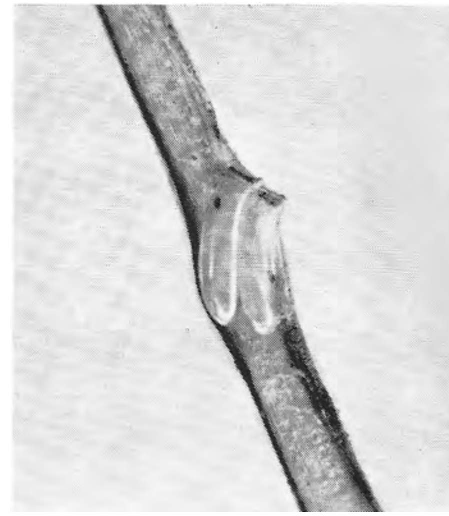
Investigations of

Lygus Bug Damage

to table beet seed plants

ELMER C. CARLSON



Lygus bug eggs on twig

Damage to seed crops by lygus bugs—*Lygus hesperus* Knight—has occurred in alfalfa, beans and other legumes, carrots and other umbelliferous seed plants, and in sugar beets. The damage may be plant deformation, die-back, and reduction of seed yield and seed viability. Degree of damage varies considerably depending on type of damage, the crop involved, and the numbers of bugs.

The data presented on numbers of bugs in relation to weight and viability of table beet seeds indicate that 2–4 bugs per sweep constitute a potentially damaging infestation. This relationship is important, because table beet seed fields are often sampled with a standard sweep net, which samples about one-sixth of 1–2 plants per sweep.

Possible effects on quantity and quality of developing table beet seeds were investigated by artificially infesting caged portions of field plants with lygus bugs. Bolting plants were exposed to male lygus bugs, with levels of infesta-

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originated from a cross between Cal 35.107-2 and Cal 36.48-1, with progenitors: Blakemore, Nich Ohmer, Redheart, Ruby, B.H. 14, N.Y. 4626, U.S. 543, and U.S. 634.

Plants of Wiltguard are vigorous semi-dense in growth habit, and they runner prolifically. The leaves are medium in size and dark green with short obovate, upcupped leaflets.

Wiltguard is fairly resistant to Verticillium wilt, although it is less resistant than the Sierra variety. It has performed well in back yard culture where tomatoes had been grown.

The fruit of Wiltguard is essentially of the Cupertino type, borne on low to medium high branching stems, and with some of the undesirable as well as the desirable characteristics of the Cupertino. Fruits are blunt-conic to conic in shape with exceptionally attractive color, both inside and out, that does not darken. The seeds are bright yellow, flush with the skin surface, medium spaced, and small sized. The fruit is highly flavored. Wiltguard tends to produce quite a number of button-type split fruits, particularly toward the end of the crop season.

On summer plantings, Wiltguard usually commences production earlier than any of the other University released varieties, especially in the central valleys and at San Jose. It has yielded consistently well.

Limited testing of the three new varieties, under the various cultural systems and particularly summer planting, should be made in all growing areas for evaluation of each variety under commercial conditions.

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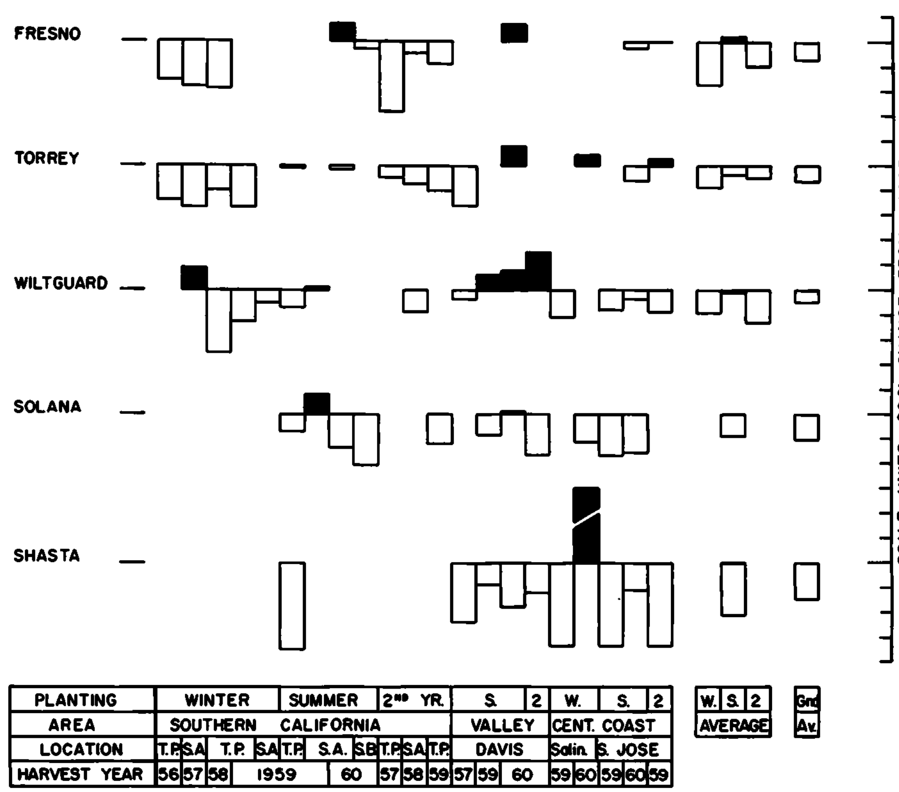
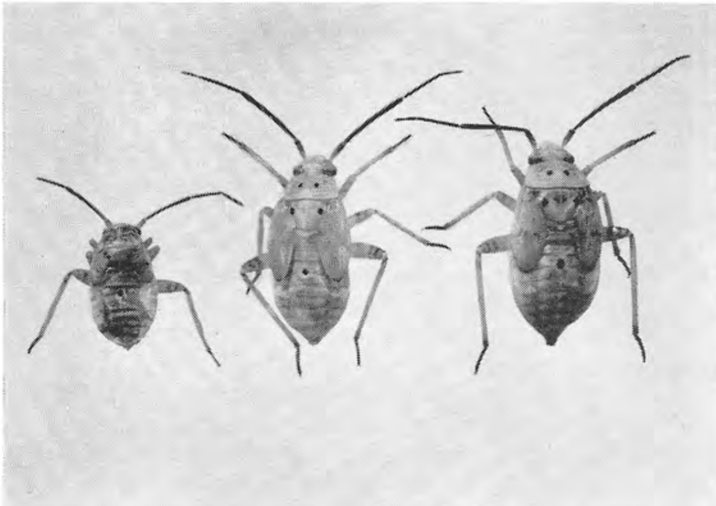
Salinity tolerance of variety Fresno was shown in comparative tests made by C. F. Ehlig at the Regional Salinity Laboratories in Riverside.

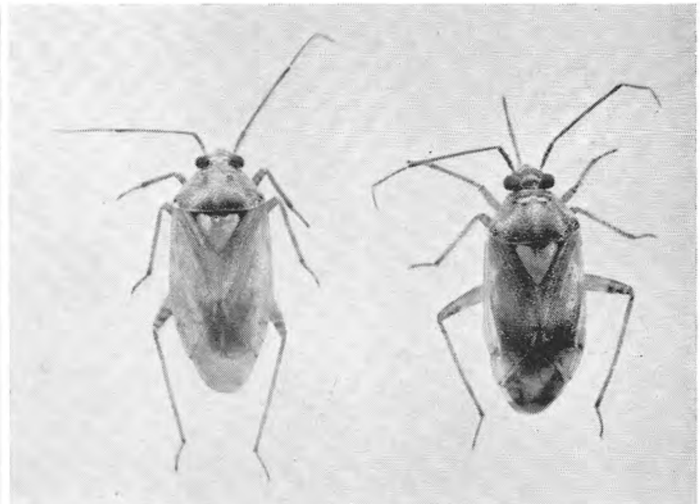
Information concerning planting stock of the new strawberry varieties may be obtained from nurserymen or from the Foundation Plant Materials Service, University of Cailfornia, Davis.



Yield of Fresno, Torrey, Wiltguard, Solana, and Shasta strawberry varieties in performance tests from 1956 through 1960 at Torrey Pines, Santa Ana, San Bernardino, Davis, Salinas, and San Jose, comparing first year production under winter and summer planting systems and second year production. Black indicates an increase and clear indicates a decrease in relation to the yield of Lassen. The broken black column for the 1960 winter planting of Shasta at Salinas indicates 100% increase over Lassen.



Lygus bug nymphs



Lygus bug adults, female *left*, male *right*

tion maintained at 1, 2, 4, 8, and 16 bugs per cage for 40 and 42 days.

One-third of the spikes and spikelets of young bolting beet plants were enclosed in 9″ × 24″ cheesecloth cages. To eliminate unwanted insects, all enclosed plant parts were sprayed with a 0.015% dilution of a commercial pyrethrum and rotenone insecticide before the lygus bugs were added, at the beginning of plant bloom. Control plants were sprayed periodically during the test period. As lygus bugs died they were replaced with live bugs. At plant maturity all bugs were killed. The caged plants were then cut, and allowed to dry in the field for 7–10 days.

Seeds were obtained from the caged portions of the dry plants, and each seed lot was cleaned twice and weighed to 0.01 gram. A unit sample of 100 seeds from each seed lot was then counted, weighed, and germinated.

Effect on Seed Yield

The accompanying table shows the yield of table beet seed, both as averages per one-third—caged—portions of the test plants and on a per plant basis. The yield per caged portion of the infested plants averaged 15%–25% below the yields from the control portions of the plants. Neither yield reduction nor level of infestation was statistically significant. The highest level of infestation also caused an increase in small seeds, but this too was not significant.

Beet seed yield, however, was significantly decreased by all levels of bug infestation when computed on a per plant basis. This was done in the second experiment by counting the number of seed spikelets in enclosed and unenclosed parts of each test plant. The maximum exposure—16 bugs per cage—provided a substantial infestation of 50.7 bugs per plant. Although lygus bugs definitely decreased seed yield per plant, the data did not give any significant differences in yield for the several levels of bug infestation.

The data show that the seed losses and blasting from lygus bug feeding are relatively low for table beet seed plants. This type of loss is considerably less than for other vegetable seed plants, such as carrots. The smaller losses of table beet seed seem to be partly related to the tight adherence of the seeds to the stems, from which they are not easily dislodged. Therefore, there is less drop of damaged seeds.

Effect on Seed Weight

The table also gives seed weights, obtained as averages for 100 seeds randomly selected and counted from each replicate lot. The effect of increased

Average Values for Yield, Weight per 100 Seeds, and Viability of Table Beet Seeds

Category	Numbers of insects per cage					
	0	1	2	4	8	16
First experiment, 1958						
Seed yield, grams	14.5a*	11.1a	12.3a	11.3a	10.8a	....
Weight of 100 seeds, grams	1.45d	1.28c	1.26bc	1.12ab	1.11a	....
No. of viable seeds per 100	83.2b	79.2ab	77.2ab	66.9a	70.1ab	....
No. of viable germs per 100 seeds	102.0b	91.9ab	94.3ab	62.6a	69.9a	....
Second experiment, 1959						
Calculated no. of bugs per plant	0.0	....	7.5	12.7	22.8	50.7
Seed yield, grams						
Large seed	29.9a	....	23.2a	22.3a	21.9a	24.5a
Small seed	0.6a	....	0.5a	0.7a	0.9a	1.4a
Calculated no. of large seed per plant	116.4b	....	74.2a	65.2a	68.2a	78.1a
Weight of 100 seeds, grams						
Large seed	1.52bc	....	1.54c	1.35ab	1.34ab	1.32a
Small seed	0.34b	....	0.28ab	0.29ab	0.29ab	0.26a
No. of viable seeds per						
100 large seeds	85.1b	....	74.3ab	73.3ab	64.1a	61.7a
100 small seeds	22.4b	....	8.8a	12.0ab	9.8ab	4.0a
No. of viable germs						
per 100 large seeds	127.5b	....	108.7ab	96.8ab	80.8a	72.2a

* Significant differences between means (5%) are indicated when compared values have no letters in common.

Lygus adult male *left*, nymph *right*

Response of

Bartlett Pear

to nitrogen in California

E. L. PROEBSTING

The response of Bartlett pear trees to fertilizers is of continuing interest to pear growers in California. An extended series of trials to obtain facts with respect to this relationship was conducted in all of the major pear producing areas in the state. Immediate objectives varied among the trials but, in each case, response in yield to the application of nitrogen was determined.

Fifteen orchards were represented, and all trials were continued for a minimum of five years.

Yield response the first year after starting a fertilizer program is unusual, because the buds which produce the flowers for that crop have already been formed. It may take longer than two years for the tree to adjust its bearing surface and the conditions for bud differentiation to produce greater yields.

Leaf samples were collected and analyses were made from each of the trial orchards. The standard sampling procedure was to remove the basal leaf from each of 100 shoots of moderate vigor from each plot. Each sample was a composite of leaves from several trees, the actual number being determined by the size of the plot.

Total nitrogen was used as a measure of nitrogen level in the top, because there is a negligible amount of nitrate in pear leaves. Very low concentrations of nitrate may appear, usually toward the latter part of the season, but are not correlated with tree condition. In most cases, seasonal curves of total nitrogen were obtained by sampling at intervals throughout the season. The seasonal curves were typically at their maximum in the early spring when the cells of the leaf are immature, with thin cell walls and little accumulation of carbohydrates. There was a rapid drop as the leaf matured and

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numbers of bugs per caged plant portion was evident in reduced seed weight. This decrease in seed weight was significant at a concentration of eight bugs per cage in the first experiment, when the large and small seeds were not segregated. In the second experiment, twice the number of bugs were required per cage in order to produce a significant reduction in the weight of 100 large seeds. The control also produced significantly less seeds of the small size.

Decreases in seed weights by lygus feeding affect the size of seeds, so that the number of seeds required per ounce is increased. This decrease in weight of seeds became economically meaningful when the number of bugs was maintained at eight and 16 per cage, equivalent to 22.8 and 50.7 bugs per plant.

Lygus damage cages on table beet seed plants

Effect on Seed Viability

The table also shows germination tests of the 100-seed samples selected for seed weight determinations. In the first experiment only one level of bug infestation—four bugs per cage—reduced viability significantly below the value for the check plants. The number of viable germs per seed, however, was reduced significantly by both four and eight bugs per cage.

In the second experiment the numbers of viable seeds of the large category were reduced significantly by eight and 16 lygus bugs per cage. Also significantly decreased were the numbers of viable germs per seed. Maximum loss of viable germs—at one to five per seed—was 42% per 100 seeds. At the highest level of infestation the viability of small seeds dropped 82%.

The data indicate that the decrease in viability was of economic significance when the bugs were maintained at infestation levels calculated to be 22.8 to 50.7 per plant. Only four bugs per cage —12.7 bugs per plant—may at times be sufficient to cause an economic reduction in seed viability. The decrease in viability of large and apparently sound seeds is important, because seeds having a germination of only 60% or slightly over are not commercially usable. Furthermore, such seeds can not be cleaned out or separated from good seed, and the accepted minimum viability of beet seed is 85%.

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