



## 1999 Alfalfa Variety Performance at the DREC s Manning Ranch

<sup>(1)</sup>R.O. Ashley, G. Ottmar, and J. Dohrmann

### Summary

Selecting alfalfa (*Medicago sativa*) varieties for southwest North Dakota conditions is difficult at best since moisture and the short growing season are often most limiting on yields. Dry matter yields from 23 different alfalfa varieties grown at the Dickinson Research Extension Center-Manning Ranch were compared under dryland conditions. No significant differences in dry matter yields were detected at the 5% level of significance. Total yield over the five seasons that alfalfa was harvested from the 1995 seeding was 11.45 tons per acre for Blazer XL and decreased to 9.09 tons per acre for Ladak 65. Producers selecting alfalfa varieties for production need to consider selecting alfalfa varieties based on total yield over the life of the stand, dormancy rating, ability to recover after first cutting or when favorable moisture conditions return to produce additional cuttings, and disease resistance. The level of management provided will also have a great affect on yield and quality.

### Introduction

In 1998, North Dakota producers in counties south and west of the Missouri River produced alfalfa hay on 652,000 acres with an average yield of 1.52 tons per acre (North Dakota Agricultural Statistics, 1999). Producers know that establishment costs provide the greatest share of expense in growing hay. In southwest North Dakota, the projected direct and indirect cost for establishment using an oat hay cover crop was \$98.70 per acre (Swenson and Haugen, 1998). Many producers grow Ladak 65 or Vernal because they want winter hardiness and seed costs are about \$20.00 per acre less than proprietary varieties. Little information is available on performance of these new varieties under a limited water low disease environment such as that such as that found in southwestern North Dakota.

### Materials and Methods

Representatives from Cenex, Northup King, Agri-Pro, Interestate, Pioneer, and Cargill provided varieties that they thought to be adapted to western North Dakota in 1995 (Table 1) (Certified Alfalfa Seed Council, 1996). In addition to commercial varieties seeded in 1995, three public varieties were included. In 1996, DeKalb, Keltgen Seed, and Northup King provided seed of additional varieties (Table 1). Varieties were seeded in a randomized complete block design to evaluate potential difference in dry matter yield. Vernal, a public variety which is commonly grown, was used as a check variety in both plantings.

Plots were seeded into standing oat stubble that had been hayed the preceding year. Glyphosate (Roundup) was applied as a burn down herbicide to control early season weed growth prior to direct seeding with a John Deere 750 no-till drill. Forty pounds of 18-46-0 was placed with the seed.

One cutting of the 1995 seeding was made each year in 1995, 1996, and 1999. The 1996 seeding was bulk harvested in 1996 and only an average yield for the entire planting is reported. In 1997 two cuttings were made and in 1998 three cuttings were made of both the 1995 and 1996 establishments. A flail forage plot harvester was used to cut samples from a measured area in each plot. Samples were then oven dried to determine the percent dry matter, dry matter weight, and yield.

## Results and Discussion

The 1995 entries produced a total mean yield of 1.34 tons per acre for 1999 (Table 2). Over the five-year production span of this trial the average yield per acre was 2.08 tons per acre per year. The 1996 entries produced a total mean yield of 1.27 tons per acre for 1999 (Table 3). Over the four year production span of this trial average yield was 1.18 tons per acre per year. No significant differences between varieties were detected at the 5% level for all cuttings made.

The year to year variation in yields can primarily be attributed to water available to the crop. In 1995 the field received 17.69 inches of precipitation. The following years growing season precipitation, that is precipitation from April 1 to the last cutting date of the year, was 7.71, 13.54, 14.60 and 5.80 for 1996, 1997, 1998, and 1999 respectively. Stored soil water was estimate to average three inches at the beginning of the 1998 growing season while at the beginning of the 1999 growing season stored soil water was estimated to average 4.0 inches.

Producers strive for low cost, high yield, and high quality alfalfa. Annual yields are important but it is the yield over the total years of the life of the stand that determines the actual profitability of the crop. Total yield of the 1995 seeding for the five years that this stand has produced ranges from 11.45 tons per acre for Blazer XL to 9.09 tons per acre for Ladak 65. If hay produced is worth \$65 per ton then the additional \$154 per acre could pay for the additional expense of improved proprietary seed with high yield potential under dryland conditions of southwest North Dakota and superior pests resistance.

The cost of stand establishment amounts to 27% of the total expense for an alfalfa field with a life expectancy of five years. Fields with less than four to six plants per square foot may result in low yielding poor quality hay. Weeds can easily invade thin stands creating problems for


the current crop and future crops.

A more detailed discussion on alfalfa performance at this particular site may be found in the Dickinson Research Extension Center 1998 Annual Report (Ashley, Dohrmann, and Ottmar, 1998).

## Summary

Alfalfa varieties should be selected with sufficient dormancy to assure winter survival and prevent premature spring growth. However varieties should not be so dormant that valuable growing days are lost in spring and fall. Total yield over a period of time should be considered. Rapid recovery and regrowth when favorable conditions exist is important in areas such as southwest North Dakota where water is limiting. Other factors such as disease and cultural mismanagement should also be considered when selecting alfalfa varieties.

## Literature Cited

**Ashley, R. O., J. Dohrmann, and G. Ottmar. 1998.** A review of alfalfa variety performance at the DREC s Manning Ranch. p 156-158 in NDSU Dickinson Research Extension Center 1998 Annual Report, Dickinson, ND.

**Certified Alfalfa Seed Council. 1996.** Fall dormancy and pest resistance ratings for alfalfa varieties 1996/97 edition. Certified Alfalfa Seed Council, Davis CA.

**North Dakota Agricultural Statistics Service. 1999.** North Dakota agricultural statistics 1999. Ag Statistics No. 68. NDSU, Fargo, ND.

**Swenson, A. and R. Haugen. 1998.** Oat hay crop and alfalfa seeding. p 24. *In* Projected 1999 crop budgets, south west North Dakota. Section VI, Region 4. NDSU Extension Service, Fargo, ND.

Table 1. Fall dormancy and pest resistance ratings for selected alfalfa varieties grown at the Dickinson Research Extension Center - Manning Ranch, North Dakota.

Variety	Company	FD	Bw	Vw	Fw	An	PRR	SAA	PA	BAA	SN	APH	SRKN	NRKN
120	DeKalb	3	HR		R	LR	R		R					
5262	Pioneer Hi-Bred	2	HR	LR	MR		R	R	R		MR			
5364	Pioneer Hi-Bred	4	R	MR	R	MR	MR	HR	HR		R			

5454	Pioneer Hi-Bred	4	R	MR	HR	HR	HR	R	R		MR	LR		
Allegiance	Keltgen Seed/Lynks Seed	3	R	R	R	HR	R	R	R		R			
Avalanche +z	America's Alfalfa	2	HR	HR	HR	HR	HR		R		MR	R		
Blazer XL	Cenex/Land O'Lakes	3	R	R	HR	HR	HR	HR	R		R	R		
Cenex 740	Cenex/Land O' Lakes	3	R	R	R	R								
Cenex MG 200	Cenex/Land O' Lakes	2	1	LR	2	3								
Crown II	Cargill	3	HR	R	HR	HR								
Cut/Graze	Agri-Pro	3	R	LR	HR	MR	R		R		MR	R		
Defiant	AgriPro	2	HR	HR	HR	R	HR		R		MR	R		
DK 127	DeKalb	3	HR	R	R	HR	HR	HR	HR		R	HR		R
Ladak	Public	1												
LegenDairy	Cenex/Land O'Lakes	2.5	HR	HR	HR	HR	HR							
NK 919 Rangeland	Northrup King	BLEND												
NK 919-10	Northrup King	BLEND												
Proof	Keltgen Seed	3	HR	R	HR	HR	HR	R	R			R		
Rainier	Northrup King	3	HR	R	HR	HR	HR	HR	HR		R	HR		R
Ranger	Public	3												
Spreador III	Northrup King	1	HR	MR	HR	R	MR	S	MR		MR	S		
Sterling	Cargill	2	HR	R	HR	HR	HR	R	R			R		
Vernal	Public	2	R		MR									MR

## KEY

FD = Fall Dormancy	<b>An = Anthracnose Race 1</b>	<b>BAA = Blue Alfalfa Aphid</b>
<b>Bw = Bacterial Wilt</b>	<b>PRR = Phytophthora Root Rot</b>	<b>SN = Stem Nematode</b>
<b>Vw = Verticillium Wilt</b>	<b>SAA = Spotted Alfalfa Aphid</b>	<b>APH = Aphanomyces Root Rot Rate 1</b>
<b>Fw = Fusarium Wilt</b>	<b>PA = Pea Aphid</b>	<b>SKRN = Southern Root Knot Nematode</b>
		<b>NRKN = Northern Root Knot Nematode</b>

### Pest resistance ratings

<b>% Resistance plants</b>	<b>Resistance class</b>
0-5%	Susceptible (S)
6-14%	Low Resistance (LR)
15 -30%	Moderate Resistance (MR)
31-50%	Resistance (R)
< 50%	High Resistance (HR)

### Fall dormancy ratings

<b>Check variety</b>	<b>Dormancy rating</b>
Norseman	1
Vernal	2
Ranger	3
Saranac	4
Dupuits	5

Table 2. 1995-1999 dry matter yields of the 1995 establishment of alfalfa varieties at the Dickinson Research Extension Center - Manning Ranch, Manning, North Dakota

	<b>1999</b>	<b>1998</b>	<b>1997</b>	<b>1996</b>	<b>1995</b>	<b>1996-1999</b>	<b>5-yr</b>
<b>Entry</b>	<b>6/9</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>
	-----Tons Dry Matter/Acre -----						
Blazer XL	1.32	2.80	2.12	1.85	3.35	8.10	11.45
Spreador III	1.44	2.15	1.95	2.09	3.81	7.63	11.44

Vernal	1.39	2.96	1.83	1.84	3.35	8.02	11.37
Ranger	1.52	2.95	2.19	1.68	3.08	8.34	11.42
5364	1.34	2.36	2	1.83	3.4	7.53	10.93
740	1.21	2.31	1.88	1.78	3.6	7.19	10.79
Sterling	1.35	2.35	2.26	1.94	3.02	7.91	10.93
5262	1.42	2.48	1.94	1.8	3.08	7.63	10.71
MG 2000	1.05	2.58	1.85	1.71	3.04	7.19	10.23
NK919 Rangeland	1.57	2.67	2.07	1.64	2.49	7.96	10.45
Defiant	1.54	2.22	2.07	1.75	2.71	7.6	10.31
Crown II	1.27	2.21	1.63	1.69	3.07	6.81	9.88
NK919-10	1.19	2.65	1.82	1.63	2.49	7.29	9.78
Cut/Graze	1.37	2.15	1.68	1.76	2.68	6.97	9.65
Avalanche +Z	1.16	1.99	1.77	1.71	2.76	6.64	9.40
LegenDairy	1.28	2.19	1.63	1.56	2.71	6.68	9.39
Ladak	1.33	2.18	1.58	1.59	2.41	6.68	9.09
Mean	1.34	2.42	1.90	1.76	3.00	7.42	10.42
LSD.05	NS	NS	NS	NS	--	NS	--
CV%	16.4	24.1	15.3	13	--	11.7	--
MCV%	--	--	--	--	--	--	--
LSR%	--	--	--	--	--	--	--

Seed date:	May 17, 1995
Seeding rate:	8.5 lbs./acre
Seeding method:	Seeded into standing oat stubble with no-till drill
Pre-plant herbicide:	Glyphosate
Plot size:	10' x 60'
Portion harvested:	2' x 50'
Seed treatments:	Inoculated with nitrogen-fixing Rhizobium

Pest Problems:	None
Experimental design:	Randomized complete block design, 3 replications
Dryland	

Table 3. 1996-1999 dry matter yields of the 1996 establishment of alfalfa varieties at the Dickinson Research Extension Center Manning Ranch, Manning, North Dakota.

	1999	1998	1997	1996	1997-1999
Entry	6/9	Total	Total	Total <sup>1</sup>	Total
	-----Tons Dry Matter/Acre -----				
120	1.41	1.99	2.43		5.29
Vernal	1.21	1.99	2.25		4.96
Proof	1.29	1.9	2.12		4.82
Rainier	1.54	1.89	2.12		5.11
5454	1.35	1.86	2.08		4.87
Allegiance	0.97	1.89	1.93		4.30
DK 127	1.07	1.65	1.81		4.02
Mean	1.27	1.88	2.11		4.70
LSD.05	NS	NS	NS		NS
CV%	16.57	16.2	10.7		11.25
MCV%	--	--	--		--
LSR%	--	--	--		--

<sup>1</sup>Bulk harvested. Yield estimate is 1 ton/acre

Seed date:	May 17, 1995
Seeding rate:	8.5 lbs./acre

Seeding method:	Seeded into standing oat stubble with no-till drill
Pre-plant herbicide:	Glyphosate
Plot size:	10' x 60'
Portion harvested:	2' x 50'
Seed treatments:	Inoculated with nitrogen-fixing Rhizobium
Pest Problems:	None
Experimental design:	Randomized complete block design, 3 replications
Dryland	

