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The sweet clover weevil, Sitona cylindricollis Fahr. is one of the principal insect pests attacking sweet clover in South Dakota. While the pest works on sweet clover principally, it has also been found feeding on other clovers and on alfalfa, although only in small numbers.

The sweet clover weevil is a European insect which was first reported to have been taken on this continent near Montreal, Canada, in 1924. In 1941 it was found in South Dakota in small numbers but at the present time it occurs abundantly over the entire state.

The adult insects are small greyish-brown snout beetles measuring about 1/5 of an inch in length. They are extremely difficult to see when they are resting or lying on the soil and, since they feign death or "play possum" when disturbed, they are usually overlooked even by a careful investigator.

The weevils overwinter usually in fields of sweet clover under debris on the soil or in the soil itself. The overwintering weevils are adult, but must feed and mate before the females are ready to lay their eggs. The eggs are laid in the spring or early summer on the soil in the neighborhood of sweet clover plants. The number of eggs that are laid by a single weevil averages about 400. The eggs hatch in about 10 to 14 days into tiny whitish grubs and these burrow into the ground and feed on the sweet clover root hairs, small rootlets and nodules found on the roots. In three or four weeks the grubs become full grown and they then transform in the soil into the pupa stage. In two to three weeks the pupae give rise to weevils. These emerge from the ground, fly about, feed and, upon the approach of cold weather, go into hibernation. Thus it is seen that the sweet clover weevil produces one generation per year, that there are four stages in the life cycle, namely, weevil or beetle, egg, grub or larva, and pupa, and that the winter is passed by the beetle in the soil or under debris lying on the soil.

The beetles begin to emerge from their hibernating quarters as soon as it begins to warm up in the spring. However, there is much variation when emergence may occur, for the overwintering beetles may come out from late April through July. Because of this, the egg-laying season of the beetles may be prolonged over three or more months and, as a consequence, the grub and pupal stages may be found over a period of three or four months. The time when the new generation of beetles emerge may also extend over a long period of time for they may come out through the late summer and fall.

A remarkable characteristic of the sweet clover weevil is that it fluctuates so much in numbers from year to year. This is largely due to

weather conditions. Hot dry weather is unfavorable to the survival of the insect in all of its stages, while cool, wet weather in general favors the pest.

DAMAGE: The weevils and grubs are the feeding stages in the life cycle of the sweet clover weevil. The grubs feed on the root hairs, small rootlets and nodules, but they seem to do little damage to the sweet clover plants by their feeding activity.

The adults or weevils feed on the leaves, where they cut out and consume more or less crescent-shaped areas of the leaflets. The most serious damage is done to sweet clover when the plants are seedlings and such plants may be killed outright by the feeding beetles. In a serious outbreak of sweet clover weevils, practically all of the seedling plants in a field may be destroyed. Older plants may also be damaged severely by the feeding beetles, provided a large population of beetles occurs in the field of sweet clover. Serious damage to second-year sweet clover is more liable to occur in the spring than later.

CONTROL: After the sweet clover has been mowed for hay, shallow tillage of the soil will crush or expose to the drying effect of the sun rays and the air many of the larvae or pupae of this pest. Or plowing, 5 to 6 inches deep, will bury the larvae and pupae so deeply that even though these transform to weevils, only a small percentage of the weevils will be able to burrow through the soil to the surface of the ground. If the soil becomes compacted after plowing, even a smaller number of weevils will be able to burrow through it, than if the soil remains loose. It is important that shallow tillage or plowing be done immediately after the hay crop is removed, because a delay in doing this permits many of the weevils to develop and emerge from the soil.

Seeding fields of sweet clover at as great a distance as possible from fields of second year clover is advisable. While this practice is helpful, it will by no means guarantee that the seedlings will not be damaged, if the year is favorable for producing large numbers of the weevils.

Chemical control has given good results especially on second year clover. However, it has been possible to control the weevil in fields of seedling clover by doing a careful and timely job of spraying or dusting. DDT, toxaphene or chlordane may be used for the control of the weevils and these insecticides may be applied as sprays or dusts. The following formulations and quantities are recommended to be applied per acre:

DUSTS

DDT.....40 lbs. of 5 per cent dust
or
Toxaphene.....20 lbs. of 10 per cent dust
or
Chlordane.....25 lbs. of 5 per cent dust

SPRAYS

DDT.....3 lbs. of 50 per cent wettable powder
or
DDT.....1½ lbs. of 25 per cent emulsion concentrate

If a 25 per cent DDT emulsion concentrate is available, use one and one-half quarts of the concentrate per acre because a quart of this concentrate contains approximately one-half pound of actual DDT.

Toxaphene.....20 lbs. of 10 per cent wettable powder
or
Toxaphene.....2 lbs. of 45 per cent Toxaphene emulsion

If a 45 per cent emulsion concentrate is available, use two quarts of the concentrate per acre, because one quart of this concentrate contains approximately one pound of actual toxaphene.

Chlordane.....15 lbs. of 10 per cent wettable powder
or
Chlordane.....1½ lbs. of 45 per cent Chlordane emulsion concentrate.

If a 45 per cent emulsion concentrate is available, use one and one-half quarts of the concentrate per acre, because one quart of this concentrate contains approximately one pound of actual chlordane.

The amount of water that is to be used per acre in the sprays will vary with the equipment that is to be employed when spraying, also upon the availability of the water. If the spray is to be applied by plane, in the neighborhood of 5 gallons of water should be used per acre; if the spray is to be applied through weed sprayers, not less than 15 gallons of water should be used per acre; and if the spray is to be applied by other ground spraying equipment (not weed sprayers) from 50 to 100 gallons of water should be used per acre.

If damage to seedling sweet clover is expected, the plants should be examined every few days and when damage occurs, then a spray or dust should be applied as soon as possible. In the case of second year sweet clover, a thorough spraying or dusting with one of the recommended formulas after the clover has developed a few inches of growth will kill many of the beetles.

For advice on agronomic practices concerned in the seeding, growing and harvesting of sweet clover for hay or seed production, the writer desires to refer the reader to the Agronomy Department of South Dakota State College, Brookings, South Dakota.