

FIRST YEAR RESULTS OF THE 2002 TO 2006 ALFALFA FORAGE VARIETY TRIAL

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Introduction

The purpose of this trial is to compare the productivity of alfalfa varieties in the Treasure Valley area of Malheur County, to test the hay quality of the varieties, and provide information about the adaptation of alfalfa hay production to drip irrigation. In this trial, over a time span of 5 years, 10 proprietary varieties are being compared to 2 public check varieties. This trial was established with a portable sprinkler irrigation system, then grown with a subsurface drip irrigation system.

Methods

The trial was established on Owyhee silt loam where winter wheat was the previous crop and alfalfa had not been grown for more than a decade. A soil test taken August 16, 2001 showed 6 ppm nitrate, 46 ppm phosphorus, 341 ppm potassium, 2,541 ppm calcium, 0.5 ppm aluminum, 337 ppm magnesium, 118 ppm sodium, 1.1 ppm zinc, 12 ppm manganese, 13 ppm iron, 0.3 ppm copper, 4 ppm sulfate, 0.4 ppm boron, organic matter 1.4 percent, and pH 7.4. Fertilizer was broadcast on September 4, 2001 to apply 79 lb/acre K_2O , 300 lb/acre sulfur, 32 lb/acre SO_4 , 60 lb/acre magnesium, 4 lb/acre zinc, 2 lb/acre copper, and 1 lb/acre boron. The trial area was then disked twice, deep ripped, and plowed. On September 13, Pathfinder drip tape (Nelson Irrigation Corp., Walla Walla, WA) (15 mil thick, 0.22 g al/min/100 ft, 12 inch emitter spacing) was shanked in at a depth of 12 inches at 30-inch spacing between the drip tapes. The drip system was flushed and drained for winter on October 29.

The trial area was rototilled in spring and on June 12, 2002 Eptam at 3 lb ai/acre plus Balan at 1.25 lb ai/acre was applied and incorporated with a bed harrow. The alfalfa seed was planted on June 20, at a rate of 20 lb/acre, in plots 20 ft long by 5 ft wide, separated at their ends by 3-ft alleys, with each variety replicated five times in a randomized complete block design. Portable mini-sprinklers (R10 Turbo Rotator, Nelson Irrigation Corp., Walla Walla, WA) were installed to provide uniform irrigation for germination and seedling establishment. Rain plus irrigation applied from June 21 to October 1 totaled 22.5 inches.

The alfalfa was harvested on August 6 and September 5, 2002 at bud stage. At each cutting date, a 3-ft by 20-ft swath was cut from the center of each plot using a flail mower, and the alfalfa was weighed. Ten random samples of alfalfa were collected over the entire field on the same day just before each cutting, dried in a forage drier at 140°F

with forced air, and reweighed to determine the alfalfa moisture content at each cutting. Yield was reported based on alfalfa hay at 88 percent dry matter.

Samples of approximately 20 stems per plot were taken September 5, before the second cutting, to measure forage quality. The forage quality samples were dried, ground to pass a 1-mm screen, sub-sampled, and sent to the OSU Forage Quality Lab at Klamath Falls, Oregon, where they were reground to pass a 0.5-mm screen. Near infrared spectroscopy (NIRS) was used to estimate percent crude protein, percent acid detergent fiber (ADF), and percent neutral detergent fiber (NDF). Relative feed value (RFV) was calculated by the formula:

$$\text{RFV} = \{[88.9 - (\text{ADF} * 0.779)] * (120/\text{NDF})\}/1.29$$

Quality standards based on RFV are: prime, RFV higher than 151; No. 1, RFV 151-125; No. 2, RFV 124-103; No. 3, RFV 102-87; No. 4, RFV 86-75; and No. 5, RFV less than 75 (Undersander et al. 1991). Hay with a higher RFV requires less grain or feed concentrate to formulate the dairy ration.

Fall regrowth was mowed with a flail mower and removed from the field on November 14, 2002, to reduce soil cover and improve herbicide spray penetration and effectiveness. Soil cover during winter can also promote rodent colonization of the alfalfa stand.

Results and Discussion

The average first year total hay yield was 2.27 ton/acre (Table 1). In the first cutting, 'Ruccus' at 1.14 ton/acre, 'Plumas' and 'SX1005A' at 1.04 ton/acre, 'SX1004A' at 0.92 ton/acre, and 'Tango' at 0.90 ton/acre were among the highest yielding varieties. In the second cutting 'Tango' and 'Somerset' at 1.58 ton/acre, 'Plumas' at 1.56 ton/acre, 'Ruccus' at 1.54 ton/acre, and 'Orestan' at 1.4 ton/acre were among the highest yielding varieties.

The crude protein averaged 25.6 percent in the second cutting, and ranged from 26.6 percent for 'Somerset' and 'SX1003A' to 24.4 percent for 'Ruccus'. Acid detergent fiber averaged 26.6 percent; NDF averaged 38.5 percent. All varieties produced prime quality hay in the second cutting, with RFV higher than 151. 'SX1003A' produced hay with a RFV of 181.8, which was significantly higher than for any other variety.

Information on the disease, nematode, and insect resistance of the varieties in this trial was provided by the participating seed companies and/or the North American Alfalfa Improvement Council (Table 2). Most alfalfa varieties have some resistance to diseases and pests that could limit hay production in our area. Growers should choose varieties that have stronger resistance ratings for disease or pest problems known to be present in their fields. The yield potential of a variety should be evaluated based on performance in replicated trials at multiple sites over multiple years.

References

Undersander, D., N. Martin, D. Cosgrove, K. Kelling, M. Schmitt, R. Becker, C. Grau, and J. Doll. 1991. Alfalfa management guide. ASA-CSSA-SSSA, Madison, WI.

Table 1. Alfalfa variety hay yields and second cutting crude protein*, ADF*, NDF*, and RFV for 2002. Malheur Experiment Station, Oregon State University, Ontario, OR.

Variety	Cutting date		2002 total	Crude protein	ADF †	NDF‡	Relative feed value RFV
	8/6	9/5					
	-----ton/acre [§] -----			-----% of DW [¶] -----			
Plumas	1.04	1.56	2.64	25.2	26.6	38.2	165
Ruccus	1.14	1.54	2.60	24.4	28.6	39.8	156
Tango	0.90	1.58	2.46	25.4	28.6	40.2	155
Somerset	0.86	1.58	2.44	26.6	26.0	37.4	171
Masterpiece	0.86	1.50	2.42	25.4	27.8	39.0	160
SX1005A	1.04	1.32	2.36	25.8	26.0	38.4	167
Orestan	0.88	1.40	2.24	26.0	26.8	38.8	163
SX1004A	0.92	1.20	2.12	25.0	26.6	38.6	163
SX1001A	0.86	1.28	2.10	26.0	25.2	37.8	171
SX1003A	0.80	1.20	2.00	26.6	23.6	36.2	182
Lahontan	0.74	1.24	1.98	25.8	27.2	39.4	160
SX1002A	0.72	1.18	1.90	25.0	26.6	38.4	166
Mean	0.90	1.38	2.27	25.6	26.6	38.5	165
LSD (0.05)	0.24	0.19	0.40	1.3	1.8	1.4	9

*Based on percent of dry weight.

†ADF: acid detergent fiber.

‡NDF: neutral detergent fiber.

§Yield at 88 percent dry matter.

¶DW: dry weight.

Table 2. Variety source, year of release, fall dormancy, and level of resistance to pests and diseases for 12 alfalfa varieties in the 2002-2006 forage variety trial. Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

Variety	Source	Release		Pest resistance rating [‡]										
		year	FD [†]	BW	FW	VW	PRR	AN	SAA	PA	SN	AP	RKN	
Orestan	public	1934	3 [§]	R	-	-	-	-	-	-	-	-	-	-
Lahontan	public	1954	6	MR	LR	-	LR	-	MR	LR	R	-	-	
Tango	Eureka Seeds	1997	6	MR	HR	HR	HR	HR	HR	HR	MR	-	R	
Plumas	Eureka Seeds	1997	4	HR	HR	R	HR	HR	R	R	HR	R	MR	
Masterpiece	Simplot Agribusiness	2000	4	HR	HR	R	HR	HR	R	-	HR	R	R	
Somerset	Croplan Genetics	2000	3	HR	HR	HR	HR	HR	R	-	R	HR	-	
Ruccus	Target Seed	2001	5	R	HR	R	HR	MR	R	R	R	-	MR	
SX1001A	Seedex ^{††}	-	-	-	-	-	-	-	-	-	-	-	-	
SX1002A	Seedex	-	-	-	-	-	-	-	-	-	-	-	-	
SX1003A	Seedex	-	-	-	-	-	-	-	-	-	-	-	-	
SX1004A	Seedex	-	-	-	-	-	-	-	-	-	-	-	-	
SX1005A	Seedex	-	-	-	-	-	-	-	-	-	-	-	-	

[†]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).

^{††}Experimental varieties, not released, data not available.