

Effects of the Green Peach and Bean Aphids

on table beet seed plants

Table beet seed crops are attacked regularly by the green peach aphid—*Myzus persicae* (Sulz.)—and by the bean aphid—*Aphis fabae* Scop. No definite knowledge about the kind and amount of damage to the seed crop caused by the aphids is available. Therefore growers usually apply aphicide sprays or dusts whenever the pests become obvious.

The need for information on the relationships between aphid populations and beet seed losses, and between numbers of aphids and their natural enemy predators—ladybird beetles—instigated a preliminary study of the general problem.

The plants used in the study were in an untreated part of a commercial field of table beets grown for seed. The field was seeded in September, 1958. Observations on selected plants were started on April 4, 1959, when the plants were beginning to bolt, and the aphids were appearing in substantial numbers.

For one test group, five plants infested with moderate populations of the two species of aphids were individually covered by tall cheesecloth cages and not otherwise treated. Heavy aphid popula-

tions soon developed on the plants and were maintained for the next two months. The insects attacked the leaves and petioles and fed in masses on new spikelets and seeds as the plants attempted to grow. Ultimately the bean aphid predominated and practically displaced the green peach aphid. The growth of the plants was severely retarded, and none developed seed.

Noncaged and untreated plants were graded for levels of aphid infestation and grouped in categories of clean, moderately infested, and severely infested. Ten plants in each category were tagged for identification and allowed to develop. The clean plants tended to remain so until harvest. The infested plants selected in April tended to hold—only for a time—their initial levels of infestation. The aphid populations gradually declined as the plants matured and disappeared when the plants became dry. Aphid migration from the heavily populated plants and natural control by ladybird beetles were, at least partially, responsible. Plant differences in aphid susceptibility also were probably involved in the initial selection

of graded infestations, and may have had some influence on the seed yield data.

The test plants were cut and bagged when mature, on June 8, 1959. They were threshed individually by hand and the seeds cleaned. Seeds in lots of 100 per plant were counted, weighed, and tested for germination to determine yield, weight of seeds, and seed viability at the three levels of aphid infestation. The averages for yield in grams per plant were significantly different for the three levels of aphid infestation. The yield was significantly reduced in plants having a moderate as well as a severe aphid infestation. Differences between averages of weight per 100 seeds were significant only between the clean and severely infested plants. Infested plants produced more small and shriveled seeds of lower viability than the uninfested plants, but the two classes of infested plants were not statistically different from each other.

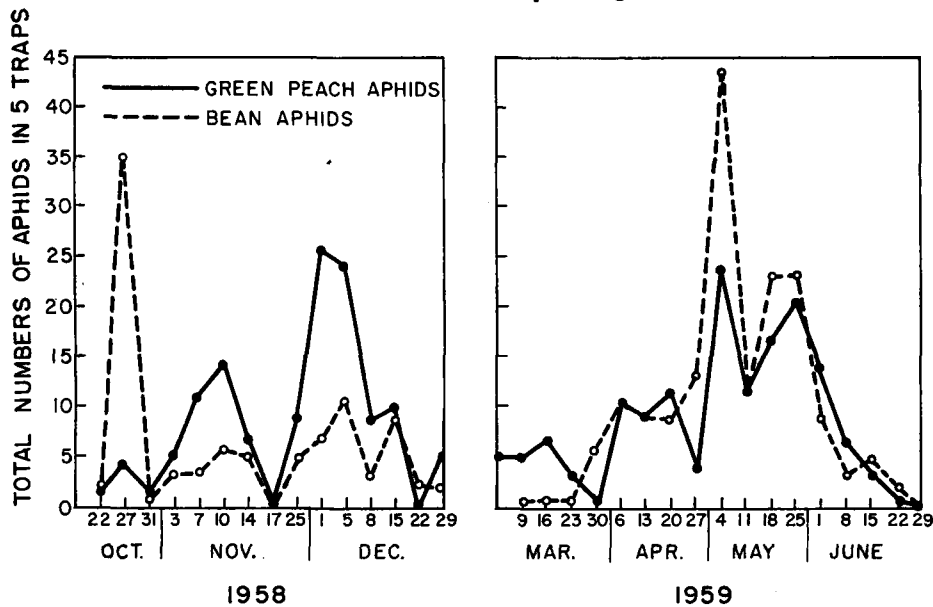
The yield and viability of seeds from the experimental plants were below normal production levels for the field as a whole.

A third group of untreated beet plants were selected for two categories of aphid infestation as light, and as moderate-to-severe. On April 3, 16 plants were tagged for observations on variations in their population of ladybird beetles—*Hippodamia* spp.—and aphids.

Counts of the beetles—adults and larvae—and two species of aphids were made at intervals of 2–4 days for a period of three weeks. The observations were terminated because the populations of both beetles and aphids declined to low levels, even to zero on some of the tagged plants.

The beetle and aphid counts were averaged for the plants in both categories of aphid infestation. Although the ratios of beetles to aphids varied between sampling dates, grand averages of the means indicated that a ratio of one ladybird beetle to 17 aphids was sufficient to hold light initial infestations in check and to assure

Numbers of green peach and bean aphids collected in traps during 1958 and 1959 in a table beet seed planting.



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Adverse effect of gibberellin on Bud Development in some stone-fruit plants

Gibberellin stimulates flowering of many plants, under appropriate conditions, but certain concentrations of gibberellin sprayed on branches of some stone-fruit trees at full bloom or at the beginning of pit-hardening retarded development of flower buds. At higher concentrations, vegetative buds as well as flower buds were inhibited. The year following the spray applications, those branches that had received the higher dosages were devoid of flowers or leaves except, in some cases at the tips of the long shoots, on regions which had apparently developed after gibberellin

treatment. The terminal buds on the new growth were relatively immune to the adverse effects of gibberellin, while the lateral buds suffered such severe growth inhibition that recovery was impossible. That gibberellin did not inhibit growth in general was evidenced by the excessive length and diameter growth of stems and petioles while lateral bud growth was restricted. The higher the dosages, the more extreme the stem and petiole growth and greater the blocking of bud development.

From study of sections of buds collected five months after treatment, the basic effect of gibberellin was concluded

to be inhibition of cell division in bud apices. The normal assortment of bud scales and leaf primordia therefore were not formed in vegetative buds and those that had begun development eventually disintegrated. In buds which normally would have been flower buds, not only was bud scale formation restricted but primordial flower organs had never begun to develop.

Variation in sensitivity to gibberellin concentrations appeared among the five species of stone fruits studied. In the Fay Elberta peach, two applications a week apart of a 500 milligrams per liter—mg/l—concentration had no effect on vegetative or flower buds. In the Royal apricot, Jordanola almond, and President plum, two applications of 50 mg/l completely inhibited flower bud development, and two applications of 250 mg/l concentration were required to inhibit vegetative buds. The Bing cherry was intermediate in its response.

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plant recovery and minor damage to the seed crop. The average ratio of beetles to green peach aphids was 1:5 in light infestation and 1:12 for bean aphids. When the mean ratio of beetles was 1:9 for green peach aphids and 1:23 for bean aphids, or 1:32 for both species, the beet plants suffered moderate-to-severe damage.

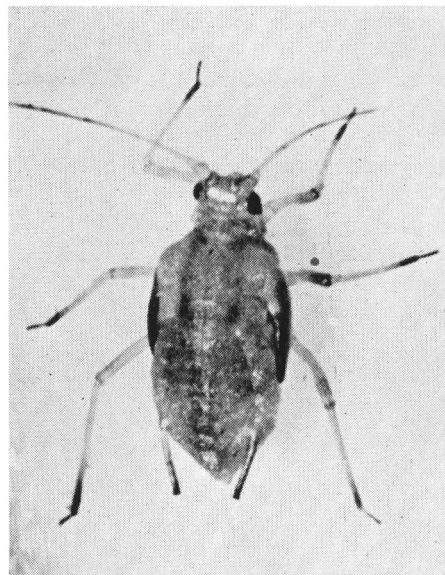
When the first two ratio counts were made—in April—the beetles were preponderantly in their larval stage. The increase in numbers of aphids observed in the fourth count—on May 13—was related to a maturing of the beetle population. On May 13, adult beetles were more abundant than the larvae, which are known to be more effective in controlling aphids.

These preliminary studies indicate that the ratios of ladybird beetles to aphids should be high when beet plants begin to bolt during April and May, in order to prevent extensive crop damage by aphids.

Aphid Flights

Five aphid traps were operated in the untreated part of the field under observation, to determine the duration and in-

tensity of the major flights of the two species of aphids during the growth period of the beet seed crop. The traps were enamelware pans filled with a dilute aqueous solution made yellow by potas-



An adult green peach aphid.

sium chromate—yellow is attractive to aphids—and were sunk to half-depth in the soil, at intervals along central untreated plant rows. Trapped aphids were collected at weekly intervals and the

numbers of each species were totalled for the five traps.

The migratory flights of the aphids began during the latter part of October and ceased during the winter months. The incoming winged aphids established colonies throughout the beet field. Flights were resumed in March and continued until the end of June.

Green peach and bean aphid flights nearly coincided in duration and periods of peak migration. During the fall flight period, the green peach aphids were more abundant except in October. In the spring flights, winged forms of both aphid species were almost equally abundant. However, there was a noticeable preponderance of bean aphids in May. The heaviest flights of both species occurred after the populations of wingless aphids on the host leaves had begun to decline. The several peaks in the flights suggest that there may have been 5–6 generations of both species of aphids within the growth period of the seed beets planted in September.

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