Lygus Bug Injury to Carrot Seed

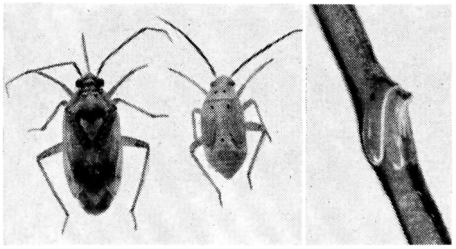
pest can cause 50% or more loss of carrot seed crop unless controlled by three properly timed 10% DDT dust applications

Elmer C. Carlson

Damage and control experiments in the Sacramento Valley investigated the relationship of the lygus bug—*Lygus hesperus* Knight—to Red Core Chantenay carrot seed.

L. hesperus Knight is the principal economic species, although *L. elisus* Van Duzee is present, but—to date—of minor importance on the carrot seed crop. The studies were designed to determine the exact effect of lygus bugs, the extent of seed loss, and the number of bugs necessary for economic loss. At the same time, the timing and number of insecticidal applications for control of the bugs in that area were investigated.

During the first season's investigations, field tests on timing of applications compared treatment with 5% DDT dust at 25% of bloom and at 25% of petal fall. The second season's investigations replicated single row plots separated by buffer rows to compare one, two, and three applications of 10% DDT dust.



***Left*—The damaging lygus bug adult and nymph. *Right*—Two eggs, laid in a carrot seed pedicel.**

Also, 10% DDT and 10% toxaphene at two applications were compared.

Field counts indicated that there were two generations of lygus bugs per season—one in June and one in July—on the carrot seed crop. The second generation developed in 27–35 days. Counts also showed that 99 out of 100 eggs were laid in the pedicels rather than the peduncle, or main stalk. Other counts showed that the lygus bugs preferred seeds and seed heads in the green spine stage when the seed heads form shade from the hot sun and the ovules are soft and succulent, affording almost ideal conditions of microclimate and food.

Cage investigations showed that the lygus bug, feeding during the blooming period, caused a blasting of the carrot seeds. Feeding after petal fall primarily resulted in embryoless seed.

Feeding of the bugs during blooming —at one bug per seed head—caused a seed loss of about 62%, a germination of only 68%, and about 32% of empty seeds. Tests conducted after petal fall showed that one bug per seed head resulted in about half as much actual seed loss, practically the same loss in germination, but a nonsignificant number of empty seeds. These results showed that after petal fall the bugs fed mostly on the seed embryos, causing embryoless seed which cannot be eliminated in the cleaning operation. Therefore, lygus bug control becomes doubly important.

Other cage experiments showed that one lygus bug per four seed heads was not enough to cause appreciable carrot seed loss. One adult bug per two seed heads was just short of causing a significant seed loss, but indicated that this concentration of bugs approaches an economic loss. One bug per seed head

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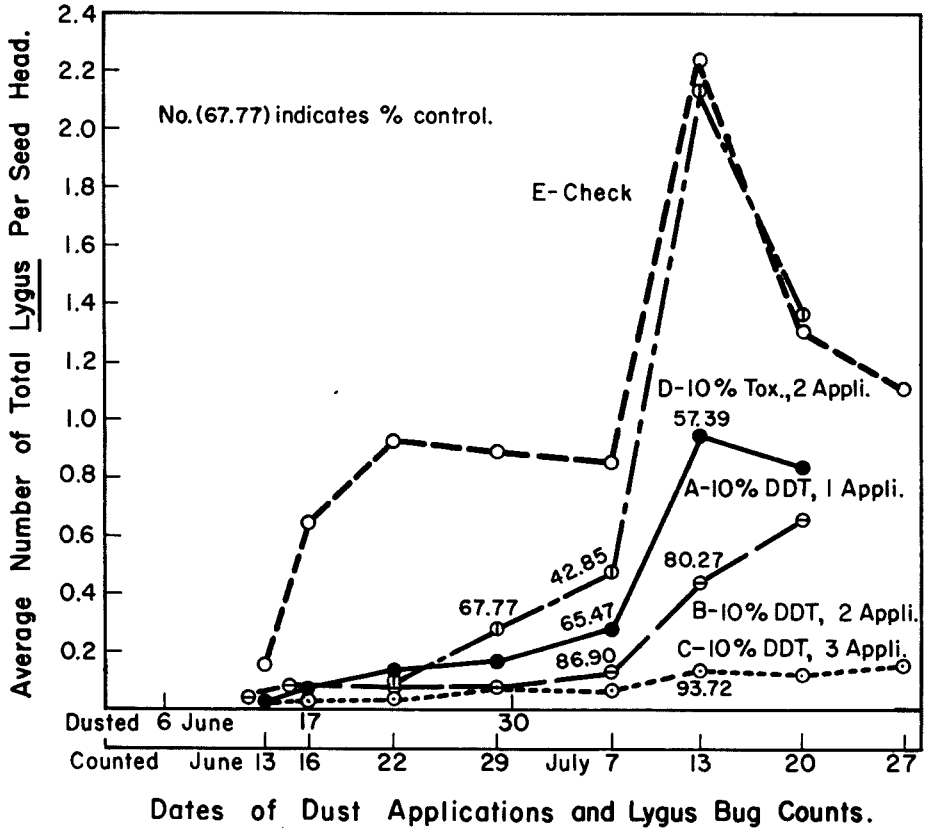
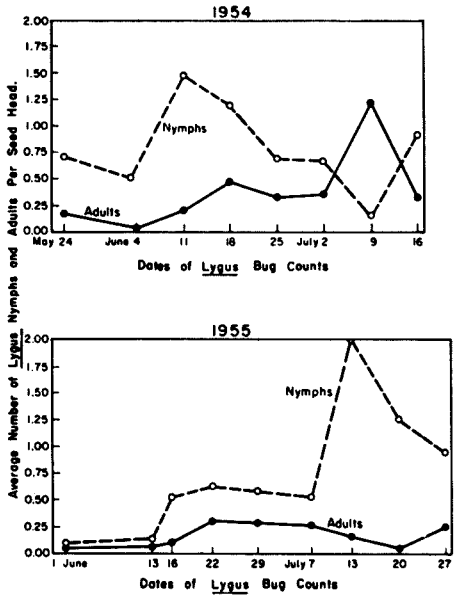
Comparison of four treatments for lygus bug control on carrot seed.



Seasonal cycle of *Lygus hesperus* on carrot seed.



LYGUS BUGS

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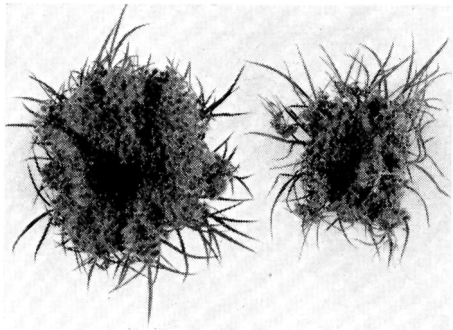
during the blooming period resulted in a high seed loss of about 55%, and when the number of bugs was as high as nine per seed head, there was an almost complete loss of seed and practically no germination of the remaining seed. When the only bug feeding was after petal fall there was about a 43% seed loss and 56% germination.

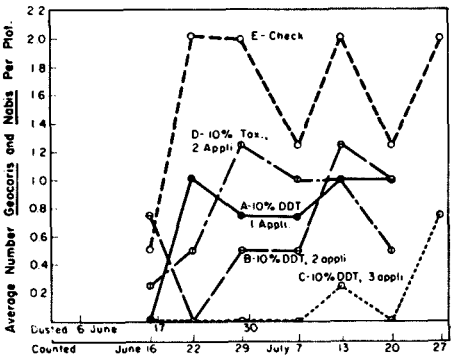


The blasting or lack of development of carrot seeds caused by lygus bug feeding. A normal seed head on the left and damaged on the right.

Cage tests on nymphs showed a significant and high seed loss at one nymph per seed head. However, at the rate of one nymph per two seed heads the seed loss—though not quite significant—did indicate a seed loss about double that of the tests with adults.

The decrease in seed germination was very significant at both one nymph per seed head and one nymph per two seed heads, which indicates some error in the yield data. Other data on the weight of 100 seed units and the number of seeds per ounce substantiate this. As a result, the data suggest that lygus bug nymphs cause about twice as much damage to carrot seed as the adults. Thus, the cage experiments show that control measures for lygus bugs on carrot should begin when the adult and nymphal count reaches one bug to two seed heads.

The earliest field control investigations showed that an insecticide should be applied when the second stage of bloom of



The mortality of the lygus bug predators is about as great and lasts about as long as for the lygus bugs; but the predator population was too low to be a factor in lygus bug control.

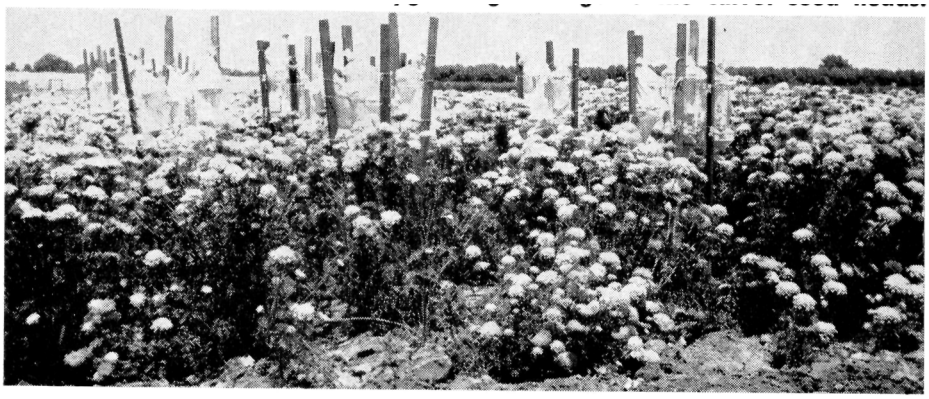
the carrot seed heads is 25% to 50% into bloom, because that is the time an economically injurious bug population ordinarily begins to develop. Because these investigations resulted in only about 62% seasonal lygus bug control with one application of 5% DDT—even when timed properly—it was evident that one application was not enough for adequate bug control.

Later experiments—comparing one, two, and three applications of 10% DDT in replicated field plots—showed that three applications, early in the blooming period of the second, third, and fourth stages of seed heads, resulted in the most effective lygus bug control.

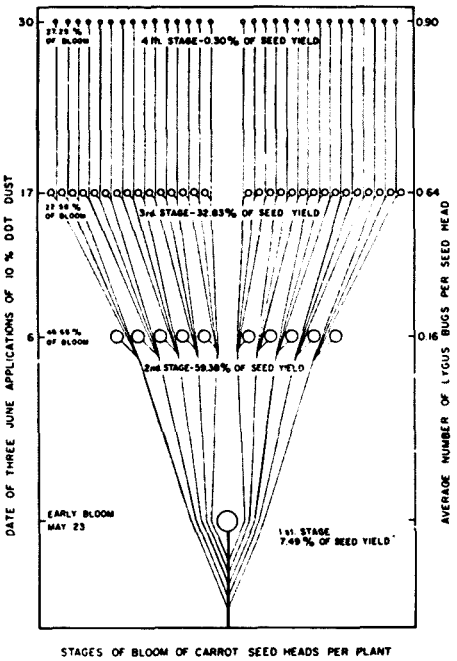
The three-applications treatment resulted in a seasonal average lygus bug control of about 93%—effective through the maturity of the seed crop—and a significant increase in seed yield for the first and third stages of seed heads, larger seed, and a consistently high increase in germination.

One application of 10% DDT dust—as with 5% DDT—did not provide satisfactory bug control. Two applications resulted in fair control and less significant increases in yield, size of seed, and germination than the three applications. Under the conditions of this experiment, two applications of 10% toxaphene were inferior to two of 10% DDT, and were only about one third as residual.

Insect cages used to determine lygus bug damage to the carrot seed heads.



The superiority of the three applications treatment with 10% DDT is evident. Furthermore, the first three stages of seed heads ordinarily produce about 90% of the carrot seed crop—so control is essential during this period.



The timing of the three 10% DDT dust applications, correlated with the stages of bloom of the carrot seed heads and the number of bugs per seed head, during the 1955 season.

Good lygus bug control is necessary to produce enough high quality seed for the market production of carrots. If insecticidal applications are properly timed—with good coverage of the seed heads—the per acre yield can be approximately doubled and a high germinating seed produced.

Insecticidal applications of 30–40 pounds of 10% DDT dust per acre should be made in early morning to avoid harm to pollinating flies and bees.

The past season's experiments developed a feasible and reliable laboratory and greenhouse method for the investigation of new materials for lygus bug control. The possible future advisability of combining certain chlorinated hydrocarbon and phosphate insecticides was indicated. And at least two of the newer insecticides look promising. Field control plots will be run this season to further evaluate the most promising chemicals—and combinations—for control of the lygus bug on the carrot seed crop.

Elmer C. Carlson is Associate Specialist in Entomology, University of California, Davis.

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