Management for Alfalfa Weevil Control
Michigan State University
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The alfalfa weevil was first found in the United States near Salt Lake City, Utah, in 1904. It has spread slowly from the West to the Dakotas and Nebraska. A new infestation was found in 1950 in Maryland, and it has since spread westward to the eastern Great Plains. In Michigan, the alfalfa weevil was first discovered in 1966 and was present in small numbers in 1967. By 1968, an estimated 6,000 acres were sprayed for its control. It has continued to spread and increase, and now infests virtually all alfalfa in the state.

The "population explosion" of the weevil is occurring because, in great part, the weevil came to this country without the natural enemies (parasites, predators, and diseases) that suppress its numbers in Europe. Some of its natural enemies have been brought over and established in the U.S. They have already greatly reduced alfalfa weevil numbers in parts of our eastern states. Some of these natural enemies are now under study as a means of control in Michigan. Some alfalfa varieties have also been found to be less damaged by the weevil than our present commercial varieties. These, too, are under study in Michigan and will be recommended if well adapted.

It will be several years before parasite and resistant varieties, or other new means of control are proved. This means that we will need to use management practices, insecticides, or a combination of the two to reduce losses from the alfalfa weevil. Knowledge of the alfalfa weevil (recognition, time of appearance, numbers, and stage of development) and an analysis of our own alfalfa cropping practices (relative importance of the crop to our operation, yields expected, timing of the first cutting, and method of harvesting) are needed for planning an effective control of the pest. An important point is that damage by the weevil increases with each day that the hay is left in the field. Taking the first cutting as soon as possible is highly desirable as a means of avoiding weevil damage.

The timing of the first cutting of alfalfa depends on the weather, the urgency of other farm operations, the use to be made of the crop, the variety, and other factors. The development of the alfalfa and the weevil is also variable, and can be influenced by temperature, rainfall, slope exposure, soil, and such things as quality of the stand. This means each grower must check his field for weevils and their damage and decide what action is necessary to avoid serious damage. This will vary from field to field, and may range from simply cutting at the best time to the use of insecticides. Assistance in making these decisions, and recommendations for insecticides and their use (if needed) are offered in this bulletin.

Recognizing the Alfalfa Weevil

Alfalfa weevils overwinter as adults in alfalfa fields, fence rows, woodlots, and other sheltered places. Adult weevils (Figure 1) are gray to brown snout beetles about

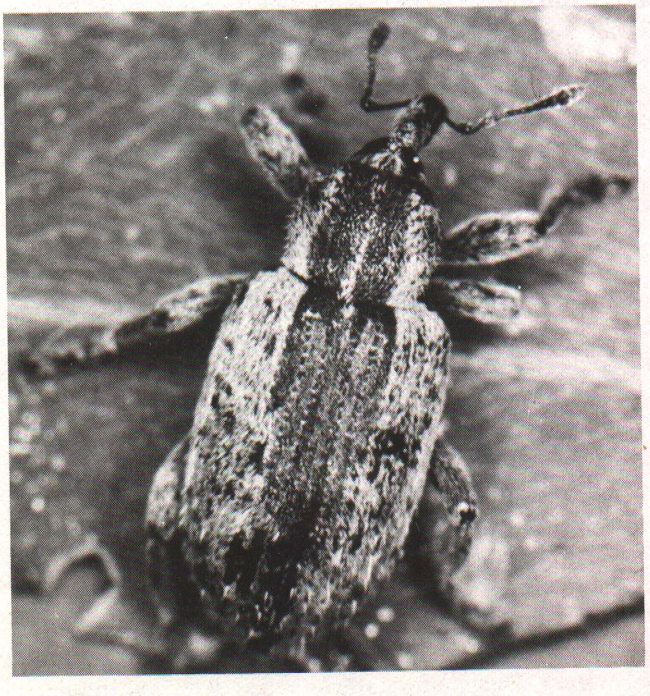

Figure 1. Adult alfalfa weevil.

1/4 inch long, with a broad black band extending to the middle of their backs. They become active on the first warm days of spring and are most active on warm nights and cloudy, windless days. They feed on alfalfa as soon as growth begins, but do not lay any eggs until they have fed for approximately two weeks. They feed by chewing holes through the young leaves of alfalfa.

Females chew small holes in dead or living stems of alfalfa or other plants, and lay up to 50 small, round, yellowish-to-brownish eggs inside the hollow stems (Figure 2). The young grubs which hatch from these eggs move out of the stems and feed on the tips of alfalfa. As they grow larger, they begin eating the leaf tissue, leaving only the veins which gives damaged leaves a skeletonized appearance (Figure 3). Weevil grubs have a black head and a legless, cylindrical, wrinkled body. They are nearly white just after hatching, but become green with a prominent white stripe down their backs as they grow larger. When full grown, they are about 3/8 inch long (Figure 4). Alfalfa weevil adults and grubs will feed on other plants, but their damage is exclusively to alfalfa.

Full grown grubs make a coarse silken cocoon on or near the plant where they transform to a quiet stage (the pupa, Figure 5). Adults emerge from their cocoons from mide-June to mid-July and begin feeding on alfalfa. These new adults feed only a short time and ordinarily cause no damage. After feeding, most of them leave the fields and seek sheltered places to spend the rest of the summer and winter. In Michigan, unlike more southern areas, very few adults feed, become sexually mature, and lay eggs in the fall; and practically none of the eggs survive the winter. Consequently, we do not have an early season problem with grubs, which hatch from the overwintering eggs, as they do farther south.

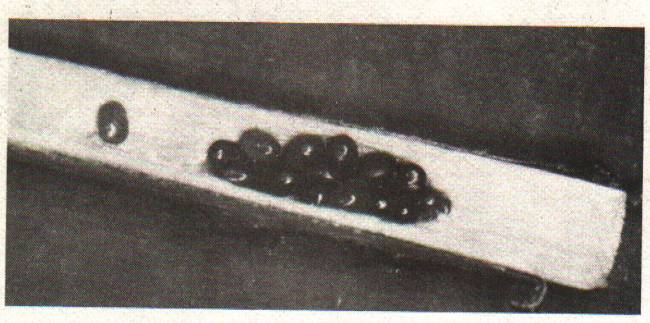

Figure 2. Eggs of the alfalfa weevil.

Figure 3. Damage of the alfalfa weevil.

Figure 4. Alfalfa weevil grub.

Checking the Fields

Your County Agricultural Extension Agent can keep you informed on the general rate of development of the alfalfa weevil in your area. However, there is considerable variation in the abundance and development of the weevil in different parts of the state and in different fields, so you must check each of your own fields. Although adult weevils rarely cause any damage, they are a good indication of damage to be expected later. It is helpful to check your fields for adult damage when alfalfa is less than six inches tall. Fields that show appreciable adult feeding must be checked very often for control. After alfalfa is about six inches high, check every few days for grub damage during normal weather, and more often when temperatures reach 60°F, or higher.

You can determine this damage by cutting a handful of about 20 tips in several parts of the field and counting the number of damaged tips. A tip that shows any

feeding should be counted as "damaged." The stubble and regrowth following the first cutting should also be checked for weevils, whether the first cutting has been sprayed or not. Each area cut in a field that is being green chopped should be treated as though it were a separate field. Fields that are droughty, on south-facing slopes, or on poor soils may become heavily infested before they are ready to cut. Check such fields especially carefully. Remember to consider each field separately and to check the stubble and regrowth after the first cutting.

ALFALFA WEEVIL MANAGEMENT

There are several programs for controlling the alfalfa weevil. The "best" program for you depends on your farming operation and the time of appearance and numbers of the weevil.

PROGRAM 1

The first cutting should be taken as soon as practicable **without** spraying when:

(a) 1/4 or less of the tips show damage of the grubs at the time of the first flower buds AND the alfalfa will be cut within a week;

or

(b) the numbers of the weevil are lower than those needed to justify spraying;

or

(c) many of the leaves have been skeletonized by the grubs.

Program 1a, early cutting without the application of insecticides, is strongly recommended when it is feasible. There may be some loss of hay to the weevil under this option, but this loss should be balanced against the cost, time, and trouble of spraying. Hay that is already badly damaged by the weevil should be cut as soon as possible without spraying. A spray prior to cutting in these circumstances is wasted as the damage has already been done.

PROGRAM 2

A spray of one of the insecticides noted in Table 2 is recommended at the time the first flower buds appear when:

(a) some loss of yield of the first cutting can be tolerated;

and

(b) about 1/4 of the tips show damage of the alfalfa weevil grubs;

and

(c) the first cutting will not be taken for one week or more.

This program will not protect the alfalfa from the early loss (about 1/6 ton of dry hay per acre) caused by the weevil. It does allow the grower to assure himself that a spray is definitely needed before he applies an insecticide and this program should fit many of Michigan's farming operations.

PROGRAM 3

A spray of carbofuran (Furadan) at 1/4 lb. active insecticide per acre is recommended prior to the appearance of the first flower buds when:

(a) maximum yield protection is needed in the field;

and

(b) feeding of the adults or the adult weevils themselves are easily found in the field;

and

(c) the first cutting will definitely be taken at late bud or first flower stage of the alfalfa.

This early spray with carbofuran will protect the alfalfa from the weevil for two weeks following its application. Its control will break sharply after this time, leaving the alfalfa unprotected from re-infestation by the weevil. This spray should, therefore, be applied no earlier than two weeks ahead of the planned cutting date. The drawback to this early spray is that we do not now have solid guidelines for predicting the need to spray at the time that the insecticide should be applied. There is a chance that sprays could be applied when they are not really needed. This problem must be balanced against the amount of adult damage in the field and the need for maximum production.

Figure 5. Alfalfa weevil cocoon.

When abundant, the grubs can damage the small (less than about 6 inches tall) regrowth following the first cutting. No matter what program is used to protect the first cutting, the stubble and regrowth should be carefully examined for grubs and their damage and an insecticide (Table 2) applied if the grubs are easily found.

Selecting and Applying the Insecticide

Insecticides are poisons—handle, store, and apply them with great care. The label of the insecticide container has full instructions for the safe, effective use of that specific insecticide. READ THE LABEL before buying any insecticide. The insecticides noted as "hazardous" should be used only by experienced operators in fields remote from buildings and livestock. Insecticides recommended for alfalfa weevil control can be effectively applied using aerial or ground equipment. Ground equipment should be carefully calibrated to uniformly cover the plants. About 12 to 15 gallons of spray per acre is adequate in stubble and small plants, and 20 gallons per acre is sufficient to cover larger plants with ground spray rigs. The amount of spray necessary for aerial application will depend on the special equipment that an aerial contractor uses. One gallon per acre is sufficient in stubble and small plants, and two gallons per acre is sufficient to cover larger plants when conventional aerial equipment is sued. The effectiveness of an aerial spray depends on the skill and thoroughness of the pilot; take care to select a reliable air contractor.

The insecticides recommended for control of the alfalfa weevil are given in Table 1, and the effectiveness of these insecticides against other pests of alfalfa is shown in Table 2.

In selecting an insecticide, first check the time needed between applications and cutting or grazing of the alfalfa. Select only those that will fit your time schedule. Next, check for insecticides that will control other pests present in the field (if there are any) as well as the alfalfa weevil. Finally, decide on the one that you can handle safely. Note that insecticides listed as "hazardous" should be used only by experienced operators in fields remote from buildings and livestock.

IMPORTANT STEPS FOR CONTROL

Learn to recognize the alfalfa weevil and its damage.
Check your fields frequently for the weevil.
Take the first cutting at the late bud stage.
Carefully select and apply insecticides if needed.

Table 1. Insecticides Recommended for Alfalfa Weevil Control.

Insecticide	Lbs. Active Insecticide/A	Days Between Applic. & Harv.	Notes
azinphosmethyl (Guthion)	½	16	hazardous
methyl parathion	½	15	hazardous
Supracide	½	10	
malathion plus methoxychlor	1 + 1	7	
Imidan	1	7	
"Alfa-Tox"[1]	2 qts.[1]	7	
carbofuran (Furadan)	¼	7	hazardous
malathion	1¼	0	
malathion	6/10	5	ULV aerial spray
carbaryl (Sevin)	1½	0	
methoxychlor	1½	7	safest for honeybees

[1]"Alfa-Tox" is a commercial mixture of diazinon and methoxychlor. The amount to be applied per acre is given in quarts of this commercial product.

Table 2. Effectiveness of Alfalfa Weevil Insecticides Against Other Pests of Alfalfa

Insecticide	Pea Aphid	Spittlebug	Cut-, Army-, & green clover-worms	Potato leafhopper	Plant Bugs	Grasshoppers
malathion	+	+	+	+	+	+
malathion plus methoxychlor	+	+	+	+	+	
methyl parathion	+	+		+	+	+
carbaryl (Sevin)	—	+	+	+	+	+
Alfa-Tox	+	+		+	+	
Supracide	+			+	+	+
carbofuran (Furadan)	—			+	+	+
methoxychlor		+		+	+	
azinphosmethyl (Guthion)	—	+		+		+
ULV malathion	+				+	
Imidan	—			+		+

[1]"+": insecticide is known to be effective against the insect.
"—": insecticide should not be used to control the alfalfa weevil if the other pest is present in the field.

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