Kansas State University Agricultural Experiment Station and Cooperative Extension Service
KANSAS CROP PESTS
K-STATE Research and Extension

Alfalfa Weevils

Figure 1. Adult alfalfa weevil

The alfalfa weevil, *Hypera postica* (Gyllenhal), is the major perennial defoliator of early season alfalfa in Kansas. Alfalfa weevils originated in Asia but were probably introduced into the United States from southern Europe. First reported from Utah in 1904, they are now established in all contiguous states. There are thought to be two strains of the alfalfa weevil, an eastern strain that ranges as far west as Kansas, and a western strain that infests as far east as Nebraska and North and South Dakota. Some overlap, and interbreeding of the two strains probably occurs in western Kansas. For practical purposes, the two strains are similar in biology and damage potential. The Egyptian alfalfa weevil has been reported from the far western states, including Utah, California, and New Mexico. It has a significantly different life cycle and has been confirmed in Kansas. The extent of the infestation has not been determined.

Figure 2. Alfalfa weevil larvae, early to late instars

Description and Life Cycle

Adult alfalfa weevils are approximately 3⁄16 inch long and light brown with a broad dark brown line down the center of the back. They have a typical weevil snout (Figure 1) and are shy, quickly dropping off the plant when disturbed. Adult females insert eggs into plant stems, usually in groups of five to 25. They are capable of producing from 800 to 2,000 eggs each. Oviposition may occur spring or fall. Eggs are yellow at first, darkening to orange-yellow. Development occurs at temperatures above 48 degrees Fahrenheit, even in the winter. Eggs hatch in the spring into small, legless light-green larvae with a black head capsule and a white stripe down the middle of the back (Figure 2). There may be three or four larval instars, each becoming darker green as they develop. Mature larvae form silken, loosely woven pupal cells in leaf litter or on the lower portions of alfalfa plants (Figure 3). The newly formed pupa is yellowish green but darkens to light brown. Adults emerge after four to seven days by chewing through the silken webbing.

Figure 3. Alfalfa weevil pupa in leaf litter and up close

New adults may feed on plants (including stems) until temperatures warm and they seek cooler areas for oversummering. They may remain under leaf litter in fields or move to nearby shaded areas. Adults return to the fields (or resume activity in the same field) when cooler temperatures return in the fall. They feed little but start depositing eggs in stems when daytime temperatures exceed 48 degrees. They overwinter as eggs or adults. When eggs hatch in the spring, larvae feed for three to four weeks before pupation. Eggs may start hatching as early as February, depending on when they were deposited in the fall. Oviposition (with continued hatching) may continue until late May, depending on temperatures. There is one generation per year in Kansas.

Damage

Larvae start feeding immediately after hatching. Feeding signs initially consist of pinprick-sized holes in leaves and frayed terminals. As larvae grow, feeding and defoliation becomes more obvious. Plants eventually appear white or silvery (Figures 4 and 5). The first cutting is affected. If feeding is not controlled, initial foliage loss may diminish subsequent cuttings. Adults also may feed on foliage, but not as voraciously as larvae. If regrowth is delayed after the first cutting by drought or cool weather, adults may strip the epidermis from stems, a type of damage known as "barking." Significant damage, especially where larval control was poor or there were poor growing conditions, may result in patchy spots of dead plants.

Figures 4 and 5. Alfalfa weevil feeding damage on untreated vs. insecticide treated plants

Management

Many nonchemical management tactics have been used to mitigate alfalfa weevil damage. Practices — such as fall livestock grazing, flaming, and burning during plant dormancy, and pulling weighted rollers over fields to squash eggs — work sporadically, but not

Table 1. Approximate degree days required for alfalfa weevil development

Degree Days or Thermal Units	Stage	Importance
25–300	Eggs hatch	In stems
301–450	1st and 2nd instars	Leaf pinholing – start sampling
450–600	2nd and 3rd instars	Defoliation
600–750	3rd and 4th instars	Defoliation
750+	Pupa to adult	Adults – some feeding – oversummering

consistently enough to be a significant factor in controlling weevil populations.

Insecticides are the most effective method of protecting alfalfa from weevil damage. Treatment thresholds and economic injury levels are relatively well established but differ for each producer. Alfalfa weevils are cool-weather insects, so scouting should start when plants break dormancy. A degree day or thermal unit accumulation system can be used to predict when to initiate scouting. Insect development is controlled by temperature. This can be used to help manage these pests. It is tricky for alfalfa weevils because eggs can be laid in the fall, winter, and spring. Weevil activity has been tracked in Kansas for the past several years and has been used to generate recommendations (Table 1).

It is impossible to determine whether eggs were laid in the fall, winter, or spring, so, the degree day model may vary considerably, but it is useful for indicating when to start a scouting program. The base temperature for alfalfa weevils, or the temperature below which there is no development, is approximately 48 degrees Fahrenheit. Every day after oviposition that the temperature exceeds 48 degrees, the eggs mature and get closer to hatching. Hatching occurs after about 300 degree days. In Kansas, scouting should start after the accumulation of about 180 degree days from January 1.

To calculate a degree day, record the daily high temperature anytime it exceeds 48 degrees. For example, if there is only one day in January that the temperature exceeded 48 degrees, take that temperature (60 degrees in the example below) and add the lowest temperature for that day (or 48 degrees, whichever is higher). Then divide by 2 to calculate the average temperature for that day. Next, subtract 48 degrees, which gives you six degree days accumulated for that day.

Continue recording and summing degree days until you have accumulated 150 to 180. That is when to start scouting alfalfa fields because the first eggs will start hatching. The location where the daily temperature is recorded is probably not exactly the same as where weevils are developing, so the model may be off a little, but it can save time by alerting you to when eggs should start hatching.

Equation for calculating growing degree days for alfalfa weevils:

$$\frac{\text{Max. Daily Temp. + Min. Daily Temp. (Or 48°F, whichever is higher)}}{2} - 48°F = \text{Weevil development units}$$

For example:

$$\frac{60°F + 48°F}{2} = \frac{108}{2} = 54 - 48 = 6 \text{ degree days (for that day)}$$

Usually, a second flush of larvae occurs from eggs deposited in the spring. Oviposition is typically interrupted during the winter, but females resume oviposition as soon as temperatures warm in the spring. Fluctuating spring temperatures and rain can prove especially troublesome for alfalfa weevil management because these conditions radically affect weevil behavior and insecticidal efficacy.

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