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Cultivar Test in South Dakota, 1989 Report: Alfalfa Yields

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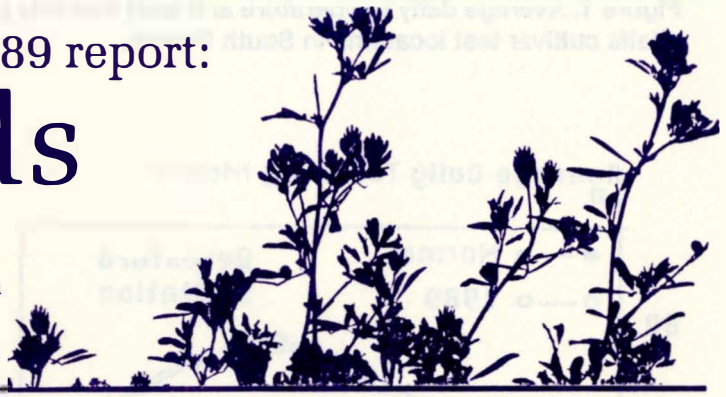

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Fifteen to 20 new alfalfa cultivars are released annually through public and commercial breeding programs. To select a cultivar for your operation, you will need information on forage yield, winterhardiness, and disease resistance.

The alfalfa cultivar yield test of the Plant Science Department at SDSU determines relative forage production characteristics for available cultivars and experimental lines at several locations in South Dakota.

Materials and Methods

Experimental plots of alfalfa cultivars were established in 1987 and 1989 at the Southeast Research Station (Beresford) and the Central Crops and Soils Research Station (Highmore) and in 1987 and 1988 at the Northeast Research Station (Watertown) and the SDSU Research Station (Brookings).

Alfalfa was planted between mid-April and late May into a firmly packed seedbed, using a five-row planter with 6-inch row spacings. Seeding rate was 12 lb pure live seed (PLS) per acre. A pre-plant herbicide (Eptam at 3 lb ai/A) was used to help alfalfa establishment. The experimental design was a randomized complete block with four replicates. An experimental unit consisted of a 75 ft^2 (3x25 ft) plot. Plots were fertilized immediately after planting with 50 lb P_2O_5/A or in accordance with SDSU soil test results for growth periods after the seeding year. Insect pests did not reach problem levels, so chemical pest control was not used.

Harvesting was performed with one of two flail-type forage plot harvesters with a harvest area of either 44 or 66 ft^2. Fresh herbage weights were obtained for each plot immediately following herbage removal.

Moisture samples from half of the entries in each replicate were randomly taken, dried at 100 F for 72 hours in a forced-air oven, and weighed to determine dry-matter (DM) concentration. Mean DM concentrations for each replicate were multiplied by fresh herbage weights for each experimental unit and then divided by harvest area to obtain forage DM production per unit area of harvest and then converted into tons of DM/A.

Data were analyzed by analysis of variance, and DM yield differences among cultivars were tested by the least-significant-difference procedure (LSD) at the 0.05 level of probability. Relative performance among cultivars was calculated by dividing average total seasonal yield over years by the mean forage yield of a given location.

Alfalfa cultivars were evaluated for stage of maturity at time of harvest at the Brookings location. Ten shoots from each plot were randomly selected and rated for maturity according to the Kalu and Fick (1983, Crop Science 23:1167-1172) mean-stage-by-count scheme (Table 1).

Experiments were harvested up to three times each year; however, growth conditions at some locations often limited harvest frequencies. Because of limited plant growth, seeding year harvests were not obtained in 1989 at Highmore.

Southeast Research Station, Beresford

Average daily temperatures were normal throughout the entire growing season (Fig 1). Precipitation, however, was below normal in all months except July. In May less than 1 inch of precipitation was received, which was over 2 inches below normal.

Three harvests were obtained from the 1987 planting. Average total DM yield was 2.29 T/A, and no significant differences were detected among the 35 entries (Table 2). The average total yield for 1989 was approximately a third less than the 1988 average yield, presumably because of continued drought.

The second and third harvests were particularly low, with average yields of 0.49 and 0.67 T/A, respectively. No significant differences among cultivars were found for the 2-year average yield.

One harvest was obtained from the 1989 planting with an average total DM yield of 1.13 T/A and no significant differences among cultivars (Table 3). Drought conditions influenced growth and development of the

Figure 1. Average daily temperature and total monthly precipitation during the 1989 growing season for four alfalfa cultivar test locations in South Dakota.

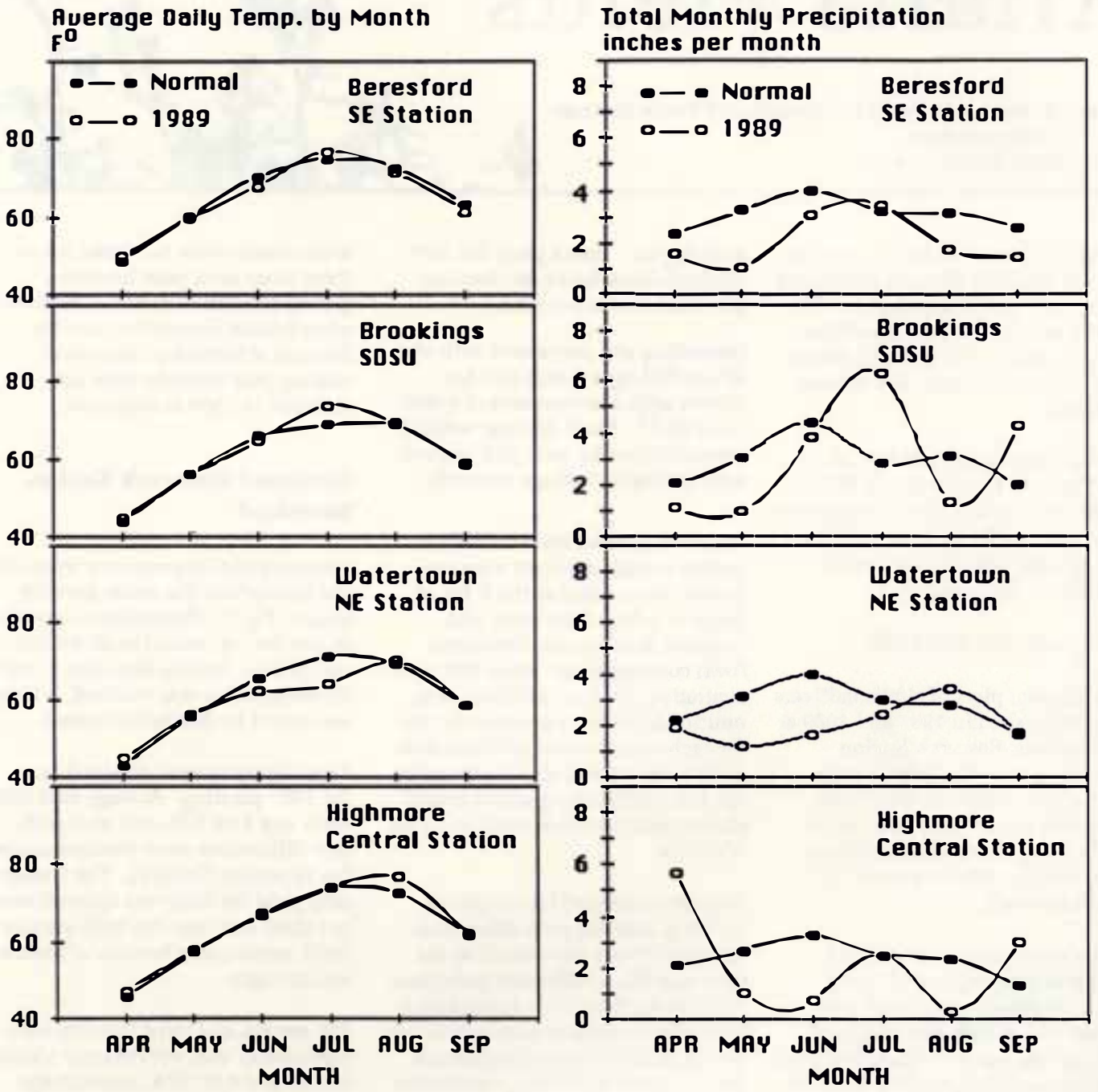

Table 1. Kalu and Fick maturity index[a] stages of development for alfalfa.

Stage No.	Stage Name	Stage Definition
0	Early Vegetative	Stem length less than 6 inches; no buds, flowers, or seed pods.
1	Mid-vegetative	Stem length 6 to 12 inches; no buds, flowers or seed pods.
2	Late-vegetative	Stem length greater than 12 inches; no buds, flowers or seed pods.
3	Early Bud	One to two nodes with buds; no flowers or seed pods.
4	Late Bud	Three or more nodes with buds; no flowers or seed pods.
5	Early Flower	One node with one open flower (standard open); no seed pods.
6	Late Flower	Two or more nodes with open flowers; no seed pods.
7	Early Seed Pod	One to three nodes with green seed pods.
8	Late Seed Pod	Four or more nodes with green seed pods.
9	Ripe Seed Pod	Nodes with mostly brown mature seed pods.

[a] Kalu, B.A., and G.W. Fick. 1983. Quantifying morphological development of alfalfa for studies of herbage quality. Crop Science 21:267-271.

plants. Even under normal conditions, however, a great deal of variation in data is expected during the seeding year. This combined variation apparently did not allow significant cultivar differences to be detected.

SDSU Research Station, Brookings

Average daily temperatures were normal for all months except July when temperatures were slightly above normal (Fig 1). Precipitation fluctuated tremendously during the growing season. During April and May precipitation was well below normal. June precipitation was near normal, while July precipitation was over twice the amount normally received. August precipitation was again below normal. The growing season ended on a positive note with over twice the normal amount of precipitation in September.

Two harvests were obtained from the 1987 planting. Average yields ranged from 0.66 T/A for the first harvest to 1.15 T/A for the second harvest (Table 4). The two-cut total yield in 1989 was 1.81 T/A, which was similar to yields obtained in 1988.

Two-year average yields ranged from 1.57 to 2.11 T/A, with no significant yield differences among cultivars. Cultivars showed no significant differences in maturity at either the first or second harvest (Table 5).

The first harvest was taken near a late vegetative stage, while the second harvest was taken near the late-bud stage. The delayed maturity of the second harvest, coupled with the high amount of precipitation received in July, may explain why yields were approximately two times higher than the first harvest (Table 4).

Three harvests were obtained from the 1988 planting (Table 6). Average yields ranged from 0.88 T/A for the first harvest to 1.25 T/A for the third harvest. No significant cultivar differences were found for any of the harvests. Two-year average yields ranged from 1.55 to 2.17 T/A with no significant cultivar differences detected.

Cultivars showed significant differences in maturity at the first and second harvests (Table 7). These maturity differences may influence forage quality. No differences in maturity were detected for the third harvest.

Northeast Research Station, Watertown

Average daily temperatures were near normal during the entire growing season, except for July in which temperatures were slightly below normal (Fig 1). Precipitation during May and June was well below normal. During the late summer, however, precipitation was near normal in August and September.

Three harvests were obtained from the 1987 planting. Average total dry matter yield was 3.33 T/A (Table 8). There were some significant differences detected among the cultivars, as yields ranged from 2.91 to 3.77 T/A.

Significant cultivar differences were also found for the 2-year average yield. Average total DM yields in 1989 were approximately 0.5 T/A lower than in 1988. A similar rainfall pattern occured in 1988, and that is probably the reason that yields were similar for the 2 years.

Three harvests were obtained from the 1988 planting. Average total DM yields was 3.80 T/A, and no significant differences were detected among the cultivars (Table 9).

The 2-year average yield was 2.20 T/A with no significant differences found among the cultivars. This is not surprising since this average includes seeding year and only one production year of data. This long-term average yield will become more meaningful as the trial continues through 1991.

Table 2. Forage yield of 35 alfalfa cultivars planted April 22, 1987, at the Southeastern Research Station, Beresford, South Dakota.

Cultivar	1987 1-Cut Total	1988 3-Cut Total	1989 Cut 1 6/4	1989 Cut 2 7/16	1989 Cut 3 8/29	1989 3-Cut Total	2 Year Avg.[a]	Relative Performance[b]
	tons / acre							%
SX 217	0.93	4.67	1.27	0.51	0.70	2.48	3.57	118
DK 135	1.03	4.36	1.32	0.62	0.83	2.77	3.57	118
MTO S82[c]	0.77	4.59	1.45	0.45	0.61	2.51	3.55	117
Vernal	0.69	4.50	1.27	0.45	0.68	2.39	3.45	114
Arrow	0.69	3.79	1.66	0.63	0.79	3.08	3.43	113
FSRC H-170[c]	0.79	4.11	1.27	0.58	0.80	2.64	3.38	111
Saranac	0.80	4.32	1.31	0.42	0.67	2.39	3.35	111
120	0.76	4.10	1.44	0.46	0.71	2.60	3.35	110
Commandor	0.77	3.94	1.22	0.64	0.74	2.60	3.27	108
Iroquois	0.62	4.11	1.36	0.40	0.65	2.41	3.26	108
Cimarron	0.78	3.96	1.29	0.42	0.68	2.40	3.18	105
Mohawk	0.65	4.10	1.19	0.40	0.65	2.23	3.17	104
FSRC H-172[c]	0.84	4.03	1.13	0.54	0.63	2.30	3.16	104
Dynasty	0.95	4.07	1.14	0.49	0.60	2.23	3.15	104
GH 737	0.87	4.15	1.03	0.45	0.67	2.14	3.15	104
636	0.71	4.00	1.15	0.45	0.69	2.29	3.14	104
XPH 2001	0.72	3.92	1.08	0.48	0.67	2.23	3.07	101
5432	0.64	3.70	1.09	0.53	0.75	2.38	3.04	100
Clipper	0.71	3.58	1.07	0.62	0.79	2.49	3.03	100
Apollo Supreme	0.67	3.38	1.21	0.65	0.75	2.62	3.00	99
Dart	0.73	3.63	1.01	0.57	0.66	2.24	2.94	97
Blazer	0.79	3.71	1.14	0.39	0.60	2.14	2.93	97
SX 424	0.67	3.67	0.99	0.49	0.68	2.16	2.92	96
Big 10	0.94	3.66	1.10	0.41	0.61	2.13	2.89	95
Fortress	0.97	3.64	1.02	0.45	0.67	2.14	2.89	95
MTO N82[c]	0.52	3.68	1.25	0.31	0.52	2.08	2.88	95
526	0.59	3.61	1.05	0.50	0.59	2.14	2.87	95
FSRC IH-171[c]	1.03	3.35	0.99	0.54	0.69	2.22	2.78	92
FSRC H-174[c]	0.77	3.38	0.95	0.40	0.60	1.95	2.67	88
Salute	0.64	3.17	0.96	0.49	0.61	2.06	2.61	86
Saranac AR	0.65	3.30	1.00	0.39	0.54	1.93	2.61	86
532	0.62	3.08	0.96	0.44	0.72	2.11	2.60	86
WL 225	0.88	3.03	0.99	0.45	0.55	1.99	2.51	83
Endure	0.63	3.00	0.73	0.44	0.56	1.73	2.37	78
Magnum III	0.94	2.57	0.89	0.52	0.67	2.08	2.33	77
Average	0.76	3.77	1.14	0.49	0.67	2.29	3.03	
Maturity[d]			3.3	5.7	3.9			
LSD(0.05)	NS	NS	NS	NS	NS	NS	NS	

[a] Two year average based on post-establishment year yields, 1988 and 1989.
[b] % Relative Performance = (cultivar 2-yr-average yield)/(2-yr-average of all cultivars.
[c] Experimental line, not currently marketed.
[d] Average harvest maturity. Value based on Kalu and Fick (1983) Index, mean-stage-by-count.

Table 3. Forage yield of 40 alfalfa cultivars planted April 20, 1989, at the Southeastern Research Station, Beresford, South Dakota.

Cultivar	1989 Cut 1 8/29	Relative Performance[a]
	--- tons / acre ---	-- % --
DK 125	1.42	126
Clipper	1.33	118
Centurion	1.31	115
Flint	1.30	115
Sure	1.28	113
Multi-plier	1.25	110
Victory	1.22	108
VS 820[b]	1.22	107
Arrow	1.21	107
86I08	1.20	106
WL 225	1.20	106
Action	1.19	105
Dart	1.19	105
636	1.19	105
FSRC 88S[b]	1.19	105
WL 317	1.19	105
420[b]	1.18	104
AP 8610B[b]	1.17	103
VS 775[b]	1.17	103
Saranac AR	1.14	100
Sabre	1.13	100
XAL72	1.12	99
DK 135	1.10	97
Legend	1.10	97
5262	1.08	96
AP 8743[b]	1.08	96
Ultra	1.07	95
Vernal	1.07	95
AP 8735[b]	1.07	94
630	1.06	93
H 174[b]	1.06	93
526	1.06	93
SDHS6[b]	1.04	92
WL 320	1.03	91
Cimarron VR	1.02	90
Chief	1.00	89
SDHL1[b]	0.94	83
Apollo Supreme	0.93	82
VIP	0.90	79
Allegiance	0.88	78
Average	1.13	
Maturity[c]	4.1	
LSD (0.05)	NS	

[a] % Relative Performance = (cultivar 2-yr-average yield)/ (2-yr-average of all cultivars.
[b] Experimental line, not currently marketed.
[c] Average harvest maturity. Value based on Kalu and Fick (1983) Index, mean-stage-by-count.

Central Research Station, Highmore

Average daily temperatures were near normal throughout the entire growing season (Fig 1). Precipitation fluctuated greatly. Early spring precipitation (April) was three times above normal. During May, June, and August, however, precipitation was much below normal. September precipitation was above normal.

Only one harvest was obtained from the 1987 planting. Average yields ranged from 0.92 to 1.39 T/A with no significant cultivar differences observed (Table 10). Two-year average yields ranged from 1.08 to 1.76 T/A with no significant cultivar differences found.

A second experiment was planted in 1989. The stand became well established. However, because of dry conditions during the early summer, there was an inadequate amount of growth to harvest in 1989.

Discussion

As shown in Fig 1, all test locations received below-normal precipitation at some point during the growing season, making 1989 the third consecutive year of pronounced drought at some locations.

As the growing season ended, however, all locations except Beresford received normal or above-normal precipitation in September. This moisture should have aided plant preparation for the winter period. Alfalfa stands at these locations may have a good chance of producing near-normal forage yields in 1990.

At Beresford, production will depend more on winter and spring precipitation. If adequate precipitation does not occur, alfalfa growth in the spring will be retarded, the first harvest may be delayed, and yields may be low.

Poor fall cutting management also threatens stand longevity. Producers should fall-cut after a hard frost when there is little chance for regrowth. Not harvesting in the fall will permit stubble to catch any snow that may fall. Snow insulates the crown and provides moisture for plant growth the following spring.

Cultivar Selection

When evaluating alfalfa cultivar test information, study their major characteristics before making your selection. These include yield, fall dormancy, disease resistance, and cost per unit of pure live seed (PLS).

Yield:

The yield information presented here represents seeding year, 2-, and 3-year averages. Generally, yield data for several years of production are the most meaningful. Use the data from the test locations that most nearly resemble your farm in terms of growing conditions.

In measuring differences in yield between cultivars, we use a statistical device known as the least significant difference (LSD). If the difference in yield between any two cultivars equals or exceeds the LSD value, the higher yielding cultivar is significantly higher in yield and should be favored. If the yield difference is less than the LSD value, the two cultivars do not significantly differ, and the cultivars are approximately equal in yielding ability. In some cases a LSD value is not presented, and the designation NS (non-significant) indicates significant yield differences among the cultivars were not detected.

Fall Dormancy:

Fall dormancy ratings (Table 11) range from values of 1 (early dormancy) to 8 (non-dormant). Fall dorman-

Table 4. Forage yield of 34 alfalfa cultivars planted April 22, 1987, at the SDSU Research Station, Brookings, South Dakota.

	1987	1988	1989			2	
	1-Cut	2-Cut	Cut 1	Cut 2	2-Cut	Year	Relative
Cultivar	Total	Total	6/7	7/27	Total	Avg.[a]	Performance[b]
			tons / acre				-- % --
636	1.30	2.15	0.81	1.25	2.07	2.11	114
Vernal	1.20	2.14	0.68	1.30	1.99	2.06	111
Summit	1.43	2.02	0.87	1.19	2.05	2.03	110
Saranac	1.39	2.05	0.65	1.37	2.02	2.03	109
8016 PCa3	1.40	1.92	0.78	1.28	2.06	1.99	107
Endure	1.41	2.05	0.72	1.21	1.92	1.98	107
Saranac AR	1.36	2.05	0.78	1.13	1.91	1.98	107
MTO S82[c]	1.50	1.99	0.81	1.15	1.96	1.98	106
Cimarron	1.33	2.00	0.73	1.20	1.93	1.96	106
Emerald	1.51	2.08	0.63	1.20	1.83	1.96	105
526	1.19	1.72	0.76	1.38	2.13	1.93	104
Ultra	1.58	2.03	0.67	1.10	1.76	1.89	102
Blazer	1.48	1.80	0.77	1.20	1.97	1.88	101
SX 217	1.36	1.92	0.68	1.13	1.81	1.87	100
120	1.38	1.88	0.64	1.17	1.81	1.84	99
Mohawk	1.50	1.91	0.71	1.06	1.77	1.84	99
Dart	1.43	2.04	0.58	1.07	1.64	1.84	99
Commandor	1.49	1.82	0.74	1.13	1.86	1.84	99
Target II	1.44	1.84	0.61	1.23	1.84	1.84	99
Big 10	1.32	1.93	0.65	1.09	1.74	1.83	99
Clipper	1.28	1.89	0.66	1.10	1.76	1.83	98
GH-747	1.35	1.90	0.56	1.19	1.75	1.83	98
DK 135	1.49	1.88	0.69	1.08	1.77	1.82	98
Sure	1.45	1.90	0.61	1.14	1.75	1.82	98
SX 424	1.39	1.87	0.58	1.16	1.74	1.80	97
DS 701	1.44	1.84	0.64	1.10	1.74	1.79	96
WL 225	1.42	1.76	0.77	1.03	1.79	1.78	96
Apollo Supreme	1.39	1.87	0.54	1.11	1.65	1.76	95
Arrow	1.39	1.87	0.52	1.08	1.60	1.73	93
Iroquois	1.31	1.65	0.72	1.09	1.81	1.73	93
VIP	1.45	1.79	0.56	1.09	1.64	1.71	92
Fortress	1.37	1.80	0.56	1.03	1.58	1.69	91
532	1.27	1.58	0.50	1.12	1.62	1.60	86
MTO N82[c]	1.56	1.68	0.46	1.00	1.46	1.57	85
Average	1.40	1.90	0.66	1.15	1.81	1.86	
LSD(0.05)	NS	NS	NS	0.19	NS	NS	

[a] Two year average based on post-establishment year yields, 1988 and 1989.

[b] % Relative Performance = (cultivar 2-yr-average yield)/(2-yr-average of all cultivars.

[c] Experimental line, not currently marketed.

Table 5. Maturity[a] of 34 alfalfa cultivars planted April 22, 1987, at the SDSU Research Station, Brookings, South Dakota.

Cultivar	1987 Cut-1 7/22	1988 Cut-1 6/6	1988 Cut-2 7/25	1989 Cut-1 6/6	1989 Cut-2 7/26
8016PCa3	3.25	3.73	4.43	2.65	4.35
Apollo Supreme	3.70	3.38	4.13	2.48	4.38
Arrow	3.90	3.45	4.30	2.55	4.43
Big 10	3.60	3.88	4.98	2.88	4.60
Blazer	3.55	3.20	4.45	2.48	4.60
Cimarron	3.50	3.68	4.43	2.73	4.60
Commandor	3.58	3.23	4.33	2.78	4.65
120	3.35	3.48	4.10	2.55	4.43
DK 135	3.55	3.50	4.58	2.60	4.68
DS 701	3.28	3.70	4.08	2.83	4.53
Dart	3.53	3.63	4.60	2.73	4.48
Emerald	3.33	3.88	4.90	3.10	4.58
Endure	3.48	3.35	4.23	2.55	4.40
Fortress	3.65	3.48	4.55	2.80	4.55
636	3.63	3.60	4.78	3.15	4.35
GH 747	3.48	3.68	4.53	2.83	4.68
Iroquois	3.53	3.55	4.48	2.93	4.68
MTO N82	3.70	3.85	4.30	2.23	4.23
MTO S82	3.53	3.95	4.40	2.65	4.38
Mohawk	3.40	3.70	4.75	2.85	4.53
Clipper	3.18	3.73	4.40	2.65	4.50
526	3.53	3.35	4.53	2.63	4.60
532	3.05	3.25	4.53	2.08	4.35
VIP	3.33	3.75	4.43	2.43	4.65
SX 217	3.73	3.53	4.50	2.78	4.70
SX 424	3.53	3.35	5.05	2.50	4.53
Saranac	3.43	3.50	4.55	2.88	4.40
Saranac AR	3.55	3.68	4.80	2.98	4.73
Summit	3.55	3.50	4.70	3.18	4.48
Sure	3.75	3.53	4.53	2.78	4.68
Target II	3.65	3.45	4.78	2.73	4.53
Ultra	3.73	3.68	4.70	2.68	4.53
Vernal	3.38	3.70	4.50	2.75	4.55
WL 225	3.45	3.40	4.08	2.65	4.30
Average	3.5	3.6	4.5	2.7	4.5
LSD(0.05)	NS	0.4	NS	NS	NS

[a] Kalu and Fick (1983) Index, mean-stage-by-count.

cy is closely related to winterhardiness, a major consideration in South Dakota.

Generally, cultivars with a fall dormancy rating of 1 or 2 are very winterhardy and may persist longer under South Dakota conditions; however, forage yield under optimum conditions may be lower for these cultivars than for less dormant types. Consequently, very winterhardy cultivars should be used if stand longevity is of primary concern.

Cultivars with a rating of 3 to 4 are winterhardy to moderately winterhardy, and at least 3 to 4 years of excellent production can be expected. Cultivars with ratings of 5 to 8 are generally not winterhardy enough to survive several South Dakota winters. These cultivars may be used as annual forages.

Disease Resistance:

Disease resistance ratings are important indicators of a cultivar's potential to perform when specific diseases may limit production. Major diseases that may affect alfalfa productivity in South Dakota are bacterial wilt, Phytophthora root rot, and Verticillium wilt.

Bacterial wilt infection generally begins in the third production year and occurs in spring or early summer, entering the plants through cracks and wounds in the roots and crowns. Eventually, the water-conducting tissues of the roots become plugged, causing the top growth to wilt, especially during pronounced moisture stress. Symptoms include yellow leaves, stunted growth, and a yellow to brown discoloration of the root tissue beneath the outermost layer. Several cultivars are resistant to bacterial wilt.

Phytophthora root rot is a fungal disease which occurs in wet, poorly drained soils during extended precip-

itation or excessive irrigation. Look for deteriorated root or crown tissue where the stands are thin. Wilting, yellowing, and lack of vigorous growth are also frequently observed. This disease is sometimes involved in damping-off of alfalfa seedlings.

Verticillium wilt is a fungal disease which initially produces temporary wilting of upper leaves on warm days at pre-bud to floral stages of maturity. After the leaf tips have yellowed, the leaves die and drop off. Eventually, the stems die as well. Yellow to brown discoloration is usually present in the woody cylinder of the tap root. Verticillium wilt has not yet been documented in South Dakota; however, it has been observed in several surrounding states and its appearance in South Dakota is expected.

Other diseases, such as anthracnose, leaf spots, Fusarium wilt, and other root and crown rots may be problems at a particular site. For these diseases, the only practical means of minimizing economic loss is to use disease resistant cultivars.

Disease resistance ratings for the tested cultivars are given in Table 11.

Multi-leaf cultivars:

There is currently much interest in the evaluation of cultivars that possess multi-leaflet characteristics. In these cultivars a proportion of the plants contain more than the standard three leaflets per leaf.

In 1989, two cultivars that possess this characteristic, 'Multi-plier' and 'Legend', were included in the trial at Beresford (Table 3). Since these data were obtained during the seeding year only, it is difficult to draw any conclusions. We hope to include these and other multi-leaflet cultivars at additional test locations in future years.

Table 6. Forage yield of 28 alfalfa cultivars planted April 20, 1988, at the SDSU Research Station, Brookings, South Dakota.

	1988	1989				2	
Cultivar	1-Cut Total	Cut 1 6/6	Cut 2 7/16	Cut 3 8/23	3-Cut Total	Year Avg.[a]	Relative Performance[b]
	tons / acre						%
Vector	0.78	0.94	1.12	1.50	3.57	2.17	112
526	0.76	1.05	1.16	1.38	3.58	2.17	112
MTO N82[c]	0.75	1.22	1.07	1.28	3.56	2.16	111
5432	0.87	0.92	1.06	1.38	3.36	2.11	109
Cimarron	0.87	0.90	1.10	1.31	3.32	2.09	108
SX 217	0.78	1.00	0.99	1.37	3.36	2.07	107
Magnum +	0.68	0.96	1.14	1.34	3.44	2.06	106
Big 10	0.78	0.91	1.06	1.34	3.30	2.04	105
FSRC 87N3[c]	0.77	0.92	1.07	1.31	3.30	2.03	105
Vernal	0.78	0.94	1.05	1.29	3.28	2.03	105
Sure	0.72	0.84	1.11	1.33	3.27	2.00	103
120	0.72	0.87	1.20	1.20	3.27	1.99	103
FSRC 87M1[c]	0.85	0.90	0.96	1.24	3.10	1.97	102
AP 8620[c]	0.70	0.86	1.08	1.29	3.24	1.97	102
Kingstar	0.76	0.89	1.00	1.23	3.12	1.94	100
Chief	0.79	0.86	0.95	1.27	3.08	1.94	100
FSRC 87N1[c]	0.77	0.96	0.96	1.14	3.06	1.92	99
Dart	0.69	0.86	1.01	1.26	3.13	1.91	99
Magnum III	0.72	0.86	0.92	1.30	3.07	1.90	98
XAF62[c]	0.57	0.84	1.08	1.27	3.19	1.88	97
Allegiance	0.66	0.87	0.99	1.18	3.04	1.85	95
Arrow	0.74	0.88	0.91	1.16	2.94	1.84	95
DK 125	0.85	0.71	0.91	1.14	2.76	1.81	93
Premier	0.66	0.73	1.00	1.10	2.83	1.74	90
AP 8631[c]	0.68	0.82	0.86	1.11	2.79	1.73	89
WL 320	0.71	0.71	0.87	1.14	2.72	1.71	88
WL 225	0.66	0.73	0.85	1.11	2.68	1.67	86
SX 424	0.62	0.72	0.76	1.00	2.48	1.55	80
Average	0.74	0.88	1.01	1.25	3.14	1.94	
LSD (0.05)	NS	NS	NS	NS	NS	NS	

[a] Two year average based on yields for 1988 and 1989.
[b] % Relative Performance = (cultivar 2-yr-average yield)/ (2-yr-average of all cultivars.
[c] Experimental line, not currently marketed.

Table 7. Maturity[a] of 28 alfalfa cultivars planted April 20, 1988, at the SDSU Research Station, Brookings, South Dakota.

Cultivar	1988 Cut 1 7/12	1989 Cut 1 6/6	1989 Cut 2 7/16	1989 Cut 3 8/23
AP 8620	4.00	3.73	4.53	4.03
AP 8631	4.43	3.45	4.73	3.98
Allegiance	4.05	3.63	4.88	4.03
Arrow	4.35	3.80	4.53	4.08
Big 10	4.30	3.78	4.70	3.98
FSRC 87M1	4.18	3.45	4.65	4.08
FSRC 87N1	4.30	3.80	4.83	4.05
FSRC 87N3	4.33	3.70	4.68	4.10
Chief	3.93	3.53	4.85	3.98
Cimarron	4.05	3.95	4.78	4.03
120	4.00	3.48	4.78	4.05
DK 125	4.28	3.55	4.85	4.08
Dart	4.20	3.30	4.73	4.03
Kingstar	4.18	3.55	4.68	3.98
MTO N82	3.98	3.75	4.53	3.83
Magnum +	3.93	3.85	4.70	4.03
Magnum III	4.35	3.50	4.78	4.03
526	3.93	3.50	4.95	4.03
5432	4.05	3.58	4.98	4.08
Premier	3.95	3.50	4.53	4.08
SX 217	4.13	3.35	4.70	4.03
SX 424	3.98	3.48	4.63	4.03
Sure	4.23	3.85	4.60	4.03
Vector	4.28	3.75	5.03	4.10
Vernal	4.03	3.53	4.60	4.03
WL 225	4.08	3.38	4.28	4.05
WL 320	4.10	3.38	4.55	4.05
XAF62	3.75	3.65	4.65	3.95
Average	4.1	3.6	4.7	4.0
LSD (0.05)	0.3	0.4	0.4	NS

[a] Kalu and Fick (1983) Index, mean-stage-by-count.

Conclusions

A single characteristic, such as high yield, will make no single alfalfa cultivar or small group of cultivars superior to any others. Several characteristics must be evaluated before you select an alfalfa cultivar. Although yield serves as a good measure of economic production, winterhardiness, and disease resistance are also important.

Yield response data collected over several years and locations may be useful indicators of stress tolerance, longevity, and economic production. Finally, you will have to consider the seed cost per unit of PLS when selecting an alfalfa cultivar.

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Brandnames are given for reader convenience and do not constitute an endorsement nor discrimination against those not mentioned. Cultivars, whether public or private, are not endorsed by their inclusion in this publication.

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Table 8. Forage yield of 31 alfalfa cultivars planted April 25, 1987, at the Northeast Research Station, Watertown, South Dakota.

Cultivar	1987 1-Cut Total	1988 3-Cut Total	1989 Cut 1 6/16	1989 Cut 2 7/25	1989 Cut 3 8/24	1989 3-Cut Total	2 Year Avg.[a]	Relative Performance[b]
	tons / acre							%
120	2.00	4.34	1.47	1.14	0.97	3.58	3.96	110
Dart	1.93	4.28	1.40	1.24	0.90	3.54	3.91	108
Clipper	2.03	4.02	1.58	1.21	0.95	3.74	3.88	108
WL 225	2.11	4.21	1.47	1.17	0.91	3.55	3.88	108
Cimarron	1.95	4.18	1.37	1.25	0.88	3.50	3.84	106
MTO S82[c]	1.91	4.15	1.69	1.03	0.79	3.50	3.83	106
532	1.77	4.16	1.39	1.11	0.97	3.48	3.82	106
Arrow	1.65	3.87	1.52	1.24	1.01	3.77	3.82	106
526	1.66	4.10	1.33	1.20	0.92	3.45	3.77	105
Fortress	1.87	4.31	1.24	1.09	0.85	3.17	3.74	104
Big 10	1.74	3.92	1.40	1.09	0.91	3.40	3.66	102
Mohawk	1.68	3.94	1.35	1.11	0.92	3.38	3.66	101
Dynasty	1.82	3.76	1.37	1.23	0.95	3.54	3.65	101
Iroquois	1.84	3.86	1.33	1.16	0.90	3.39	3.63	101
SX 217	2.05	4.04	1.18	1.14	0.88	3.21	3.63	101
Magnum III	1.86	3.92	1.27	1.03	1.00	3.30	3.61	100
XPH 2001	1.69	3.82	1.32	1.14	0.91	3.38	3.60	100
SX 424	1.65	3.88	1.26	1.12	0.85	3.23	3.55	99
5432	1.72	3.73	1.31	1.11	0.95	3.37	3.55	98
Apollo Supreme	1.81	3.66	1.38	1.12	0.90	3.39	3.52	98
Endure	1.81	3.83	1.35	0.97	0.88	3.20	3.51	98
Blazer	1.82	3.86	1.31	0.97	0.81	3.09	3.47	96
Vernal	1.83	3.55	1.38	1.13	0.87	3.38	3.47	96
Cim2000G	1.79	3.78	1.18	1.05	0.83	3.07	3.42	95
Saranac	1.60	3.57	1.36	1.03	0.85	3.24	3.41	95
Commandor	1.80	3.56	1.26	1.09	0.87	3.21	3.38	94
636	1.73	3.57	1.32	1.00	0.82	3.14	3.36	93
Eagle	1.72	3.78	1.08	1.02	0.82	2.91	3.35	93
DK 135	1.81	3.69	1.17	1.00	0.81	2.98	3.33	92
Saranac AR	1.78	3.61	1.20	1.00	0.79	3.00	3.30	92
MTO N82[c]	1.78	3.33	1.48	0.91	0.72	3.10	3.21	89
Average	1.81	3.88	1.34	1.10	0.88	3.33	3.60	
Maturity[d]			4.3	6.0	4.3			
LSD(0.05)	NS	NS	0.18	NS	0.12	0.46	0.36	

[a] Two year average based on post-establishment year yields, 1988 and 1989.
[b] % Relative Performance = (cultivar 2-yr-average yield)/(2-yr-average of all cultivars.
[c] Experimental line, not currently marketed.
[d] Average harvest maturity. Value based on Kalu and Fick (1983) Index, mean-stage-by-count.

Table 9. Forage yield of 28 alfalfa cultivars planted April 28, 1988, at the Northeast Research Station, Watertown, South Dakota.

Cultivar	1988	1989				2 Year Avg.[a]	Relative Performance[b]
	1-Cut Total	Cut 1 6/16	Cut 2 7/25	Cut 3 8/24	3-Cut Total		
	tons / acre						-- % --
Big 10	0.76	2.02	1.27	1.17	4.45	2.61	119
DK 125	0.67	1.74	1.18	1.20	4.12	2.40	109
Vernal	0.77	1.75	1.10	1.15	4.00	2.38	109
Chief	0.58	1.77	1.23	1.16	4.15	2.37	108
Vector	0.62	1.67	1.22	1.18	4.06	2.34	107
FSRC 87N1[c]	0.70	1.61	1.20	1.07	3.88	2.29	104
Magnum III	0.57	1.75	1.19	1.06	4.00	2.29	104
AP 8620[c]	0.67	1.68	1.10	1.08	3.86	2.26	103
120	0.71	1.68	1.06	1.07	3.81	2.26	103
Arrow	0.57	1.75	1.13	1.06	3.94	2.26	103
Magnum +	0.52	1.65	1.12	1.15	3.92	2.22	101
FSRC 87N3[c]	0.57	1.65	1.14	1.07	3.86	2.22	101
Sure	0.61	1.62	1.14	1.05	3.81	2.21	101
XAF62[c]	0.52	1.68	1.01	1.18	3.87	2.20	100
5432	0.49	1.52	1.20	1.19	3.91	2.20	100
AP 8631[c]	0.55	1.66	1.11	1.06	3.84	2.19	100
SX 424	0.62	1.60	1.09	1.07	3.75	2.19	99
MTO N82[c]	0.54	1.76	0.98	0.99	3.73	2.13	97
FSRC 87M1[c]	0.67	1.59	1.00	1.00	3.60	2.13	97
526	0.56	1.60	0.93	1.13	3.66	2.11	96
Cimarron	0.67	1.38	1.15	1.03	3.56	2.11	96
WL 320	0.53	1.48	1.10	1.03	3.62	2.07	94
Kingstar	0.58	1.59	0.99	0.95	3.53	2.06	94
Dart	0.54	1.58	0.95	1.02	3.55	2.04	93
86639[c]	0.53	1.60	0.98	0.96	3.54	2.03	92
Premier	0.57	1.46	0.99	1.01	3.46	2.01	92
SX 217	0.60	1.44	0.92	1.03	3.39	1.99	91
WL 225	0.47	1.63	0.80	0.99	3.41	1.94	88
Average	0.60	1.64	1.08	1.08	3.80	2.20	
Maturity[d]		3.7	6.1	4.1			
LSD (0.05)	NS	NS	NS	NS	NS	NS	

[a] Two year average based on yields for 1988 and 1989.
[b] % Relative Performance = (cultivar 2-yr-average yield)/(2-yr-average of all cultivars.
[c] Experimental line, not currently marketed.
[d] Average harvest maturity. Value based on Kalu and Fick (1983) Index, mean-stage-by-count.

Table 10. Forage yield of 24 alfalfa cultivars planted April 27, 1987 at the Central Crops and Soils Research Station, Highmore, South Dakota.

Cultivar	1988 2-Cut Total	1989 Cut 1 6/9	2 Year Avg.[a]	Relative Performance[b]
	--- tons / acre ---			-- % --
Mohawk	2.23	1.29	1.76	121
Saranac	2.21	1.31	1.76	121
636	2.08	1.39	1.73	119
Saranac AR	2.18	1.27	1.72	119
Iroquois	1.94	1.33	1.64	113
Vernal	1.85	1.30	1.57	108
Big 10	1.87	1.23	1.55	107
120	1.89	1.18	1.53	105
8016 PCa3	1.81	1.25	1.53	105
Magnum III	1.79	1.18	1.48	102
526	1.74	1.22	1.48	102
MTO S82[c]	1.65	1.24	1.44	99
MTO N82[c]	1.70	1.18	1.44	99
Emerald	1.61	1.16	1.39	95
DK 135	1.70	0.99	1.35	93
Cimarron	1.65	1.04	1.34	92
Blazer	1.59	1.07	1.33	91
Eagle	1.56	1.08	1.32	91
SX 424	1.61	1.01	1.31	90
WL 225	1.50	1.12	1.31	90
Dynasty	1.42	1.14	1.28	88
Clipper	1.44	1.10	1.27	87
532	1.48	1.06	1.27	87
SX 217	1.24	0.92	1.08	74
Average	1.74	1.17	1.45	
Maturity[d]		3.9		
LSD (0.05)	NS	NS	NS	

[a] Two year average based on post-establishment year yields, 1988 and 1989.

[b] % Relative Performance = (cultivar 2-yr-average yield) /(2-yr-average of all cultivars.

[c] Experimental line, not currently marketed.

[d] Average harvest maturity. Value based on Kalu and Fick (1983) Index, mean-stage-by-count.

Table 11. Listing of alfalfa cultivars, developers, suppliers and agronomic characteristics[ab].

Developer/ Supplier	Cultivar	FD[c]	BW[d]	VW[d]	FW[d]	An[d]	PRR[d]	SAA[d]	PA[d]	BAA[d]	SN[d]	RKN[d]
AgriPro	Arrow	3	HR	R	HR	MR	HR	--	--	--	MR	--
	Dart	3	HR	R	HR	R	HR	--	--	--	--	--
	Apollo Supreme	4	HR	R	HR	HR	R	--	--	--	--	--
Allied Seed	Centurion	3	HR	R	R	R	R	MR	R	--	--	--
	Sabre											
	86I08											
Arrow Seed	Emerald	4	R	MR	R	MR	R	LR	R	--	--	--
Asgrow Seed	Eagle	4	HR	MR	R	R	MR	R	R	LR	R	--
	XPH 2001											
Bio-Plant Research	Target II	4	HR	R	R	R	R	R	--	--	--	--
Cargill	Endure	3	R	R	R	MR	R	LR	--	--	--	--
Cenex/Land O'Lakes	Sure	3	HR	R	HR	HR	R	LR	HR	--	--	--
	Blazer	3	HR	LR	R	LR	MR	--	HR	--	HR	--
	Legend	4	HR	R	HR	HR	R	LR	R	--	--	--
Dahlgren	Kingstar	3	R	R	HR	MR	R	R	MR	--	R	MR
	Premier	4	R	R	HR	R	HR	MR	HR	--	MR	MR
Dairyland Research Int'l.	Magnum III	4	R	MR	R	MR	R	MR	--	--	--	--
	DS 701											
	Dynasty	4	HR	R	R	MR	R	R	--	--	--	--
	Magnum +	4	R	LR	R	MR	R	LR	--	--	--	--
Dekalb-Pfizer Genetics	DK 135	4	R	MR	R	MR	MR	MR	R	LR	R	--
	120	3	HR	--	R	LR	R	--	R	--	R	--
	DK 125	3	HR	R	R	HR	R	MR	R	--	--	--
Garst Seed	636	2	HR	R	R	MR	R	--	--	--	--	--
	630	4	HR	MR	R	MR	R	MR	--	--	--	--
Golden Harvest	GH 747	4	HR	MR	R	HR	HR	LR	HR	--	MR	--
Great Lakes Hybrids	Big 10	3	HR	--	HR	R	R	LR	R	--	--	--
Great Plains Res.	Cimarron	4	HR	LR	HR	R	MR	HR	R	--	--	--
	Cim 2000G											
	Cimarron VR	4	HR	HR	HR	HR	MR	R	R	--	--	--
Jacques Seed	Multi-plier	2	HR	R	HR	HR	HR	R	R	--	--	--
	Chief	4	HR	R	R	R	HR	R	R	--	MR	MR
J.C. Robinson Seed	GH 737	4	R	R	R	MR	HR	R	R	--	MR	MR
L. Peterson Ltd.	Vector	4	R	MR	HR	R	R	R	R	LR	R	--
New York Agric. Exp. Stn.	Iroquois	2	R	--	--	--	--	--	--	--	--	--
	Mohawk	2	HR	--	MR	HR	--	--	--	--	--	--
	Saranac	4	R	--	--	--	--	--	--	--	--	--
	Saranac Ar	4	MR	--	R	HR	--	--	--	--	--	--

Table 11. Continued[ab].

Developer/ Supplier	Cultivar	FD[c]	BW[d]	VW[d]	FW[d]	An[d]	PRR[d]	SAA[d]	PA[d]	BAA[d]	SN[d]	RKN[d]
Northrup King	Commandor	4	R	MR	R	HR	R	LR	--	--	MR	--
	Summit	4	R	R	R	HR	R	MR	R	--	--	--
	Fortress	4	R	R	R	R	HR	HR	R	--	HR	--
Payco Seeds/ Interstate	Clipper	2	HR	R	HR	R	R	--	MR	--	MR	--
	WL 225	2	HR	R	HR	MR	HR	R	R	--	LR	MR
	WL 317	3	HR	R	HR	R	HR	R	HR	--	R	MR
	WL 320	4	R	MR	HR	MR	R	R	MR	MR	MR	MR
Pioneer Hi-Bred Int'l.	526	2	HR	--	MR	--	LR	HR	R	--	--	--
	5262	2	HR	LR	MR	--	R	R	R	--	MR	--
	532	3	HR	--	R	LR	LR	HR	R	--	--	--
	5432	4	HR	R	HR	--	MR	HR	R	--	--	--
	XAL72											
Plant Genetics	Flint	4	R	LR	HR	HR	R	R	MR	--	MR	--
Research Seeds	VIP	3	HR	R	R	R	R	MR	HR	LR	MR	--
	Action	4	R	MR	R	HR	R	MR	R	--	--	--
SeedTec	Ultra	3	HR	R	HR	HR	R	LR	R	--	R	--
Sexauer	SX 217	4	R	--	HR	MR	MR	HR	--	--	R	MR
	SX 424	5	MR	--	R	R	R	HR	--	--	R	MR
United AgriSeeds	Allegiance	3	R	R	R	HR	R	LR	R	--	R	--
	Salute	4	HR	MR	R	MR	R	LR	--	--	--	--
W-D Seed Growers	Victory	3	HR	R	R	HR	MR	--	--	--	--	--
Wisc. Agric. Exp. Stn./USDA	Vernal	2	R	--	MR	--	--	--	--	--	--	MR

[a] Blank spaces indicate cultivar is susceptible or has not been adequately tested.

[b] Ratings have been obtained from: Pick and Choose Your Alfalfa Varieties. pp. 14-17. Hay and Forage Grower. Vol. 4 no. 8. Webb Div. Intertec Publishing Corp. St. Paul, MN.

[c] FD = Fall Dormancy Index, 1 = greatest fall dormancy; 8 = absence of fall dormancy.

[d] Refer to pest resistance rating below:

BW = Bacterial Wilt
VW = Verticillium wilt
FW = Fusarium wilt
An = Anthracnose
PRR = Phytophthora Root Rot
SAA = Spotted Alfalfa Aphid
PA = Pea Aphid
BAA = Blue Alfalfa Aphid
SN = Stem Nematode
RRK = Root Knot Nematode

Pest Resistance Rating	
% Resistance plants	Resistance class
0-5%	Susceptible (S)
6-14%	Low Resistance (RS)
15-30%	Moderate Resistance (MR)
31-50%	Resistance (R)
> 50%	High Resistance (HR)