

1996-2000 ALFALFA FORAGE VARIETY TRIAL

Eric P. Eldredge, Clinton C. Shock, and Lamont D. Saunders
Malheur Experiment Station
Oregon State University
Ontario, Oregon

Introduction

Alfalfa forage trials have been conducted at the Malheur Experiment Station for the last five decades. The purpose of this alfalfa variety trial was to compare varieties for yield and forage quality when cut four times per year over the 5-year life of the stand.

Procedures

The variety trial was established in August 1995 with 32 varieties of alfalfa. The experimental design was a randomized complete block with four replications. Details of establishment and results of the trial for the years 1996 through 1998 are found in the Malheur Experiment Station annual reports for those years.

Prior to the 1999 season, the plot area was mowed with a flail mower and the debris was removed on December 1, 1998, to reduce rodent cover and improve spring herbicide contact with the soil. On March 24, 1999, Sencor at 0.5 lb ai/acre plus Gramoxone at 0.5 lb ai/acre were applied for weed control. The varieties Nitro and CUF 101 winter killed and those plots were replanted by hand with seed of Lahontan on May 19, 1999, after the first irrigation.

The trial was irrigated with a solid-set sprinkler system for a total of 32 hours between the first and second cutting, 32 hours between the second and third cutting, 17 hours between the third and fourth cutting, and a 5.5 hour irrigation after the last cutting. Sprinklers applied water at approximately 0.3 acre-in/hour.

May 13, June 22, July 27, and September 3, alfalfa was harvested with a flail mower that cut a 36-in swath from the center of each plot, and the freshly chopped hay from each plot was weighed. Ten random samples of alfalfa representing all the plots were collected before each cutting, weighed fresh, dried in a forced-air dryer at 100°F, then weighed dry, to calculate the moisture content of the hay. Yields are reported as hay at 88 percent dry matter in tons per acre.

At the second cutting, June 22, samples were clipped from each plot for forage quality analysis. Samples were dried in a forced-air dryer at 100°F, ground to pass a 1 mm screen, sub-sampled, and sent to the OSU Forage Quality Laboratory at Klamath Falls, Oregon, for near infrared spectroscopy (NIRS) analysis of crude protein, percent acid

detergent fiber (ADF), and percent neutral detergent fiber (NDF). Relative feed value (RFV) was calculated by the formula: $RFV = \{[88.9 - (ADF * 0.779)] * (120 / NDF)\} / 1.29$. Data from the four cuttings and NIRS analysis were scanned for extreme outliers using box plots of each variable by replication. Extreme outliers were omitted from the statistical analysis, as were the data from the varieties that winter killed and were replanted with Lahontan.

Results and Discussion

The fourth production year of this trial, 1999, started out cool, windy, and drier than normal. The average daytime high temperature in April was 62°F, with 0.23 in rain, and the average daytime high temperature in May was only 71°F, with 0.28 in of rain. Wind run recorded at the station for April was 3,343 miles, compared to the 10-year average of 2,247, and the 50-year average of 2,110 miles.

The 1999 average total hay yield of all the alfalfa varieties for four cuttings was 8.3 ton/acre, based on 12 percent moisture content (Table 1). In the first cutting, 21 varieties yielded over 2 ton/acre, with Orestan, Magnum III and Magnum IV yielding 2.4 ton/acre. Relative Feed Value (RFV) greater than 151, the minimum value for prime quality dairy hay, was produced by 12 varieties at second cutting. There were no significant differences in crude protein among varieties.

The second cutting was the highest yielding this year, with an average of 2.6 ton/acre hay at 12 percent moisture content. Sterling yielded 3.1 ton/acre, and Laser, Orestan, and ZX9351 yielded 2.9 ton/acre. The third cutting averaged 2 ton/acre, with Sterling, ZX9351, and Innovator +Z yielding 2.2 ton/acre. In the fourth cutting, hay yield averaged 1.7 ton/acre, with Orestan, ZX9351, and Stamina yielding 1.9 ton/acre. Seasonal yield averaged 8.3 ton/acre over the 30 varieties, with Sterling totaling 9.3 ton/acre followed by Laser 152 and Orestan at 9 ton/acre. Yield for all varieties averaged over the 4 years was 8.9 ton/acre (Table 2).

The information on varieties' pest and disease resistance was provided by participating seed companies and the "Fall dormancy and pest resistance ratings for alfalfa varieties, 1998/1999 edition" by the Alfalfa Seed Council, Davis, CA (Table 3). Most of the varieties have some degree of resistance to the diseases and pests that can limit hay production in our area. Growers should choose varieties that have strong resistance ratings for disease or pest problems in their fields as well as demonstrated potential for high yield in this area. Aphids, Verticillium wilt, bacterial wilt, and stem nematode can limit productivity and longevity of irrigated alfalfa hay in Malheur County.

Table 1. Alfalfa variety trial 1999 yield of hay at 12 percent moisture and second cutting crude protein, ADF, and relative feed value. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Variety	1st	2nd	3rd	4th	1999	Crude protein	ADF [†]	Relative feed value
	5/13	6/22	7/27	9/3	Total			
	-----ton/acre-----					% of DW ‡	% of DW	
Sterling	2.3	3.1	2.2	1.8	9.3	24.4	29.7	158
Laser	2.3	2.9	2.1	1.7	9.0	21.3	33.1	142
Orestan	2.4	2.9	1.9	1.9	9.0	21.8	31.1	148
ZX9351	1.9	2.9	2.2	1.9	8.8	24.9	28.5	164
Magnum IV	2.4	2.6	2.1	1.7	8.7	21.9	31.0	149
WL 324	2.2	2.6	2.0	1.8	8.6	22.2	31.3	150
WL 252HQ	2.2	2.6	2.0	1.8	8.6	23.0	29.6	158
Vernal	2.3	2.6	2.1	1.7	8.6	23.9	28.9	159
Innovator +Z	2.1	2.6	2.2	1.8	8.6	21.2	33.2	139
Rushmore	2.2	2.5	2.1	1.8	8.5	21.7	30.7	150
Columbia 2000	2.2	2.5	2.0	1.8	8.5	23.4	29.3	158
Ladak	2.2	2.8	1.9	1.6	8.5	20.4	34.3	138
Alfagraze	2.3	2.5	2.1	1.7	8.5	22.3	31.1	150
MP2000	2.0	2.7	2.0	1.8	8.4	21.7	31.8	145
Excalibur II	2.0	2.6	2.1	1.7	8.4	22.1	31.2	152
Stamina	1.9	2.6	2.1	1.9	8.4	22.9	31.1	149
Magnum III	2.4	2.4	2.1	1.6	8.4	22.9	31.0	152
Wrangler	2.2	2.5	2.0	1.6	8.2	23.7	28.8	159
330	2.0	2.3	2.1	1.8	8.2	23.6	29.4	160
ZX9352	1.8	2.7	2.1	1.8	8.2	22.3	32.2	146
Sevelra	2.2	2.5	2.0	1.5	8.2	23.2	29.8	159
Robust	1.7	2.5	2.0	1.8	8.0	22.0	31.5	148
ABI9252	1.8	2.3	1.9	1.8	7.8	22.4	31.7	147
Lahontan	1.9	2.3	1.9	1.6	7.7	20.3	34.3	134
UN 13	1.6	2.3	1.9	1.8	7.6	22.0	30.1	150
Wild Card	1.4	2.0	1.9	1.6	7.0	21.5	30.4	152
Tahoe	1.0	2.3	1.9	1.8	6.9	21.6	29.8	155
Mean	2.0	2.6	2.0	1.7	8.3	22.4	30.8	151
LSD (0.05)	0.5	0.8	0.2	0.2	1.2	NS	3.9	20

[†]ADF: acid detergent fiber

[‡]DW: dry weight

Table 2. Forage yield of alfalfa varieties over 4 years. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1996-1999.

Variety	1996	1997	1998	1999	4-year total	4-year average
	-----ton/acre†-----					
Sterling	9.6	10.1	8.9	9.3	37.9	9.5
Rushmore	8.8	10.3	9.1	8.5	36.7	9.2
MP 2000	8.9	10.4	8.8	8.4	36.5	9.1
Columbia 2000	8.8	9.7	9.3	8.5	36.3	9.1
Laser	8.6	9.6	9.1	9.0	36.3	9.1
WL 252HQ	9.5	9.6	8.6	8.6	36.3	9.1
330	9.3	9.9	8.6	8.2	36.0	9.0
Magnum III	9.0	9.5	9.1	8.4	36.0	9.0
Vernal	8.6	9.8	9.0	8.6	36.0	9.0
Excalibur II	8.9	9.5	9.1	8.4	35.9	9.0
ZX9351	8.4	10.0	8.6	8.8	35.8	8.9
Magnum IV	8.2	9.5	9.2	8.7	35.6	8.9
Orestan	8.3	9.1	9.2	9.0	35.6	8.9
UN 13	9.2	9.6	9.1	7.6	35.5	8.9
Sevelra	9.0	9.7	8.5	8.2	35.4	8.8
Tahoe	9.3	9.9	9.3	6.9	35.4	8.8
WL324	8.7	9.3	8.7	8.6	35.3	8.8
ZX9352	8.7	9.2	9.2	8.2	35.3	8.8
Alfagraze	8.7	9.3	8.7	8.5	35.2	8.8
Innovator +Z	8.9	9.1	8.6	8.6	35.2	8.8
Wrangler	9.3	9.2	8.5	8.2	35.2	8.8
Ladak	8.5	9.2	8.8	8.5	35.0	8.8
Robust	8.7	9.1	9.1	8.0	34.9	8.7
Wild Card	8.6	9.6	9.6	7.0	34.8	8.7
ABI 9252	8.9	9.1	8.8	7.8	34.6	8.7
Stamina	8.2	9.0	9.0	8.4	34.6	8.7
Lahontan	8.4	9.1	8.7	7.7	33.9	8.5
Nitro	8.8	9.2	8.8	out	--	--
CUF-101	9.1	8.9	8.2	out	--	--
Mean	8.8	9.5	8.9	8.3	35.1	8.9
LSD (0.05)	NS‡	NS	NS	1.2	NS	NS

†Yield at 88% dry matter

‡NS: not significant

Table 3. Variety source, year of release, fall dormancy, and resistance ratings to pests and diseases, for varieties in the 1996-2000 forage variety trial. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Variety	Source	Release		Resistance rating [‡]										
		Year	FD [†]	BW	FW	VW	PRR	AN	SAA	PA	SN	AP	RKN	
Ladak	Public	10	1 [§]	-	-	-	-	-	-	-	-	-	-	-
Sevelra	Public	18	1	LR	-	-	-	LR	-	-	-	-	-	-
Orestan	Public	34	3	R	-	-	-	-	-	-	-	-	-	-
Vernal	Public	53	2	R	MR	-	-	-	-	-	-	-	-	MR
Lahontan	Public	54	6	MR	LR	-	LR	-	MR	LR	R	-	-	-
Wrangler	Public	84	2	R	R	LR	HR	LR	HR	HR	-	-	-	-
Magnum III	Dairyland Seed	88	4	R	R	MR	R	MR	MR	R	MR	LR	-	-
Alfagraze	ABI America's Alfalfa	89	2	MR	R	-	-	MR	-	R	R	-	R	-
Magnum IV	Dairyland Seed	92	4	HR	HR	R	HR	R	MR	-	R	MR	MR	-
330	Union Seed	93	4	HR	HR	R	HR	HR	R	R	-	R	-	-
Innovator +Z	ABI America's Alfalfa	93	3	HR	HR	R	HR	HR	-	R	R	-	-	-
Robust	Gooding Seed	93	5	R	HR	R	HR	R	R	R	R	-	MR	-
Rushmore	Northrup King	93	4	HR	HR	R	HR	HR	HR	R	-	HR	-	-
Sterling	Cargill Hybrids	93	2	HR	HR	R	HR	HR	-	R	-	R	-	-
Tahoe	Northrup King	93	6	MR	HR	R	HR	HR	HR	HR	-	-	-	-
Excalibur II	Allied Seed	94	4	HR	HR	R	HR	HR	R	R	-	R	-	-
Laser	J-V Seeds	94	4	HR	HR	R	HR	R	MR	-	MR	MR	MR	-
MP 2000	Cenex/Land O'Lakes	94	3	HR	HR	R	HR	HR	R	HR	-	R	-	-
UN 13	Union Seed	94	7	MR	HR	MR	HR	HR	HR	R	-	-	-	-
WL 252HQ	W-L Research	94	3	HR	HR	R	HR	HR	MR	-	R	-	-	-
WL 324	W-L Research	95	3	HR	HR	HR	HR	HR	R	R	MR	HR	-	-
ABI 9252	ABI America's Alfalfa	96	6	R	R	R	R	R	HR	R	R	-	R	-
Columbia 2000	Allied Seed	96	2	R	R	-	MR	R	-	MR	-	-	-	-
Stamina	Allied Seed	96	4	HR	HR	HR	HR	HR	HR	R	HR	MR	HR	-
ZX9352	ABI America's Alfalfa	96	5	R	HR	HR	R	HR	R	MR	R	-	R	-
Wild Card	University of Idaho	x	8	-	-	-	-	-	-	-	-	-	-	-
ZX9351	ABI America's Alfalfa	x		-	-	-	-	-	-	-	-	-	-	-

[†]FD: fall dormancy, BW: bacterial Wilt, FW: Fusarium wilt, VW: Verticillium wilt, PRR: Phytophthora root rot, AN: Anthracnose, SAA: spotted alfalfa aphid, PA: pea aphid, SN: stem nematode, AP: Aphanomyces, RKN: root knot nematode (Northern)

[§]Fall Dormancy: 1=Norseman, 2=Vernal, 3=Ranger, 4=Saranac, 5=DuPuits, 6=Lahontan, 7=Mesilla, 8=Moapa 69, 9=CUF 101

[‡]Pest Resistance Rating: >50%=HR (high resistance), 31-50%=R (resistant), 15-30%=MR (moderate resistance), 6-14%=LR (low resistance)