FIRST YEAR YIELD OF THE 1999-2003 ALFALFA FORAGE VARIETY TRIAL

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

Introduction

The purpose of this alfalfa variety trial is to compare the hay yield and forage quality of 14 alfalfa varieties with five cuttings per year, over the 5-year life of the stand.

Procedures

The variety trial was established in September 1998, with 12 proprietary varieties of alfalfa entered in the trial and 2 public varieties used as checks. The trial was planted in a field on a bench soil type, Nyssa silt loam. The previous crop was wheat, and the field had not grown alfalfa for 9 years. The field had never been deep plowed nor had the calcite layer been broken. A preplant soil test in the top 2 feet taken September 16, 1998 showed pH 7.3, nitrate-N 10 ppm, ammonium-N 6 ppm, phosphate-P 9 ppm, potassium-K 666 ppm, and sulfate-S 8 ppm. A fertilizer mix of mono ammonium phosphate, potassium sulfate, zinc sulfate, manganese, and sodium borate was spread on the plot area to provide 32 lb/acre N, 150 lb/acre P_2O_5, 150 lb/acre K, 54 lb/acre S, 6 lb/acre Zn, 2 lb/acre Mn, and 1 lb/acre B. On September 22, the field was disked, moldboard plowed, and cultivated with a groundhog.

For weed control, a tank-mix of Eptam at 2.6 lb ai/acre plus Balan at 0.6 lb ai/acre was sprayed and incorporated with the groundhog with two passes in opposite directions, resulting in a fine, firm seedbed. The field was corrugated to form 5-ft beds using furrow slickers and dragging a heavy chain connected between shanks.

On September 24, 1998, seed of each entry was planted at 20 lb/acre using a belted cone plot seeder with seven double disc furrow openers spaced 7 in apart. The experimental design was a randomized complete block with five replications. Plots were 20 ft long by 5 ft wide, with a 3-ft alley between tiers of plots. The variety Wrangler was used for border plots on all sides of the trial. A 2-hr sprinkler irrigation was applied September 29 to provide moisture for uniform seedling emergence. On October 12, the first trifoliate leaf was emerging on most seedlings, and sprinklers were operated 3.5 hours, followed by a 4-hr irrigation October 16.

The seedlings came through the winter in good condition, except for the public check variety Nitro, which winter killed. All plots were hand weeded April 2 and again April 14. Poast herbicide was applied April 26 using a backpack sprayer to control grasses,

mostly volunteer wheat. Plots where Nitro alfalfa died were replanted by hand with Lahontan on May 19, and sprinkler irrigated for 4 hours. Sprinklers were operated a total of 41.5 hours by June 24, the first cutting date, when most of the varieties were at 50 percent bloom. Sprinklers were operated a total of 40 hours between first and second cutting on July 27 (bud stage). Sprinklers were operated a total of 85.5 hours between second and third cutting on September 8 (early bloom stage). Approximately 55 acre-in/acre of water was applied during the growing season, but the soil did not absorb all the water. Season-long alfalfa evapotranspiration estimated by the U.S. Bureau of Reclamation Agrimet station at the site was 43.9 acre-in.

To improve water infiltration for the 2000 season, sulfur was broadcast at 3 ton/acre on September 14. On September 15, a ripper shank was pulled both directions in each alley, and one direction in the furrow on each plot border, to rip the subsoil at 34-inch depth to aid root development. After ripping, sprinklers were operated 4.5 hours September 16, 5 hours September 17, and 8 hours September 18.

At each cutting date, a 36-in 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 before each cutting to represent all of the plots, dried in a forage drier at 100°F with forced air, and re-weighed to determine hay moisture content at each cutting. At the second cutting, a sample of approximately 20 stems was clipped from each plot, dried, ground to pass a 1-mm screen, sub-sampled, and sent to the OSU Forage Quality Lab at Klamath Falls, Oregon, for near infrared spectroscopy (NIRS) analysis of percent 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.

Fall growth was cut with a flail mower on November 29, 1999, to reduce cover that favors rodents and to improve herbicide penetration and effectiveness the next spring.

Results and Discussion

The varieties DK142, Multi-5301, Plumas, Tango, and ZX9453 produced 4.5 ton/acre hay at 12 percent moisture, totaled over three cuttings (Table 1). The varieties had no significant differences in yield, except Lahontan, which was planted in May and yielded lowest. The first cutting was delayed until mid-bloom, June 24, to enhance establishment of the alfalfa plants. The second cutting, July 27, at bud stage of most of the varieties, resulted in excellent forage quality (Table 1). Emperor had the highest protein, 28.5 percent, and highest relative feed value (RFV), 208. All varieties had RFV over 151, the minimum value for prime quality dairy hay. There were no significant differences in crude protein, ADF, NDF, or RFV among varieties.

The low first year productivity was typical of bench soil that has not been deep plowed. In an effort to improve the alfalfa growth rate, the sprinklers were operated for 36 hours July 30 and 32 hours August 30, to try to fill the soil profile with water. A hard soil layer

from 8 to 24 in deep in the trial area was thought to be causing slow alfalfa growth, so sulfur was applied, and the field was cross-ripped with a single tooth ripper shank to enhance growth in the year 2000. Sprinklers were operated an additional 17.5 hours over a 3-day period following ripping. No alfalfa plants were injured by the ripping procedure and the alfalfa varieties went into fall dormancy following 8 to 10 in of regrowth.

Growers should choose varieties with resistance to the pests or diseases that may be present in their fields (Table 2). Aphids, Verticillium wilt, bacterial wilt, and stem nematode can limit productivity or longevity of irrigated alfalfa hay in Malheur County. Pest and disease resistance information is based on information provided by the companies and the "Fall dormancy and pest resistance ratings for alfalfa varieties, 1998/1999 edition" by the Alfalfa Seed Council, Davis, CA.

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

Variety	Cutting date 6/24	7/27	9/8	1999 Total	Crude protein	ADF[1]	NDF[2]	Relative feed value
	----------ton/acre----------				----------% of DW[3]----------			
DK 142	1.54	1.72	1.28	4.54	27.87	22.74	33.18	200
Tango	1.38	1.93	1.22	4.53	24.87	28.16	37.48	169
Multi-5301	1.48	1.70	1.34	4.51	27.15	24.45	34.66	189
ZX9453	1.55	1.75	1.20	4.51	27.24	25.04	34.35	190
Plumas	1.44	1.69	1.33	4.46	26.17	26.24	35.18	183
Rambo	1.45	1.64	1.29	4.39	28.22	23.55	33.08	200
Surpass	1.42	1.64	1.27	4.34	26.74	25.11	34.64	187
Archer II	1.42	1.67	1.22	4.31	26.73	24.49	34.21	191
G9722	1.34	1.66	1.24	4.24	25.72	25.80	35.52	182
Emperor	1.42	1.59	1.23	4.24	28.50	22.67	32.19	208
Wrangler	1.34	1.66	1.21	4.20	26.12	25.31	34.80	186
Gold Plus	1.19	1.70	1.27	4.15	26.67	24.70	33.61	195
WL 325 HQ	1.25	1.50	1.26	4.00	26.72	25.20	35.14	184
Lahontan	0.30	1.09	0.85	2.25	26.04	24.95	35.19	184
Mean	1.32	1.64	1.23	4.19	26.77	24.89	34.52	189
LSD (0.05)	0.38	0.22	0.11	0.57	NS	NS	NS	NS

[1]ADF: acid detergent fiber

[2]NDF: neutral detergent fiber

[3]DW: dry weight

Table 2. Variety source, year of release, fall dormancy, and resistance ratings to pests and diseases† for 14 varieties in the forage variety trial. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Variety	Source	Release Year	FD†	Resistance rating‡									
				BW	FW	VW	PRR	AN	SAA	PA	SN	APH	RKN
Wrangler	public	84	2§	R	R	LR	HR	LR	HR	HR	-	-	-
Lahontan	public	54	6	MR	LR	-	LR	-	MR	LR	R	-	-
Surpass	Andrews Seed	85	3	HR	HR	R	R	MR	-	R	-	-	-
G9722	Geertson Seed	X	6	R	R	-	R	-	R	HR	-	-	-
Multi-5301	Geertson Seed	98	4	R	HR	R	MR	HR	-	R	-	R	-
WL 325 HQ	W-L Research	97	3	HR	HR	R	HR	HR	R	R	R	R	-
Gold Plus	MBS Inc.	98	4	HR	HR	R	HR	HR	HR	HR	HR	R	-
Tango	Forage Genetics	97	6	MR	HR	HR	HR	HR	HR	HR	MR	-	R
Plumas	Forage Genetics	98	4	R	HR	R	HR	HR	HR	R	HR	R	MR
Emperor	ABI Alfalfa	98	4	HR	HR	HR	HR	HR	MR	R	-	HR	-
Archer II	ABI Alfalfa	98	5	R	HR	HR	R	HR	R	MR	R	LR	R
Rambo	ABI Alfalfa	95	3	HR	HR	R	HR	HR	MR	R	R	R	-
ZX9453	ABI Alfalfa	X	5	-	HR	R	R	MR	R	R	HR	-	MR
DK 142	DeKalb	96	4	HR	HR	R	HR	R	R	HR	R	HR	-

†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)