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Alfalfa Weevil Control in South Dakota

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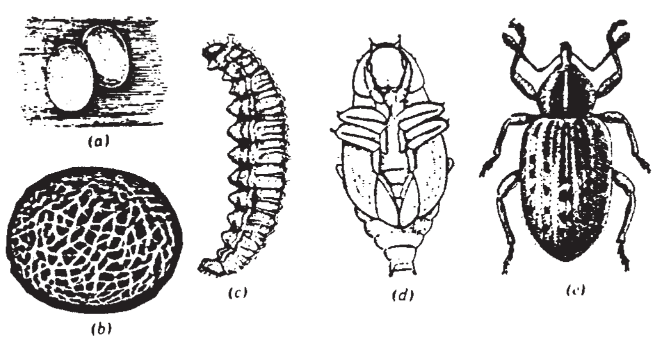
Alfalfa weevil, *Hypera postica* (Gyllenhal), is a significant pest of alfalfa in some areas of South Dakota each year. Feeding by larval stages results in reductions in yield and quality of the harvested forage. Although it generally is a problem of first-cutting alfalfa in South Dakota, regrowth of the second crop is occasionally hindered by alfalfa weevil as well.

Description

Adult alfalfa weevils are about 3/16 of an inch long and light brown to straw-colored with a darker stripe down the middle of the back. Alfalfa weevil larvae are light green with a white stripe down the center of the back and a black head capsule. Fully developed larvae will be approximately 3/8 of an inch long. Other life stages are illustrated in Figure 1.

Figure 1. The alfalfa wevil, *Hypera postica* (Gyllenhall): (a) eggs; (b) cocoon; (c) larva; (d) pupa; (e) adult; all much enlarged. (Webster, USDA).



Life Cycle

Alfalfa weevil adults overwinter in field residue, fencelines, shelterbelts, and road ditches in South Dakota. Adults become active in the spring and begin depositing eggs in alfalfa stem tissue. Adults use their elongated mouthparts to chew a hole in the stem into which groups of eggs are deposited.

Larvae emerging from eggs initially feed in the terminal buds of the growing alfalfa and may be found in rolled up leaves at the growing tip of the plant. Larvae pass through four stages while feeding for three to four weeks. When larvae complete their development, they move to the crown of the plant to pupate.

Fully developed larvae spin a silken-like protective cocoon around themselves before they enter the pupal or resting stage. It's during this pupal stage that the larvae transform to adults.

Newly emerged adults may feed for a short time, but feeding and damage at this time is minimal. Adults will enter a dormancy and be inactive during much of the summer. This generation of adults will overwinter and serve as the source of infestation the following year.

Damage

You'll know that larvae are feeding when you see small, circular holes in leaves at the growing tip of the plant, commonly referred to as "pinholing." As larvae increase in size, feeding becomes more pronounced, with large areas of individual leaflets being removed. Larvae may feed on only the interveinal tissue, resulting in a skeletonized appearance to the leaves. Severely damaged fields typically take on a silvery appearance, much like that of a field which has suffered frost damage.

Larval feeding results in less leaf tissue and, therefore, reduces yield. Moreover, feeding at the tip of the growing plant significantly reduces forage quality. Feeding by alfalfa weevil adults is usually insignificant.

Management

Start routine monitoring of alfalfa fields in early to mid May, and continue on a weekly basis until threat of weevil damage is passed. Examine 20 plants in each of at least five locations throughout the field; look for leaf feeding damage and presence of larvae. Take all samples at least 100 feet in from field margins, because damage may be concentrated along field margins. An economic threshold is reached if 30% of the plants show feeding damage and larvae are still present. If the alfalfa has reached the bud stage, an early harvest of the alfalfa is the recommended control strategy.

1993 Control Studies

Alfalfa weevil control was evaluated in 1993 in South Dakota at two locations near Rapid City and one location near Gregory. Treatments consisted of various cultural methods and insecticide applications. Applications were made using a six-foot-wide, hand-held boom in a final spray volume of 20 gallons per acre at a pressure of 35 psi. Insecticide applications were made on June 9 at both Rapid City locations and June 10 at the Gregory location. Plots were 30 feet by 30 feet with 3 replications per treatment arranged in a randomized complete block design.

An early harvest treatment was done on the insecticide application date at all locations. Cultivation treatments were made at the time of alfalfa green up in the spring and consisted of a single pass with a spring-tooth harrow at one of the Rapid City locations and a single pass with a tandem disc at the Gregory location. A flaming treatment also was evaluated at Gregory and consisted of a single pass over the plots with a tractor-mounted propane flamer at the time of initial alfalfa growth.

Alfalfa weevil larval populations were measured before insecticide applications were made, as well as 7 and 14 days after treatment. Counts were made by taking 10 sweeps from each plot with a standard 15-inch diameter sweep net. Yield was determined from a 45-square-foot area in the center of each plot. A subsample of the harvested forage was analyzed in the laboratory for crude protein and neutral detergent fiber.

Results

Data is presented in Tables 1, 2, and 3. Alfalfa weevil populations were extremely high at both Rapid City locations but never reached an economic threshold at Gregory.

Cultivation treatments did not significantly reduce alfalfa weevil populations when compared to the untreated plots at Rapid City. However, cultivated plots at Gregory had significantly fewer alfalfa weevil larvae than the untreated plots.

Flaming was not effective in reducing alfalfa weevil larval populations in this experiment.

Although all insecticide treatments were very effective in reducing alfalfa weevil populations, there were no significant differences in alfalfa dry matter yields among the treatments at any of the locations. It is believed that no yield differences were detected at Gregory because of the low insect populations and at Rapid City because the insecticide applications were made after significant damage had already occurred. Rain prevented insecticide treatment on June 3 at the Rapid City locations and by June 9 significant feeding damage had already occurred in all of the plots. <u>This emphasizes the need for frequent monitoring and attention to those fields where insect populations are increasing toward an economic threshold.</u>

Several studies have been conducted in which yield reductions due to alfalfa weevil have been demonstrated. It is believed that insecticide applications simply were made too late in this experiment.

Early harvest plots at both Rapid City locations had significantly higher-quality alfalfa than the untreated plots as measured by crude protein and neutral detergent fiber concentrations. <u>As is commonly recommended for alfalfa weevil control, early harvest was a very favorable management strategy in this experiment</u>.

Acknowledgement

The authors give their appreciation to the staff of the Lower Rapid Creek Hydrological Unit for assistance in site selection and data collection during this study.

Tables 1, 2, and 3. Influence of chemical and cultural methods on control of alfalfa weevil populations, alfalfa yields, crude protein, and neutral detergent fiber concentrations from established stands of alfalfa at three locations in South Dakota in 1993.

1 -- Rapid City

Treatment/form	Rate Product/Acre	Avg. # larvae/10 sweeps 9 Jun	15 Jun	22 Jun	Yield lb/acre	Crude Protein (%)	Neutral Detergent Fiber (%)
Early Harvest		285			2773	19.1	44.0
Cultivation		281	224	150	2941	16.9	46.0
Penncap-M	2 pt	257	4	3	2738	16.4	49.1
Lorsban 4E	1 pt	334	7	0.4	2610	18.0	47.5
Furadan 4F	1 pt	229	0.4	0.1	3367	15.8	49.5
Imidan 50WP	2 lb	277	0.7	2	3078	17.1	46.3
Malathion 57EC	2¼ pt	249	10	18	2920	17.3	44.7
Sevin XLR	1½ qt	284	1	3	2839	17.1	48.7
Pounce 3.2 EC	8 fl oz	293	7	4	2837	16.2	50.1
Control		259	245	120	3034	15.1	54.5
LSD (P = 0.05)		NS	108	83	NS	2.3	6.4

2 -- Rapid City

Treatment/form	Rate Product/acre	Avg.# larvae/10 sweeps 9 Jun	15 Jun	22 Jun	Yield lb/acre	Crude Protein (%)	Neutral Detergent Fiber (%)
Early Harvest		300			3894	21.7	42.9
Lorsban 4E	½ pt	350	5	26	3790	19.8	46.2
Penncap-M	2 pt	361	7	15	3828	18.2	49.6
Lorsban 4E	1 pt	289	5	19	3409	18.8	51.6
Furadan 4F	1 pt	305	0.1	1	3876	19.5	46.2
Imidan 50WP	2 lb	344	0.1	9	3882	20.1	47.5
Malathion 57EC	2¼ pt	351	11	33	4572	18.7	47.1
Sevin XLR	1½ qt	241	17	61	4528	20.8	43.2
Pounce 3.2 EC	8 fl oz	309	12	44	2771	20.6	46.4
Control		270	439	213	3481	17.5	53.3
LSD (P = 0.05)		NS	77	52	NS	2.2	5.3

3 -- Gregory

Treatment/form	Rate Product/acre	Avg.# larvae/10 sweeps 8 Jun	16 Jun	22 Jun	Yield lb/acre	Crude Protein (%)	Neutral Detergent Fiber (%)
Early Harvest		15	27	2	3341	19.3	46.3
Cultivation		10	12	0.7	2132	22.2	39.8
Flaming		12	47	8	3251	20.3	42.3
Lorsban 4E	1 pt	15	0.1	0.4	3028	19.8	44.1
Furadan 4F	1 pt	13	0.2	0.1	3165	17.2	51.1
Imidan 50WP	2 lb	8	0.4	0.4	3261	20.1	43.3
Malathion 57EC	2¼ pt	17	0.1	0.1	3070	20.1	43.0
Sevin XLR	1½ qt	16	3	2	3309	20.7	41.8
Pounce 3.2 EC	8 fl oz	16	2	2	3397	19.6	46.4
Control		16	36	3	3531	17.9	46.8
LSD (P = 0.05)		NS	9	1.5	NS	2.2	5.6

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