

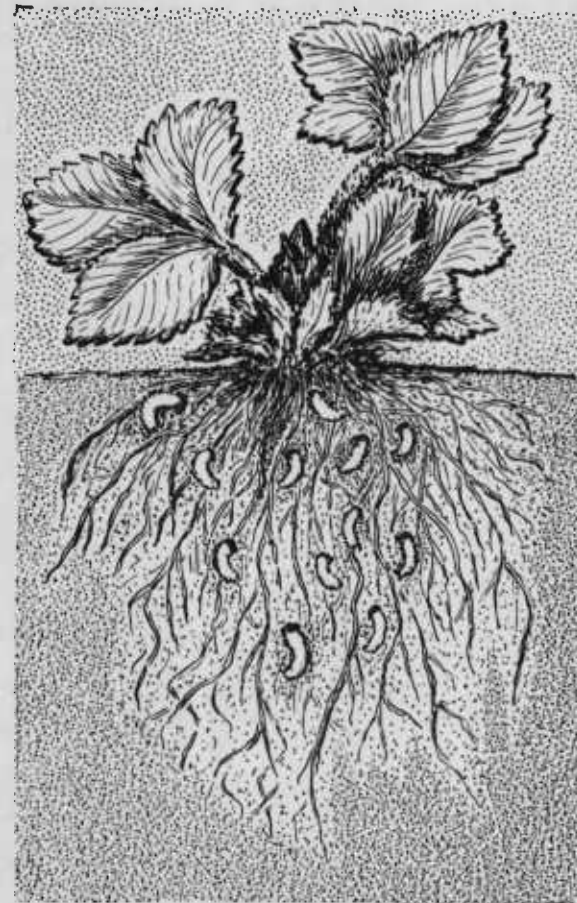
STRAWBERRY ROOT WEEVIL *Control*

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STRAWBERRY ROOT WEEVIL CONTROL

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Strawberry root weevils are among the most injurious insect pests in Oregon. They cause serious damage to commercial plantings of strawberries, caneberries, mint, and nursery stock. Around homes they are injurious to many ornamental plants, particularly primroses. A study of their control with modern insecticides is in progress. Useful information from the current study is given here.

Root Weevil Appearance and Injury

The adult strawberry root weevil is either black or gray in color and from a quarter- to a half-inch long. It has a short snout or beak at the front of its head. The hind part of its body is bulb shaped. The adults eat "half circle" shaped notches in the edges of leaves. This injury is not important to strawberry growers.

The root weevil larvae or "grubs" are white with tan heads. They are about a half-inch long when full grown. The larvae can be distinguished from most other insects in the soil around strawberries because they are legless, thick bodied, and crescent shaped. Serious damage to plants is caused by young larvae feeding on the roots. Larger larvae injure larger roots and the crown of the plants. Plants that are girdled at the crown will die. Larval injury to the roots weakens or kills the plants.

Two Root Weevil Groups

It is important to know that there are two groups of root weevils in Oregon. The adult weevils of the first group are black in color and are most common at lower elevations (below 350 feet). Larvae are present from July to May of the following year. The small black root weevil adults are three-sixteenths of an inch long while the large black weevils are three-eighths of an inch in length. The adults usually appear in late May and continue to emerge until September.



Large black weevil.
Actual size.

The other group of weevils is gray in color and is found at higher elevations (above 350 feet) in the Willamette Valley. The weevils are in the larval stage throughout the summer and fall. Adults appear at the end of fall. They spend the winter in or on the soil and lay their eggs in April and May.

Locating Root Weevil Larvae

You can locate root weevil larvae by digging about 6 inches beneath or beside a strawberry plant. A hand trowel is a handy tool to use in searching for them since it disturbs only part of the root system. The larvae of black root weevils are mature and easiest to find in April and May.

The gray root weevil larvae are easiest to find in August and September. In looking for root weevil larvae, examine edges of new fields next to other berry plants or grass or fence rows. Periodical examination of such border plants in the months mentioned should determine the need and extent of weevil control treatment.

Commercial Grower Control

The following control discussion deals mostly with new control methods for the black weevils. Weevil baits may still be used, however, for both gray and small black weevils. The large black weevil does not eat the bait. Although larvae cause strawberry plant damage, direct larval control on established plantings is not practical. Controlling the adult is much easier.

Baiting for Adults

Baits made by adding 5 per cent sodium fluosilicate or calcium arsenate to dried waste fruit have been used for years against the adult weevils before they lay their eggs. Apply the bait at the rate of 100 pounds on 1 to 3 acres, depending on the size of the plants, or when most of the weevils are in the adult stage. That is about the time of the second picking of nonirrigated Marshall strawberries (June) for the black weevils, and in April for the gray weevils. Bait is usually applied from three to six times a season. Severe rain storms wash away the poison so the bait must be replaced frequently, especially for the gray weevils.

Dusting for Adults

Growers who have not mixed insecticide into their soil before planting strawberries may need to apply insecticides on top of the soil and plants. In the table (page 4), programs are presented for control of black root weevils by surface applications of insecticides. Malathion and parathion also will give control of the strawberry aphid and strawberry leafroller for several days following application.

At higher elevations around the Willamette Valley, some of the black weevils overwinter as adults and may lay eggs in May. In such locations growers should use an extra, early bait, or a 4 per cent dust of malathion or 1 per cent parathion at 50 pounds per acre about May 1, when strawberry blossoming is at the peak in the Valley. This application is in addition to the regular ones listed in the table. This special, early dust should control spittlebugs and aphids.

Do not use malathion or parathion within 14 days before picking. This is to avoid contamination of the fruit by insecticide residue. At present tolerances heptachlor, dieldrin, aldrin, and chlordane should be used only after the strawberries have been picked.

Surface insecticides on strawberries give best control when they are applied with a hooded power duster. Of course that applies to dusts only. Home gardeners will find application procedures for them at the end of this circular, page 4.

Soil Insecticides

Certain insecticides thoroughly mixed with the top 6 inches of soil will control the two common black weevil adults.

Heptachlor, dieldrin, or aldrin should give effective control of the small weevil for at least 3 bearing years when used at the rate of 5 pounds of actual chemical per acre.

For controlling the large black weevil, use 10 pounds of actual chemical per acre of aldrin, dieldrin, or heptachlor. This should give control for at least 3 bearing years. Chlordane has been used extensively in the Northwest for root weevil and has apparently given good control. Tests here and elsewhere indicate it is inferior to dieldrin, aldrin, or heptachlor at comparable dosages.

No flavor difference has been detected in frozen Marshall strawberries between fruit grown in soil treated with recommended soil insecticides compared to fruit grown in untreated soil. Flavor studies of canned strawberries and red raspberries, however, have not been completed. With this in mind, it is suggested that those growing berries for canning use only the recommended surface dust applications or baits for weevil control.

How to spread insecticides on soil

One way to apply a soil insecticide is as an emulsion sprayed on fields just before planting. The emulsions may be cheaper to use than the dry formulations especially if you have your own weed or orchard spray rig equipped with a boom. Orchard spray rigs with constant agitation also could handle wettable powder insecticides.

Another way is by using a fertilizer spreader. Two hundred pounds of 2.5 per cent granular insecticide per acre would give 5 pounds of actual insecticide which would be the right dosage for the small black weevil, four hundred pounds per acre for the large black weevil.

The third application method is now the most expensive. In this method the insecticide is mixed with a fertilizer by a fertilizer dealer, usually on a custom mix basis. This method is expensive because of the costly fertilizer carrier, and the extra labor involved. If this third plan is used, you must decide in the winter on the rate of insecticide and fertilizer per acre you want to use, so the fertilizer dealer can make up his order ahead of time. The OSC Soils and Horticulture Departments warn that the effects of fertilizer may be considerably reduced when it is broadcast. General strawberry culture recommendations may be found in Station Bulletin 442, Strawberry Production in Oregon.

How to mix insecticides into the soil

After the insecticide is on the field, rotocultivate to mix it into the top 6 inches. Rotocultivating does an excellent job of mixing the insecticide and soil especially when the soil is in good planting condition.

If a rotocultivating implement is not available, a "split" application may be made. In this, half the insecticide is applied before you work the soil. It may be applied directly on a cover crop. Next, the treated soil is thoroughly disked, then plowed. Then apply the other half and disk it three or more times into the soil. Mixing the insecticide into the soil should be done at once or at least on the same day it is spread. Strawberries can be planted any time after the insecticide is worked into the ground. No plant injury has been found following use of the insecticides recommended here.

Harrowing or spring-toothing as a means of mixing insecticides into the soil has not been effective. Even multiple disking alone does not get the insecticide down into the soil too well. Plowing alone tends to bury the insecticide below the useful depth. Side dressing with insecticides on strawberries would give little practical weevil control, since it does not put the insecticide down among the roots where it is needed for lasting control.

Weevil Control for the Home Gardener

Home gardeners may use the insecticides mentioned (except for parathion) in controlling root weevils either before or after planting is done. Use of parathion by the home gardener is discouraged because it is dangerous to handle, unless the person applying it wears an efficient mask and takes other precautions. All of the insecticides mentioned are poisonous. Be sure they do not come in contact with the skin while you are working with them. Store insecticides out of the reach of children. Follow the precautions on the package carefully.

Baits may be broadcast by hand at monthly intervals to control the adults, beginning in early May and ending in August. Use 2.3 pounds per 1000 square feet, per application.

Dusts may be applied around the base of plants with a hand crank or puff duster as outlined for commercial strawberry growers. Use 1.2 pounds per 1000 square feet, per application.

Soil insecticides may be applied to the soil surface with a hand pump pressure sprayer or in granular form with a lawn size fertilizer spreader. Mixing the insecticides with soil may be done with a rotocultivator most efficiently. An alternate way--involving a lot of work--would be to apply half the insecticide to the soil, then rake the surface thoroughly with a 4-tined potato hook having tines about 8 inches long. Next, turn over the soil with a spade and rake again with a potato hook. A wheel hoe with deep cultivators could be used in place of a potato hook. For the rate of 10 pounds actual insecticide per acre the 2.5 per cent granular insecticide should be used at 9.3 pounds per 1000 square feet. The 50 per cent emulsion concentrates should be used at .46 pints or about 15 tablespoons per 1000 square feet in any convenient amount of water.

Flavor studies have not been completed on canned Marshall strawberries and red raspberries grown in soil treated with soil insecticides. It is suggested that home growers planning to can their berries use the surface dust treatments or baits only.

Root Weevil Control Summary

Method	Weevil controlled	Application rate and time	Formulations	Remarks
BAITS 5% sodium fluosilicate	All but large black weevil	33 to 100 lbs./acre in June and July three or more times.	5% insecticide mixed with dried fruit waste	Rain reduces bait effects.
DUSTS 1. Malathion 4% 2. Parathion 1% 3. Hepatchlor 5% 4. Dieldrin 5% 5. Chlordane 5% 6. Aldrin 5%	All black weevils	Apply 1 or 2 at 50 lbs/acre 2 weeks before harvest. Apply 3, 4, 5, and 6 at 50 lbs./acre just after harvest.	Insecticide mixed in an inert dust carrier	Surface control must be repeated each year.
SOIL INSECTICIDES 1. Dieldrin 2. Heptachlor 3. Aldrin	All black weevils	For small black weevil: apply 5 lbs. actual insecticide per acre to soil before planting. For large black weevil: use 10 lbs. per acre.	1. 2.5% granules 2. Emulsions 3. Insecticide-fertilizer mixture	Mix thoroughly in top 6 inches of soil. Gives 3 years protection.