Cabbage Seedpod Weevil

new enemy of seed crops of Brussels sprouts and other members of mustard family can be controlled

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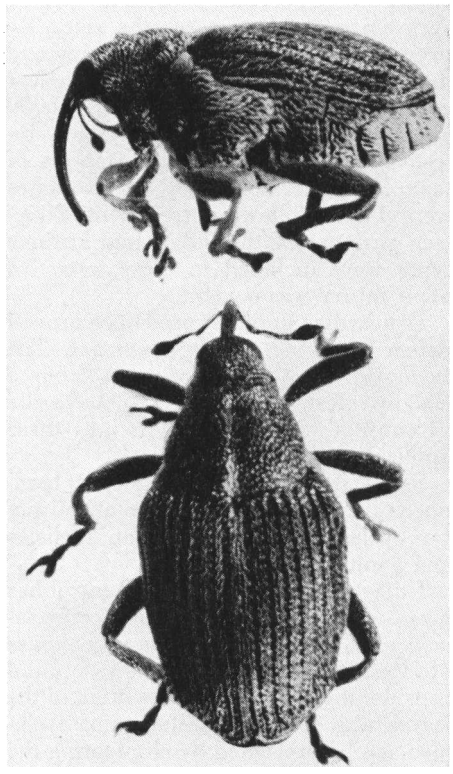
The cabbage seedpod weevil—*Ceutorhynchus assimilis* (Paykull)—in 1950, caused losses to the Brussels sprouts seed crop in San Mateo and Santa Cruz counties ranging from 14% to 54%. On broccoli seed at Watsonville one field suffered a 6% loss from the weevil. On cabbage north of Salinas one field had less than 1% loss.

To date, commercial seed losses have occurred only in the coastal counties of San Mateo, Santa Cruz, and Santa Clara.

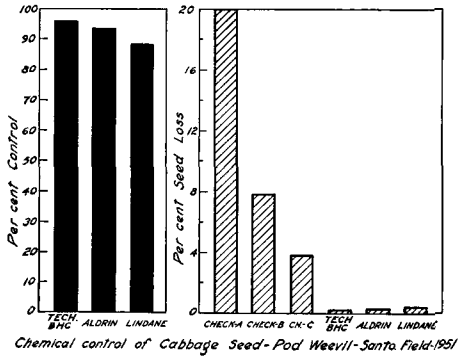
Since its introduction into California in 1946 the cabbage seedpod weevil has spread quite rapidly and is established in north coastal California, parts of the north central valleys, and in the far northern counties. It is becoming established in the northern sections of Monterey and San Benito counties.

The weevil is also present on noncultivated host plants in Alameda, Contra Costa, Marin, Sonoma, and Napa counties.

In the north central valleys the weevil is present in San Joaquin, Sacramento, Solano, and Yolo counties, and probably occurs in others. Climatic conditions are quite different from the coastal areas, but apparently the weevil is well established in certain localized areas. It is possible that the weevil may prove of economic importance to the scattered acreages of commercial mustard and turnip seed grown in this general area.



Adults of the cabbage seedpod weevil, greatly enlarged.



Chemical control of Cabbage Seed-Pod Weevil-Santo Field-1951

Per cent control with 1% chemical dusts on Santo ranch, Half Moon Bay, 1950, in relation to per cent loss of Brussels sprouts seed. Check A: untreated yellow mustard plants near plots. Check B: untreated Brussels sprouts plants in plots, but protected from extensive dust drift. Check C: untreated Brussels sprouts plants in experimental plots showing influence of dust drift on beetles.

In the far north the weevil probably has migrated from Oregon into Humboldt, Siskiyou, Modoc, Del Norte, and Shasta counties. These areas do not produce much cruciferous—plants of the mustard family—seed commercially, and the weevil occurs on uncultivated hosts and backyard plants which have gone to seed.

Natural insect enemies of the weevil grubs occurred in several areas during 1950.

The most efficient parasite at Half Moon Bay was a small hymenopterous species, *Xenocrepis pura* Myar, and with it were associated *Amblymerus mayetiolae* Gahan and *Trimeromicrus maculatus* Gahan. *Xenocrepis* parasitized as high as 27% of the grubs occurring in yellow mustard. No parasites were found in the experimental chemical dust plots, indicating the adverse effect of these chemicals on the parasites. The existence of many noncultivated hosts, particularly yellow mustard, would indicate that parasites may prove advantageous in lowering the general population level of the weevil.

The results of two years investigations indicate that chemical treatments will give excellent control of the weevil affecting Brussels sprouts seed. In addition there was no evidence of the adverse effect of the dusts upon seed-set.

Dusts giving the best results during 1949 and 1950 were: *1*, crude benzene hexachloride—BHC—containing 1% gamma isomer; *2*, lindane, 1%; *3*, aldrin, 1%; and *4*, dieldrin, 1%.

Crude benzene hexachloride gave the best control, but in some cases may not be the best selection. It is known that under certain conditions this chemical can impart off-flavors to some vegetables grown in contaminated soil. Lindane, the purified gamma isomer of benzene hexachloride, is safer, but is more expensive. Aldrin and dieldrin are newer chemicals, and to date are not registered for control of the weevil in California.

The dusts should be applied at the rate of 40 to 50 pounds per acre using four to five applications. Dusting should start

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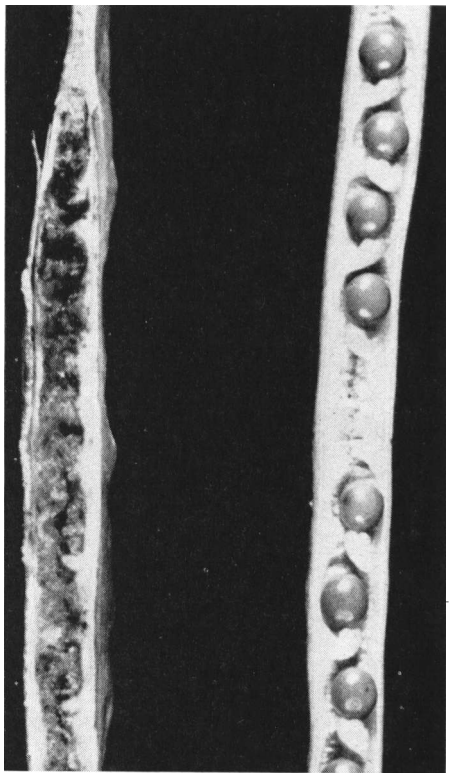

Damage to Brussels sprouts seed. *Left*, 100% destruction; *right*, uninjured.

WEEVIL

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when the first pods form, about the first part of April, and should continue at about 12-day intervals. If this program is followed growers should obtain about 95% control or better.

Benzene hexachloride and lindane will also keep the cabbage aphid under control. In one experiment at Pescadero it was found that dieldrin did not control this aphid, and so a good aphicide might be necessary if this particular chemical were used.

The adult weevil is about one-eight inch long, and is gray to black in color. The mouth parts are located at the tip of the long snout. The female weevil lays her eggs in the interior of the seedpod by means of punctures made by her snout and mouth parts. The egg then lies adjacent to the developing seeds.

The weevil grubs or larvae hatch from the eggs within a few days and begin feeding on the immature seeds. They feed for three to four weeks and consume or injure five to six seeds apiece. It is this stage of the life cycle that causes economic loss in the form of seed damage. Control is not possible during this stage but must be attempted against the adults, prior to oviposition. Upon reaching maturity the larvae make a circular hole in the shell of the seedpod, preparatory to emergence.

The mature larvae squeeze through the emergence holes in the seedpods and drop to the ground. They work themselves beneath the soil surface to a depth of one-half to two inches and construct a small earthen cell around themselves. The larvae pupate in these cells and remain dormant for about three weeks. At the end of the pupal stage the adults emerge from their cells and come out of the ground.

The weevils overwinter as adults in debris or in the soil. Early in the spring they emerge—the exact date depending upon the season and climatic conditions. The first adults usually emerge during the latter part of March or first part of April—timed with the appearance of the first blossoms of their cruciferous host plants. They are attracted to the flowers, feed to some extent upon pollen, but cause little damage at this time. Mating takes place soon after emergence, and the fertilized female begins laying her eggs in the first small developing seedpods. Hibernating weevils continue to emerge into June and fly into commercial plantings.

Following a single generation, adults emerge from the ground, crawl and fly to the plants and feed upon the flower parts, stems, or pods. They do not oviposit, but continue to emerge from the latter part of May into August. Thus, the next season's generation of weevils is found in association with their parents. The feeding of the new generation of weevils often results in the production of beads of plant sap. This syrupy exudate occurring on the pods at the end of the seedpod growth should not cause undue concern.

When the population of weevils rises to a point that results in 80% to 90% of seedpod infestation, the actual seed loss may reach 40% to 50%. Under these conditions the total seed clean-out after harvest is even greater and causes severe economic loss to the grower. Seed losses of this severity are caused by the occurence of two to four weevil grubs in each infested pod.

The presence of a large number of natural uncultivated hosts or weeds in the vicinity of the commercial seed crops builds up and maintains the weevil population. This source of weevils assures economic losses on commercial crops once the pest has become established, subject of course to some reduction from parasite activity.

Investigations to date indicate that any seed loss of more than 5% to 10% necessitates some control measure. Usually the extent of seed loss will eventually level off at 20% to 25% when there are enough cultivated and uncultivated hosts to maintain a moderate to heavy weevil infestation.

Growers using chemical dusts for control treatment should use adequate respirators during dusting operations, and take other precautions prescribed by the manufacturers of the materials.

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TOXAPHENE

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Poor control has been obtained on Japanese aralia, because the new leaves open so slowly. Methyl bromide fumigation is preferable for this host.

Privet Mite, Mushroom Mites

The privet mite—*Brevipalpus inornatus* (Banks)—is a common pest of azaleas and other plants in California. It is a tiny, flat, bright red mite that feeds on the under surface of the leaves. Parathion or TEPP are of no value for its control. A single application of toxaphene, at a rate of one quart of the 60% emulsion per 100 gallons of water, gave 100% control in small plots of azaleas. About 5,000 lathhouse azaleas, moderately to severely infested with the privet mite, were similarly treated. One live female was found on 50 leaves examined three weeks later, and the infestation had returned one year later. Two spray applications would be preferable when large numbers of plants are involved.

Several species of mites have long been a scourge to mushroom growers. Those belonging to the genus *Anoetus*—formerly known as *Histiostoma*—are the most important in the Half Moon Bay area. Their hypopi—a special migratory stage—may build up in such incredible numbers as to cover the casing soil and mushrooms. Predaceous mites belonging to the family Ascaidae also build up and scar the mushrooms.

Small, replicated plots containing such a mite infestation, were used for screening tests. One hundred per cent control was obtained with toxaphene at a rate of two quarts of the 60% emulsion per 100 gallons of water. Relatively poor control was obtained with parathion, Neotran or K-1875, Ovotran or K-6451, Gen. Chem. 923, and Dimite, at the dosages used.

Subsequent tests in mushroom houses have mostly been with toxaphene as a residual spray for the woodwork and treatment of the compost. In replicated plots of compost treatment on the benches, no adverse effects from toxaphene were noted with regard to either mycelial growth or mushroom production. It is true, however, that mite injury usually rendered the check plots poor comparisons.

In larger scale experiments, several entire houses were treated. In preparing for a new crop, the walls and benches were sprayed thoroughly with the 60% emulsion diluted at a rate of two quarts per 100 gallons of water and applied at a rate of 1½ quarts of the diluted spray per 100 square feet. In this connection, the usual practice of cyanide fumigation and DDT residual sprays was discontinued. After the compost in the benches was heated and just prior to placing the spawn, the surface of the compost and the woodwork were again treated. The casing soil used had been sterilized with chloropicrin.

Mushroom houses thus treated remained practically free of mites—as well as flies and springtails—for the duration of the crop.

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