



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Plant Materials Center

June 2010



Sideoats Grama

(*Bouteloua curtipendula*)

Performance Trials

North Dakota, South Dakota, and Minnesota



Who We Are

Plants are an important tool for conservation. The Bismarck Plant Materials Center (PMC) is part of the United States Department of Agriculture, Natural Resources Conservation Service (USDA, NRCS). It is one of a network of 27 centers nationwide dedicated to providing vegetative solutions to conservation problems. The Plant Materials program has been providing conservation plant materials and technology since 1934.

Contact Us

*USDA, NRCS Plant Materials Center
3308 University Drive
Bismarck, ND 58504
Phone: (701)250-4330
Fax: (701)250-4334
<http://Plant-Materials.nrcs.usda.gov>*

Acknowledgements

Cooperators and partners in the warm-season grass evaluation trials, together with the USDA, NRCS Plant Materials Center at Bismarck, ND, have included: the U.S. Department of Interior, Fish and Wildlife Service (J. Clark Salyer National Wildlife Refuge near Upham, ND; the Wetland Management District at Fergus Falls, MN; and the Karl E. Mundt National Wildlife Refuge near Pickstown, SD); the South Dakota Department of Agriculture Forestry Division; the South Dakota Department of Game, Fish, and Parks; the Minnesota Department of Natural Resources, Division of Forestry; the U.S. Army Corps of Engineers; the USDA, NRCS field and area offices and Soil and Water Conservation District offices located at Bottineau, ND; Fergus Falls, MN; Lake Andes, SD; Onida, SD; Rochester, MN; and Pierre, SD; the Southeastern Minnesota Association of Soil and Water Conservation Districts; the Hiawatha Valley Resource Conservation and Development Area (Minnesota); and the North Central Resource Conservation and Development Office (South Dakota).

*In this photo:
sideoats grama seed
remains as clumps
of spikelets after
processing*

Sideoats Grama (*Bouteloua curtipendula*)

Performance Trials North Dakota, South Dakota, and Minnesota

*Dwight Tober, Plant Materials Specialist; Nancy Jensen, Agronomist;
Wayne Duckwitz, Plant Materials Center Manager;
and Mike Knudson, Assistant Plant Materials Center Manager;
USDA, Natural Resources Conservation Service, Bismarck, North Dakota*

Sideoats grama [*Bouteloua curtipendula* (Michx.)Torr.] is a warm-season, perennial grass. It is a sod forming grass with short, scaly rhizomes but has a tufted, bunchy appearance. It grows 8-24 inches in height and is considered a short to midstatured grass. The leaves have distinct stiff hairs along the margins. They are normally flat and bluish green with a purplish cast in the early stages of growth. Late in the summer, the entire plant may take on a reddish cast. The basal leaves curl and dry to a brownish white upon curing. The small, oat-like seeds hang down uniformly on one side of the stem, hence the name “sideoats.” The plant is quite showy at flowering with its reddish orange anthers and purplish spikes (see inside back cover).

Sideoats grama occurs naturally throughout the United States except for the Northwest and Southeast. It extends west from southern Ontario to Alberta, Canada and south into Mexico (Larson and Johnson, 1999). It grows in elevations ranging from below 325 ft to 8,200 ft (Barkworth et al., 2007). Sideoats grama is common in a variety of upland habitats including dry prairie, foothills, pine savanna, and rocky or eroded slopes, often in thinly developed, calcareous, and fine textured soils. It is often growing in association with blue grama, western wheatgrass, and little bluestem but may be found growing in association with Indiangrass, switchgrass, and big bluestem on overflow ecological sites.

Ease of establishment, good seedling vigor, and drought tolerance are recognized attributes. Sideoats grama is considered a good quality winter and summer forage. It is relished by livestock and grazing wildlife and its seeds are eaten by upland birds (Larson and Johnson, 1999).

Dry matter forage production and other plant performance



Figure 1. Locations of warm-season grass trials in North Dakota, South Dakota, and Minnesota

documentation were compiled for sideoats grama and six other warm-season grass species from 1982 to 1992 at six sites in North Dakota, South Dakota, and Minnesota (Jacobson et al., 1986). The effect of seed origin (parentage) on plant performance was observed. Four varieties of sideoats grama were evaluated with origin varying from North Dakota to Nebraska (USDA, 2006).

Trial Sites

The trial sites were studied in cooperation with numerous partners (see acknowledgements inside front cover). They were located near Upham, ND; Fergus Falls, MN; Rochester, MN; Lake Andes, SD; Onida, SD; and Fort Pierre, SD (Fig. 1). Soils and precipitation information are included with the tables (pages 6-11). Growing seasons at the six locations varied from an average of 110 days at Upham, ND, to an average of 150 days at Rochester, MN. Average annual precipitation ranged from 15 to 30 inches. Seven to nine different species of warm-season grasses were evaluated at each site. Each species included two or more varieties or seed sources. Sideoats grama is the only species presented in this report.



Methods and Materials

The experimental design was a randomized complete block with three replications for data collection. An evaluation array was seeded for demonstration purposes. Plot size varied from 12 to 15 feet in width, and from 60 to 100 feet in length. A clean, firm seedbed was prepared by disking, harrowing, and roller packing. The plots were seeded using a grass drill. Herbicides were used for weed control. Biomass residue was removed each spring either by mowing and raking, or burning. No fertilizer was applied.

Data collection at all six locations included stand ratings, plant height, weed contamination, stand index density, phenology, and annual biomass production. Only forage production, stand density, and phenology are presented and discussed in this report.



Plots were planted into a clean, firm seedbed

Stand index density was determined by estimating the number of plants in a 9-inch by 16-inch quadrat. Ten quadrats were systematically counted near the center line of each plot. A density index rating was developed. Values ranging from 0 to 40 plants per square foot were used to estimate density for each subsample.

Dry matter yield was documented at all sites beginning the second year following establishment. Biomass production was determined by clipping a 2-foot by 10-foot subplot in each plot with a forage harvester. Sampling dates were as close as possible to

the end of the growing season (first killing frost). The sample plots were systematically located within each plot across the treatment and clipped to a stubble height of approximately 2 inches. After weighing the large samples, small (100 gram) grab samples were weighed, oven-dried at 60 degrees C for 48 hours, and used for dry matter determinations. Forage production is reported in pounds per acre (USDA NRCS, multiple years).



Estimating plant density in 10 quadrats/plot to determine stand index

Plots were seeded with the same native grass drill

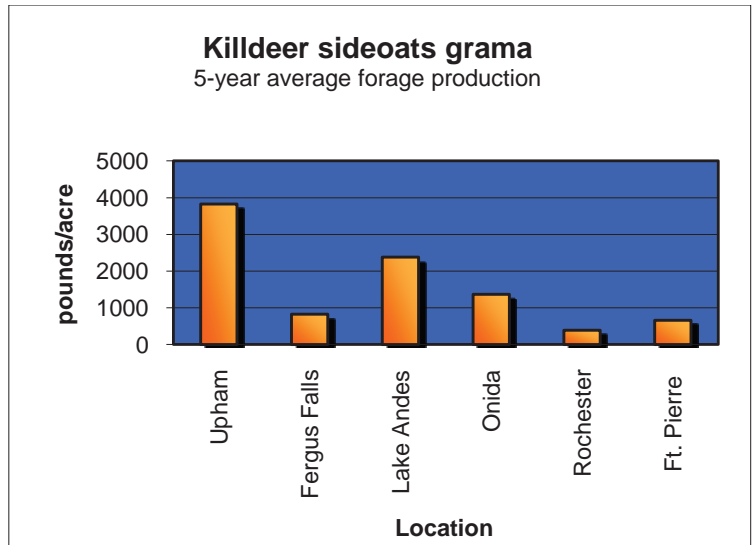


Harvesting 10-foot by 2-foot strips to determine forage production

Variety/Seed Source Origins (USDA SCS, 1994)

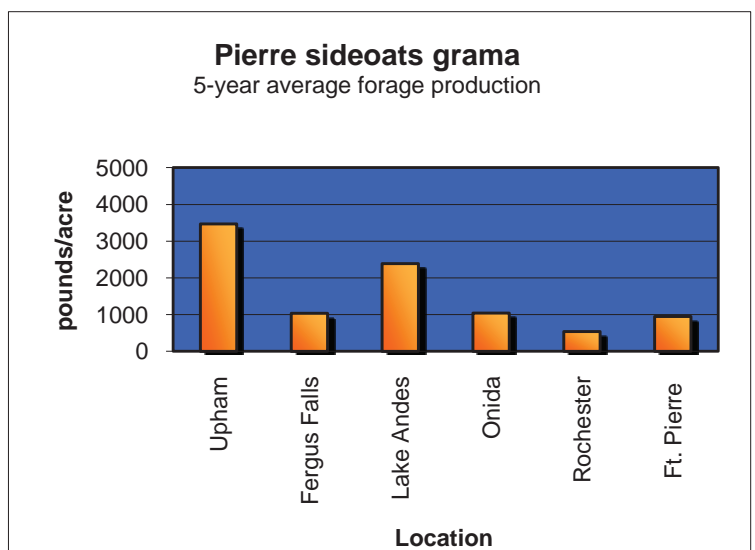
Killdeer

Seed was collected in 1956 from native stands in western North Dakota. The collection sites were in Bowman County near the town of Bowman, and Dunn County, near the town of Killdeer. Annual precipitation in these areas averages approximately 15 inches. The seed collections were tested at the Bismarck Plant Materials Center (PMC) as PM-ND-143 and PM-ND-89 against various other field collections. They were selected as the two outstanding field collections from North Dakota. The seed of these two collections was composited and informally released as Killdeer in the late 1960s by the USDA, SCS (now NRCS), Bismarck, ND. Killdeer is described as outstanding in vigor and leafiness, fair seed production, and free from disease at Bismarck. Collections comprising Killdeer have the most northern origins when compared to Pierre, Butte, or Trailway. Common seed is available for Killdeer. The original breeder seed field is no longer maintained by USDA. Killdeer had the highest forage production at Upham, the northernmost site.



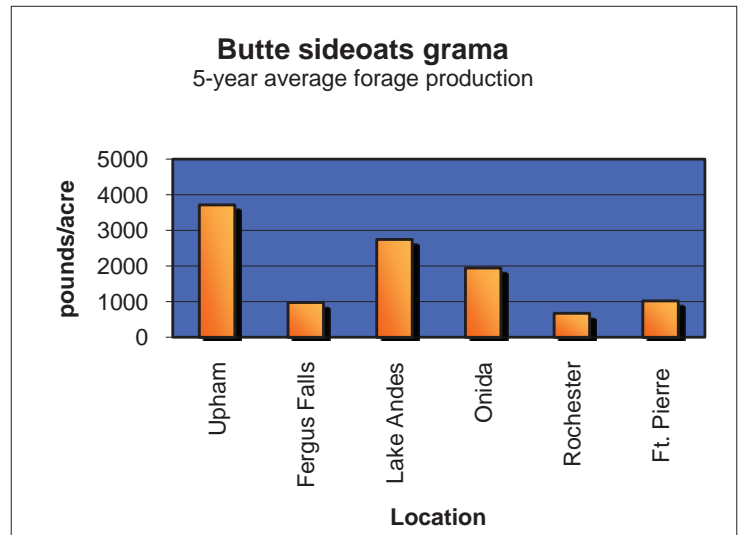
Pierre

The original seed was collected in 1954 on native range in Stanley County, South Dakota, approximately five miles west of the city of Fort Pierre. Seed was collected from several plants with outstanding vigor, growing on a south slope in a shale range site. The seed collection was tested at the Bismarck PMC as PM-SD-251 and PI-476980. The comparison trials had many other field collections and the variety Butte. Phenology, forage yield, and adaptation to soil and climate were extensively examined in advanced evaluation studies and field plantings in North Dakota, South Dakota, and Minnesota. Pierre sideoats grama was informally released by USDA, SCS (now NRCS), Bismarck, ND, and the South Dakota Agriculture Experiment Station, Brookings, SD, in the mid 1960s. Pierre is described as outstanding in vigor, leafiness, freedom from disease, seedling vigor, and persistence in a cold, semiarid environment. It compares well with other sideoats releases in forage and seed production. Foundation and certified seed is available. Pierre had the highest forage production at Upham and Lake Andes which had the two most fertile soils.



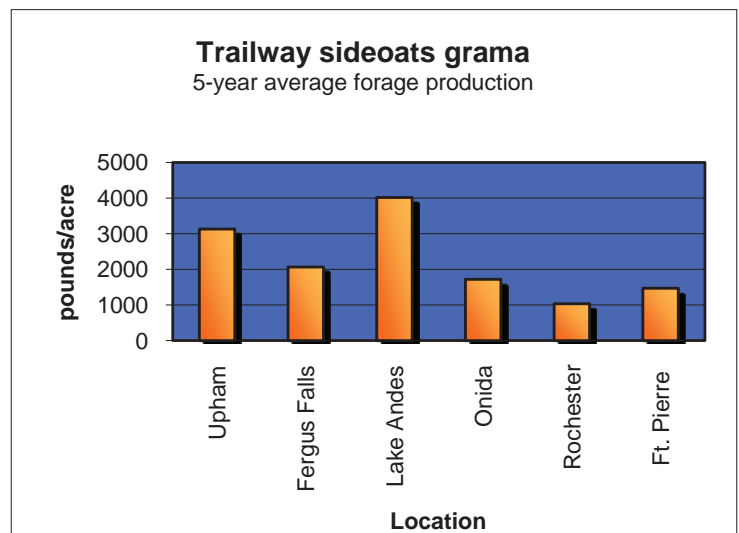
Butte

Native collections were from Holt County and Platte County in northeast Nebraska. Field plantings revealed superiority of seedling vigor and establishment when compared with other sources. The collections were eventually combined and increased for further testing as Nebraska 37. Seed was distributed for testing in 1948. Butte was released as a cultivar in 1958 by the Nebraska Agriculture Experiment Station; Plant Science Research Division, ARS; and Plant Sciences Division, SCS. Butte is described as winter-hardy, long-lived, relatively early maturing, large caryopsis, and excellent seedling vigor. In eastern Nebraska, it produces an excellent seed crop, maturing in mid-August. It matures seed before frost in north-central and western districts of Nebraska and is grown for seed as far north as central Minnesota. Similar to Killdeer and Pierre, forage production was highest at Upham and Lake Andes.



Trailway

The original plant material was collected in 1935 from a population growing along an abandoned roadway in northern Holt County in northeast Nebraska. The true identity is unknown because it was collected along a roadside. Plants of the collection were compared with other collections at the Nebraska Agriculture Experiment Station and selected for late maturity and freedom from rust. The selection was carried through three generations, resulting in harvest and increase of seed from these groups and combined for increase and testing as Nebraska 52. Trailway was released as a cultivar in 1958. It is described as winter-hardy, long-lived, late maturing, and comparable in growth type to varieties of more southerly origin. It is somewhat indeterminate in heading and flowering, exhibiting considerable variability in maturity. It requires most of the growing season to mature seed in eastern Nebraska, and may fail to produce seed crops in regions with shorter seasons. In Nebraska, it is recommended for upland plantings in eastern and southern districts. It had the highest forage production at Lake Andes, the southernmost site.



Upham, North Dakota

Average annual precipitation for the five years of forage production harvest was near normal. Killdeer, the northernmost origin variety tested, had the highest average forage production (3,826 lb/ac) and the highest average density (25) at Upham, which was the northernmost site. Butte was rated second in both categories (3,718 lb/ac and 24), which was somewhat unusual given its Nebraska origin. Butte is recommended for use in North Dakota (Sedivec et al., 2001). Pierre performed well and was ranked third at this location. Trailway rated last in both categories (3,134 lb/ac and 14) and had severe winter injury the first year. The plots averaged 2 plants/ft² recorded as dead the following spring. Trailway had the highest average forage production the two years below average rainfall was received, and the lowest forage production the three years above average rainfall was received. During three of the five years, there were no significant differences (P=.05) in average forage production among varieties. Both Killdeer and Pierre had mature seed in early August compared to Butte which had 50 percent ripe seed, and Trailway which was just beginning to show ripe seed.

Upham, ND (MLRA 55A, north central North Dakota)

Average Annual Precipitation: 16.08 inches

Soils: Great Bend silty clay loam

Variety	(pounds/acre)							Stand Index ²	Phenology ³
	Biomass ¹								
(inches)	1983	1984	1985	1986	1987	Avg	Rank	1982-1984*	Early Aug.
Precip. deviation	(0.98)	(0.9)	(1.63)	(-0.09)	(-1.23)				
Killdeer	5354a	3844a	4472a	3312a	2150a	3826	1	25	8
Pierre	4432a	3475ab	4303a	3550a	1582a	3468	3	23	8
Butte	5427a	3978a	4315a	2885a	1988a	3718	2	24	7
Trailway	3529a	2542b	2965b	3881a	2757a	3134	4	14	6

Statistical Analyses: Duncan's New Multiple Range Test, means with same letter are not significantly different (P=.05)

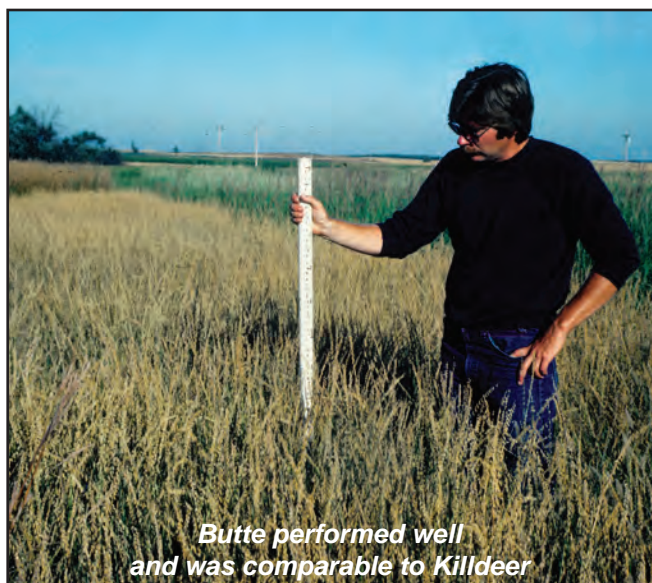
¹**Biomass:** flail-type forage harvester, 2' x 10' strip in each plot clipped to a 2-inch stubble height

²**Stand Index:** Estimate of plant density in 10 (1.0 sq ft) quadrats per plot. Full frame=40

³**Phenology (1984):** 1=vegetative; 2=jointing; 3=first emergence of inflorescence; 4=first anthesis, 10 culms or more;

5=50% anthesis; 6=first seed ripe; 7=50% seed ripe; 8=seed mature; 9=complete dormancy

* Data is an average from these years



Butte performed well and was comparable to Killdeer



A mosaic of plots

Fergus Falls, Minnesota

The soils on this site are a well drained loam complex formed in calcareous glacial till. Two years were well below normal precipitation, 1983 (-3.96) and 1987 (-7.2), and 1986 was more than 6 inches above normal. Trailway had highest average forage yield every year even though average stand index densities (11) were less than half of the other three varieties. Killdeer, Pierre, and Butte had average stand index ratings of 26, 25, and 23, respectively. The five-year average forage yield for Trailway was 2,068 lb/ac, which was twice that of second ranked Pierre (1,036 lb/ac). The other three varieties were not significantly different (P=.05) in any of the five years. Although Trailway had the highest forage productions, it would be questionable how long the higher yields would continue given the reduced stand index. Killdeer and Pierre had mature seed in early September. Butte was 50 percent ripe, and Trailway was still at 50 percent anthesis.

Fergus Falls, MN (MLRA 102A, west central Minnesota)
Average Annual Precipitation: 23.52 inches
Soils: Barnes and Langhei loam

Variety	(pounds/acre)							Stand Index ²	Phenology ³
	Biomass ¹								
(inches)	1983	1984	1985	1986	1987	Avg	Rank	1983-1984*	Early Sept.
Precip. deviation	(-3.96)	(1.54)	(.85)	(6.23)	(-7.2)				
Killdeer	1372a	1189ab	685b	572b	317b	827	4	26	8
Pierre	1789a	1189ab	914b	853b	436b	1036	2	25	8
Butte	1782a	947b	835b	817b	512b	978	3	23	7
Trailway	1795a	2683a	1911a	2507a	1445a	2068	1	11	5

Statistical Analyses: Duncan’s New Multiple Range Test, means with same letter are not significantly different (P=.05)

¹**Biomass:** flail-type forage harvester, 2’ x 10’ strip in each plot clipped to a 2-inch stubble height

²**Stand Index:** Estimate of plant density in 10 (1.0 sq ft) quadrats per plot. Full frame=40

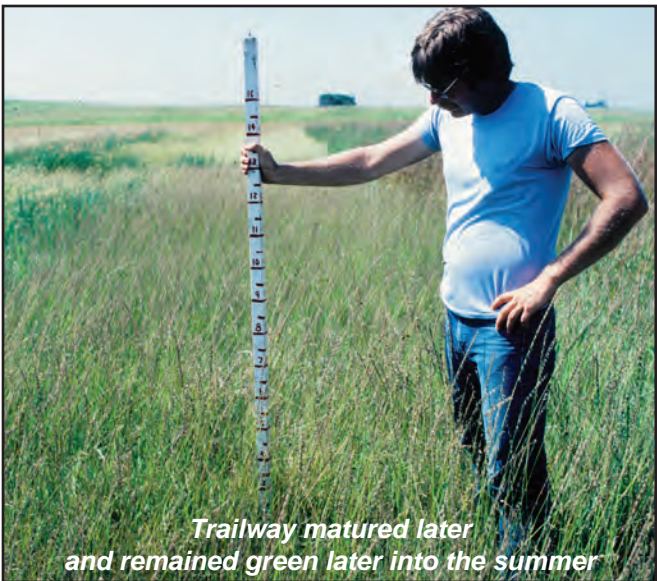
³**Phenology (1983):** 1=vegetative; 2=jointing; 3=first emergence of inflorescence; 4=first anthesis, 10 culms or more;

5=50% anthesis; 6=first seed ripe; 7=50% seed ripe; 8=seed mature; 9=complete dormancy

* Data is an average from these years



Warm-season plots showing fall colors



Trailway matured later and remained green later into the summer

Lake Andes, South Dakota

The soils are a fertile Agar silt loam. Three years of well above average rainfall influenced forage production at this site. Above average precipitation amounts totaled 12.9 inches (1984), 10.7 inches (1986), and 3.71 (1987). This was the most southern of the test sites and Trailway, the latest maturing variety, had the highest forage yield at 4,020 lb/ac. The other three varieties averaged less than 2,800 lb/ac. The average stand index counts were considerably higher at Lake Andes compared to the other five sites. The northernmost variety Killdeer again had the highest average density at 38, compared to Pierre and Butte, both at 26, and Trailway the lowest at 17. The longer growing season at this site allowed more time for varieties to mature. In early August, Killdeer, and Pierre already had mature seed, while Butte had 50 percent ripe seed, and Trailway was still at 50 percent anthesis.

Lake Andes, SD (MLRA 55C, southeast South Dakota)

Average Annual Precipitation: 21.37 inches

Soils: Agar silt loam

Variety	(pounds/acre)							Stand Index ²	Phenology ³
	Biomass ¹								
(inches)	1984	1985	1986	1987	1988*	Avg	Rank	1984	Early Aug.
Precip. deviation	(12.9)	(-.21)	(10.7)	(3.71)	(1.0)				
Killdeer	3559a	2776a	3465a	1432a	677	2381	4	38	8
Pierre	3572a	2921a	3079a	1276a	1092	2388	3	26	8
Butte	3827a	3069a	3927a	1663a	1255	2748	2	26	7
Trailway	4602a	3865a	5868a	3222a	2543	4020	1	17	5

Statistical Analyses: Duncan's New Multiple Range Test, means with same letter are not significantly different (P=.05)

¹**Biomass:** flail-type forage harvester, 2' x 10' strip in each plot clipped to a 2-inch stubble height

²**Stand Index:** Estimate of plant density in 10 (1.0 sq ft) quadrats per plot. Full frame=40

³**Phenology (1984):** 1=vegetative; 2=jointing; 3=first emergence of inflorescence; 4=first anthesis, 10 culms or more; 5=50% anthesis; 6=first seed ripe; 7=50% seed ripe; 8=seed mature; 9=complete dormancy

* No statistical analyses. Replications within a variety were not clipped due to poor stand or excess weeds.



Replicated plots included seven different species



Forage production was harvested at the end of the growing season

Onida, South Dakota

The soil at the site is a Lowry silt loam, which is fertile but droughty. Average annual precipitation was near normal for 3 years, considerably above normal in 1986 (5.27 inches), and below normal in 1988 (-4.07 inches). Phenology data collected in early August showed Killdeer and Pierre to be the same at 50 percent ripe seed. Butte and Trailway were later maturing at 50 percent anthesis. The later maturing varieties also had the highest average forage production values at 1,946 lb/ac for Butte, and 1,723 lb/ac for Trailway. Killdeer and Pierre were considerably less at 1,368 lb/ac, and 1,042 lb/ac, respectively. The highest forage production recorded was in 1986 when the average annual rainfall was over 5 inches. Butte produced 3,948 lb/ac. The lowest forage production was in 1985 when the average annual rainfall was near normal. Killdeer produced only 333 lb/ac. Stand index counts were highest for Pierre (23), and lowest for Trailway (14).

Onida, SD (MLRA 53C, central South Dakota)
Average Annual Precipitation: 17.47 inches
Soils: Lowry silt loam

Variety	(pounds/acre)							Stand Index ²	Phenology ³
	Biomass ¹								
(inches)	1985	1986	1987	1988	1989	Avg	Rank	1984-1985*	Early Aug.
Precip. deviation	(.13)	(5.27)	(-1.86)	(-4.07)	(.33)				
Killdeer	333b	2196a	2685a	733a	893a	1368	3	16	7
Pierre	388b	2734a	1248b	340a	503a	1042	4	23	7
Butte	2184a	3948a	2496ab	622a	482a	1946	1	15	5
Trailway	1189b	3913a	2419ab	515a	580a	1723	2	14	5

Statistical Analyses: Duncan's New Multiple Range Test, means with same letter are not significantly different (P=.05)
¹**Biomass:** flail-type forage harvester, 2' x 10' strip in each plot clipped to a 2-inch stubble height
²**Stand Index:** Estimate of plant density in 10 (1.0 sq ft) quadrats per plot. Full frame=40
³**Phenology (1986):** 1=vegetative; 2=jointing; 3=first emergence of inflorescence; 4=first anthesis, 10 culms or more; 5=50% anthesis; 6=first seed ripe; 7=50% seed ripe; 8=seed mature; 9=complete dormancy
 * Data is an average from these years



A flail-knife harvester was used to collect forage samples



Green-up after burning to remove old growth

Rochester, Minnesota

The soils are a well drained, rolling silt loam. This site had the highest average annual precipitation, 29.58 inches, of the six test sites. Precipitation was quite variable from year to year. It was below normal in 1987 (-2.63), 1988 (-8.19), and 1989 (-6.85). Precipitation was substantially above normal in 1990 (14.36), and 1991 (7.33). Trailway ranked first for 5-year average forage production (1,037 lb/ac), which was expected because it is a later maturing seed source. Killdeer was ranked last (390 lb/ac). Stand index counts were similar except for Trailway which was the lowest at 13. Pierre was highest at 23. Killdeer and Pierre had the earliest maturity with first seed ripe in early August. Trailway was 50 percent anthesis at this time, and Butte was at first anthesis.

Rochester, MN (MLRA 105, southeast Minnesota)

Average Annual Precipitation: 29.58 inches

Soils: Mount Carrol silt loam

Variety	(pounds/acre)							Stand Index ²	Phenology ³
	Biomass ¹								
(inches)	1987	1988	1989	1990	1991	Avg	Rank	1985-1987*	Early Aug.
Precip. deviation	(-2.63)	(-8.19)	(-6.85)	(14.36)	(7.33)				
Killdeer	910b	320a	216b	194b	312a	390	4	21	6
Pierre	1065b	504ab	316b	617ab	194a	539	3	23	6
Butte	1554ab	595a	443ab	420ab	366a	675	2	20	4
Trailway	2218a	785b	681a	954a	547a	1037	1	13	5

Statistical Analyses: Duncan's New Multiple Range Test, means with same letter are not significantly different (P=.05)

¹**Biomass:** flail-type forage harvester, 2' x 10' strip in each plot clipped to a 2-inch stubble height

²**Stand Index:** Estimate of plant density in 10 (1.0 sq ft) quadrats per plot. Full frame=40

³**Phenology (1988, 1989):** 1=vegetative; 2=jointing; 3=first emergence of inflorescence; 4=first anthesis, 10 culms or more; 5=50% anthesis; 6=first seed ripe; 7=50% seed ripe; 8=seed mature; 9=complete dormancy

* Data is an average from these years



Trailway had the highest 5-year average forage production



Plots were burned each spring so only new growth was sampled

Fort Pierre, South Dakota

The soil at the site is Promise clay, which is fertile with low permeability. Infiltration is less than 0.2 inch/hour. Three consecutive years (1988, 1989, and 1990) of significantly lower than normal rainfall greatly reduced annual and the 5-year average forage yields. Trailway had the highest 5-year average forage production (1,472 lb/ac) and Killdeer was lowest (661 lb/ac). Stand index counts were similar. Pierre was the highest at 29, and Trailway the lowest at 23. Phenology ratings in early August showed Killdeer and Pierre to be at 50 percent seed ripe. Butte was the next mature variety at first seed ripe. Trailway was at 50 percent anthesis.

Fort Pierre, SD (MLRA 63A, central South Dakota)

Average Annual Precipitation: 18.08 inches

Soils: Promise clay

Variety	(pounds/acre)							Stand Index ²	Phenology ³
	Biomass ¹								
(inches)	1988	1989	1990	1991	1992	Avg	Rank	1986-1987*	Early Aug.
Precip. deviation	(-7.3)	(-4.77)	(-5.74)	(.87)	(.79)				
Killdeer	589bc	95c	639b	1126a	858c	661	4	24	7
Pierre	832ab	303ab	1066ab	1049a	1496bc	949	3	29	7
Butte	470c	213bc	929ab	1353a	2153b	1023	2	25	6
Trailway	955a	460a	1555a	1100a	3292a	1472	1	23	5

Statistical Analyses: Duncan's New Multiple Range Test, means with same letter are not significantly different (P=.05)

¹**Biomass:** flail-type forage harvester, 2' x 10' strip in each plot clipped to a 2-inch stubble height

²**Stand Index:** Estimate of plant density in 10 (1.0 sq ft) quadrats per plot. Full frame=40

³**Phenology (1990):** 1=vegetative; 2=jointing; 3=first emergence of inflorescence; 4=first anthesis, 10 culms or more;

5=50% anthesis; 6=first seed ripe; 7=50% seed ripe; 8=seed mature; 9=complete dormancy

* Data is an average from these years



An array of all the varieties for a species planted together was established at each location



Killdeer had the lowest 5-year average forage production

Results and Discussion

Sideoats grama is not a high forage production species. Annual forage yields varied on all sites, primarily dependent on soils and seasonal precipitation. Average annual yields ranged from highs of over 4,000 lb/ac to lows of less than 1,000 lb/ac. The northernmost varieties (Killdeer and Pierre) generally had the highest forage production at the more northern locations, and Butte and Trailway had the highest production at the more southern locations.

Maturity is earlier for sideoats grama than most other warm-season species. Studies have shown crude protein to drop below 10 percent by early to mid-July depending on location, and 5 to 6 percent by early October (USDA NRCS and NDSU, 2009). Killdeer and Pierre were similar in maturity and usually had ripe seed in mid-August, depending on location. Butte was next in maturity at about 50 percent seed ripe. Trailway was the latest maturing variety tested and was often still flowering in mid-August.

Killdeer and Pierre had the highest density index counts at five of the six sites. Trailway had the lowest density index counts at all six sites, and winter injury at Upham. Additional winter injury would be anticipated when southern origin varieties are grazed or hayed. Only seed sources or varieties of sideoats grama that originate locally or that have been performance tested should be planted for long-term conservation use. Production of viable seed and winter survival are important components of local adaptation (USDA NRCS, 2006).



Variety Recommendations for North Dakota, South Dakota, and Minnesota

Variety	Origin	Average Number of Days to Ripe Seed after July 15	Where Adapted
Killdeer	western North Dakota	30	ND, SD, MN
Pierre	central South Dakota	35	ND, SD, MN
Butte	northeast Nebraska	45	ND, SD, MN
Trailway	northeast Nebraska (roadside)	65	SD, south half MN

Key Establishment and Management Considerations (USDA 2010)

- **Soils/Adaptation:** Adapted to diverse site conditions, from sandy to clayey textured soils. Best stands are on medium to fine textured upland soils. Moderately drought tolerant on rocky, shallow soils. Performs best in 12 to 25 inch precipitation zone.
- **Seeding:** Sideoats grama seed, on the open market, usually consists of clumps of at least partially whole spikes. As long as a seed unit has a germinable caryopsis in the spike fragment, it is considered viable and used to determine PLS. Clumps of seed may plug seed tubes when drilling depending on seeding rate. Clumps can be broken apart with additional hammermilling if necessary. There are approximately 180,000 seeds/lb. The NRCS recommended seeding rate for North Dakota is 6.0 to 7.5 Pure Live Seed (PLS) lb/ac. This is approximately 25 to 30 seeds/ft². Broadcast seeding rates are higher than recommended drilled seeding rates, and are generally doubled. Seeding rates vary across the United States, generally increasing from west to east. Spring seeding is recommended. A firm seedbed is essential for a shallow seeding depth ($\frac{1}{2}$ - $\frac{3}{4}$ inch). Germination is greatly reduced when seeds are planted deeper than 1 inch (USDA NRCS, 2003). Sideoats grama is considered quick to establish. It is often seeded as part of a mixture for its ease of establishment and early erosion control benefits.



photo credit: E. Brent Turnipseed, SDSU, Brookings, SD

- **Weed Control:** Abundant broadleaf weeds and annual grasses need to be controlled by mowing and/or herbicide application. Dense stands of foxtail (*Setaria* spp.) can be very competitive and significantly reduce stand establishment. Herbicides generally are more effective than mowing in controlling annual grasses. Consult local Extension specialists for specific recommendations.
- **Fertilization:** Forage production, quality, and seed production can be improved with fertilizer if nitrogen or other nutrients are limiting. A soil test is recommended.
- **Grazing/Haying/Mowing:** Sideoats grama is not recommended for hay production because of its moderate growth stature. It will provide excellent grazing starting in late June and continuing through the growing season. Palatability and nutritional quality remain fairly high into the growing season. Grazing value is limited due to moderate production potential. Leaving a stubble height of at least two inches is recommended. A rotational grazing system will extend plant growth, reduce trampling loss, enhance utilization, and increase nutritional quality and palatability. Sideoats grama is usually seeded/grazed as one component in a mixture of native species (USDA and NDSU, 2009).
- **Burning:** Sideoats grama benefits from burning of plant residue prior to initiation of spring growth. Advantages to burning include low impact residue removal, weed control, more uniform growth initiation and seed ripening, improved nutrient cycling, and more vigorous growth. Burning annually at the Bismarck PMC has increased long-term seed yields.
- **Seed Harvest:** Seed shattering may occur shortly after the first seed is ripe. Conventional grain harvesting equipment can be used with proper setting adjustments, screen sizes, and reduced air flow. Seed strippers work well for harvesting sideoats grama seed. Seed is subject to heating, and moisture levels may require drying. Air drying is recommended as heat may cause damage to the seed. Fields should be as weed-free as possible prior to harvest to aid in the seed cleaning process.



*Demonstration plot of Pierre sideoats grama
at Wessington Springs, SD*



A prescribed burn is an important management tool

References

Barkworth, M.E., L.K. Anderton, K.M. Capels, S. Long, and M.B. Piep. 2007. Manual of grasses for North America. Intermountain Herbarium and Utah State University Press, Logan, UT.

Jacobson, E.T., D.A. Tober, R.J. Haas, and D.C. Darris. 1986. The performance of selected cultivars of warm-season grasses in the northern prairie and plains states. p. 215-221. *In* G.K. Clambey and R.H. Pemble (ed.) Proc. North Am. Prairie Conf., 9th, Moorhead, MN. 29 July-1 Aug. 1984 Tri-College Univ. Cent. for Environ. Studies, North Dakota State Univ., Fargo.

Larson, G.E., and J.R. Johnson. 1999. Plants of the Bear Lodge Mountains. B732 South Dakota State University College of Agriculture and Biological Sciences. South Dakota Agricultural Experiment Station, Brookings, SD. p. 384.

Sedivec, K., D. Tober, J. Berdahl. 2001. Grass varieties for North Dakota. NDSU Extension Service, Fargo, ND. 20p.

USDA NRCS. 2003. Five keys to successful grass seeding. Plant Materials Center, Bismarck, ND. 6p.

USDA NRCS. 2010. The PLANTS Database (<http://plants.usda.gov>, 2 March 2010). Sideoats grama fact sheet and plant guide. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA NRCS Plant Materials Center. 1983, 1984, 1985, 1986/1987, 1988/1989, 1990/1991, 1992/1993. Technical report, part 1, grasses, forbs, and legumes, Bismarck, ND.

USDA NRCS Plant Materials Center. 2006. Origins of native grass and forb releases. Bismarck, ND. brochure 12p.

USDA NRCS and NDSU. 2009. Grasses for the Northern Plains; Growth patterns, forage characteristics, and wildlife values. Volume II – warm-season. Pub. R-1390. Fargo, ND. 66p.

USDA SCS. 1994. Grass varieties in the United States. Agric. Handbook No. 170. Washington, D.C. p. 194-199.



Sideoats grama and switchgrass are compatible

**Seed production field of Butte sideoats grama
at farm of Kaste Seed, Fertile, MN**



“The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual’s income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.”

June 2010