

LONG TERM WEED CONTROL EFFECTS ON ALFALFA PRODUCTION:
THE FIRST YEAR

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ABSTRACT

A long term weed control in alfalfa trial was initiated in central Oregon at Powell Butte and Klamath Falls in the fall and spring of 1990 and 1991. Only the results from Powell Butte are discussed. There were significant differences in the first cutting yield and quality of both the spring and fall-established alfalfa comparing weed control to no weed control. Weed competition from establishment through first cutting significantly reduced the second cutting in the fall-established alfalfa. These are the first year results of a minimum six year study.

Introduction

Over 100,000 acres of alfalfa are grown in central Oregon and the Klamath Basin. Although a few growers consistently produce high yields of weed-free hay, many growers do not. Observations indicate that weed-free hay is often sold first and at premium prices, while weedy hay is the last to be purchased and brings lower prices. In years of excess production, growers may be unable to sell weedy hay at any price. Many alfalfa growers in central Oregon and the Klamath Basin do not use herbicides in the establishment year, and many do not use herbicides in subsequent years.

There is no research or economic data to indicate the effect of long term weed control on alfalfa production in central Oregon and the Klamath Basin. This study will establish a set of field plots at two locations for a minimum six year study to evaluate chemical weed control effects on the long term production of alfalfa. Only the results from Powell Butte will be discussed.

The main objective of this trial will be to determine the economic difference in value of weed control vs. no weed control at different stages in the plant stand life (including chemical weed control on plant stand) over time. The chemical rates used were intended to insure no weeds and to produce clean hay. Over the course of the trial, the difference in the value of clean hay and weedy hay will be used to determine the economics of weed control.

Materials and Methods

Alfalfa variety 'Pioneer 5364' was planted in the late summer of 1990 and the spring of 1991 at the Central Oregon Agricultural Research Center - Powell Butte site (August 28, 1990 and June 11, 1991) and at the Klamath Falls Experiment Station. The experiment was a split plot design consisting of four repetitions, with fall and spring plantings as main plots (40 x 100 ft.) and the five weed management schemes (20 x 40 ft.) randomized within the main plots. The five treatments for weed management are:

1. Best herbicide treatment at establishment followed by best herbicide treatment every year thereafter.
2. Best herbicide treatment at establishment followed by no herbicide treatment thereafter.
3. No herbicide treatment at establishment followed by the best herbicide treatment every year thereafter.
4. No herbicide treatment at establishment followed by the best herbicide treatment in year three or year four as salvage treatment.
5. No herbicide treatment at establishment followed by no herbicide treatment thereafter.

For the fall-planting, Buctril (0.2 lb a.i./a), Pursuit (0.094 lb a.i./a), Poast (0.4 lb a.i./a) and crop oil (2 qt/a) were applied on October 3, 1990 for weed control (3-4 trifoliolate leaf stage). For the spring planting, the same herbicides and rates were applied on July 18, 1991. Harvest consisted of two cuttings each 52.5 square feet in area for yield from each treatment. Samples were taken for moisture and quality analysis. Samples were oven dried at 149°F until there was no change in weight. The data presented is based on dry matter percentage. Two quadrants, each 2.7 square feet in area, were clipped and the number of alfalfa stems counted. The alfalfa and weeds were separated, weeds into grass and broadleaf components, and weighed separately to determine relative percentage(s). Quality data to be determined includes crude protein, acid detergent fiber (ADF), neutral detergent fiber (NDF) and relative feed value (RFV), among others.

In the fall-planting of 1990, shepardspurse was the main weed present followed by nightshades, redstem filaree, lambsquarters, redroot pigweed, groundsel, smart weed, pineappleweed, dogfennel, oats, barley, green foxtail and wild buckwheat.

In the spring-planting of 1991, redroot pigweed was the main weed present followed by lambsquarters, common mallow, redstem filaree, groundsel, field bindweed, wild buckwheat, russian thistle, prostrate knotweed, witchgrass, nightshades, buttercup, quackgrass, smartweed and purslane speedwell.

Winter dormant herbicide treatment consisting of Velpar (1 lb a.i./a) and Paraquat (0.5 lb a.i./a) was applied on January 29, 1992.

Results and Discussion

Only the results from Powell Butte 1991 harvest year are presented. Treatments 1 and 2 have been combined and called herbicide applied (H) while treatments 3, 4, and 5 have been combined and called no herbicides applied (NH) for the first years results. The results for yield, plant percentages, and quality are given in tables 1, 2, and 3.

Alfalfa, weed yield, and quality were affected by chemical weed control compared to no weed control. Weed control produced significantly less weeds (one and one half tons less) in the alfalfa hay. Crude protein was 3.2 percent higher, ADF 2.3 points lower, NDF was 2.4 points lower, and RFV was 11 points higher in the first cutting of fall-established alfalfa. The results were similar for the spring-established alfalfa with crude protein 1.4 percent higher, ADF 6.2 points lower, NDF 5.0 points lower and RFV 35 points higher.

Yield from the second cutting of the fall-established alfalfa was lower in the non-weed control plots because of the weed competition that occurred from establishment to first cutting. Quality was the same for the fall herbicide (FH) and fall no herbicide (FNH) treatments in the fall-planting.

In the third cutting for fall-planting (the second cutting for spring-established), there were no differences in yield or quality. Weed control had a positive effect on the quality of the spring herbicide (SH) treatment compared to the spring no herbicide (SNH) treatment.

Table 1. Fall (F) and spring (S) planted alfalfa yields of first, second and third cuttings for 1991 at Powell Butte.

Treatment	Alfalfa	Broadleaf Weeds	Grass Weeds	Total Weeds	Total Yield
lbs/acre -----					
----- First Cutting-----					
FH	3890	37	96	133	4022
FNH	2393	2620	663	3282	5675
----- Second cutting-----					
FH	3123	3	2	4	3127
FNH	1967	127	171	298	2265
SH	417	124	1	78	495
SNH	559	1670	72	72	2521
----- Third Cutting-----					
FH	2968	11	65	71	3044
FNH	2694	148	199	319	3014
SH	434	105	1	106	540
SNH	302	347	68	415	718
----- Total-----					
FH	9981	51	163	208	10193
FNH	7054	2758	1033	3899	10954
SH	851	229	2	184	1035
SNH	861	2017	140	2156	3239

l- = fall, S = spring, H = herbicides applied, NH = no herbicides applied

Table 2. Percentage of plant species by weight and alfalfa stems per square foot for first, second and third cuttings for 1991 at Powell Butte.

Treatment	Alfalfa (%)	Broadleaf Weeds (%)	Grass Weeds (%)	Total Weeds (%)	Alfalfa Stems (ft ²)
----- First Cutting -----					
FH	96.6	0.9	2.7	3.5	100
FNH	41.5	47.4	11.0	58.5	54
Second Cutting -----					
FH	99.9	0.1	0.1	0.1	87
FNH	84.3	6.5	9.2	15.7	67
SH	78.3	21.6	02	21.7	42
SNH	30.2	66.3	3.5	69.8	32
----- Third Cutting -----					
FH	97.0	0.5	2.6	3.0	111
FNH	86.4	4.3	9.3	13.6	94
SH	76.5	23.5	0.2	23.6	67
SNH	413	47.8	11.0	58.8	49

= fall, S = spring, H = herbicides applied, NH = no herbicides applied

Table 3. Quality of fall (F) and spring (S) planted alfalfa for first, second and third cuttings in 1991 at Powell Butte.

Treatment	% Protein	ADF	NDF	RFV
-- First Cutting --				
FH	17.0	33.3	42.3	139
FNH	13.8	35.6	44.7	128
Second Cutting				
FH	20.8	33.9	41.4	141
FNH	20.5	33.0	40.5	145
SH	17.4	29.0	34.5	180
SNH	16.0	35.2	39.5	145
--- Third Cutting ---				
FH	21.6	26.5	36.9	173
FNH	222	263	37.0	173
SH	21.3	23.7	32.3	204
SNH	19.2	263	352	183

1 = fall, S = spring, H = herbicides applied, NH = no herbicides applied