

ALFALFA VARIETY TRIAL, 1980 - 1984

Dickinson Experiment Station
L. Manske and H. Goetz

An alfalfa variety trial was seeded at the Dickinson Experiment Station in May 1979. The 10 x 25 foot plots were arranged in a randomized block design with four replications. The trial was designed to evaluate the performance of the varieties in western North Dakota on the basis of dry weight herbage production and compared to a standard variety (Vernal). Four pasture type, sixteen dryland hay type and one hay and pasture type varieties were included in the trial. One cutting in late June or early July has been made annually since 1980.

The annual above ground dry weight herbage production for each variety and the percentage of production compared to a standard variety (Vernal) are shown in Table 1. The five highest producing varieties for 1980 were Norseman, Ranger, Kane, Iroquois, and Rangelander with 445, 403, 402, 401 and 400 pounds of herbage production per acre respectively. The five highest producing varieties for 1981 were Anik, D-111, Baker, Kane, and Rangelander with 1978, 1747, 1662, 1655, and 1642 pounds of herbage per acre. The five highest producing varieties for 1982 were Kane, Spredor II, Norseman, Travois, and Rangelander with 6139, 5260, 5210, 5077 and 4981 pounds of herbage production per acre respectively. The five highest producing varieties for 1983 were 520, Kane, 524, Baker and D-111 with 6342, 6135, 5896, 5865 and 5442 pounds per acre of herbage production respectively. The five highest producing varieties for 1984 were Norseman, Ladak-65, Rangelander, Polar I and Thor with 4899, 4884, 4755, 4607 and 4554 pounds per acre of herbage production respectively.

The production data from this trial has shown that there was very little difference between most of the alfalfa varieties that were included. The five year (1980-1984) mean annual production for all the varieties was 3150 pounds per acre. The five varieties with the greatest five year mean annual production were Kane (3752 lbs/acre), Ladak 65 (3369 lbs/acre), Rangelander (3358 lbs/acre), Norseman (3322 lbs/acre) and 520 (3273 lbs/acre). The two varieties with the lowest five year mean annual production were Agate (2636 lbs/acre) and Trek (2933 lbs/acre). The standard variety (Vernal) ranked thirteenth out of twenty one varieties with a five year mean annual production of 3112 lbs/acre.

The five year mean production for the pasture type varieties was 3341 lbs/acre. This was 7.4 percent greater than mean production for the hay type varieties which was 3115 lbs/acre (Table 2). The pasture type varieties have had a slightly greater production than the hay type varieties each year of the trial (Table 2).

The alfalfa varieties were separated into three winterhardy categories based on their reported adaptability to survive the winter period. These categories were: very winterhardy, winterhardy, and moderately winterhardy. All of the pasture type alfalfas were very winterhardy. Three of the dryland hay type varieties were very winterhardy, one variety was moderately winterhardy and twelve hay type varieties were winterhardy. One variety was a hay and pasture type. This hay and pasture type variety was very winterhardy. The five year mean production for the very winterhardy, the winterhardy and the moderately winterhardy categories were 3238, 3101 and 3042 pounds per acre respectively (Table 3). The very winterhardy category had the greatest herbage production in 1980, 1982 and the five year mean. The winterhardy category had the greatest herbage production in 1983. The moderately winterhardy

category had the greatest production in 1981 and 1984 but it has had the lowest production in 1980, 1982, 1983 and the five year mean (Table 3). Most of the varieties in the trial performed satisfactorily under the environmental conditions of western North Dakota during this trial. Twelve of the twenty one varieties had greater five year mean annual herbage production than the standard variety (Vernal). All of the varieties had five year mean production of over 3300 lbs/acre. Two of these varieties were pasture types and the other two were hay types. Three of the four were very winterhardy and one was winterhardy.

Most of the varieties have had very good herbage production during the 1982, 1983 and 1984 growing seasons. Fifteen varieties have three year mean annual herbage production of over 4500 lbs/acre, six varieties have over 4800 lbs/acre, and two varieties have over 5000 lbs/acre. The six varieties with the greatest three year (1982-1984) mean annual herbage production were Kane, Ladak 65, Rangelander, 520, Norseman, and Polar I with 5567, 5034, 4910, 4901, 4870 and 4860 pounds per acre respectively.

Plant density and mean dry weight per plant data were collected in 1983 and 1984 for each variety (Table 4). The five varieties with the greatest number of plants per square foot were Anik, Rangelander, Kane, Spredor II and Ramsey with 3.92, 3.87, 3.64, 3.53 and 3.45 plants per foot squared respectively. The five varieties with the lowest plant densities were Trek, Polar I, D-111, Thor and 520 with 2.59, 2.61, 2.71, 2.88 and 2.93 plants per foot squared respectively. The five varieties with the greatest mean weight per plant were Polar I, 520, Thor, D-111 and Trek with 0.72, 0.67, 0.66, 0.63 and 0.62 ounces per plant respectively. The four varieties with the lowest mean plant weight were Anik, Rangelander, Agate and Ramsey with 0.45, 0.46, 0.47 and 0.49 ounces per plant respectively. Generally the varieties with the higher plant densities had the lower mean plant dry weights and the varieties with the lower plant densities had the greatest mean plant weights.

Plant densities for the pasture type and dryland hay type varieties (Table 5) were 3.60 and 3.06 plants per foot squared respectively. The mean weight per plant for the pasture and hay type varieties were 0.50 and 0.58 ounces respectively. The pasture type alfalfa varieties had a slightly greater plant density per foot squared, a slightly lower mean weight per plant and a slightly greater herbage production per acre than the hay type alfalfa varieties. The plant densities for the very winterhardy, the winterhardy, and the moderately winterhardy categories were 3.52, 3.02 and 2.88 respectively (Table 6). The mean weight per plant for the very winterhardy, the winterhardy, and the moderately winterhardy categories were 0.51, 0.58 and 0.66 ounces respectively (Table 6). The very winterhardy varieties had the greatest plant density per foot squared, the lowest mean weight per plant and the greatest mean herbage production per acre. The moderately winterhardy varieties had the lowest plant density, the greatest mean plant weight and the lowest mean herbage production per acre. The winterhardy varieties were intermediate between the very winterhardy varieties and the moderately winterhardy varieties in plant density, mean plant weight and herbage production per acre. Most of the varieties in the trial performed very similarly. There was very little actual significant difference between the performance of any of the varieties. Only one variety (Kane) has had an annual mean herbage production of significant difference from the standard variety (Vernal). Vernal has performed satisfactorily in western North Dakota and any variety selected to be seeded should have tested performance as good or better than Vernal. These plots were established in 1979 and have been stressed by drought conditions. Western North Dakota is subjected to drought and harsh winter conditions on an irregular basis. These conditions should be considered when selecting alfalfa varieties.

Table 1. Alfalfa Variety Trial at the Dickinson Experiment Station, 1980 – 1984¹

Variety	1980 Clip-27 Jun		1981 Clip-23 Jun		1982 Clip-2 Jul		1983 Clip-1 Jul		1984 Clip-3 Jul		1980 - 1984 Mean	
	Total Lbs./ Acre ¹	% Vernal	Total Lbs./ Acre ¹	% Vernal	Total Lbs./ Acre ¹	% Vernal	Total Lbs./ Acre ¹	% Vernal	Total Lbs./ Acre ¹	% Vernal	Total Lbs./ Acre	% Vernal
Agate	329 abcd	88	1401 cdef	89	3832 e	86	3912 c	81	3705 ab	85	2636	85
Anik	171 f	46	1978 bcde	126	4563 bcde	103	4459 bc	92	3892 ab	89	3013	97
Baker	233 def	63	1662 bc	106	4011 de	91	5865 ab	121	3966 ab	91	3147	101
D-111	295 bcdef	79	1747 ab	111	3944 de	89	5442 abc	113	4316 ab	99	3149	101
Iroquois	401 ab	108	1422 bcdef	90	4794 bcde	108	3744 c	77	4489 ab	103	2970	95
Kane	402 ab	108	1655 bcd	105	6139 a	139	6135 ab	126	4428 ab	102	3752	121
Ladak	320 abcd	86	1351 cdef	86	4796 bcde	108	4414 bc	91	4546 ab	104	3085	99
Ladak-65	337 abcd	91	1407 bcdef	90	4785 bcde	108	5433 abc	112	4884 a	112	3369	108
Norseman	445 a	120	1556 bcde	99	5210 b	118	4495 bc	93	4899 a	113	3321	107
Nugget	374 abc	101	1391 bcdef	88	4558 bcde	103	4338 bc	90	4549 ab	105	3042	98
Polar I	244 cdef	66	1519 bcdef	97	4695 bcde	106	5277 abc	109	4607 ab	106	3268	105
Ramsey	307 bcd	83	1195 f	76	4804 bcde	108	5187 abc	107	4094 ab	94	3117	100
Rangelander	400 ab	108	1642 bcd	104	4981 bcd	112	5010 abc	104	4755 ab	109	3358	108
Ranger	403 ab	108	1239 ef	79	4455 bcde	101	5243 abc	108	4540 ab	104	3176	102
Spredor II	369 abc	99	1289 cdef	82	5260 b	119	4575 abc	95	4289 ab	99	3156	101
Thor	284 bcdef	76	1554 bcde	99	4158 cde	94	4662 abc	96	4554 ab	105	3042	98
Travois	372 abc	100	1277 def	81	5077 bc	115	4659 abc	96	4097 ab	94	3096	100
Trek	335 abcd	90	1362 cdef	87	4282 bcde	97	5124 abc	106	3561 b	82	2933	94
Vernal	372 abc	100	1572 bcdef	100	4425 bcde	100	4838 abc	100	4353 ab	100	3112	100
520	180 ef	48	1485 bcdef	94	4274 bcde	96	6342 a	131	4086 ab	94	3273	105
524	339 abcd	91	1518 bcdef	97	4121 cde	93	5896 ab	122	3820 ab	88	3139	101

¹Means within columns followed by the same letter are not significantly different by Duncan's multiple range test at P<0.05.

Table 2. Mean Herbage Production (lbs. / acre) for the Pasture and Dryland Hay Type Alfalfa Varieties at the Dickinson Experiment Station, 1980-1984

Type Alfalfa	1980	1981	1982	1983	1984	Mean
Pasture	386	1466	5364	5095	4392	3341
Hay	345	1461	4447	5013	4311	3115
Hay and Pasture	171	1978	4563	4459	3892	3013

Table 3. Mean Herbage Production (lbs. / acre) for the Alfalfa Variety in Three Winterhardy Categories at the Dickinson Experiment Station, 1980-1984

Winterhardy Category	1980	1981	1982	1983	1984	Mean
Very Winterhardy	348	1493	5104	4867	4376	3238
Winterhardy	320	1477	4348	5121	4240	3101
Moderately Winterhardy	284	1554	4158	4662	4554	3042

Table 4. The Density of Plants and the Mean Dry Weight per Plant at the Dickinson Experiment Station, 1983-1984

Varieties	1983		1984		Mean	
	# of Plt. / Ft. sq.	Wt. / Plt. In oz.	# of Plt. / Ft. sq.	Wt. / Plt. In oz.	# of Plt. / Ft. sq.	Wt. / Plt. In oz.
Agate	3.81	0.43	2.65	0.51	3.23	0.47
Anik	4.90	0.41	2.93	0.48	3.92	0.45
Baker	3.63	0.59	2.65	0.55	3.14	0.57
D-111	3.04	0.59	2.37	0.66	2.71	0.63
Iroquois	3.28	0.57	2.79	0.59	3.04	0.58
Kane	4.21	0.48	3.07	0.53	3.64	0.51
Ladak	3.26	0.57	2.70	0.62	2.98	0.60
Ladak 65	3.88	0.50	2.93	0.61	3.41	0.56
Norseman	4.12	0.40	2.65	0.67	3.39	0.54
Nugget	3.07	0.55	3.02	0.55	3.05	0.55
Polar I	3.07	0.65	2.14	0.79	2.61	0.72
Ramsey	3.91	0.48	2.98	0.50	3.45	0.49
Rangelander	4.21	0.42	3.53	0.49	3.87	0.46
Ranger	3.35	0.53	3.07	0.54	3.21	0.54
Spredor II	4.03	0.47	3.02	0.52	3.53	0.50
Thor	3.75	0.48	2.00	0.83	2.88	0.66
Travois	4.16	0.46	2.56	0.58	3.36	0.52
Trek	2.95	0.65	2.23	0.58	2.59	0.62
Vernal	3.35	0.55	2.98	0.53	3.17	0.54
520	3.10	0.80	2.75	0.54	2.93	0.67
524	3.63	0.55	2.65	0.53	3.14	0.54

Table 5. Mean Density of Plants and the Mean Dry Weight per Plant for the Pasture and Dryland Hay Type Alfalfa Varieties at the Dickinson Experiment Station, 1983-1984

Type Alfalfa	1983		1984		Mean	
	Mean # of Plt. / Ft. sq.	Mean Wt. / Plt. In oz.	Mean # of Plt. / Ft. sq.	Mean Wt. / Plt. In oz.	Mean # of Plt. / Ft. sq.	Mean Wt. / Plt. In oz.
Pasture	4.15	0.46	3.05	0.53	3.60	0.50
Hay	3.45	0.56	2.66	0.60	3.06	0.58
Hay and Pasture	4.90	0.41	2.93	0.48	3.92	0.45

Table 6. Mean Density of Plants and the Mean Dry Weight per Plant for the Alfalfa Varieties in Three Winterhardy Categories at the Dickinson Experiment Station, 1983 – 1984

Winterhardy Category	1983		1984		Mean	
	Mean # of Plt. / Ft. sq.	Mean Wt. / Plt. In oz.	Mean # of Plt. / Ft. sq.	Mean Wt. / Plt. In oz.	Mean # of Plt. / Ft. sq.	Mean Wt. / Plt. In oz.
Very Winterhardy	4.10	0.46	2.93	0.55	3.52	0.51
Winterhardy	3.35	0.58	2.69	0.58	3.02	0.58
Moderately Winterhardy	3.75	0.48	2.00	0.83	2.88	0.66