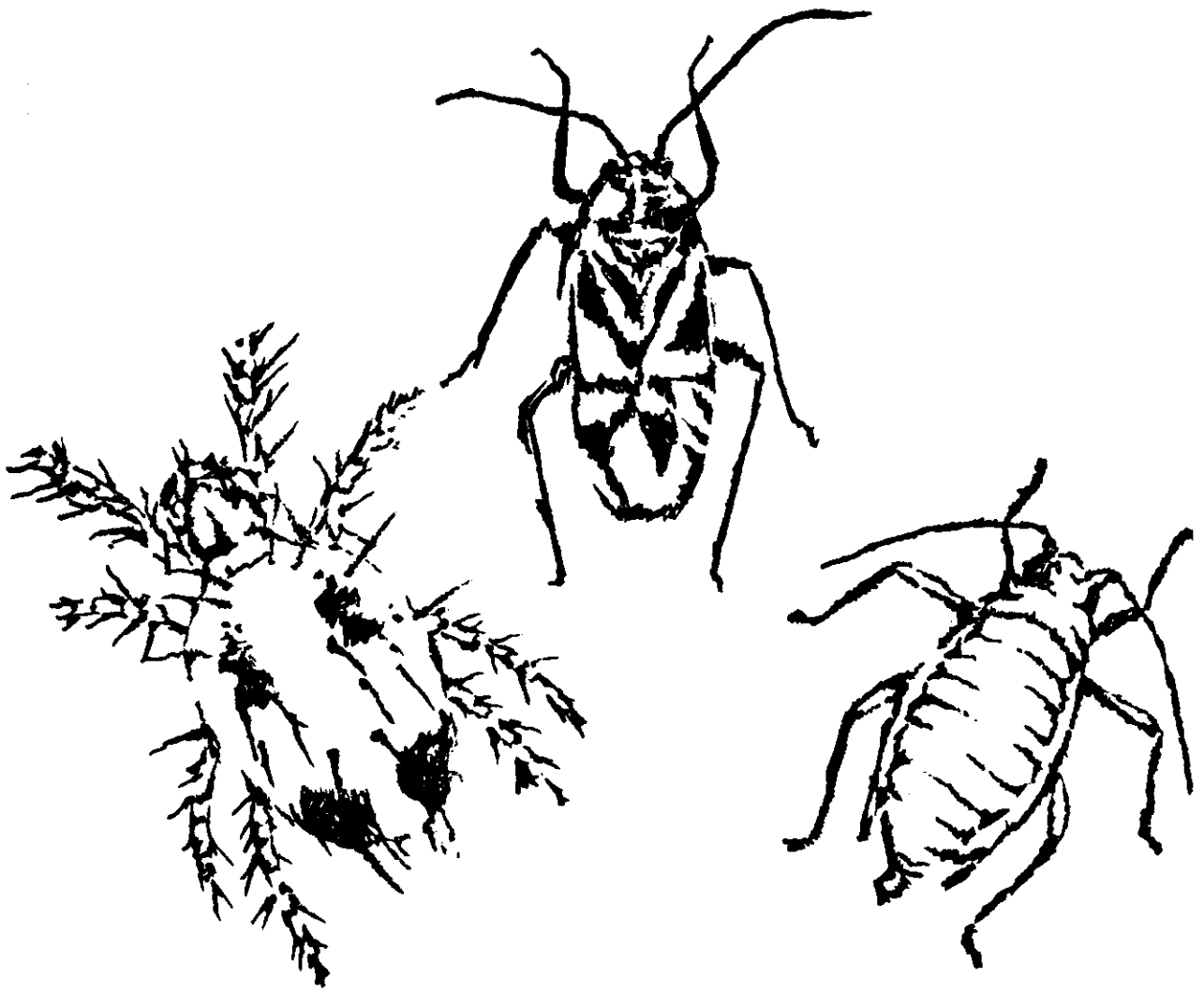
A SURVEY OF

COMMERCIAL INSECTICIDE PROGRAMS & SEED QUALITY



IN SEED ALFALFA

1984

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Research on Insects Affecting Seed Alfalfa 1984

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Introduction

Objectives for 1984 were to: 1) Conduct surveys in commercial fields at harvest to ascertain the amount and types of insect damage to alfalfa seed and in certain fields to relate these data to commercial pest insect control practices. 2) Conduct a literature search to compile known information on the biology and ecology of lygus bugs. 3) Continue to investigate the factors involved in the effects of Monitor on the susceptibility of certain alfalfas resistant to the spotted alfalfa aphid.

Since there were no new insecticides available for evaluation in alfalfa seed production, no insecticide evaluations were made in field trials in 1984.

Commercial Insecticide Treatments vs. Insect Control in 7 Fresno County Fields

During 1984 lygus bug populations were monitored throughout the season by sweeping with an insect sweeping net (20 sweeps/field on each sampling date) in 7 commercial alfalfa seed fields in West Fresno County. Records were also obtained of the insecticide treatments applied to these fields. Data on seed yields and percentages of insect damage in harvested seeds were recorded. The results of these studies are shown in Table 1.

The number of insecticide applications in the monitored fields ranged from 2 to 6. One field (#1) was treated with Temik applied to the soil at the rate of 3.0 lb. AI/acre on May 11. This field received its first foliar spray on May 22 and the other fields were first treated with various insecticides during the period May 12 through 28. One field received 2 foliar applications for the season, 3 fields were treated 3 times, 1 was treated 4 times and 2 were sprayed 5 times. Supracide at 0.5 to 0.75 lb AI/acre was the most widely used insecticide for the first lygus bug control treatment. Four of the 7 fields received this treatment and lygus bug populations remained below treatment levels (6-8 bugs per sweep) for 44 to 50 days. Monitor at dosages of 0.5 to 1.0 lb AI/acre was used for the first application on the remaining 3 fields. Data are incomplete regarding the residual effectiveness of this material since some fields were retreated at levels below those recommended but the Monitor appeared to be effective for about 30 days.

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Lygus bug populations were generally low during 1984 and the second application was made in most fields as the populations reached levels of 6 to 8 bugs per sweep. The materials used for the second application were more varied than those for the first application although Carzol 0.75 to 1.0 lb AI/acre, combined with Thiodan 1.0 lb AI/acre, was used in 3 of the fields. Other combinations used were Carzol 0.5 lb AI/acre + Lorsban 0.5 lb AI/acre, Phosdrin 0.5 lb AI/acre + Thiodan 1.0 lb AI/acre, Thiodan 1.0 lb AI/acre + Nudrin 0.75 lb AI/acre, and Lannate 0.5 lb AI/acre + Phosdrin 0.5 lb AI/acre. It appeared that several of these combinations, notably Thiodan + Nudrin, Phosdrin + Thiodan and Lannate + Phosdrin, were probably used to control spotted alfalfa aphid infestations in addition to lygus bugs. Carzol + Thiodan appeared to control lygus bugs for approximately 3 weeks.

Monitor at 1.0 lb AI/acre was applied as the third treatment in 3 of the 6 fields. Two were treated with combinations of Carzol + Phosdrin + Thiodan or Carzol + Comite and 1 received a Phosdrin + Thiodan combination. Similar combinations were used on those fields that received 4 and 5 applications.

Four of the fields received 1 application of Comite, 1.64 lb AI/acre, either in combination with or shortly following the first spray for lygus bug control. Two fields were treated twice with Comite at 1.64 AI/acre and 1 field received a second spot treatment of 2.46 lb AI/acre. The fact that several fields were treated more than once with Comite indicates that this material is not as effective as it was when it was first used to control spider mites on this crop. As mentioned in the 1983 report, data obtained each year since 1976 indicates that spider mites are slowly becoming resistant to this compound. It is, however, the only effective material currently available on this crop and control is still satisfactory. To be most effective, Comite should be applied with the first lygus bug control treatment at the beginning of the season.

It was noted that most of the Monitor treatments were applied at a rate of 1.0 lb AI/acre. This is double the rate that has been used in our experiments and may account for some of the severe honeybee toxicity problems that have been reported by beekeepers. It is our opinion that rates over 0.5 lb AI/acre are hazardous to honeybees and experiments conducted over several years have shown that lygus bug control is not substantially improved by applying the material at rates over 0.5 lb AI/acre.

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 1753 seeds were examined per field. The seeds were examined for chalcid damage, lygus bug and stink bug injury and for water damaged, green and shriveled seeds. The results are presented in Table 1. The percentages of lygus bug damaged seed for the 7 fields were 3.5, 3.5, 5.8, 4.2, 2.2, 4.8, and 1.0. The overall percentage of lygus damaged seed for the 7 fields was 3.6. Field 3 received 2 insecticide applications, the remainder received 3 or more. Although the timing of the insecticide applications was based on treatment levels of 6 to 8 bugs per sweep, treatments were frequently applied at populations below these levels. Although the highest lygus bug damage occurred in the field where only 2 insecticide applications were made, there did not appear to be a significant correlation between the number of applications and damaged seed in the remaining fields. The lowest

yield of the 7 fields also occurred in the field that received only 2 insecticide applications.

Percentages of seeds damaged by the seed chalcid for the 7 fields were 0.1, 0.4, 0.0, 5.0, 0.0, 0.1 and 0.2. There was no correlation between chalcid damage and insecticide programs. The overall average of chalcid damaged seeds for the 7 fields was 0.8. Yields of clean seed in pounds per acre from these fields were 851, 876, 773, 1000, 868, 925 and 855. The overall average was 878.

Lygus bug Study in Imperial County

During 1984, lygus bug populations were monitored at weekly intervals in 6 alfalfa seed fields in Imperial County. As in 1983, this again 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 subsamples of seeds were examined from each of the threshed 2-quart samples. An average of 1651 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 2. Four different insecticides (applied separately) and 5 insecticide combinations were reported as having been used. The insecticides were Phosdrin, Monitor, Lorsban, and methyl parathion. The combinations were Thiodan + Lorsban, Monitor + Lorsban, parathion + malathion, methyl parathion + Lorsban and Carzol + Thiodan. The number of insecticide applications per field ranged from 3 to 5, 1 field was treated 3 times, 3 were treated 4 times and 2 fields received 5 treatments.

In examining the data in Table 2, it appears that Phosdrin and parathion alone did not significantly reduce the lygus bug population (Field #1) although populations remained at or below treatment levels for up to 21 days following the Phosdrin application. Monitor alone at 1.0 lb AI/acre reduced populations and held them below treatment levels for periods ranging from 17 to 29 days. Thiodan + Lorsban was perhaps the most commonly used treatment. This combination appeared to hold lygus bug populations below treatment levels for 2 to 3 weeks. Conditions varied among the fields but generally lygus bug populations were low and with one or two exceptions did not exceed 10 bugs per sweep before treatments were applied.

An analysis of seeds from the 6 fields, with the exception of one, showed moderate percentages of lygus bug damaged seed. The percentages of lygus bug damaged seed for the 6 fields were 11.0, 5.0, 3.4, 2.6, 4.5 and 4.1. The overall average percentage of seed damaged by lygus bugs for the 6 fields was 5.1. Percentages of seeds damaged by the seed chalcid for the 6 fields were 1.6, 0.5, 2.0, 5.1, 1.6, and 3.0. The overall average of chalcid damaged seeds for the 6 fields was 2.3.

Hand stripped seed samples were taken prior to harvest from 9 additional seed fields in Imperial County. The results of these surveys are shown in Table 3. These fields were not monitored by Cooperative Extension personnel so insect population levels were not recorded but information was obtained from pest control advisors regarding insecticides applied to the fields. Insecticides

used alone were Monitor, Phosdrin, Supracide, and Methomyl. Insecticide combinations included Monitor + parathion, Thiodan + Lorsban, Supracide + Carzol, parathion + Lorsban and Monitor + Lorsban. One field received no insecticide treatments, 2 were treated once, 4 were treated twice and 2 received 3 insecticide applications. Percentages of lygus bug damaged seed in these fields ranged from 4.7 to 11.4 and averaged 7.3. It appears that lygus bug populations may have reached higher levels in these 9 fields than in the previous six fields since fewer insecticide applications were made during the season. Percentages of chalcid infested seed ranged from 1.1 to 5.9 and averaged 2.2.

Insect Damage in Seed Samples Taken at Harvest Time in Commercial Alfalfa Seed Fields

Samples of seed pods were hand stripped before commercial harvest from 152 alfalfa seed fields, 5 in the Firebaugh area, 9 from Mendota, 7 from Tranquility, 51 near San Joaquin, 20 from Five Points, 9 from Huron, 3 from Coalinga, 33 from Corcoran and 15 from Imperial County. The seeds were threshed and lightly cleaned in a clipper seed cleaner. An average of 1600 to 2100 seeds were examined from each field for damage caused by lygus bugs, the alfalfa seed chalcid and stink bugs. In addition to insect damage, the seeds were also examined for water damaged, and immature green seed at the time of harvest. The results are shown in Table 4.

Lygus bug damaged seed is the most severe problem evident in these survey results. Thirty-five fields (23%) of the 152 fields sampled had 6% or more of lygus bug damaged seed. Fifteen fields showed 10% or more damage by Lygus. This indicates that there were problems in certain fields with the timing and perhaps selection of materials applied for control of lygus bugs.

Seeds from individual fields showing lygus bug injury ranged from 0.8% to 19.4%. Fields with the highest percentages of lygus bug damage were in the San Joaquin area. Of 51 fields surveyed in this area seven showed percentages of seeds damaged by lygus bugs that ranged from 10.1 to 19.4. Individual fields with lygus bug damaged seed that exceeded 10% also occurred in Tranquility, Five Points, Huron, Corcoran and Imperial County. The overall average of seeds showing lygus bug injury in each of the areas was Firebaugh 3.8%, Mendota 2.2%, Tranquility 5.9%, San Joaquin 5.0%, Five Points 4.2%, Huron 5.2%, Coalinga 3.7%, Corcoran 4.3%, and Imperial County 6.4%. The overall average of lygus bug damaged seed for the 9 areas was 4.5%.

In general the percentages of seeds showing lygus bug damage were about the same or slightly lower in the San Joaquin Valley in 1984 than in 1983. In the Firebaugh, San Joaquin and Five Points areas, where data have been maintained for several years, overall percentages of seeds damaged by lygus bugs in 1984 were 3.8, 5.0 and 4.2, respectively. These percentages compare with 5.6, 5.5 and 5.4 for these respective areas in 1983.

Chalcid damage was second to lygus bugs as a problem in the fields surveyed. The percentages of chalcid damaged seed in samples from individual fields in the 9 areas ranged from 0 to 14.8. Two fields showed chalcid damage in excess of 11% and eleven fields out of the 152 sustained chalcid damage levels of more than 4%. Overall, seed chalcid damage for the Firebaugh area averaged 1.8%, Mendota 0.5%, Tranquility 2.4%, San Joaquin 0.7%, Five Points 1.0%, Huron 4.7%,

Coalinga 0.1%, Corcoran 1.1% and Imperial County 2.2%. Seed chalcid damage for the 9 areas averaged 1.6%.

Overall chalcid damage in the Firebaugh and Five Points areas was approximately the same in 1984 as in 1983. Chalcid damage in the San Joaquin area was about 50% less in 1984 than in 1983. The percentages of chalcid damaged seed for the Firebaugh, San Joaquin and Five Points areas for the years 1976 through 1984 are shown graphically in Figure 1.

Since the chalcid problem appears to be limited to just a few fields, it would seem that it can be corrected with clean-up and clip back management cautions.

Stink bug populations were low throughout the seed producing areas. Overall, percentages of seeds damaged by stink bugs in the areas ranged from 0.1 to 0.5 and the 9 area average was 0.3%.

Seed Sampling from Various Locations on the Plant

In hand stripping seed pods for various seed quality evaluations, efforts are made to take pods from both upper and lower portions of the plant. An opportunity occurred in 1984 in sampling commercial fields in the San Joaquin and Five Points areas to evaluate and compare samples taken from the upper portions of the plants, from the lower portions of the plants in or near furrows and in samples taken randomly from both upper and lower portions of the plants. Four 2-quart samples of pods were hand stripped from the various locations on the plants prior to commercial harvest. The samples were hand threshed and lightly cleaned in a clipper seed cleaner. The seeds were then analyzed for damage by seed chalcid, lygus bugs, stink bugs, water damaged, green and shriveled seeds. Evaluations were based on 4 subsamples from each of the threshed 2-quart samples. Approximately 400 to 500 seeds were examined per sample. The results of this study are shown in Tables 5, 6 and 7.

The percentage of seeds damaged by lygus bugs was slightly higher in samples taken from the upper portions of the plant than from lower portions, 4.6% upper vs. 3.5% lower. Stink bug damage was the same in both upper and lower plant locations, 0.8%. The percentage of seeds damaged by the seed chalcid was slightly higher in samples taken from the upper portions of the plant as opposed to the lower portions, 0.7% vs. 0.2%. As expected, water damaged seed was greater in the lower portion of the plant than in the upper portion, 1.3% vs. 0.8%. Also, as expected, the percentage of immature green seed was highest in samples taken from the upper portion of the plant, 1.3% upper vs. 0.7% lower. Seed samples taken randomly from both upper and lower portions of the plants were intermediate to the percentages of damage found in upper vs. lower plant areas. In fact, seed damage in these combined samples was equivalent to an average of the damage found in separate upper and lower samples including water damaged and green seeds. It, therefore, appears that the procedure of randomly sampling seed pods from both upper and lower portions of the plant provides a representative evaluation of damage to mature seeds. It should be pointed out, however, that lygus bugs cause other damage such as blasting of buds and shedding of florets that prevent seed production thereby reducing total yields. This damage is not reflected in our seed quality analyses, but high levels of seed damage may imply additional unmeasured yield losses.

Lygus Bug Literature Survey

During 1984, a search of library material was conducted to assemble titles of published references to the genus Lygus. The major objective of the search was to compile known information on the biology and ecology of lygus bugs. A starting point was a Bibliography of Lygus compiled by D. R. Scott, University of Idaho, in 1980 that included 902 references from 1896 through 1979. In September 1984, Graham et al., U.S. Department of Agriculture, published a bibliography of worldwide literature of the Lygus complex (Hemiptera: Miridae) 1900-1980. This publication included 2467 citations to the literature published from 1900 to 1980 on members of the genus Lygus and closely related genera throughout the world. It is indexed by subject area, decade of publication, and the continent where the research was conducted. The references reflect a wide range of interactions involving the relationship of lygus bugs with their host plants including feeding damage, plant resistance, reproduction, nutrition, toxic effects on plants, taxonomic status, predation, etc. We were especially interested in papers dealing with field life table studies on alfalfa. This type of information is basic to studies involving potential resistance of alfalfa to lygus bugs. Some 90 papers published from 1931 to 1980 in North America contain some reference to host plant resistance. We hope to become more involved in such studies in future years.

Effects of Insecticide Treatments on Resistance of Alfalfa to SAA

A research project to study the effects of Monitor insecticide on resistance of alfalfa to spotted alfalfa aphid has been conducted for the past five years by graduate student Curtis Powell, and is now close to completion. The research has produced significant information regarding the survival and reproduction of SAA on treated and untreated alfalfa, the population dynamics of SAA on Monitor-treated and untreated seed and hay alfalfa, the relationship between alfalfa variety and likelihood of resistance breakdown, and the biochemical basis of the breakdown of resistance to SAA.

Early research showed that certain alfalfa varieties, when treated with Monitor or Orthene, a related insecticide, supported greater population of SAA. In depth analysis showed that the primary factor responsible for the larger populations was higher survival of the very young aphids.

During the summers of 1982 and 1983 experiments were performed that measured the population numbers of SAA on alfalfa grown under different insecticide treatment regimes. It was found that plots of alfalfa treated with Orthene or Monitor on a semi-weekly schedule supported large numbers of SAA, but that these numbers decreased significantly three to four weeks after treatment, or sooner if treatments with an alternative insecticide, e.g. Carzol, were interspersed with the Monitor or Orthene treatments.

Different varieties of alfalfa have been observed to differ in their propensity to lose their resistance to SAA following Monitor treatment. Fifty-three varieties of alfalfa were evaluated to see how much resistance to SAA they would lose following treatment with Monitor. It was found that the most important factors associated with resistance loss were 1) the level of resistance present when the alfalfa variety was not treated with Monitor, and 2) the amount of flemish germplasm present in the variety.

Research is currently underway to determine the biochemical basis of the resistance-loss phenomenon that has been documented by the previous experiments. During the summer of 1984, foliage from Monitor-treated and untreated alfalfa plants was collected, and sap from the phloem tissue (the feeding site of SAA) of the foliage was extracted. These samples are currently being analyzed to determine the amount of amino acids (the building blocks of protein) and sugars present in the sap, and to correlate these levels with the numbers of SAA present on the plants. It is hypothesized that Monitor insecticide decreases the plant's resistance to SAA by increasing the nutritional value of the phloem sap to the aphid. It is hoped that this experiment will provide evidence for this hypothesis.

Table 1 - Lygus bug populations and seed quality in 7 commercial seed alfalfa fields treated by aircraft for lygus bug control. Fresno County, California, 1984.

Field #1

Treatment Insecticides		AI/acre lb.	Days after treatment	Number of lygus bugs per sweep[1] Adults	Nymphs	Adults + Nymphs
Temik Monitor	(5-11) (5-22)	3.00 1.00				
			24	0.7	1.4	2.1
			29	1.3	6.8	8.1
Carzol + Thiodan	(6-23)	1.00 + 1.00				
			3	0.9	0.7	1.6
			7	3.9	0.3	4.2
Carzol + Comite	(7-7)	1.00 + 1.64				
Carzol + Comite	(7-18)	1.00 + 2.46		(spot treated north 1/3 of field)		
			1	0.1	1.4	1.5
			5	0.4	1.7	2.1
Lannate		1.00				

Yield: Clean Seed 851 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CW-62	1573	95.6	0.1	3.5	0.0	0.4	0.3	0.1

Table 1 - (continued)

Field #2

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Supracide	(5-12)	0.50				
Comite	(6-7)	1.64				
			33	0.2	0.3	0.5
			41	1.3	2.0	3.3
			44	1.5	4.8	6.3
Carzol		0.75				
+	(6-27)	+				
Lorsban		0.50				
			6	1.4	1.0	2.4
			16	2.2	3.3	5.5
			22	0.9	4.7	5.6
Phosdrin		0.50				
+		+				
Thiodan		1.00				
			1	0.2	0.5	0.7

Yield: Clean Seed 876 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Apollo-2	1798	94.5	0.4	3.5	0.2	0.6	0.5	0.3

Table 1 - (continued)

Field #3

Treatment				Number of lygus bugs per sweep[1]		
Insecticides	AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Supracide (5-21)	0.50				
Comite (6-10)	1.64				
		24	0.8	0.2	1.0
		29	0.6	0.1	0.7
		36	0.5	1.6	2.1
		45	2.6	3.2	5.8
		57	0.9	1.3	2.2
Phosdrin	0.50				
+	+				
Thiodan	1.00				
		2	0.3	0.2	0.5

Yield: Clean Seed 773 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Apollo-2	1831	91.0	0.0	5.8	0.3	1.1	1.7	0.1

Table 1 - (continued)

Field #4

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Supracide + Comite	(5-28)	0.75 + 1.64				
			28	0.2	0.7	0.9
			38	1.2	1.4	2.6
			46	1.2	2.8	4.0
			50	1.3	6.5	7.8
Thiodan + Nudrin	(7-21)	1.00 + 0.75				
			2	0.2	0.4	0.6
Monitor	(8-12)	1.00				

Yield: Clean Seed 1000 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Common	1792	89.0	5.0	4.2	0.0	1.2	0.5	0.1

Table 1 - (continued)

Field #5

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
(No clean up spray)						
	(6-16)		Pre	0.3	0.6	0.9
	(6-20)		Pre	0.4	2.4	2.8
	(6-26)		Pre	2.0	5.0	7.0
Monitor + Comite	(7-1)	0.50 + 1.23				
			4	0.4	0.1	0.5
			8	1.5	0.4	1.9
			16	1.8	0.9	2.7
Carzol + Phosdrin + Thiodan	(7-19)	0.75 + 0.38 + 1.13				
			4	0.7	0.3	1.0
Lannate + Thiodan	(8-5)	0.68 + 1.00				

Yield: Clean Seed 868 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
FM-160	1857	95.6	0.0	2.2	0.1	1.3	0.3	0.5

Table 1 - (continued)

Field #6

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Supracide + Comite	(5-18)	0.75 + 1.64				
			27	1.2	0.4	1.6
			33	0.5	0.4	0.9
Lannate + Phosdrin + Comite	(6-26)	0.50 + 0.50 + 1.64				
			1	0.0	0.2	0.2
			8	0.3	0.7	1.0
			12	1.3	5.6	6.9
Monitor	(7-17)	1.00				
			1	0.7	0.4	1.1
			6	0.5	0.9	1.4
Nudrin + Thiodan	(7-26)	0.75 + 1.00				
Nudrin + Phosdrin		0.50 + 0.25				

Yield: Clean Seed 925 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
NAPB-109	1783	93.0	0.1	4.8	0.9	0.5	0.4	0.3

Table 1 - (continued)

Field #7

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Monitor + Comite	(5-18)	0.67 + 1.64				
Carzol + Thiodan	(6-15)	0.75 + 1.00				
			1	1.0	0.2	1.2
			12	0.5	0.5	1.0
			22	0.6	1.5	2.1
Monitor + Comite	(7-6)	1.00 + 1.64				
			7	0.3	0.1	0.4
			11	0.4	0.3	0.7
			16	0.5	0.9	1.4

Yield: Clean Seed 855 lbs/acre

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1637	96.7	0.2	1.0	0.5	0.4	0.5	0.7

[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.

Table 2 - Lygus bug populations and seed quality in 6 commercial seed alfalfa fields treated by aircraft for lygus bug control. Imperial County, California, 1984.

Field #1

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Furadan + Methyl parathion	(3-17)	0.27 + 0.33				
			25	1.0	0.0	1.0
			32	0.2	0.2	0.4
			39	0.5	5.1	5.6
Phosdrin	(6-26)	0.50				
			7	6.0	3.9	9.9
			14	1.5	4.4	5.9
			21	2.0	4.6	6.6
Parathion 6-3	(7-18)	0.90				
			7	2.5	3.3	5.8

Field desiccated 7-31-84

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1771	83.8	1.6	11.0	0.1	3.1	0.3	0.1

Table 2 - (continued)

Field #2

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Monitor	(6-2)	0.67				
			9	0.3	0.2	0.5
Thiodan + Lorsban	(6-16)	1.00 + 0.60				
			2	0.0	0.2	0.2
			9	0.5	1.5	2.0
			16	0.9	1.7	2.6
			23	2.0	3.9	5.9
Monitor + Lorsban	(7-10)	1.00 + 0.67				
			6	0.3	0.2	0.5
Parathion + Malathion	(7-17)	0.67 + 2.00				

Field desiccated 7-29-84

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1545	87.4	0.5	5.0	0.0	6.7	0.3	0.1

Table 2 - (continued)

Field #3

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
			Pre	1.3	0.2	1.5
Thiodan + Lorsban	(6-13)	0.94 + 0.53	5	1.7	0.0	1.7
Monitor	(6-22)	0.94	3	0.2	0.0	0.2
			10	2.0	3.7	5.7
			17	8.1	7.1	15.2
Thiodan + Lorsban	(7-10)	1.10 + 0.53	6	0.6	2.0	2.6
Thiodan + Lorsban	(7-22)	1.12 + 0.73	1	0.3	1.0	1.3

Field desiccated 8-2-84

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1773	89.7	2.0	3.4	0.0	1.0	3.4	0.5

Table 2 - (continued)

Field #4

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Thiodan + Lorsban	(6-11)	0.94 + 0.50				
			1	1.8	0.5	2.3
			8	1.9	1.2	3.1
Monitor	(6-22)	1.00				
			3	0.3	0.1	0.4
			10	0.1	4.1	4.2
Thiodan + Lorsban	(7-9)	1.13 + 0.50				
			1	0.0	1.2	1.2
			8	1.2	6.4	7.6
Thiodan + Lorsban	(7-22)	1.12 + 0.73				
			1	6.4	7.4	13.8
Methyl parathion + Lorsban	(8-10)	1.00 + 0.50				

Field desiccated 8-15-84

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1563	90.4	5.1	2.6	0.1	1.6	0.2	0.0

Table 2 - (continued)

Field #5

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Thiodan + Lorsban	(6-16)	1.13 + 0.63				
			2	0.2	0.0	0.2
			9	0.1	0.9	1.0
Monitor	(6-27)	1.00				
			5	0.2	0.5	0.7
			12	0.4	2.8	3.2
			19	2.6	4.9	7.5
			26	3.0	2.8	5.8
Carzol + Thiodan	(7-26)	0.92 + 1.13				
Lorsban	(8-4)	0.50				
Methyl parathion	(8-11)	1.00				

Field desiccated 8-20-84

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1657	90.4	1.6	4.5	0.0	2.1	0.7	0.7

Table 2 - (continued)

Field #6

Treatment				Number of lygus bugs per sweep[1]		
Insecticides		AI/acre lb.	Days after treatment	Adults	Nymphs	Adults + Nymphs
Thiodan + Lorsban	(6-3)	1.29 + 0.57				
Thiodan + Lorsban	(6-18)	1.11 + 0.46				
			1	0.4	1.3	1.7
			8	1.4	3.8	5.2
			15	1.9	9.9	11.8
Thiodan + Lorsban	(7-4)	1.11 + 0.57				
			5	3.6	1.1	4.7
			12	0.6	9.7	10.3
Monitor	(7-17)	1.00				
			6	0.7	1.6	2.3

Field desiccated 8-2-84

Variety	Number seeds Examined[2]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1596	89.6	3.0	4.1	0.3	2.6	0.4	0.0

[1] Data based on an average of 20 sweeps (2-10 sweep samples) per field on each sampling date.

[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.

Table 3 - Seed quality in 9 commercial seed alfalfa fields treated by aircraft for lygus bug control. Imperial County, California, 1984.

Field #1

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
June 20	Monitor	1.00	10
July 28	Monitor + Parathion	0.75 + 0.50	10

Field desiccated August 6

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1620	83.4	3.5	8.6	0.3	1.9	1.9	0.4

Field #2

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
June 19	Thiodan + Lorsban	1.11 + 0.49	5
July 10	Thiodan + Lorsban	1.11 + 0.51	10

Field desiccated August 7

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1886	84.2	0.7	8.4	1.3	5.1	0.3	0.0

Table 3 - (continued)

Field #3

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
June 16	Thiodan + Lorsban	1.11 + 0.49	5
July 10	Thiodan + Lorsban	1.11 + 0.51	10

Field desiccated August 7

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1860	90.7	0.9	4.7	0.3	2.3	1.0	0.1

Field #4

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
June 12	Phosdrin	0.49	5
June 30	Monitor	0.91	5

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1657	88.6	1.1	7.2	0.2	2.7	0.1	0.1

Table 3 - (continued)

Field #5

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
June 29	Supracide + Carzol	0.42 + 0.50	5
July 5	Supracide	0.70	5
July 28	Parathion 6-3 + Lorsban	0.96 + 0.48	10

Field desiccated August 10

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Moapa 69	1941	83.7	2.5	8.9	0.4	3.2	1.3	0.0

Table 3 - (continued)

Field #6

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
June 12	Monitor + Lorsban	0.80 + 0.50	5
June 21	Monitor + Lorsban	0.98 + 0.49	5
July 19	Monitor + Lorsban	0.98 + 0.50	10

Field desiccated July 27

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Moapa	1873	90.2	1.1	5.1	0.3	2.2	0.3	0.8

Field #7

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
June 29	Supracide	0.63	5

Field desiccated August 14

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1671	77.5	5.9	11.4	0.2	4.7	0.0	0.3

Table 3 - (continued)

Field #8

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
September 6	Methomyl	0.72	5

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
CUF-101	1686	86.3	1.9	5.5	0.4	3.3	2.4	0.2

Field #9

Date Treated	Insecticide Used	Rate AI/acre lb.	GPA
No insecticide treatments			

Variety	Number seeds Examined[1]	Percent good seed	Percent Defective Seeds					
			Chalcid	Lygus bug	Stink bug	Water damage	Green	Other
Cargo	1792	88.2	2.2	6.1	0.2	2.1	0.6	0.6

[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 4 - Percentages of good and defective seeds in samples from 152 commercial seed alfalfa fields surveyed for chalcid damaged seed. Fresno, Kings, and Imperial Counties, California, 1984.

Field Number and Location[1]	Variety	Seed Exam[2]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 Firebaugh	A-54	1752	94.5	0.8	3.5	0.2	0.6	0.3	0.1
2 Firebaugh	DK-135	1762	89.5	3.4	2.9	0.0	1.7	2.5	0.0
3 Firebaugh	F-104	1774	96.1	1.1	1.8	0.0	1.0	0.0	0.0
4 Firebaugh	Prospera	1563	92.2	1.0	4.2	0.3	0.2	1.9	0.2
5a Firebaugh	UC Cibola	1596	89.2	2.8	7.3	0.3	0.0	0.1	0.3
5b Firebaugh	UC Cibola	1564	85.2	1.7	3.3	0.3	4.4	4.9	0.2
--- Average	---	1669	91.2	1.8	3.8	0.2	1.3	1.6	0.1
1 Mendota	CUF-101	1741	96.0	0.8	1.7	0.0	1.2	0.3	0.0
2 Mendota	CUF-101	1663	95.8	0.9	2.1	0.0	1.1	0.1	0.0
3 Mendota	CUF-101	1766	95.8	0.5	2.3	0.1	1.2	0.1	0.0
4 Mendota	Moapa 69	1668	95.7	1.0	2.2	0.0	0.7	0.2	0.2
5 Mendota	Moapa 69	1681	93.7	0.6	3.4	0.0	2.1	0.2	0.0
6 Mendota	Moapa 69	1886	95.9	0.1	2.2	0.0	1.5	0.3	0.0
7 Mendota	Moapa 69	1615	95.0	0.1	2.4	0.1	2.1	0.3	0.0
8 Mendota	Moapa 69	1706	97.8	0.2	1.1	0.0	0.8	0.1	0.0
9 Mendota	Common	1648	94.9	0.7	2.8	0.1	0.9	0.5	0.1
--- Average	---	1708	95.6	0.5	2.2	0.1	1.3	0.2	0.1
1 Tranquility	Magnum	1591	95.9	0.8	1.6	0.0	1.1	0.3	0.3
2 Tranquility	Moapa 69	1571	91.1	0.9	6.0	0.2	0.7	1.0	0.1
3 Tranquility	Moapa 69	1679	90.4	3.2	4.7	0.0	1.4	0.3	0.0
4 Tranquility	RE RE	1660	83.9	0.4	14.2	0.0	0.9	0.5	0.1
5 Tranquility	Riley	1586	90.2	4.0	4.0	0.4	0.2	1.0	0.2
6 Tranquility	74-5-6 CAB	1621	93.0	3.3	2.5	0.1	0.5	0.4	0.2
7 Tranquility	187-R	1765	83.9	4.4	8.6	0.1	1.8	1.2	0.0

Table 4 - (continued)

Field Number and Location[1]	Variety	Seed Exam[2]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
--- Average	---	1639	89.9	2.4	5.9	0.1	0.9	0.7	0.1
1 San Joaquin	A-54	1661	94.4	0.7	3.5	0.4	0.5	0.2	0.3
2 San Joaquin	A-54	1691	92.1	0.8	5.2	0.4	0.4	0.4	0.7
3 San Joaquin	A-54	1554	94.6	0.7	4.0	0.1	0.2	0.1	0.3
4 San Joaquin	Advantage	1611	96.2	0.6	1.9	0.0	0.2	0.9	0.2
5 San Joaquin	Advantage	1702	91.5	2.8	3.4	0.1	0.6	0.8	0.8
6 San Joaquin	Apollo 2	1798	94.5	0.4	3.5	0.2	0.6	0.5	0.3
7 San Joaquin	Apollo 2	1831	91.0	0.0	5.8	0.3	1.1	1.7	0.1
8 San Joaquin	Cimarron	1601	90.0	0.2	6.6	0.3	1.6	0.6	0.7
9 San Joaquin	CUF-101	1793	96.1	0.2	2.8	0.0	0.5	0.3	0.1
10a San Joaquin	CUF-101	1637	96.7	0.2	1.0	0.5	0.4	0.5	0.7
10b San Joaquin	CUF-101	1659	95.6	0.1	1.6	1.5	0.1	0.7	0.4
11a San Joaquin	CUF-101	1810	96.1	0.2	2.2	0.2	0.6	0.6	0.1
11b San Joaquin	CUF-101	1601	94.2	0.7	2.1	0.5	0.4	1.5	0.6
12a San Joaquin	CUF-101	1420	90.9	1.5	5.9	0.0	0.9	0.6	0.2
12b San Joaquin	CUF-101	1633	89.9	2.0	6.8	0.4	0.2	0.6	0.1
13 San Joaquin	CUF-101	1448	89.1	1.6	4.7	2.1	0.2	1.3	1.0
14 San Joaquin	CUF-101	1630	97.8	0.0	1.1	0.0	1.0	0.1	0.0
15 San Joaquin	CUF-101	1577	95.4	0.2	3.3	0.1	0.8	0.0	0.2
16 San Joaquin	CUF-101	1666	96.3	0.2	2.2	0.2	0.7	0.0	0.4
17a San Joaquin	CUF-101	1776	91.0	1.5	6.0	0.0	1.0	0.4	0.1
17b San Joaquin	CUF-101	1588	92.0	1.4	2.7	0.3	0.9	2.6	0.1
18 San Joaquin	CUF-101	1552	91.7	0.4	6.6	0.4	0.1	0.4	0.4
19 San Joaquin	CUF-101	1661	89.1	3.7	4.7	0.2	0.4	1.7	0.2
20 San Joaquin	CUF-101	1639	93.7	0.1	5.1	0.1	0.6	0.1	0.3
21 San Joaquin	CUF-101	1652	91.3	0.4	7.0	0.0	0.7	0.2	0.4
22 San Joaquin	CUF-101	2033	96.8	0.1	1.3	0.1	0.6	0.6	0.5
23 San Joaquin	CUF-101	1613	93.4	0.6	4.4	0.1	0.7	0.7	0.1
24 San Joaquin	CUF-101	1882	93.2	0.1	3.1	1.5	0.0	1.4	0.7
25 San Joaquin	CUF-101	1705	95.4	0.0	1.8	0.8	0.9	0.3	0.8

Table 4 - (continued)

Field Number and Location[1]	Variety	Seed Exam[2]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
26 San Joaquin	CUF-101	1847	93.1	0.4	3.5	0.2	1.5	0.4	0.9
27 San Joaquin	CUF-101	1901	92.8	0.0	5.0	0.3	1.1	0.7	0.1
28 San Joaquin	CW-62	1573	95.6	0.1	3.5	0.0	0.4	0.3	0.1
29 San Joaquin	DK-187	1682	93.5	0.2	1.4	1.2	0.7	2.5	0.5
30a San Joaquin	DK-187	1624	85.2	0.4	11.0	1.2	1.4	0.5	0.3
30b San Joaquin	DK-187	1786	87.6	0.6	8.2	0.6	2.5	0.4	0.1
31 San Joaquin	F-104	1768	96.0	0.1	3.1	0.1	0.1	0.2	0.4
32 San Joaquin	FM-130	1761	94.1	0.8	3.0	0.1	0.2	1.7	0.1
33a San Joaquin	FM-160	1857	95.6	0.0	2.2	0.1	1.3	0.3	0.5
33b San Joaquin	FM-160	1740	93.4	0.1	3.2	0.1	0.5	2.4	0.3
34 San Joaquin	G-2815	1612	82.4	0.1	15.1	2.0	0.1	0.3	0.0
35a San Joaquin	G-2815	1685	79.1	0.5	18.6	0.4	0.2	0.9	0.3
35b San Joaquin	G-2815	1616	77.5	0.9	19.4	1.6	0.5	0.0	0.1
36 San Joaquin	G-2815	1768	94.9	0.4	3.7	0.2	0.3	0.1	0.4
37a San Joaquin	G-2815	1636	89.5	1.8	4.4	1.6	0.4	1.2	1.1
37b San Joaquin	G-2815	1550	90.6	1.0	5.2	0.9	0.6	1.7	0.0
38 San Joaquin	Granada	1785	93.0	0.9	5.1	0.0	0.6	0.2	0.2
39 San Joaquin	H 134	1691	87.5	2.0	5.7	1.3	0.4	2.6	0.5
40 San Joaquin	Mesa Sirsa	1636	90.2	0.9	5.0	0.0	1.1	2.4	0.4
41a San Joaquin	Moapa 69	2011	95.6	0.0	2.3	0.0	2.0	0.1	0.0
41b San Joaquin	Moapa 69	1567	91.9	0.2	6.1	0.4	0.3	1.0	0.1
41c San Joaquin	Moapa 69	1516	90.7	0.5	5.5	2.2	0.5	0.6	0.0
42 San Joaquin	Moapa 69	1811	95.1	0.8	2.5	0.0	0.7	0.7	0.2
43a San Joaquin	Moapa 69	1648	97.0	0.1	1.5	0.1	0.9	0.3	0.1
43b San Joaquin	Moapa 69	1636	95.1	0.6	1.9	0.1	1.7	0.4	0.2
44a San Joaquin	Moapa 69	1551	90.6	0.2	4.6	2.3	0.6	0.9	0.8
44b San Joaquin	Moapa 69	1677	88.1	0.3	10.1	0.7	0.4	0.4	0.0
45 San Joaquin	Moapa 69	1615	93.9	1.3	3.3	0.8	0.3	0.2	0.2
46 San Joaquin	Moapa 69	1635	82.9	4.2	10.3	1.0	1.0	0.3	0.3
47 San Joaquin	NAPB-109	1573	92.6	0.4	6.5	0.1	0.0	0.3	0.1
48 San Joaquin	NAPB-109	1783	93.0	0.1	4.8	0.9	0.5	0.4	0.3
49 San Joaquin	187-R	1719	77.8	0.4	15.5	0.7	5.2	0.2	0.2

Table 4 - (continued)

Field Number and Location[1]	Variety	Seed Exam[2]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
50a San Joaquin	Common	1646	96.7	0.2	1.8	0.1	0.4	0.6	0.2
50b San Joaquin	Common	1703	96.3	0.1	2.7	0.1	0.2	0.1	0.5
50c San Joaquin	Common	1520	92.7	0.6	4.7	0.3	0.3	1.3	0.1
51 San Joaquin	Common	1701	94.0	1.5	2.9	0.1	0.5	0.9	0.1
--- Average	---	1681	92.1	0.7	5.0	0.5	0.7	0.7	0.3
1 Five Points	Advantage	1928	95.7	0.0	2.9	0.0	0.9	0.4	0.1
2 Five Points	Advantage	1816	94.3	0.8	3.4	0.1	0.6	0.5	0.3
3 Five Points	Apollo 2	2006	93.3	1.1	3.6	0.0	1.5	0.4	0.1
4 Five Points	CUF-101	1872	89.2	1.0	5.9	1.9	0.2	1.1	0.7
5 Five Points	CUF-101	1754	91.2	0.3	6.5	0.4	0.7	0.3	0.6
6 Five Points	CUF-101	1510	87.4	1.9	3.0	5.0	1.5	1.1	0.1
7 Five Points	CUF-101	1629	94.8	0.1	3.8	0.1	0.6	0.4	0.2
8 Five Points	CUF-101	1500	95.3	0.3	2.5	0.1	1.1	0.1	0.6
9 Five Points	CW-69	1713	93.5	0.7	3.4	0.4	0.7	0.8	0.5
10 Five Points	Hi Phy	1718	93.1	2.2	0.9	0.7	0.8	1.8	0.5
11 Five Points	Moapa	2017	94.0	0.4	3.9	0.1	0.3	0.7	0.6
12 Five Points	Moapa 69	1754	95.1	0.4	3.4	0.5	0.1	0.3	0.2
13 Five Points	Moapa 69	2082	95.4	0.1	3.6	0.1	0.3	0.2	0.3
14 Five Points	Moapa 69	1770	94.0	0.2	2.6	0.5	0.6	1.1	1.0
15a Five Points	NAPB-61	1676	96.2	0.4	2.4	0.0	0.3	0.2	0.5
15b Five Points	NAPB-61	1611	93.2	2.7	3.1	0.2	0.6	0.1	0.1
16 Five Points	NAPB-109	1928	95.4	0.1	2.3	0.0	1.6	0.5	0.1
17 Five Points	Common	1737	84.9	1.0	11.1	0.7	0.2	1.4	0.7
18 Five Points	Common	1792	89.0	5.0	4.2	0.0	1.2	0.5	0.1
19 Five Points	Common	1734	84.8	2.2	10.6	0.3	0.3	1.6	0.2
20 Five Points	Common	1890	89.7	1.4	4.1	0.4	1.0	2.4	1.0

Table 4 - (continued)

Field Number and Location[1]		Variety	Seed Exam[2]	Good Seed	Defective Seeds					
					Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
---	Average	---	1783	92.4	1.0	4.2	0.5	0.7	0.8	0.4
1	Huron	ATRA-55	1791	88.6	1.6	5.3	0.1	0.5	3.7	0.2
2	Huron	Magnum	2034	68.1	14.8	9.7	0.3	0.7	6.4	0.0
3	Huron	NAPB-108	1810	94.0	2.5	2.8	0.1	0.2	0.4	0.0
4	Huron	NK-80335	1736	95.0	0.9	2.1	0.1	1.2	0.7	0.0
5	Huron	NK-80335	1796	90.5	5.6	2.0	0.0	1.7	0.2	0.0
6	Huron	Pioneer 526	1893	87.2	3.5	5.1	0.1	0.5	3.6	0.0
7	Huron	Pioneer 532	1603	94.4	1.1	2.3	0.1	1.4	0.6	0.1
8	Huron	UC Cibola	1585	83.3	11.6	3.6	0.5	0.6	0.4	0.0
9	Huron	WL-313	1689	77.0	1.1	13.7	0.5	4.9	2.8	0.0
---	Average	---	1771	86.4	4.7	5.2	0.2	1.3	2.1	0.1
1	Coalinga	Armor	2087	92.8	0.1	4.4	0.1	1.4	1.2	0.0
2	Coalinga	Armor	2032	94.4	0.2	2.4	0.1	1.5	1.4	0.0
3	Coalinga	Armor	2257	94.2	0.0	4.2	0.1	0.4	1.1	0.0
---	Average	---	2125	93.8	0.1	3.7	0.1	1.1	1.2	0.0
1	Corcoran	Baron	1921	95.8	0.2	0.9	0.0	2.7	0.1	0.3
2	Corcoran	CUF-101	1652	89.8	0.4	7.5	0.1	2.2	0.0	0.0
3	Corcoran	CUF-101	1585	86.1	3.1	6.3	0.3	3.0	1.0	0.2
4	Corcoran	D-108	1792	92.0	1.0	5.2	0.2	1.3	0.2	0.1
5	Corcoran	Eagle	1848	90.7	0.5	3.6	0.1	4.2	0.5	0.4
6	Corcoran	EPIC	2024	95.0	0.2	2.2	0.0	2.2	0.4	0.0
7	Corcoran	Florida-77	1729	94.1	0.2	2.4	0.0	2.7	0.5	0.1

Table 4 - (continued)

Field Number and Location[1]		Variety	Seed Exam[2]	Good Seed	Defective Seeds					
					Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
8	Corcoran	G-7730	1826	78.5	2.3	16.5	0.0	1.9	0.7	0.1
9	Corcoran	K-3650	1678	93.1	0.4	2.3	0.0	2.6	1.6	0.0
10	Corcoran	Magnum	2031	92.7	4.2	1.8	0.1	1.1	0.1	0.0
11	Corcoran	Mesilla	1909	94.9	0.1	4.0	0.0	0.8	0.1	0.1
12	Corcoran	Moapa-69	1722	94.0	0.4	2.9	0.2	1.9	0.5	0.1
13	Corcoran	Moapa-69	1722	88.3	2.2	4.8	0.0	3.7	0.9	0.1
14	Corcoran	Moapa-69	1686	87.5	0.7	5.8	1.5	3.5	1.0	0.0
15	Corcoran	Moapa-69	1729	89.5	1.3	5.7	0.1	2.2	1.2	0.0
16	Corcoran	NAPB-105	1886	90.3	0.6	4.5	0.0	2.7	1.7	0.2
17	Corcoran	NAPB-105	1828	86.8	2.0	5.3	0.0	3.3	2.5	0.1
18	Corcoran	NK-78010	1614	90.7	3.8	4.4	0.1	0.7	0.3	0.0
19	Corcoran	P-526	1890	97.3	0.1	1.2	0.1	1.0	0.1	0.2
20	Corcoran	P-532	1735	95.4	0.1	2.2	0.0	2.0	0.2	0.1
21	Corcoran	P-532	2018	97.0	0.2	1.6	0.0	1.0	0.1	0.1
22	Corcoran	P-532	1850	95.1	0.0	2.4	0.0	2.3	0.2	0.0
23	Corcoran	SW-421	1492	87.1	0.6	5.6	0.0	6.1	0.5	0.1
24	Corcoran	VORIS A-77	1742	89.6	0.6	7.0	0.3	2.0	0.4	0.1
25	Corcoran	WL Spectrum	1810	91.7	0.3	4.8	0.0	2.9	0.3	0.0
26	Corcoran	WL-315	1869	96.3	0.2	2.4	0.0	0.9	0.2	0.0
27	Corcoran	WL-518	1573	83.0	3.2	10.2	0.8	0.8	1.2	0.8
28	Corcoran	WL-518	1562	85.9	5.3	6.7	0.3	0.7	0.5	0.6
29	Corcoran	WL-316	1791	94.0	0.7	2.6	0.0	1.9	0.8	0.0
30	Corcoran	78015	1869	94.3	0.7	2.3	0.0	2.4	0.2	0.1
31	Corcoran	78-115	1804	94.6	0.6	3.0	0.1	1.6	0.1	0.0
32	Corcoran	78-115	1799	94.0	0.3	3.6	0.1	1.5	0.5	0.0
33	Corcoran	77-T-23	1949	97.0	0.2	0.8	0.0	1.4	0.5	0.1
---	Average	---	1786	91.6	1.1	4.3	0.1	2.2	0.6	0.1
1	Imperial Co.	Cargo	1792	88.2	2.2	6.1	0.2	2.1	0.6	0.6
2	Imperial Co.	CUF 101	1771	83.8	1.6	11.0	0.1	3.1	0.3	0.1

Table 4 - (continued)

Field Number and Location[1]	Variety	Seed Exam[2]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
3 Imperial Co.	CUF 101	1657	88.6	1.1	7.2	0.2	2.7	0.1	0.1
4 Imperial Co.	CUF 101	1620	83.4	3.5	8.6	0.3	1.9	1.9	0.4
5 Imperial Co.	Moapa 69	1941	83.7	2.5	8.9	0.4	3.2	1.3	0.0
6 Imperial Co.	CUF 101	1860	90.7	0.9	4.7	0.3	2.3	1.0	0.1
7 Imperial Co.	CUF 101	1657	90.4	1.6	4.5	0.0	2.1	0.7	0.7
8 Imperial Co.	CUF 101	1773	89.7	2.0	3.4	0.0	1.0	3.4	0.5
9 Imperial Co.	Moapa	1873	90.2	1.1	5.1	0.3	2.2	0.3	0.8
10 Imperial Co.	CUF 101	1545	87.4	0.5	5.0	0.0	6.7	0.3	0.1
11 Imperial Co.	CUF 101	1686	86.3	1.9	5.5	0.4	3.3	2.4	0.2
12 Imperial Co.	CUF 101	1671	77.5	5.9	11.4	0.2	4.7	0.0	0.3
13 Imperial Co.	CUF 101	1563	90.4	5.1	2.6	0.1	1.6	0.2	0.0
14 Imperial Co.	CUF 101	1596	89.6	3.0	4.1	0.3	2.6	0.4	0.0
15 Imperial Co.	CUF 101	1886	84.2	0.7	8.4	1.3	5.1	0.3	0.0
--- Average	---	1726	87.0	2.2	6.4	0.2	3.0	0.9	0.3
9 Area Average	---	1765	91.2	1.6	4.5	0.3	1.4	0.8	0.2

[1]Letters a, b & c refer to samples from the same field.

[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.

CHALCID DAMAGED SEED

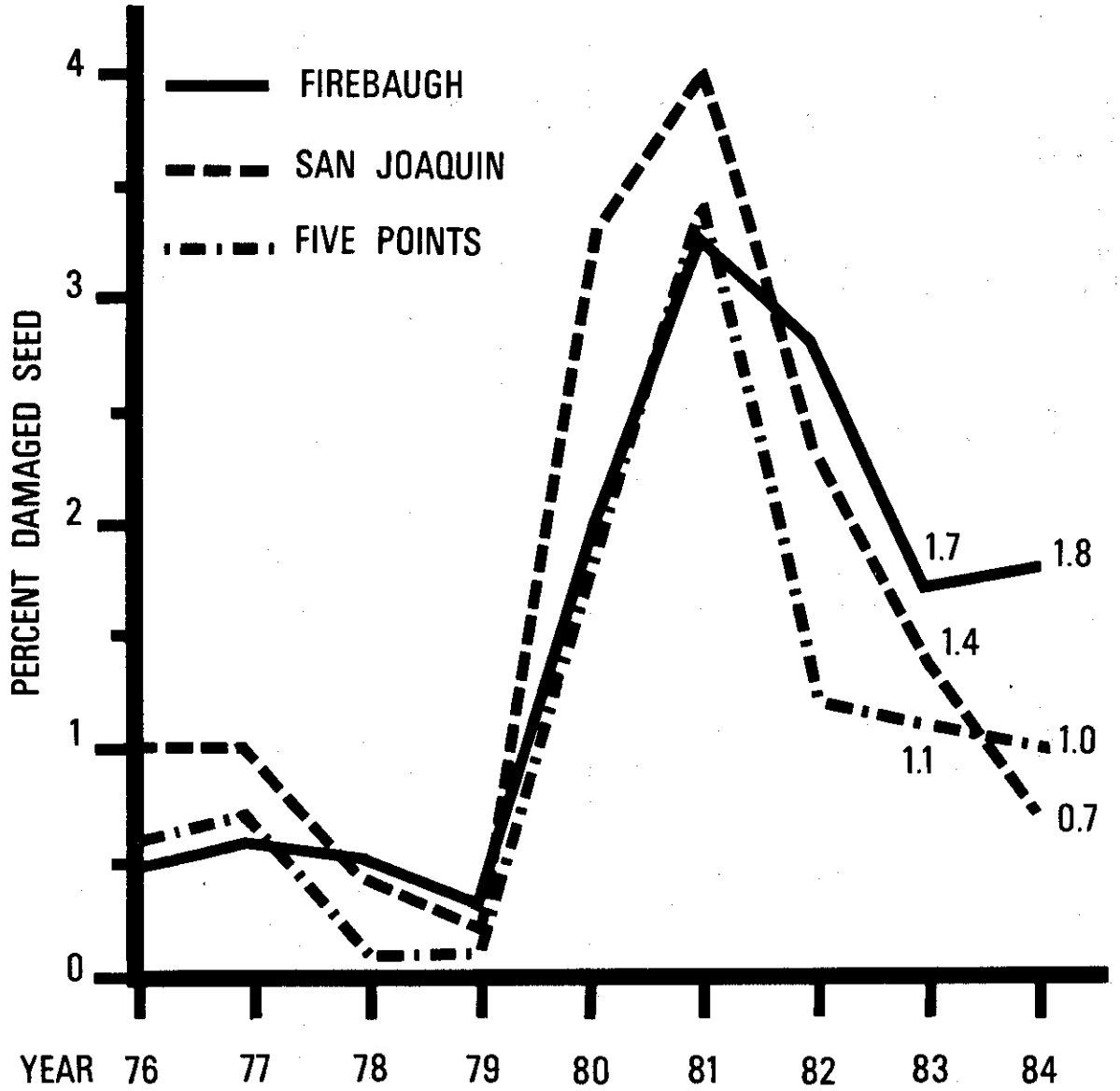

Fig. 1. Percentages of chalcid damaged seed from hand stripped samples taken from commercial alfalfa seed fields in the Firebaugh, San Joaquin and Five Points areas from 1976 to 1984.

Table 5 - Percentages of good and defective seeds in hand harvested samples from the upper portions of the plant standing erect on the beds. Fresno County, CA. 1984.

Field Number and Location		Variety	Seed Exam[1]	Good Seed	Defective Seeds					
					Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1	San Joaquin	CUF 101	440	95.3	0.2	2.7	0.0	0.9	0.7	0.2
2	San Joaquin	CUF 101	410	84.4	0.5	11.5	0.7	0.2	1.0	1.7
3	San Joaquin	CUF 101	407	93.6	0.7	1.2	0.5	0.3	3.7	0.0
4	San Joaquin	Moapa 69	485	95.6	0.2	2.3	0.0	1.9	0.0	0.0
5	San Joaquin	Moapa 69	419	88.1	0.7	6.4	2.2	0.7	1.2	0.7
6	San Joaquin	Apollo 2	480	93.8	0.8	4.0	0.6	0.4	0.4	0.0
7	San Joaquin	Apollo 2	474	91.8	0.2	5.3	0.4	0.0	2.1	0.2
8	San Joaquin	DK 187	442	93.0	0.7	3.4	0.2	2.0	0.7	0.0
9	San Joaquin	DK 187	375	81.4	0.8	14.8	1.7	1.3	0.0	0.0
10	San Joaquin	G 2815	427	93.4	1.2	4.2	0.5	0.2	0.5	0.0
11	San Joaquin	Common	446	91.5	0.2	2.5	1.1	1.1	2.9	0.7
	San Joaquin Average		437	91.1	0.6	5.3	0.7	0.8	1.2	0.3
1	Five Points	Moapa 69	426	94.4	0.9	4.0	0.5	0.0	0.0	0.2
2	Five Points	Moapa 69	583	93.3	0.0	5.3	0.4	0.2	0.2	0.6
3	Five Points	Advantage	503	95.0	0.0	3.4	0.0	1.2	0.4	0.0
4	Five Points	FM 160	452	96.1	0.0	2.2	0.0	0.9	0.4	0.4
5	Five Points	CUF 101	385	86.8	1.0	4.4	4.7	1.0	1.9	0.2
6	Five Points	CUF 101	466	89.5	0.9	4.7	1.5	0.4	1.8	1.2
7	Five Points	Common	467	84.2	3.2	3.9	0.2	0.6	6.6	1.3
8	Five Points	NAPB-109	479	93.4	0.2	3.3	0.0	2.3	0.8	0.0
	Five Points Average		470	91.6	0.8	3.9	0.9	0.8	1.5	0.5

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
Area Average for upper plant samples		454	91.4	0.7	4.6	0.8	0.8	1.3	0.4

[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 6 - Percentages of good and defective seeds in hand harvested samples from the lower portions of the plant near or in the furrows. Fresno County, CA. 1984.

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1 San Joaquin	CUF 101	465	95.5	0.0	4.1	0.0	0.2	0.0	0.2
2 San Joaquin	CUF 101	407	93.4	0.2	3.0	0.0	3.0	0.2	0.2
3 San Joaquin	CUF 101	381	93.4	1.1	2.6	0.8	0.0	1.6	0.5
4 San Joaquin	Moapa 69	522	94.2	0.0	2.7	0.0	2.7	0.4	0.0
5 San Joaquin	Moapa 69	371	89.2	0.0	6.2	1.6	0.8	1.1	1.1
6 San Joaquin	Apollo 2	420	94.8	0.2	3.8	0.0	1.0	0.2	0.0
7 San Joaquin	Apollo 2	457	88.0	0.0	7.0	0.4	2.8	1.8	0.0
8 San Joaquin	DK 187	455	92.6	0.2	3.1	0.4	3.3	0.4	0.0
9 San Joaquin	DK 187	424	89.4	0.0	8.0	1.0	1.4	0.0	0.2
10 San Joaquin	G 2815	455	95.2	0.0	3.7	0.0	0.4	0.0	0.7
11 San Joaquin	Common	415	91.8	0.0	0.7	2.7	0.2	4.4	0.2
San Joaquin Average		434	92.5	0.2	4.1	0.6	1.4	0.9	0.3
1 Five Points	Moapa 69	440	96.4	0.0	2.2	0.5	0.2	0.5	0.2
2 Five Points	Moapa 69	486	96.7	0.0	2.1	0.0	0.8	0.4	0.0
3 Five Points	Advantage	486	93.6	0.0	3.9	0.0	1.9	0.4	0.2
4 Five Points	FM 160	490	95.6	0.0	1.8	0.0	1.8	0.2	0.6
5 Five Points	CUF 101	377	89.1	0.5	4.3	4.3	1.1	0.3	0.4
6 Five Points	CUF 101	464	92.7	0.2	3.2	2.4	0.2	1.1	0.2
7 Five Points	Common	495	92.1	0.6	4.9	0.0	1.8	0.0	0.6
8 Five Points	NAPB-109	487	95.5	0.0	1.6	0.0	2.1	0.6	0.2
Five Points Average		466	94.0	0.2	3.0	0.9	1.2	0.4	0.3

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds: Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
Area Average for lower plant samples		450	93.2	0.2	3.5	0.8	1.3	0.7	0.3

[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 7 - Percentages of good and defective seeds in hand harvested samples from the upper and lower portions of the plant. Fresno County, CA. 1984.

Field Number and Location		Variety	Seed Exam[1]	Good Seed	Defective Seeds					
					Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
1	San Joaquin	CUF 101	888	96.1	0.2	2.8	0.0	0.5	0.3	0.1
2	San Joaquin	CUF 101	784	90.0	0.2	6.6	0.3	1.6	0.6	0.7
3	San Joaquin	CUF 101	813	94.2	0.7	2.1	0.5	0.4	1.5	0.6
4	San Joaquin	Moapa 69	1004	95.6	0.0	2.3	0.0	2.0	0.1	0.0
5	San Joaquin	Moapa 69	761	90.6	0.2	4.6	2.3	0.6	0.9	0.8
6	San Joaquin	Apollo 2	998	94.5	0.4	3.5	0.2	0.6	0.5	0.3
7	San Joaquin	Apollo 2	900	91.0	0.0	5.8	0.3	1.1	1.7	0.1
8	San Joaquin	DK 187	889	92.6	0.6	3.2	0.6	2.5	0.4	0.1
9	San Joaquin	DK 187	825	85.2	0.4	11.0	1.2	1.4	0.5	0.3
10	San Joaquin	G 2815	886	94.9	0.4	3.7	0.2	0.3	0.1	0.4
11	San Joaquin	Common	821	93.5	0.2	1.4	1.2	0.7	2.5	0.5
	San Joaquin Average		870	92.6	0.3	4.3	0.6	1.1	0.8	0.3
1	Five Points	Moapa 69	888	95.1	0.4	3.4	0.5	0.1	0.3	0.2
2	Five Points	Moapa 69	1014	95.7	0.2	3.2	0.2	0.2	0.2	0.3
3	Five Points	Advantage	943	97.3	0.0	2.1	0.0	0.2	0.2	0.2
4	Five Points	FM 160	915	95.6	0.0	2.2	0.1	1.3	0.3	0.5
5	Five Points	CUF 101	748	87.4	1.9	3.0	5.0	1.5	1.1	0.1
6	Five Points	CUF 101	942	89.2	1.0	5.9	1.9	0.2	1.1	0.7
7	Five Points	Common	928	89.7	1.4	4.1	0.4	1.0	2.4	1.0
8	Five Points	NAPB-109	962	95.4	0.1	2.3	0.0	1.6	0.5	0.1
	Five Points Average		918	93.2	0.6	3.3	1.0	0.8	0.8	0.3

Field Number and Location	Variety	Seed Exam[1]	Good Seed	Defective Seeds					
				Chalcid	Lygus bug	Stink bug	Water damage	Green	Other damage
Area Average for upper and lower plant samples		894	92.9	0.4	3.8	0.8	1.0	0.8	0.3

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

The contents of this report should not be interpreted as recommendations by the University of California.

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.

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

Carzol® (formetanate)

Comite® (propargite)

Lannate® (methomyl)

Lorsban® (chlorpyrifos)

Malathion

Methyl parathion

Monitor® (methamidophos)

Nudrin® (methomyl)

Parathion

Phosdrin® (mevinphos)

Supracide® (methadathion)

Temik® (aldicarb)

Thiodan® (endosulfan)