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B. Ritter

B. Bauernfeind

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The effect of alfalfa weevil control on alfalfa hay yield and quality

Abstract

A 2-year-old, irrigated alfalfa field was left untreated or treated with ¼ lb, ½ lb, or 1 lb of Furadan® per acre on April 5, 1986. Alfalfa weevil populations were determined 2,9,16 and 23 days post-spraying. Forage samples were collected at about the 1/10 bloom stage of maturity. All three Furadan levels provided excellent weevil control up to 23 days post-spraying, and all resulted in an increase in dry matter yield. But only the yield of the 1 lb./A. treatment was significantly ($P < .15$) greater than the untreated forage (1.97 vs. 2.44 tons/A). There was no difference in nutrient composition between the untreated and treated forage. All Furadan treatment resulted in a net economic gain per acre. In this study, between ½ lb and 1 lb Furadan per acre resulted in the greatest weevil control and economic return per acre.

Keywords

Kansas Agricultural Experiment Station contribution; no. 88-363-S; Cattlemen's Day, 1988; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 539; Beef; Alfalfa; Weevil control; Yield; Quality

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The Effect of Alfalfa Weevil Control on Alfalfa Hay Yield and Quality

Bob Ritter and Bob Bauernfeind¹

Summary

A 2-year-old, irrigated alfalfa field was left untreated or treated with 1/4 lb, 1/2 lb, or 1 lb of Furadan® per acre on April 5, 1986. Alfalfa weevil populations were determined 2, 9, 16 and 23 days postspraying. Forage samples were collected at about the 1/10 bloom stage of maturity. All three Furadan levels provided excellent weevil control up to 23 days post-spraying, and all resulted in an increase in dry matter yield. But only the yield of the 1 lb./A. treatment was significantly ($P < .15$) greater than the untreated forage (1.97 vs. 2.44 tons/A). There was no difference in nutrient composition between the untreated and treated forage. All Furadan treatments resulted in a net economic gain per acre. In this study, between 1/2 lb and 1 lb Furadan per acre resulted in the greatest weevil control and economic return per acre.

Introduction

Adult alfalfa weevils lay their eggs inside the stems of alfalfa plants in the fall or spring. These eggs hatch in the spring, and the larvae feed on the alfalfa plant for about 3 weeks during the growth of the first cutting. Most damage is confined to the terminal and upper leaves of the plant. As feeding continues by the larvae and/or adults, the dry, tattered foliage gives the field a gray, or frosted appearance. Our study was conducted to measure the effect of alfalfa weevil damage on forage yield and quality and to determine the economic advantage of chemical control of the weevil.

Experimental Procedures

A 2-year-old, irrigated alfalfa field was divided into 16, 10 ft. by 20 ft. plots representing four replications of four treatments. The treatments consisted of an untreated control and three rates of Furadan: 1/4 lb., 1/2 lb., and 1 lb. actual ingredient per acre. All plots were sprayed on April 5, 1986, at a delivery rate of 30 gal./A. Alfalfa weevil populations were determined in the plots by making 10 net sweeps down the center of each treatment plot. Weevil populations were determined on April 7, 14, 21, and 28, corresponding to 2, 9, 16, and 23 days postspraying, respectively (Table 48.1).

¹South Central Area Extension Livestock Specialist and Entomologist, respectively.

Forage samples were collected from each plot by hand-harvesting 1 square yard of forage, less than one inch from the ground, from the center of the plot. The forage samples were air-dried, weighed, and chopped before being submitted for nutrient analysis. The samples were analyzed for dry matter, crude protein, acid detergent fiber (ADF), calcium (Ca), and phosphorus (P) (Table 48.2). Total digestible nutrients (TDN) were estimated from nutrient analysis. The economic impact of alfalfa weevil control was also determined, based upon yield, current hay price, Furadan cost, and application cost (Table 48.3).

Results and Discussion

All Furadan treatments provided excellent control of the alfalfa weevil through the 16-day post-spray period. Between days 16 and 23 after spraying, Furadan performance diminished, with weevil counts inversely related to application rates. However, weevil populations were still less than those of the control plots (Table 48.1).

Dry matter yield increased with increasing rates of Furadan application. The dry matter yield of the 1 lb. application rate was significantly ($P < .15$) greater than for the untreated control, (1.97 vs. 2.55 ton/A.) (Table 48.2). The alfalfa weevil infestation of this study did not affect the nutrient composition of the forage for the nutrients that were determined (Table 48.2). Although not actually measured, the leaf-to-stem ratio of the alfalfa plants appeared to increase with increasing Furadan rates. The stems of the untreated alfalfa plants appeared to have a smaller diameter than those of the Furadan-treated plants. This difference in stem diameter may have been due to the reduced photosynthetic activity of the untreated plants because of defoliation by the weevil and a reduced need for stem support.

The higher forage yields resulting from weevil control increased the net value of alfalfa production per acre (Table 48.3). The results of this trial indicate that spraying alfalfa with Furadan in the spring at a rate of 1/2 lb. to 1 lb. active ingredient per acre will increase first cut alfalfa hay yield and economic return per acre.

Table 48.1. Weevil Counts on Alfalfa Treated with Three Levels of Furadan

Furadan lb. per acre	Weevils per 40 sweeps (days post-spray)			
	2	9	16	23
0	1017	939	2188	2366
1/4	2	0	0	569
1/2	0	0	0	141
1	3	0	0	117

Table 48.2. Forage Analysis of Alfalfa Treated with Three Levels of Furadan

Furadan lb. AI/A	DM T/A	CP	TDN	ADF	Ca	P
-----% DM basis-----						
0	1.97 ^a	19.2	63.3	35.2	2.1	.24
1/4	2.31	19.7	62.7	34.5	2.1	.23
1/2	2.44	20.1	62.2	35.2	2.0	.25
1	2.55 ^b	19.6	61.5	33.4	2.0	.24

^{ab} Values with different letters within a column are significantly different, P<.15.

^c TDN values were estimated from nutrient analyses

Table 48.3. Economic Returns from Three Rates of Furadan Application on Alfalfa Hay

Furadan lb. per acre	Yield advantage over untreated (tons per acre)	Advantage at \$50/T	Chemical cost	Appl. Cost	Net Return \$/A
1/4	.36	\$18.00	\$3.89	\$2.50	\$11.61
1/2	.51	\$25.50	\$7.78	\$2.50	\$15.22
1	.63	\$31.50	\$15.57	\$2.50	\$13.43