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Insect Control in Hay, Forage and Pasture Crops

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A wide variety of insects can lower both yield and quality of hay, forage, and pasture crops. A few of these pests appear in damaging numbers over large areas during some years, and some of them damage a few scattered fields each year. Use of chemical insecticides in these crops has been very minor in the past. The appearance of the alfalfa weevil, a severe pest of alfalfa, in 1966 and its subsequent spread and increase have changed this. Check your fields for this pest and apply an insecticide for its control when needed. Since the other pests are still present, you must continue to be alert for them as well as the alfalfa weevil. Notes on the biology and identification of these pests are presented below and some suggestions on how to check fields for them are given in Table 1. Recommendations for insecticides to use for control are shown in Table 2.

Meadow Spittlebug

The spittlebug overwinters as eggs in alfalfa, clover and other plants. These eggs hatch early in the spring. The yellowish nymphs suck the sap of the plants, weakening them. When the nymphs are abundant, they can stunt the plant. Damage has been especially severe on lighter soils. The nymphs form a spittle-like froth around themselves and feed within its protection.

Check your fields for these spittle masses every few days, starting after the first warm days of spring. If about 1/5 of the stems on sand soils, or 1/3 of the stems on heavier soils show spittle masses, insecticides are needed. Note that these are the stems that arise from the root and not each plant.

The nymphs change to the adult stage in June. The adult spittlebugs are stout, oval-shaped insects that jump when disturbed. The adults range in color from light gray through red, and brown, to nearly black. The adults suck sap from many crops but need control only if they are extremely abundant. Insecticide should be applied as sprays to cover foliage of the plants.

HONEY BEES

Honey bees are frequent visitors of forage crops and are easily killed with insecticides. Advise neighboring beekeepers that you are going to apply an insecticide far enough in advance that they can protect their bees from the spray. Do not spray forage crops during bloom. Use special care to avoid drift of insecticides into areas where bees may be foraging.

Sweet Clover Weevil

The sweet clover weevil adult chews crescent-shaped holes in the leaves of the sweet clover. The grubs of the pest feed on plant roots, but greatest damage is caused by the adult feeding on the small plants early in the spring. They can severely damage newly seeded and second-year stands of sweet clover when abundant.

Begin searching for the feeding and adults of the pest when plants first germinate or start new spring growth. The adults are gray beetles with a broad "snout" and are about 3/16 of an inch long. They may be found feeding on the leaves or hidden near the bases of the plants. An application is needed if field damage is easily seen. Insecticides should be applied as sprays to cover the small plants. The weevil can defoliate small plants rapidly, so do not delay spraying if the weevils are abundant.

Pea Aphid and Spotted Alfalfa Aphid

Several species of aphids attack forage crops. The **pea aphid** is the most common species in alfalfa and clovers. It is a small, soft, green, inactive insect usually found in colonies on the new stems and leaves of the plant. It sucks the sap of a plant. Heavy infestations cause a curling of the new leaves and weaken and stunt the plant. The aphid is usually most abundant in cool, early and late parts of the season. They are attacked by many natural enemies (lady beetles, small parasitic wasps, diseases and others) that usually keep their numbers down. However, they do appear in damaging numbers in some fields each year, so check the tips of the stems for aphids each time you check for other insects.

The **spotted alfalfa aphid** sucks the sap of alfalfa and, when numerous, can cause a severe yellowing and stunting of plant growth. It is similar in general appearance to the pea aphid, but the spotted alfalfa aphid is yellowish with prominent black spots on its body. The spotted alfalfa aphid has been a pest only occasionally in Michigan. It is apparently not well adapted to our climate and has been a pest only during hot, dry spells in late summer.

Table 1. Guide to checking hay, forage, and pasture crops for insects.

When	Crop	Where	What	Why
First warm spring days	Alfalfa & Clover	Stems	Frothy mass of spittle	Spittlebug nymphs
	Alfalfa	Bases of Plants	Hard shelled snout beetles	Alfalfa weevil adults
Germination to 2 inch growth	Sweet clover	Leaves	Crescent shaped holes and snout beetles	Sweetclover weevil
Before first cutting	Alfalfa, clover, hay and pasture grasses	Areas of poor stand	Dark, cylindrical worms	Cutworms
	Alfalfa & clovers	Stems & leaves	Colonies of soft, green bugs	Pea aphid
	Alfalfa	Tips of stems	Greenish, legless grubs	Alfalfa weevil grubs
At first cutting and regrowth	Alfalfa	Leaves, machinery, stubble & regrowth	Greenish, legless grubs	Alfalfa weevil grubs
Later growth	Alfalfa, clover, hay and pasture grasses	Leaves & flowers	Oval, active running bugs	Plant bugs
			Stout, hopping bugs	Spittlebug adults
			Large, jumping insects	Grasshoppers
			Small, sideways-running bugs	Leafhoppers
		Leaves & bases of plants	Dark, cylindrical worms	Armyworms & cutworms
	Alfalfa & clover	Leaves	Greenish, cylindrical worms	Green cloverworm
			Small, sideways-running bugs	Potato leafhopper
	Alfalfa	Leaves	Colonies of soft, yellowish bugs	Spotted alfalfa aphid

Spray for aphid control only if nearly every stem has a colony of aphids. Apply insecticide as a spray to fully cover the plants. Use at least 15 gallons of spray per acre in small plants and at least 20 gallons per acre in tall alfalfa if ground sprayers are used. Apply aerial sprays at one gallon per acre to small plants and two gallons per acre to larger plants.

Alfalfa Weevil

Alfalfa weevils overwinter as adults at the bases of alfalfa plants or in sheltered places. Adults are gray-to-brown snout beetles that are about 1/4 inch long. They can be identified by their slender "snout" and by a broad black band that extends to the middle of the wings. They become active with the first warm days of spring, feeding on the young leaves of alfalfa at night and hiding near the bases of the plants during the day.

Rounded, yellow-to-brown eggs are laid inside the hollow stems of alfalfa or other plants. The small grubs that hatch from the eggs feed on the small leaves at the tip of the stem and move out to feed on the leaves as they grow larger. Grubs have a black head but lack legs. They are whitish when small, but change to green with a prominent white stripe down the length of their backs as they grow older. They are about 3/8 of an inch long when fully grown.

The grubs make a rough cocoon of silk either on or near the bases of a plant and transform into a quiet pupal stage. Adults that emerge from these cocoons feed on the leaves of the alfalfa for a week or so, and then move into cool, sheltered areas out of the alfalfa field. Some adults return to the alfalfa field, then feed, and lay eggs in the fall while many adults stay out of the field until the following spring. The fall feeding is slight and few of the eggs survive the winter.

Check new alfalfa growth for feeding and the bases of the plants for the adults of the alfalfa weevil each time you check for other insects early in the spring. Fields that show feeding and presence of adult weevil should be checked especially frequently. Check tips (buds) and upper leaves of plants for grubs and their damage starting with the first warm spell (about 60°F or more) in the spring. Continue to check every few days through the first cutting and until the regrowth from the first cutting is well established (about 6 inches tall).

Table 2. Insecticides recommended for control of insect pests of hay, forage, and pasture crops.

Insect	Crop	Insecticide	Pounds active Insecticide / A	Limits
Spittlebug nymphs	Alfalfa & clover	malathion	1¼	0 days
		methoxychlor	1	7 days
		Guthion	½	21 days
		Alfa-Tox	3 qt of commercial mixture	7 days
		Trithion	1	28 days; 1 application per cutting
Spittlebug adults	Alfalfa, clover, hay and pasture grasses	malathion	1¼	0 days
		methoxychlor	1	7 days
Sweetclover weevil	Sweetclover	malathion	1½	0 days
		methoxychlor	1¼	7 days
		Sevin	1	0 days
Pea aphid and spotted alfalfa aphid	Alfalfa & clover	malathion	1¼	0 days
		Cygon	½	10 days
		Dibrom	1	4 days
		Di-Syston	½	7 days
		Alfa-Tox	2 qt of commercial mixture	7 days
		Supracide	½	1 day
		Trithion	½	28 days; 1 application per cutting
		Phosdrin	¼	1 day
Alfalfa weevil	Alfalfa	Methyl parathion	½	15 days
		Malathion, plus Methoxychlor	1 plus 1	7 days
		Imidan	1	7 days
		Guthion	½	16 days; use once per cutting
		Alfa-Tox	3 qts of the commercial mixture	7 days
		Malathion	1¼	0 days
		ULV malathion	3/5	Aerial spray only; 5 days
		Methoxychlor	1¼	7 days; safest for honeybees
		Furadan	¼	7 days
		Supracide	½	10 days; 1 application per cutting
		Sevin	1½	0 days
Cutworms and Armyworms	Alfalfa, clover, hay and pasture grasses	Dylox	1	0 days
		Sevin	1½	0 days
Armyworm	Alfalfa, clover, hay and pasture grasses	malathion	1¼	0 days
	Alfalfa	Dibrom	1	4 days
		Alfa-Tox	3 qt of commercial mixture	7 days
Green cloverworm	Alfalfa, clover, hay and pasture grasses	Sevin	1	0 days
		malathion	1¼	0 days
		Guthion	½	16 days

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Table 2 continued

Insect	Crop	Insecticide	Pounds active Insecticide / A	Limits
Leafhoppers and plant bugs	Alfalfa, clover, hay and pasture grasses	Sevin	1	0 days
		malathion	1	0 days
		Cygon	½	10 days
		Guthion	½	16 days
		Dibrom	1	4 days
		Dylox	½	0 days
		Alfa-Tox	2 qt of commercial mixture	7 days
Grasshoppers	Alfalfa, clover, hay and pasture grasses	Sevin	1½	0 days
		malathion	1¼	0 days
		Dibrom	¾	4 days
		Guthion	½	16 days
		Cygon	½	10 days

Three general programs are recommended for the control of the alfalfa weevil. The best program to be used for the weevil depends on the individual farming operation as well as the time of appearance and numbers of the pest.

Program 1. Spray carbofuran (Furadan) at 1/4 pounds of active insecticide per acre 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 fields; 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.

Program 2. Spray one of the insecticides noted in Table 2 at the time the first flower buds appear when:

(a) some loss of yield in 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 caused by the weevil. It does allow the grower to assure himself that a spray is definitely needed before he applies an insecticide and, for this reason, is the program that should fit most Michigan farming operations.

Program 3. Take the first cutting as soon as practical without spraying when:

(a) 1/4 or less of the tip show damage of the grub 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 in the programs given above; or,

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

Early cutting without the application of insecticide is strongly recommended when 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 already badly damaged by the weevil should be cut as soon as possible without spraying. Since the damage has already been done, a spray now would be wasted.

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

Apply insecticide at the rate of 15 gallons per acre in stubble or small plants and at 20 gallons per acre in tall plants if a ground sprayer is used. If regular aerial applications are made, apply 1 gallon per acre in stubble or small plants and 2 gallons per acre in tall plants. Concentrate malathion in aerial spray (ULV aerial application) is also recommended for control of the weevil in stubble or small plants. The ULV application must be well done to be effective, and reliable air spray contractors should be hired.

Armyworms, Cutworms, Green Cloverworms

Many caterpillars eat the leaves or clip the stems of forage crops. These worms are cylindrical, lack noticeable hairs on the body, have three pair of jointed legs just behind the head, and three to five pairs of fleshy legs near the tail end. The worms range in size from 1/2 inch to nearly 2 inches in length. Cutworms are most common in hay and pasture grasses, and occasionally also damage forage legumes. They are usually most abundant early in the season and in wet or weedy areas. Cutworms feed on the leaves or clip the stems of the plants at night and hide in the soil or the bases of the plants during the day. They vary in color, but are usually dark colored.

The armyworm is also usually a night-feeding pest of grasses, but when abundant will "march" in large bands from grasses or grain crops into legume crops and feed during the day. Armyworms are usually most abundant during June and early July. They are greenish to black in color and usually have a broad, pale stripe down each side.

The green cloverworm is a pest of legumes and damages beans and soybeans as well as clovers and alfalfa. It is usually most abundant during July and later during the summer. Green cloverworms feed night and day on plant leaves. The worms are usually found on the underside of the leaves. They are greenish in color with whitish stripes extending along each side of their bodies.

Examine areas of cut plants or plants with leaves showing signs of feeding. Check for the worms on the leaves or hiding under the plants. Apply an insecticide if the worms are easily found. Cover the area infested plus a 20 to 40 foot border if the worms are found only in one area of the field. A 20 to 40 foot swath of insecticide around the margins of an uninfested field will prevent the armyworms from "marching" into the field from an infested adjacent field.

Notify your county agricultural extension agent if the armyworms appear in damaging numbers so that he can warn others. Insecticides may be applied as either sprays or granules for armyworm and cutworm control. They should be applied only as sprays for control for the green cloverworm.

Leafhoppers and Plant Bugs

Several species of both leafhoppers and plant bugs attack forage and hay crops. These are sucking bugs that weaken and stunt the crops when they are abundant. The two most common species are the potato leafhopper and the tarnished plant bug. Both of these pests inject a toxic saliva into the plant and suck sap from the plant.

The potato leafhopper is a pest of alfalfa and clovers. It appears in Michigan in early June and is most abundant in the field during mid- to late-summer. Its damage appears as yellowish to reddish leaves with dead tips and is often confused with drought. Potato leafhoppers are small, greenish, wedge-shaped insects that run sideways when disturbed. Other leafhoppers are gray-to-tan in color and attack grasses as well as legumes. These other leafhoppers have the same side-running habit as the potato leafhopper and are controlled by the same insecticides.

The tarnished plant bug and other species of plant bugs are pests of grasses, clovers, and alfalfa. They reach their greatest numbers during late June to late summer. The plant bugs are about 1/8 to 1/4 of an inch long, oval in shape and are very active runners. They range from greenish-to-gray or red in color. The tarnished plant bug can be distinguished from the others by a yellow V-shaped mark on the center of its back. Recent studies have shown that periodic cutting of hay tends to keep tarnished plant bug numbers down. Feeding of the tarnished plant bug on the flowers and pods of the seed legumes causes blasting of the seed. The tarnished plant bug has been a pest primarily of legumes grown for seed in Michigan.

Check for leafhoppers or plant bugs in areas of hay and pasture crops that appear stunted or droughty or have a slow regrowth following cutting or pasturing during the summer. Periodically check fields of legumes grown for seed, especially when the first flower buds appear. Apply an insecticide if most of the stems have one or more insects on them. Apply the insecticide as a spray to cover the foliage of the plants.

Grasshoppers

The well-known grasshoppers are normal residents of our hay and pasture fields and rarely appear in large enough numbers to justify the use of insecticides for their control. While called "grasshoppers," they feed mainly on boardleaves and are pests only when they are unusually abundant and forced to feed on cultivated plants by summer droughts. Grasshoppers were abundant during the late summers of 1965, 1970, and 1971 in recent years, but did not cause much damage to forage crops.

Check hay and pasture fields for grasshoppers and their feeding on leaves during periods of drought. Special attention should be given to margins of fields adjacent to large, weed areas. Apply insecticide only of grasshoppers are especially abundant. Notify your county agricultural extension agent if damaging numbers of grasshoppers are seen. Insecticides may be applied either as sprays or as granules for grasshopper control.

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