0	2	2	0	25	70
Monitor (7-21)	0.50																	
		6	5	12	0	10	32	3	0	0	0	0	0	0	7	0	22	33
		13	0	1	0	0	3	1	0	0	0	0	0	0	0	2	18	10
		20	4	6	2	0	14	10	0	0	0	0	0	0	0	0	32	12
		27	1	2	2	0	24	9	0	0	0	1	0	0	0	0	21	2
		34	4	4	0	9	40	42	0	0	0	2	0	0	0	0	0	4
Monitor (8-25)	0.50																	
		6	1	1	0	11	4	0	0	0	0	0	6	0	0	0	9	1
Lorsban (9-1)	0.50																	
		6	0	1	0	3	2	0	0	0	1	7	0	0	1	0	8	6
		13	2	0	0	0	19	0	0	0	4	4	0	0	0	0	5	11

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin was a 90% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 4:00 a.m. on the dates indicated in parentheses.

[2] Pretreatment counts were made on June 22.

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

Table 11 - Predator and parasite populations in seed alfalfa plots treated by aircraft for aphid control. Helm, California, 1982.

Treatment[1]			Days after treatment[2]	Number per 50 D-Vac Samples[3]															
Insecticides		AI/ acre lb.		Geocoris		Nabis		Orius		Lacewings Brown		Lacewings Green		Coccinellidae		Collops		Parasitic wasps	Spiders
				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
			Pre	15	82	5	126	459	142	2	2	2	4	0	4	0	0	85	3
Thiodan + Nudrin	(6-24)	1.00 + 0.50																	
			5	2	4	1	0	22	2	0	0	1	6	0	0	0	0	36	26
			12	0	3	1	0	14	1	1	1	10	2	0	0	0	0	39	16
			19	24	13	6	3	30	2	0	0	3	1	0	0	0	0	30	0
Thiodan + Nudrin	(7-15)	1.00 + 0.50																	
			5	0	0	0	3	15	1	0	0	2	4	0	0	2	0	6	14
			12	0	7	0	0	13	0	0	0	1	6	0	1	1	0	10	9
			19	1	1	0	0	15	0	0	0	3	0	0	1	4	0	58	0
			Pre	24	88	12	167	539	71	0	0	0	3	0	2	0	0	104	1
Pounce	(6-24)	0.20																	
			5	4	15	1	14	20	6	0	0	3	0	0	0	0	0	27	27
			12	12	5	6	3	10	1	0	0	6	0	0	1	0	0	39	3
			19	84	92	10	13	42	3	0	0	5	1	0	0	0	1	51	3
Pounce	(7-15)	0.20																	
			5	21	54	0	5	2	3	0	0	1	1	0	0	0	0	19	0
			12	10	28	0	0	0	0	0	0	1	1	0	0	2	0	6	1
			19	2	6	0	0	6	0	0	0	1	0	0	0	1	0	10	0

Table 11 - (continued)

Treatment[1]			Days after treatment[2]	Number per 50 D-Vac Samples[3]															
										Lacewings									
Insecticides		AI/ acre lb.		Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic wasps	Spiders
				A	N	A	N	A	N	A	L	A	L	A	L	A	L		
			Pre	15	102	10	176	611	111	2	0	0	6	0	9	0	0	129	8
Ammo	(6-24)	0.10																	
			5	11	30	0	5	5	1	0	0	2	3	0	0	0	0	30	19
			12	16	29	0	3	4	0	0	0	5	0	0	0	0	3	71	1
			19	96	76	0	1	25	1	0	0	4	0	0	0	0	0	54	1
Thiodan + Lannate	(7-15)	1.00 + 0.50																	
			5	3	5	0	6	4	2	0	0	5	1	0	0	4	0	58	1
			12	1	0	0	0	0	0	0	0	1	0	0	0	0	0	7	1
			19	1	1	0	0	1	0	0	0	1	1	0	0	4	1	2	5
			Pre	21	54	12	186	704	123	2	0	1	3	0	5	0	0	154	2
Pay Off	(6-24)	0.08																	
			5	4	34	0	0	26	1	0	0	2	0	0	0	0	0	93	18
			12	12	32	1	8	58	6	0	0	17	0	0	0	0	1	137	4
Pay Off	(7-8)	0.08																	
			5	102	97	0	0	4	3	0	0	10	1	0	0	0	0	22	2
Thiodan + Lannate	(7-15)	1.00 + 0.50																	
			5	1	1	0	0	5	0	0	0	3	4	0	0	0	0	26	1
			12	0	0	0	0	1	1	0	0	4	0	0	0	0	0	7	0
			19	2	2	0	3	1	0	0	0	0	0	0	0	1	0	7	3

Table 11 - (continued)

Treatment[1]		Days after treatment[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	24	134	11	207	647	109	2	0	3	4	0	6	0	0	133	5
Advantage (6-24)	0.50																	
		5	23	58	1	11	165	22	0	0	12	3	0	0	0	0	23	11
		12	41	57	20	35	75	3	3	1	32	1	0	0	0	0	204	2
Advantage (7-8)	0.50																	
		5	176	83	2	8	21	4	0	0	10	1	1	0	0	0	15	0
Thiodan + (7-15) Lannate	1.00 + 0.50																	
		5	6	2	0	1	17	1	0	0	3	5	0	1	1	0	35	2
		12	0	0	0	0	2	0	0	0	3	3	0	0	0	0	7	1
		19	0	1	0	0	9	6	0	0	1	1	0	0	3	0	28	67
		Pre	20	128	12	173	825	134	3	0	1	3	0	6	0	0	162	9
Mavrik (6-24)	0.20																	
		5	0	8	0	4	13	6	0	0	1	0	0	0	0	0	30	12
		12	10	39	4	17	46	0	2	0	39	0	0	0	0	1	187	3
Mavrik (7-8)	0.20																	
		5	14	19	1	0	2	0	0	0	16	0	0	0	1	0	18	2
Pounce (7-15)	0.20																	
		5	4	6	0	0	7	0	0	0	0	2	0	0	0	0	20	0
		12	0	1	0	0	2	0	0	0	1	0	0	1	3	0	0	1
		19	0	0	0	2	3	0	0	0	4	0	0	0	4	1	1	2

Table 11 - (continued)

Treatment[1]		Days	Number per 50 D-Vac Samples[3]															
									Lacewings									
	AI/ acre	after treat-	Geocoris		Nabis		Orius		Brown		Green		Coccinellidae		Collops		Parasitic	
Insecticides	lb.	ment[2]	A	N	A	N	A	N	A	L	A	L	A	L	A	L	wasps	Spiders
		Pre	13	106	10	230	481	152	0	0	2	0	0	1	0	0	52	5
Thiodan + (6-24) Lannate	1.00 + 0.50																	
		5	2	3	0	2	7	0	0	0	0	4	0	0	0	0	16	7
		12	0	0	1	3	37	0	1	0	11	5	0	0	0	0	73	3
		19	17	10	4	7	17	0	0	0	5	2	0	0	0	0	9	5
		26	8	18	0	4	42	13	0	0	1	2	0	0	1	0	11	0
		33	1	10	0	1	11	0	0	0	2	1	0	0	1	0	2	0
		40	1	6	0	0	21	1	0	0	3	2	0	0	2	3	21	1

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Nudrin and Lannate were 90% wettable powders, while the other insecticides were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated before 3:00 a.m. on the dates indicated.

[2] Pretreatment counts were made on June 22.

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

Table 12 - Predator and parasite populations in seed alfalfa plots treated by aircraft for spider mite control. Firebaugh, California, 1982.

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
		Pre	9	29	9	74	239	156	3	0	6	8	0	7	0	8	134	97
Comite (7-6)	1.69																	
		7	13	35	5	88	281	285	2	3	0	1	0	0	0	2	83	107
		14	14	28	3	55	481	162	0	1	0	4	0	1	1	1	97	104
		21	10	33	5	47	235	83	0	0	0	0	0	0	3	3	57	341
		Pre	16	8	3	19	141	46	1	1	2	7	0	1	1	5	93	95
Plictran (7-6)	0.75																	
		7	24	18	5	79	211	269	1	7	2	11	0	3	3	2	93	131
		14	9	14	4	32	569	152	2	2	8	5	0	0	0	0	53	65
		21	3	30	5	41	205	49	1	0	1	0	0	0	3	0	39	196
		Pre	20	13	1	39	170	76	0	0	2	8	1	0	1	1	148	187
Mitac (7-6)	1.00																	
		7	28	40	1	73	230	272	0	0	1	13	0	1	0	2	65	100
		14	6	19	1	74	378	215	0	0	15	2	0	0	1	2	57	47
		21	12	39	1	79	229	93	4	1	1	3	0	0	1	1	57	158

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[1] Plot size: Each treatment 5 acres (165' x 1320'). Plictran was a 50% wettable powder, while the others were emulsifiable concentrates. Sprays were applied at 10 GPA. Plots were treated at 11:30 p.m. on the date indicated.

[2] Pretreatment counts were made on July 6.

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

STINKBUGS

Table 13 - Stink bug populations in 12 commercial seed alfalfa fields. Fresno County, California, 1982.

		Number per 25 ft of row[1]					
		Consperse stink bug			Says stink bug		
Field Number and Location[2]	Variety	Adult	Nymph	Total	Adult	Nymph	Total
1 Firebaugh	Mesa Sirsa	1	2	3	0	0	0
2 Firebaugh	Moapa 69	0	7	7	0	1	1
3 Firebaugh	Moapa 69	5	21	26	0	0	0
4 Firebaugh	Blazer	0	5	5	0	0	0
5 San Joaquin	NAPB-91	0	0	0	0	0	0
6 San Joaquin	Advantage	0	0	0	0	0	0
7 San Joaquin	524	0	4	4	0	0	0
8 San Joaquin	CW 8015	0	0	0	0	0	0
9 Five Points	Vertus	0	0	0	0	0	0
10 Five Points	Natsuwakaba	0	0	0	0	0	0
11 Five Points	Peak	0	1	1	0	0	0
12 Five Points	Moapa 69	0	0	0	0	0	0
Total		6	40	46	0	1	1

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

[2] Samples collected July 14 and examined on July 16.

Table 14 - Percentages of good and defective seeds in samples from 12 commercial seed alfalfa fields surveyed for stink bug damaged seed. Fresno County, California, 1982.

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Firebaugh	Blazer	1447	78.7	8.9	7.9	0.3	2.0	0.5	1.7
2 Firebaugh	Moapa 69	1568	68.4	0.3	14.5	0.1	16.0	0.1	0.6
3 Firebaugh	Mesa Sirsa	1278	72.0	0.5	2.7	0.5	22.8	1.4	0.1
4 Firebaugh	Moapa 69	1556	67.8	0.8	24.9	0.0	6.1	0.0	0.4
--- Average	---	1462	71.8	2.6	12.5	0.2	11.7	0.5	0.7
1 Five Points	Vertus	1718	89.7	2.2	5.9	0.1	0.1	0.7	1.2
2 Five Points	Moapa 69	1732	91.6	0.5	5.2	0.8	0.0	1.8	0.1
3 Five Points	Peak	1914	93.6	0.1	3.7	0.1	1.0	0.9	0.6
4 Five Points	Natsuwakaba	1709	94.8	0.1	4.1	0.0	0.0	0.9	0.1
--- Average	---	1768	92.4	0.7	4.7	0.3	0.3	1.1	0.5
1 San Joaquin	524	1867	90.0	1.6	5.6	0.0	1.4	1.1	0.2
2 San Joaquin	CW 8015	2026	91.0	0.6	5.7	0.0	0.1	0.3	2.3
3 San Joaquin	Advantage	1658	84.9	1.2	9.3	0.0	1.4	1.3	1.9
4 San Joaquin	NAPB-74	1537	82.7	7.6	5.8	0.0	0.3	1.8	1.8
--- Average	---	1772	87.1	2.8	6.6	0.0	0.8	1.1	1.6
3 Area Average	---	1667	83.8	2.0	7.9	0.2	4.3	0.9	0.9

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

Table 15 - Percentages of good and defective seeds in samples from 81 commercial seed alfalfa fields surveyed for chalcid damaged seed. Fresno, Kings, and Imperial Counties, California, 1982.

				Defective Seeds					
Field Number and Location	Variety	Seed Exam[1]	Good Seed	Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Firebaugh	CW 185	1541	89.3	1.2	2.0	1.8	2.9	0.1	2.7
2 Firebaugh	Blazer	1447	78.7	8.9	7.9	0.3	2.0	0.5	1.7
3 Firebaugh	Mesa Sirsa	1486	83.6	6.7	8.0	0.0	0.5	0.5	0.7
3a Firebaugh	Mesa Sirsa	1499	48.2	1.4	5.6	1.2	42.2[2]	1.4	0.0
4 Firebaugh	Moapa 69	1568	68.4	0.3	14.5	0.1	16.0[2]	0.1	0.6
5 Firebaugh	Mesa Sirsa	1278	72.0	0.5	2.7	0.5	22.8[2]	1.4	0.1
6 Firebaugh	Moapa 69	1556	67.8	0.8	24.9	0.0	6.1	0.0	0.4
--- Average	---	1482	72.5	2.8	9.4	0.6	13.2	0.6	0.9
1 Mendota	524	1497	87.7	1.2	8.9	0.2	0.3	0.8	0.9
2 Mendota	La Rocca	1533	91.6	0.9	5.2	0.8	0.3	0.5	0.7
3 Mendota	Moapa 69	1556	88.7	3.7	4.1	0.1	1.5	0.5	1.4
4 Mendota	524	1867	90.0	1.6	5.6	0.0	1.4	1.1	0.2
5 Mendota	Moapa 69	1773	89.5	1.8	5.9	0.1	0.9	0.6	1.2
--- Average	---	1645	89.5	1.8	5.9	0.3	0.9	0.7	0.9
1 San Joaquin	Riley	1774	94.0	0.2	3.4	0.2	0.1	1.2	0.9
2 San Joaquin	Cimarron	1562	85.4	2.4	9.7	0.1	0.1	1.9	0.4
3 San Joaquin	CW 8015	2026	91.0	0.6	5.7	0.0	0.1	0.3	2.3
4 San Joaquin	A-57	1642	87.3	1.9	9.5	0.1	0.2	0.5	0.5
5 San Joaquin	CUF 101	1491	71.5	5.2	8.3	0.1	1.7	1.1	12.1[3]
6 San Joaquin	Advantage	1658	84.9	1.2	9.3	0.0	1.4	1.3	1.9
7 San Joaquin	Trident	1667	92.6	0.2	4.6	0.1	1.1	0.8	0.6
8 San Joaquin	Trident	1912	93.3	0.0	1.6	0.1	3.8	0.2	1.0
9 San Joaquin	Moapa 69	1719	94.2	0.2	2.3	0.0	1.0	0.5	1.8
10 San Joaquin	Moapa 69	1783	74.9	1.1	20.5	0.3	0.2	2.3	0.7
11 San Joaquin	CUF 101	1773	94.2	0.4	4.3	0.0	0.6	0.1	0.4
12 San Joaquin	NAPB-91	1749	75.9	8.7	10.0	0.0	0.3	1.7	3.4

Table 15 - (continued)

Field Number and Location	Variety	Seed Exam^1	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
13 San Joaquin	Moapa 69	1728	83.7	6.7	5.1	0.1	0.8	3.0	0.6
14 San Joaquin	NAPB-74	1537	82.7	7.6	5.8	0.0	0.3	1.8	1.8
15 San Joaquin	C-731	1686	81.8	1.2	14.5	0.0	0.5	0.4	1.6
16 San Joaquin	CUF 101	1469	49.8	1.3	30.7	0.1	0.3	0.4	17.4^3
17 San Joaquin	167-R	1736	82.7	1.0	14.5	0.1	0.7	0.3	0.7
--- Average	---	1701	83.5	2.3	9.4	0.1	0.8	1.1	2.8
1 Five Points	Vertus	1718	89.7	2.2	5.9	0.1	0.1	0.7	1.2
2 Five Points	Moapa 69	1732	91.6	0.5	5.2	0.8	0.0	1.8	0.1
3 Five Points	Moapa 69	1428	89.9	0.8	8.1	0.1	0.2	0.1	0.8
4 Five Points	Classic (C.T.)	1694	94.0	0.2	4.0	0.0	0.1	0.4	1.3
5 Five Points	CW 69	1522	90.9	0.3	7.1	0.1	0.2	1.3	0.1
6 Five Points	CW 67	2149	93.9	0.2	5.2	0.0	0.0	0.3	0.4
7 Five Points	Peak	1587	93.1	1.6	4.5	0.1	0.1	0.4	0.2
8 Five Points	Peak	1651	92.9	0.7	6.2	0.0	0.0	0.2	0.0
9 Five Points	Peak	1914	93.6	0.1	3.7	0.1	1.0	0.9	0.6
10 Five Points	Natsuwakaba	1709	94.8	0.1	4.1	0.0	0.0	0.9	0.1
11 Five Points	Natsuwakaba	1782	96.4	0.2	2.9	0.0	0.0	0.3	0.2
12 Five Points	NATB-109	1697	93.0	0.6	4.4	0.2	0.5	0.6	0.7
13 Five Points	Classic (C.T.)	1529	89.5	4.0	5.7	0.1	0.0	0.1	0.6
14 Five Points	Armor	1678	94.1	0.1	4.7	0.0	0.0	0.6	0.5
15 Five Points	185	1704	89.1	0.7	8.6	0.2	0.3	0.7	0.4
16 Five Points	Peak	1589	84.5	2.2	10.5	0.1	0.3	1.8	0.6
17 Five Points	Classic (C.T.)	1696	92.4	1.6	4.1	0.0	0.5	1.1	0.3
18 Five Points	572	1322	90.1	2.2	4.9	0.0	2.1	0.5	0.2
19 Five Points	Bonus	1699	89.8	3.8	4.5	0.0	1.3	0.2	0.4
--- Average	---	1674	91.8	1.2	5.4	0.1	0.4	0.6	0.5

Table 15 - (continued)

Field Number and Location	Variety	Seed Exam^1	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Coalinga	Moapa 69	1937	88.8	1.6	8.1	0.0	0.1	1.0	0.4
2 Coalinga	Common	1759	91.9	0.6	6.2	0.2	0.0	0.8	0.3
3 Coalinga	FM 110-A	1665	94.4	0.5	3.4	0.0	0.1	0.7	0.9
4 Coalinga	Common	1882	89.1	1.4	7.8	0.1	0.6	0.0	1.0
5 Coalinga	Moapa 69	1706	85.6	5.6	6.6	0.0	0.8	1.0	0.4
6 Coalinga	Moapa 69	1705	72.0	1.7	23.9	0.0	0.7	1.4	0.3
7 Coalinga	Moapa 69	1731	81.0	11.5	5.8	0.0	0.9	0.1	0.7
8 Coalinga	K7-706	1965	89.0	0.8	8.8	0.2	0.7	0.2	0.3
--- Average	---	1794	86.5	3.0	8.8	0.1	0.5	0.7	0.4
1 Corcoran	CG-101	1689	90.6	3.8	3.4	0.2	0.8	0.8	0.4
2 Corcoran	WL-312	1887	96.8	0.1	1.8	0.1	0.8	0.4	0.0
3 Corcoran	WL-312	1903	92.0	0.2	5.8	0.1	1.2	0.5	0.2
4 Corcoran	CG-101	1727	86.4	1.5	5.3	0.0	1.3	5.3	0.2
5 Corcoran	WL-313	1967	91.8	0.3	4.9	0.1	1.6	1.0	0.3
6 Corcoran	K7-706	1681	93.8	0.1	3.9	0.2	1.5	0.4	0.1
7 Corcoran	P10-545	2194	90.3	0.1	4.1	0.0	2.7	2.2	0.6
8 Corcoran	DeKalb 130	2039	91.9	0.1	4.7	0.0	1.4	1.7	0.2
9 Corcoran	WL-318	1844	91.4	0.3	6.8	0.0	1.5	0.0	0.0
10 Corcoran	Peak	1737	92.6	0.4	5.2	0.0	1.0	0.0	0.8
11 Corcoran	NAPB-91	1505	89.8	2.2	6.7	0.0	0.6	0.0	0.7
12 Corcoran	CG-99	1755	82.0	1.1	11.2	0.0	2.4	0.1	3.2
13 Corcoran	NK-78015	1777	92.1	0.6	5.6	0.0	0.5	0.0	1.2
14 Corcoran	Pioneer 545	1828	92.1	0.2	6.3	0.0	0.5	0.0	0.9
15 Corcoran	K7-706	1775	92.8	2.9	3.2	0.0	0.3	0.0	0.8
--- Average	---	1821	91.1	0.9	5.3	0.1	1.2	0.8	0.6

Table 15 - (continued)

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Imperial Co.	Moapa 69	1607	84.4	1.8	9.3	0.2	0.3	3.9	0.1
2 Imperial Co.	CUF 101	1586	91.4	2.0	5.3	0.0	0.2	0.8	0.3
3 Imperial Co.	Moapa 69	1582	87.2	3.4	7.2	0.7	0.3	1.1	0.1
4 Imperial Co.	CUF 101	1619	80.9	7.3	6.1	0.8	1.9	0.2	2.8
5 Imperial Co.	CUF 101	1627	90.2	1.1	4.4	0.0	0.4	0.5	3.4
6 Imperial Co.	CUF 101	1591	92.6	1.5	3.4	0.3	0.6	0.9	0.7
7 Imperial Co.	Salton	1749	85.8	2.3	7.8	0.1	0.8	2.2	1.0
8 Imperial Co.	CUF 101	1464	79.8	2.7	13.8	0.1	1.8	1.7	0.1
9 Imperial Co.	CUF 101	1425	59.6	10.5	23.4	0.6	1.1	0.9	3.9
10 Imperial Co.	CUF 101	1737	79.2	4.4	14.5	0.0	0.6	0.0	1.3
11 Imperial Co.	CUF 101	1565	55.4	3.2	40.4	0.1	0.3	0.0	0.6
--- Average	---	1596	80.5	3.7	12.3	0.3	0.8	1.1	1.3
7 Area Average	---	1673	85.0	2.3	8.1	0.3	2.6	0.8	0.9

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

[2] Damage from October rains.

[3] Damage in green seed pod stage by unknown chewing insects.

The results of these experiments should not be interpreted as recommendations by the University of California. Insect control recommendations are published by the University of California and can be obtained free of charge from any Cooperative Extension office.

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

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

Advantage®
Ammo®
Bidrin®
Carzol®
Comite®
Dylox®
Lannate®
Lorsban®
Mavrik®
Mitac®

Monitor®
Nudrin®
Parathion®
Pay Off®
Phosdrin®
Plictran®
Pounce®
Supracide®
Thiodan®

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.