Alfalfa Weevil Management
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AG FACTS

Alfalfa Weevil Management

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THE ALFALFA WEEVIL, *Hypera postica* (Gyllenhal), a major pest of alfalfa, was accidentally introduced into the United States in the first part of this century. As with most introduced pest species, the alfalfa weevil was brought to this country without its natural enemies, so it became readily established and spread rapidly. It was first discovered in Michigan in 1966 and had become an important pest throughout the United States by the early 1970s.

Identification

Adult: The newly emerged alfalfa weevil is a gray to light brown beetle, about 3/16 inch long, with a broad, dark band down the middle of the back. As the weevil ages, it turns darker brown or gray and the stripe becomes darker. The mouthparts are in the form of a long, slender snout (Fig. 1A).

Egg: The egg is small (1/32 inch) and oval. It may vary in color from yellow to brown, darkening as it matures (Fig. 1B).

Larva: The young larva, or grub, is cream colored to yellowish green and has a cylindrical, wrinkled body. As the larva grows, it becomes green and has a prominent white stripe down the middle of the back. The head capsule is shiny black. A full-grown larva is 1/4 inch to 3/8 inch long (Fig. 1C). The larva of the clover leaf weevil, *Hypera punctata* (Fabricius), resembles the alfalfa weevil larva but has a brown head capsule and is much larger when mature.

Pupa: The pupa is about as large as a full-grown larva. Pupation occurs in a loosely woven, round, silken cocoon that may be white, light green or light brown. Frequently, pieces of leaf material are included in the cocoon (Fig. 1D).

Life Cycle

In Michigan, alfalfa weevils overwinter as adults in plant debris in and around alfalfa fields. They become active on the first warm days of spring and feed for about two weeks before egg laying begins (Fig. 2).

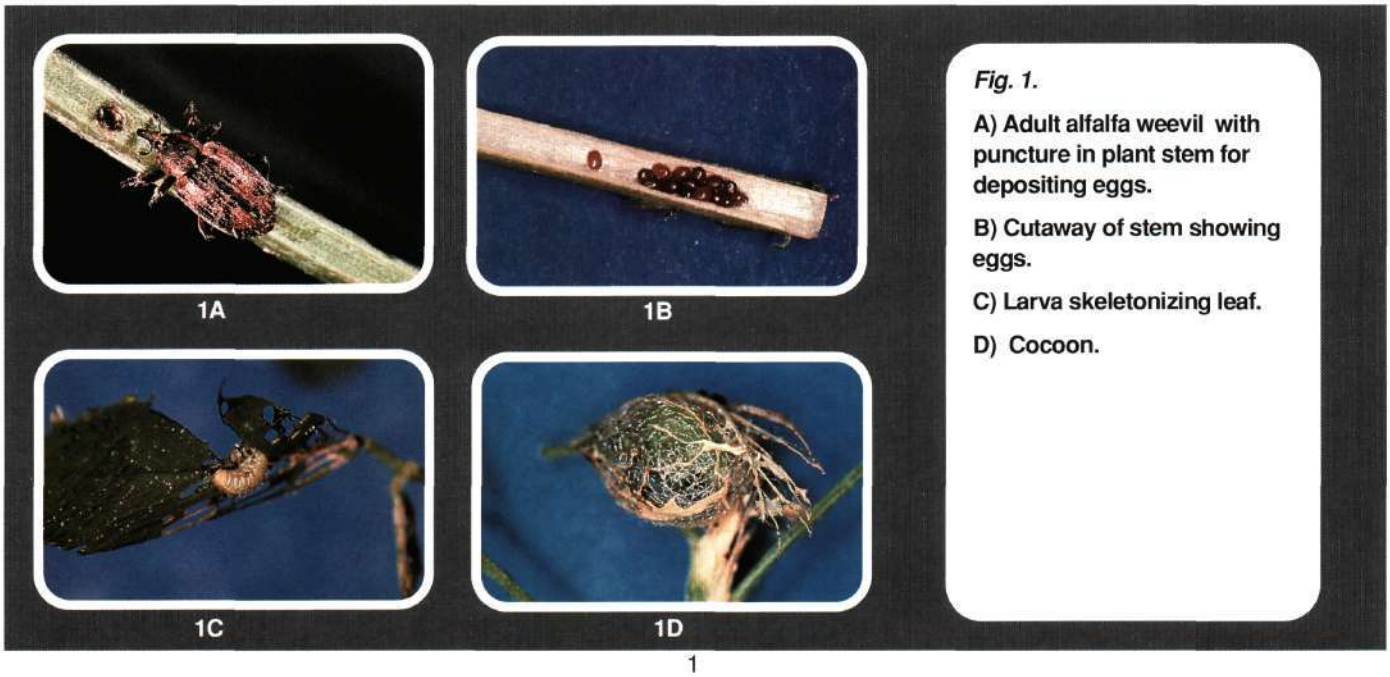


Fig. 1.

A) Adult alfalfa weevil with puncture in plant stem for depositing eggs.

B) Cutaway of stem showing eggs.

C) Larva skeletonizing leaf.

D) Cocoon.

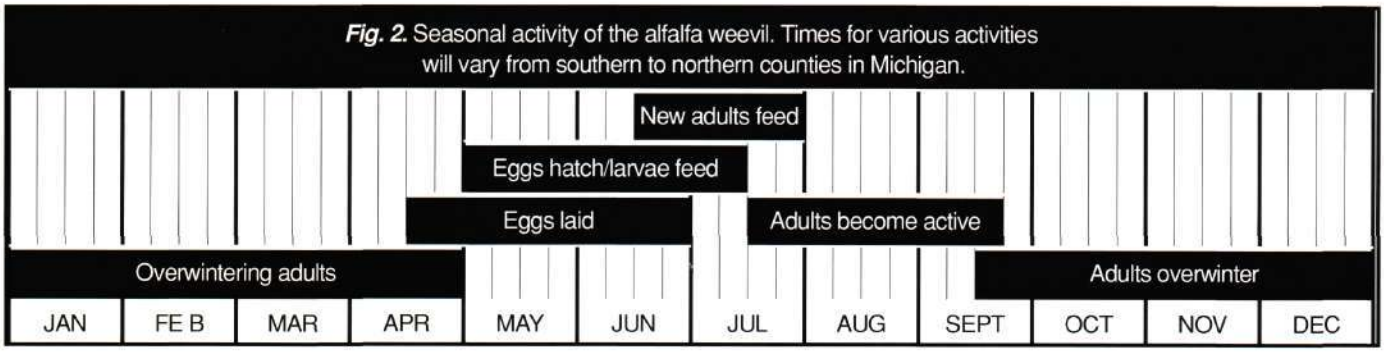


Fig. 2. Seasonal activity of the alfalfa weevil. Times for various activities will vary from southern to northern counties in Michigan.

Females chew holes in alfalfa stems, where they deposit eggs in clusters of up to 50 (generally 2 to 25). Eggs may also be deposited in alfalfa litter or stubble. Under normal conditions, the eggs hatch in one to two weeks. Once hatched, the larvae pass through four growth stages called instars, progressively increasing in size and the amount of leaf tissue they consume. Larvae feed for three to four weeks.

After feeding is complete, fourth instar larvae spin cocoons in which to pupate. Cocoons may be formed on the leaves of the plant or in leaf litter on the ground. Pupation normally takes about 10 days, after which the adult emerges and feeds for about two weeks before seeking a sheltered location in which to spend a summer hibernation period known as aestivation.

Adult weevils become active again in the fall, and some mating and egg laying may take place in the extreme southern counties of Michigan. However, these eggs generally do not survive the winter.

Damage

In spring, when temperatures reach 48 degrees F or higher, overwintered adults begin to feed on the stems and leaves of alfalfa. Stems may be notched and shoots or leaf stems completely cut off. Round to elongated holes in leaves are also signs of adult feeding. The adults may be found on the foliage or near the bases of plants.

The larval stage of the weevil causes the most economically important damage. The newly hatched larvae begin feeding on the alfalfa leaf buds and terminal growing areas (Fig. 3). The appearance of pinholes in the upper leaves is an early indication of larval feeding. Warm areas such as south-facing slopes may show this type of damage first. Older larvae feed on expanded leaves, sometimes leaving only the veins. This gives leaves a skeletonized appearance

Fig. 3.
Early signs of larval damage. Note holes in leaves and damaged leaf margins.

Fig. 4.
Severely damaged alfalfa on a south-facing slope.

(Fig. 1C). Heavily infested areas of the field may appear lighter in color or "frosted" because of the drying of damaged foliage (Fig. 4).

When present in high numbers, adults and larvae can also do serious damage to alfalfa regrowth after the first cutting. The alfalfa may fail to green up because of weevils feeding on the developing crown buds. Adult weevils may also strip the surface layer of tissue from alfalfa stems ("debarking").

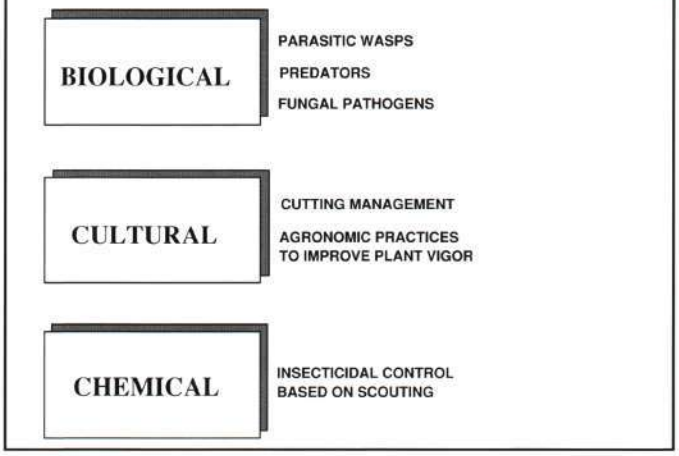
Though the alfalfa weevil is primarily a first cutting pest, the effects of damage can carry through to subsequent cuttings. Reductions in yield, forage quality and stand life are often seen. Management practices that promote rapid growth and stand vigor can reduce the impact of the alfalfa weevil.

Detection and Management

Alfalfa weevil management is an excellent example of an IPM (integrated pest management) approach. It combines biological, cultural and chemical control methods to minimize environmental impacts while providing economic and effective control (Fig. 5). Natural enemies of the alfalfa weevil (described below) in combination with cutting management (cultural control) frequently maintain weevil populations below economic thresholds. Chemical controls are available when biological and cultural means fail to provide adequate control.

Routine inspection of fields is the best way to determine if you have a situation requiring action. The need for intervention changes with the growth of the crop. Make observations early in the season (late April to early May), looking for the insect and for signs of feeding damage. Alfalfa should be especially well monitored at the first bud stage. Survey five randomly selected areas of the field, staying away from field edges and unusual areas not representative of the overall field. Check the tips and upper leaves of 20 plants for grubs and their damage. Continue to check every few days. If grubs are present and 25% (25/100) or more of the plants have feeding damage, you need to take steps to avoid serious loss.

Fig. 5. **The three types of control procedures used in integrated pest management of the alfalfa weevil.**



Biological Control

Several biological agents help control alfalfa weevil populations. The most effective of these are several species of small, non-stinging wasps that attack various life stages of the weevil, killing them or in some cases, causing infertility (Fig. 6). In Michigan, three of these wasps are known to occur statewide: *Microctonus aethiopoides* , *Bathyplectes anurus* and *Bathyplectes curculionis*.

Fig. 6. Adult *Bathyplectes anurus* wasp on alfalfa leaf. Actual size is about 1/8 inch in total length.

Probably the greatest reduction in alfalfa weevil numbers is due to *M. aethiopoides*, which lays its eggs (oviposits) in the adult weevil. The egg hatches and the wasp larva spends the winter inside of the weevil adult, rendering it sterile. In the spring the *M. aethiopoides* larvae emerge from the dying host weevils and pupate. The newly emerged *M. aethiopoides* adults lay eggs in other unparasitized weevils that have overwintered. The wasps that emerge from these overwintered adult weevils then lay eggs in spring generation adult weevils, starting the cycle over again.

The females of *B. anurus* and *B. curculionis* oviposit in alfalfa weevil larvae. Parasitized weevil larvae tend to feed for a shorter period of time than unparasitized larvae. The wasp larva hatches from the egg within the host and feeds on the weevil larva's internal organs, eventually killing it. The wasp larva then spins a brown, oval-shaped cocoon in which it pupates and from which it eventually emerges as an adult. Sometimes the wasp cocoon will be formed inside of the weevil cocoon. *B. anurus* cocoons can sometimes be seen "jumping". This is due to the jumping motion of the larva inside of the cocoon. It is believed that this enables this otherwise vulnerable stage of the insect to avoid attack from other insects and also to escape from harsh microenvironments. Of these two parasitoids, *B. anurus* has the greater impact on the alfalfa weevil population.

Several predators of alfalfa weevil larvae also exist. These include certain species of lady beetles, nabids (damsel bugs) and spiders. A fungal disease of alfalfa weevil larvae may also lower populations. This disease is favored by moist conditions and does not usually cause population reduction until late in the larval feeding period.

Cultural Control

If the crop is in early bud stage or beyond and the weevil has reached the economic threshold, cutting is recommended. Cutting the crop directly kills many weevils, removes their food supply and exposes them to direct sunlight and hot temperatures, a combination that greatly reduces their survival. Once cut, hay should be removed from the field at the earliest opportunity. Cutting too early, before bud stage, does little to reduce weevil numbers and may allow extensive damage to the second crop. This happens because peak weevil oviposition has yet to occur and eggs laid after cutting produce larvae that feed on the second crop. On the other hand, cutting too late allows weevils opportunity to severely damage the first crop. Timely cutting, in combination with the biological control agents, provides the best direct control of weevil larvae.

Chemical Control

If a threshold has been reached and the field can not be cut for a week or more, an insecticide application may be necessary to prevent economic losses. If the field is in bloom, then take special care to avoid exposing bees to insecticides. Make applications when bee activity is lowest, either in the early morning or in the evening, and use a material with low or moderate bee toxicity. Consult Extension Bulletin E-1582, Chemical Control of Insects and Nematodes in Field and Forage Crops, for recommended insecticides and their relative bee toxicity. Also, notify nearby beekeepers of your intention to spray.

Hay that has already been badly damaged should be cut as soon as possible without spraying. Spraying will not return the investment of time and money if serious damage has already occurred. Continue to check fields until the regrowth from the first cutting is well established (about 6 inches tall). An insecticide application may be necessary if the field is not regrowing and you can easily find grubs feeding on the stubble. Note that stubble applications should be used only if warranted for weevil control, not as a potato leafhopper prevention method. A stubble application will not ensure adequate control of future leafhopper populations. Avoid using unnecessary sprays which would have the potential to disrupt the weevil's natural enemies.

With a combination of scouting, preserving natural enemies, timing of cutting and selective insecticide use, alfalfa producers can achieve optimum weevil control with the least expense. Following these sound IPM practices should help reduce the need for insecticide use in future years as well.

New-5:90-5M-TCM-LB, Price 75, for sale only.

File 27.11 (Insects and Nematodes)