What Bugged Alfalfa Hay in 2013

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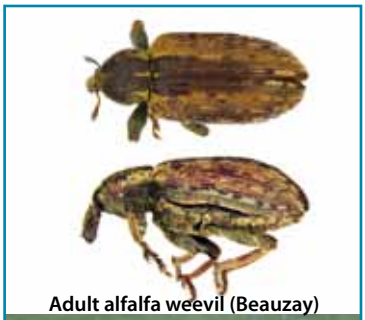
Alfalfa weevil feeding injury; note frosted appearance of crop (Beauzay).

Alfalfa weevils plague alfalfa hay production in this region. Weevil can cause severe defoliation to alfalfa reducing plant biomass, especially in drought situations. However, they can be effectively managed by timely scouting, using thresholds, and Integrated Pest Management (IPM) strategies.

Identification

Adults are about 1/4", with elbowed and clubbed antennae, blunt snout, and a distinctive brown stripe along the center of the back. Mature larvae are about 3/8" long, have a black head capsule, and a wrinkled green body with a white stripe running lengthwise along the top.


Adult alfalfa weevil (Beauzay)


Mature alfalfa weevil larvae (Knodel)

Life Cycle

Alfalfa weevil has one complete generation per year. Adults become active from late-April through May, and females lay eggs in alfalfa stems. Eggs hatch in one to two weeks. Larvae emerge from the stem and begin feeding on the growing tips of the alfalfa plants. Larvae pass through four growth stages (instars) in two to three weeks, and feed on tender leaf tissue. As the plants and larvae grow, feeding injury will progress throughout the plant leaves, with leaves becoming skeletonized as feeding injury becomes more severe. Pupation (resting stage) takes place in small, silken cocoons that are spun near the base of the plant. Adults emerge after one to two weeks. Adults feed in the alfalfa for two to three weeks before leaving for sheltered areas and entering a summer dormancy period (aestivation).

Since alfalfa weevil development is temperature-dependent, a degree day model has been developed for alfalfa weevil growth. The following degree day table (Table 1) has been adopted by university Extension specialists in the North Central Region. For most years, degree days toward alfalfa weevil development do not begin to accumulate before March 1.

Table 1. Approximate degree day (DD) requirements for alfalfa weevil development using 48°F as the base developmental temperature.

Life Stage	DD Required to Complete Life Stage	Accumulated DD	Typical Feeding Activity
Egg hatch begins	300	300	
1st instar larval development	71	371	Light
2nd instar larval development	67	438	
3rd instar larval development	66	504	Heavy
4th instar larval development	91	595	
Pupation	219	814	
Adult emergence	---	>814	

Scouting

Scouting for alfalfa weevil should begin immediately after egg hatch and fields should be scouted weekly through the first cutting. Fields should be scouted in an "M" pattern or by selecting random sites within the field, with a minimum of five sampling sites per field. For sampling, the following is needed: a sharp pruning shears, a white 5-gallon bucket, a hand lens, a yardstick for measuring plant height, a pencil, paper, and a calculator. At each sampling site within the field, select a minimum of 30 plants and cut them off at the base. Invert the cut plants into the 5-gallon pail and vigorously beat the plants in the pail to dislodge the larvae. First instar larvae feeding in rolled leaf tips will not dislodge easily, so be sure to examine leaf tips for larvae. Count and record: 1) the number of plants sampled; 2) the total number of larvae counted; 3) estimated percent feeding damage (defoliation); and 4) the height of the alfalfa at the sampling sites. Repeat this procedure for all sampling sites within the field. When finished, total the number of larvae sampled and divide by the total number of plants sampled to calculate an average number of larvae per plant for the entire field. Also, calculate percent feeding damage and plant height averages for the field.


Alfalfa weevil larvae collected during 30-stem sampling method using a white bucket (Beauzay).

IPM Strategies

Cutting typically occurs soon after alfalfa reaches the early bud stage. At this time, continued feeding by larvae may not be great enough to warrant the cost of insecticide application. **If economic alfalfa weevil infestations are observed (>30% of stems infested), early cutting (hay) is one of the best strategies for mitigating alfalfa weevil damage.** After the first cutting has been harvested, be sure to scout for larvae where the windrows were located. Larvae that escaped the

first cutting tend to move under the windrows for shelter, and will feed in these locations. **Check regrowth for larval feeding. If eight or more larvae per square foot are found or re-growth is delayed due to feeding, treatment is recommended.**

Several factors must be considered when making alfalfa weevil management decisions. Plant height, estimated yield, crop market value, management costs, and plant injury based on the number of larvae per stem must be considered. Threshold numbers are based on the average number of larvae sampled in the field using the 30-stem sampling method (Table 2). These action thresholds apply prior to the first cutting only.

When the decision is made that insecticidal control is needed, some considerations must be made. Pay particular attention to the pre-harvest (PHI) and pre-grazing (PGI) intervals. Another important consideration is pollinator safety. Most insecticide labels now carry 'bee language' such as 'do not apply when crop is in bloom' or 'do not apply when bees are actively foraging.' When treating, be sure to observe pollinator safety. Only apply insecticides early in the morning and late in the evening when bees are not present.

Be sure to read, understand, and follow all label directions and precautions.

Source: NDSU Extension Service, E1675 Integrated Pest Management of Alfalfa Weevil in North Dakota - www.ag.ndsu.edu/extensionentomology/recent-publications-main/publications/e-1676-integrated-pest-management-of-alfalfa-weevil-in-north-dakota.

Table 2. Recommended economic thresholds for third and fourth instar larvae of alfalfa weevil prior to the first cutting.

Plant Growth Stage (height)	Treatment Cost	Crop Value ($/ton)						Management Decision
		$50	$75	$100	$125	$150	$175	
		Number of Alfalfa Weevil Larvae per Stem						
50% bud or greater								Cut early
Early bud (>20")	$7/ac	4.0	2.7	2.0	1.6	1.3	1.2	Cut early, or use a short PHI/PGI product
	$8/ac	4.6	3.1	2.3	1.8	1.5	1.3	
	$9/ac	5.2	3.5	2.6	2.1	1.7	1.5	
	$10/ac	5.8	3.8	2.9	2.3	1.9	1.6	
	$11/ac	6.3	4.2	3.2	2.5	2.1	1.8	
	$12/ac	6.9	4.6	3.5	2.8	2.3	2.0	
Late vegetative (16-20")	$7/ac	3.8	2.4	1.8	1.4	1.1	0.9	Use a short- to mid-PHI/PGI product
	$8/ac	4.4	2.8	2.1	1.6	1.3	1.1	
	$9/ac	4.9	3.2	2.4	1.8	1.5	1.2	
	$10/ac	5.5	3.6	2.6	2.1	1.7	1.4	
	$11/ac	6.1	4.0	2.9	2.3	1.9	1.6	
	$12/ac	6.7	4.4	3.2	2.5	2.1	1.7	
Mid-vegetative (10-15")	$7/ac	3.6	2.2	1.5	1.1	0.9	0.7	Use a long-residual product
	$8/ac	4.1	2.6	1.8	1.4	1.1	0.8	
	$9/ac	4.7	3.0	2.1	1.6	1.2	1.0	
	$10/ac	5.3	3.4	2.4	1.8	1.4	1.2	
	$11/ac	5.9	3.7	2.7	2.1	1.6	1.3	
	$12/ac	6.4	4.1	3.0	2.3	1.8	1.5	