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# Extension Extra

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COLLEGE OF AGRICULTURE & BIOLOGICAL SCIENCES / SOUTH DAKOTA STATE UNIVERSITY / USDA

## Forage Yield and Quality of Multileaflet Alfalfa

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There has been interest among private companies in the past five years in producing multifoliolate or "multileaflet" alfalfa varieties. Conventional varieties have only three leaflets per leaf while multileaflet varieties may have plants that possess five, seven, or even nine leaflets per leaf.

Although the multileaf trait of alfalfa has been known for more than 50 years, research has been limited. Recent interest has led to the development of about 10 multileaflet varieties. The promotion of these varieties has generated interest among forage and livestock producers in the potential benefits of these varieties over conventional varieties.

Many multileaflet varieties have been promoted as more "leafy" and higher in nutritive value than conventional varieties. At present, however, limited university data are available to substantiate these claims.

To gain information on the forage yield and quality of multileaflet varieties compared to conventional varieties, a study was conducted by SDSU, in 1990 and 1991, in western South Dakota near Nisland. Fourteen varieties were included in the trial: eight conventional and six multileaf. Balan, a pre-plant incorporated herbicide was applied prior to seeding. The varieties were seeded at a rate of 11 pounds per acre on April 19, 1990. About 130 pounds of phosphorus fertilizer was applied to the plot. One cutting was obtained in the seeding year of 1990 and three cuttings were taken in 1991.

### Results

For the 1990 cutting, there were no significant differences detected among the varieties for forage yield, crude protein content, neutral detergent fiber (NDF), or acid detergent fiber (ADF) (Table 1).

In 1991, cuttings were taken in June, July, and August. Again no significant differences were found among the varieties for any of

the parameters studied (Tables 2, 3, and 4). Only on the first cutting did the multileaf varieties display any type of advantage over the conventional varieties. Although the differences were not statistically significant, the multileaf varieties averaged 0.8 percentage unit higher crude protein content and 1.0 percentage unit lower in NDF. On the second and third cuttings, however, this slight advantage in forage quality for the multileaf varieties was not found.

### Conclusions

Results of this study are similar to those from other states performing research with multileaf varieties. There do not appear to be large differences in forage quality between multileaf varieties currently on the market and conventional varieties. One reason is that not every plant of a multileaf variety has the multileaf trait.

In a recent University of Minnesota study, researchers found that the level of expression of the multileaf trait varied widely among varieties. With one variety, about 70 percent of the plants had at least one multileaf present, while another variety had only seven percent multileaf expression.

The expression of the multileaf trait also appears to vary with environmental conditions. Therefore, on some cuttings, the multileaf varieties may have potentially higher quality than conventional varieties. However, as indicated by the SDSU study, the differences in quality will most likely be small.

Although no large advantages in forage quality were observed for the multileaf varieties in this study, they performed as well as conventional varieties. For all cuttings, the multileaf and conventional varieties produced similar forage yields.

All of these multileaflet varieties possess good to excellent disease resistance and are winterhardy enough for South Dakota conditions. The seed costs for the multileaf varieties range from the same as to 5 to 10 percent higher than conventional varieties.

It is expected that more multileaf varieties will be released in the next few years. Alfalfa plant breeders are hopeful that as more information is gained about the multileaf trait, they can develop varieties that consistently have higher forage quality than conventional varieties.

Extension and research personnel at SDSU will continue to evaluate the merits of these multileaf varieties and report their findings as they become available.

**Table 1. Forage yield, crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF) of 14 alfalfa varieties harvested on Sept. 19, 1990.**

Variety	Yield	CP	NDF	ADF
	-lb/A-	-----%	-----	-----
<b>Conventional</b>				
Chief	2216	19.6	37.9	31.4
Agate	2415	19.8	37.0	30.4
Super 740	2481	18.8	40.2	34.3
Elevation	2327	19.9	37.5	31.4
5364	2023	18.9	37.5	31.3
Vernal	2156	19.9	36.3	31.4
DK 120	2363	19.4	38.3	32.2
Dart	2230	20.2	36.9	31.1
<b>Multileaf</b>				
Multi-plier	2584	19.5	37.8	31.5
MultiKing 1	2214	19.4	37.2	31.0
Legend	2700	19.4	37.4	31.0
2833	2524	19.6	36.8	31.5
XAM 84	2571	19.9	36.5	30.2
Crown II	2534	19.6	36.6	31.1
LSD (5%)	NS	NS	NS	NS

NS = no significant differences found among varieties

**Table 2. Forage yield, crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF) of 14 alfalfa varieties harvested on June 10, 1991.**

Variety	Yield	CP	NDF	ADF
	-lb/A-	-----%	-----	-----
<b>Conventional</b>				
Chief	4594	18.3	47.0	39.5
Agate	4922	18.8	46.8	38.8
Super 740	4572	18.3	48.6	40.7
Elevation	4870	18.3	48.5	40.3
5364	4694	18.4	47.8	39.7
Vernal	4247	18.8	47.7	40.0
DK 120	4851	18.2	47.8	40.8
Dart	4604	18.2	47.4	39.9
<b>Multileaf</b>				
Multi-plier	4868	19.0	46.6	39.2
MultiKing 1	4600	19.4	46.1	38.7
Legend	4953	19.2	47.1	39.3
2833	4790	19.2	47.1	39.9
XAM 84	4463	19.1	47.1	40.5
Crown II	4577	19.4	45.9	39.7
LSD (5%)	NS	NS	NS	NS

NS = no significant differences found among varieties

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Table 3. Forage yield, crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF) of 14 alfalfa varieties harvested on July 23, 1991.

Variety	Yield	CP	NDF	ADF
	-lb/A-	-----%-----		
<b>Conventional</b>				
Chief	4049	20.2	44.5	37.5
Agate	3970	20.5	44.4	36.8
Super 740	3606	20.2	44.1	38.0
Elevation	3827	20.3	44.1	37.3
5364	4123	19.6	45.8	38.3
Vernal	3713	20.0	45.2	37.7
DK 120	4134	20.1	45.5	38.3
Dart	3825	19.8	45.3	38.2
<b>Multileaf</b>				
Multi-plier	3732	20.4	44.2	37.4
MultiKing 1	3787	20.5	44.8	37.4
Legend	3712	21.3	44.1	37.0
2833	4356	19.3	46.5	38.7
XAM 84	3977	19.5	46.0	38.7
Crown II	4075	19.8	46.5	39.4
LSD (5%)	NS	NS	NS	NS

NS = no significant differences found among varieties

Table 4. Forage yield, crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF) of 14 alfalfa varieties harvested on August 29, 1991.

Variety	Yield	CP	NDF	ADF
	-lb/A-	-----%-----		
<b>Conventional</b>				
Chief	3133	19.7	41.4	36.6
Agate	3191	20.9	40.1	35.5
Super 740	2990	20.1	41.8	36.3
Elevation	3132	19.5	41.8	36.1
5364	3179	19.3	42.5	36.3
Vernal	2844	20.1	40.8	34.5
DK 120	3381	19.8	41.0	35.1
Dart	3045	19.8	41.0	35.5
<b>Multileaf</b>				
Multi-plier	3199	19.7	42.1	36.4
MultiKing 1	3308	19.3	42.7	37.1
Legend	3047	19.4	42.7	36.9
2833	3061	19.8	42.8	36.6
XAM 84	3241	19.7	42.7	36.5
Crown II	3115	20.2	41.7	36.5
LSD (5%)	NS	NS	NS	NS

NS = no significant differences found among varieties

#### Alfalfa developers, varieties, and fall dormancy ratings.

Developer	Variety	Fall dormancy rating <sup>1</sup>
AgriPro Seeds	Dart	3
Cargill	Crown II	3
Cenex/Land O'Lakes	Legend	4
	Super 740	NA <sup>2</sup>
CIBA-GEIGY Seeds	2833	3
Dekalb Plant Genetics	DK 120	3
Jaques Seed	Multi-plier	2
	Chief	4
	Elevation	3
Northup King	MultiKing 1	4
Pioneer Hi-Bred Int'l.	5364	4
	XAM84	NA <sup>2</sup>
Public	Vernal	2
	Agate	2

<sup>1</sup>Rating Index: 1 = greatest fall dormancy; 9 = absence of fall dormancy.

<sup>2</sup>NA = information is not available.