

SOUTH DAKOTA – Alfalfa Variety Trials for South Dakota State University

Karla Hernandez, South Dakota State University-Extension

Alfalfa is widely considered one of the most important forage-legume species in South Dakota. It is a deep-rooted legume growing best in moderate to well-drained soils. Under optimum growing and soil conditions, along with proper management, yields can exceed 3-4 tons DM/ac of hay with irrigation, and 1-2 tons DM/ac on dryland. Alfalfa is a good forage for the region since it is a crown-former and high yielder, with high feed quality. It is persistent, has a very deep taproot, tends to be drought hardy, and is winter hardy. Understanding how alfalfa grows, its harvest conditions, and its relationship with storage of carbohydrates in the root system are important aspects to improve its overall production throughout the state.

For production, developing a harvest schedule with forage quality goals should be considered. Most harvest schedule decisions will include cutting date, stage of maturity, interval between cuts, and cutting height. For spring seedings without a companion crop, two harvests can generally be made the first year depending on adequate rainfall and optimum levels of soil nutrients.

The first harvest during the seeding year must consider when the alfalfa was seeded in the spring and plan for one or two cuttings that year. The first harvest should be done after the flowers begin to appear, allowing greater energy reserves in the roots. Generally, alfalfa will reach this stage of development between 60-70 days after emergence. Harvesting delays during this stage will cause large reductions in quality and decline in total yield over the season, since fewer harvests are possible.

The objective of the variety trials was to develop unbiased research providing better estimates of which alfalfa varieties work better under specific environmental conditions in Watertown and Redfield, SD.

Goals for the 2016 growing season were to keep a research area in the northeastern part of the state and to explore other locations with more varieties and replicates. Locations being considered include Beresford, Parkston, and one more location in Redfield.

Establishment and Management

Alfalfa was planted at a rate of 15 lbs of pure live seed/ac on April 23, 2015, in Redfield and May 21, 2015, in Watertown. Plots were 5'x20' and planted with a Brillion broadcast seeder. Seven varieties were evaluated using three replicates. A sickle-bar harvester was used to harvest this plot two times during the growing season. Fresh alfalfa samples were randomly obtained during harvest and dried to determine yield on a dry matter basis. Herbicides and insecticides were used as needed to successfully establish and manage alfalfa as well as to control weeds. Weeds were pulled by hand every other week or when necessary. Wet samples were weighed in the field to calculate biomass and then dried at 60°C for 72 hours in a forced-air oven and reweighed to determine total biomass.

Varieties evaluated: Genuity; Phirst Extra; Crave; Persist II; Salinity Max; Prolific I; and Toughmax provided by Millborn Seeds in Brookings, SD, and Legend Seeds in De Smet, SD.

Yield

Tables 1 and 2 represent the total yield (tons/ac) of alfalfa varieties and quality at the Northeast Research Farm in Watertown. There were no significant differences among the varieties evaluated in yield for both cuttings. However, yields were numerically higher for Genuity, Phirst Extra, and Crave varieties. The lowest yield was observed for Toughmax during both harvest dates.

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Table 1. Total yield (tons/ac) harvested twice in Watertown.

Entry	10-Aug	14-Sep	Total
Genuity	0.94	0.74	1.68
Check	0.87	0.65	1.52
Phirst Extra	0.85	0.63	1.48
Crave	0.81	0.62	1.43
Persist II	0.78	0.68	1.46
Salinity Max	0.78	0.58	1.36
Prolific I	0.69	0.48	1.17
Toughmax	0.65	0.43	1.08
Average	0.80	0.50	1.40
CV (%)	31.80	40.30	0.12
P-value	0.88	0.56	—

CV = coefficient of variation (%)
LSD (P = 0.05) was not significant across the trials.

Table 2. Alfalfa forage quality for first cutting in Watertown.

Entry	CP	ADF	NDF	NDFD	Lignin	RFV	RFQ
Genuity	20.4	31.3	34.8	45.5	8.7	172.7	179.0
Check	19.9	30.4	34.8	43.7	8.2	174.0	174.0
Phirst Extra	18.1	33.7	38.7	41.8	9.0	151.3	147.3
Crave	20.4	29.6	33.4	44.9	8.0	183.3	185.7
Persist II	20.2	32.0	35.8	45.0	8.9	167.3	170.7
Salinity Max	21.5	30.5	34.1	45.4	8.0	182.0	187.0
Prolific I	19.7	34.9	40.0	40.3	9.1	145.0	136.7
Toughmax	20.3	32.5	36.7	42.9	8.5	161.7	160.3
Average	20.1	31.9	36.0	43.7	8.5	167.2	167.6
LSD (P = 0.05)	NS	NS	NS	3.7	NS	NS	34.2
CV (%)	9.4	7.6	8.0	4.8	7.5	10.7	11.7
P-Value	0.62	0.20	0.17	0.07	0.30	0.17	0.06

NS = not significant at 0.05 level of probability.
CV = coefficient of variation (%); measure of variability of experimental error.

Forage Quality

There were significant differences on alfalfa varieties for digestible neutral detergent fiber (NDFD) and relative forage quality (RFQ) for the first cutting. Highest and lowest values for NDFD and RFQ were found for Genuity and Prolific I, respectively. Interestingly, there were no significant differences for varieties on crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), lignin content, and relative feed value (RFV).

Summary

Results from the trial show very small differences among the varieties at this location. However, higher yields were produced by Genuity during the first cutting completed mid-summer, and then Persist II took the lead with the second cutting in early September. The research plot in Redfield was not successful. The high levels of salt, along with extensive periods of rain, did not allow the seeds to germinate during the 2015 growing season.

This information is needed in the state as there has been very little research performed on the forages of South Dakota since 2011. The idea of bringing variety trials back provides current knowledge of what actually happens in the field even when the conditions are not optimum.

It is important to remember weather patterns are a significant factor affecting yield and quality every growing season.

For questions on this report, please contact Karla A. Hernandez at karla.hernandez@sdstate.edu.