

## PLANT MATERIALS TECHNICAL NOTE

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### SIDEOATS GRAMA *Bouteloua curtipendula* (Michx.) Torr.

#### A Native Perennial Warm Season Grass for Conservation Use in Montana and Wyoming

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Figure 1. Sideoats grama (NRCS photo)

#### General Description

Sideoats grama, (*Bouteloua curtipendula* [Michx.] Torr), is a deep-rooted, warm season perennial grass, found throughout most of the United States (Figure 1). It is a major component of rangeland in the central and southern Great Plains, and commonly grows in association with big bluestem (*Adropogon gerardii*) and little bluestem (*Schizachyrium scoparium*). Sideoats grama in the northern Great Plains is found in many upland plant communities, but is most common on weakly developed soils of steeper slopes.

Sideoats grama is a medium-size, perennial, sod-forming grass with short, scaly rhizomes but has a tufted, bunched appearance, 8 to 32 inches tall, and is the largest of the grama grasses. Leaves are rather wide, straight, comparatively stiff, and mostly basal. Leaves are normally flat with long

evenly spaced stiff hairs along the margins of the leaf blade and tend to be coarser than the other gramas. It has a blue-green to purplish cast during early growth stages, and the basal leaves curl as it cures to a reddish brown or white color. Flower culms are up to 32 inches in height with 10 to 30 small, very distinct inflorescences (raceme) consisting of a zigzag stalk with small compressed, evenly spaced spikes dangling to one side of the seed stalk (Figure 2). The plant is quite showy at flowering with its reddish orange anthers and purplish spikes.

Sideoats grama is named for the oat-like appearance of the spikes. The entire plant may take on a light reddish appearance later in the summer and fall.



Figure 2. Sideoats grama seedhead. (NRCS photo)

### **Adaptation or Range**

Sideoats is adapted to a broad range of well-drained upland sandy to clayey textured soils, ranging from deep to shallow in depth, but does not do well on loose sands and dense clay soils. In the Great Plains it does well on well-drained uplands, ridges, rocky open slopes, woodlands, and forest openings. Sideoats grama occurs naturally throughout most of the United States. It extends west from southern Ontario to Alberta and south into Mexico. It grows in elevations ranging from below 325 and up to 8200 feet, often growing in association with blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), and little bluestem. It has excellent vigor and persistence, providing erosion cover in areas with annual precipitation ranging from 14 to 16 inches. This species is reported to demonstrate some soil salinity tolerance, but supporting research results could not be found. Sideoats grama is moderately drought tolerant, but less so than blue grama. It is somewhat tolerant of semi-shaded conditions and can be found in open woodlands. It will suffer damage from wildfire or controlled burns when actively growing and under drought stress conditions. In a dormant state it is fairly tolerant of fire, which is used for early weed control and field maintenance. It is also fairly tolerant of spring flooding.

### **Conservation Uses**

Sideoats grama is recommended in grass mixtures for range and pasture, bank stabilization, critical areas, and native gardens. Successful seeding can be obtained on rocky, stony, shallow

sites; and has been observed in nearly pure stands on clayey outcrops, rocky hillsides, and breaks.

Erosion control: Sideoats grama, with its sod-forming ability, performs well as an erosion control species when mixed with the other plants naturally associated with it.

Grazing: Sideoats grama is often overlooked as the valuable range species it is. It produces high quality, nutritious forage that is relished by all classes of livestock. Although not as palatable as some of the smaller grammas, e.g. blue grama, it is more palatable than many other grass species. It produces greater biomass than blue grama, which offsets its slightly lower palatability. It initiates growth in the spring before other grammas, and remains moderately palatable into winter, maintaining a fairly high feed value throughout the year.

As a warm-season grass, sideoats grama provides high quality forage during the summer months when cool season grass quality has diminished. Sideoats grama has a protein content around 15% in June, curing to 4.75% in October, filling the nutritional gap in cool season grass dominated pastures.

Wildlife: Deer and antelope utilize sideoats grama when it is green and tender, whereas elk utilize it throughout the year. Seeds of this species are eaten by wild turkeys.

Sideoats grama may offer an alternative to conventional turfgrass lawn species, especially for low-maintenance and xeric landscapes, conserving water, fertilizers, pesticides, and costs. Warm season species, like sideoats grama, do not initiate growth as early as cool season species, and achieve peak growth during the hot summer months when cool season grasses typically go dormant. Once established, rhizomatous and stoloniferous warm season grasses require minimal irrigation and fertilization, and are competitive against weeds.

### **Stand Establishment**

For best results, plant into a firm, weed-free seedbed to enhance establishment. For optimum establishment, seed in early summer (late May through June) with a seed drill (planter) equipped with seedbox agitators, oversized seed tubes, depth bands, and packer wheels. To prevent sideoats grama seed from clumping and plugging seed tubes, spikes can be separated into individual spikelets, and awns removed from spikelets by processing in a hammer mill. This processing will allow seeds to flow smoothly through the drill. Seed ¼-inch or less deep on light textured soils, and ½-inch deep on heavy textured soils. Use appropriate seeding rates for planting method, between-row spacing, and site conditions (see Table 1). Seeding is more likely to be successful if soil moisture conditions are good and/or if mulch is used to retain soil surface moisture. Under good environmental conditions, most seeds germinate within 7 days. Germination, emergence, and establishment of this species is better than other grama species. Stand establishment is enhanced by early weed control by mechanical or chemical means. Defer grazing until after the second growing season.

### **Planting Rates** (all recommended amounts are based on pure-live-seed [PLS])

Direct Seeding. The full stand drill seeding rates listed in Table 1 are based on 12-inch wide, between-row spacing on a favorable (non-critical area) site. The reported number of seeds per pound for sideoats grama varies widely by source. Use specifications in Montana Plant Materials Technical Note MT-46 (Revision 4) when calculating seeding rates. Seeding rates vary by percentage in the mix, row spacing, site conditions, and planting method (drill versus broadcast). Seeding rates by planting method and site condition are shown in Table 2 and are based on an average and approximate number of seeds per pound. When calculating per acre seeding rates

based on reported seeds per pound, estimate a target of 25 to 30 pure-live-seeds (PLS) per square foot.

Table 1. Seeding specifications for conservation plantings of sideoats grama.

Seeds/lb.	Seeding Date	1 PLS lbs./ac	Full Stand Rate	
		Rate	PLS seeds/ft <sup>2</sup>	lbs. PLS/ac
191,000	early summer	4.4	26	~6.0

Table 2. Seeding rates for sideoats grama as determined by planting method and site condition.

Non-Critical Drilled	Non-Critical Broadcast <sup>†</sup>	Critical Area Drilled <sup>†</sup>	Critical Area Broadcast <sup>‡</sup>
lbs. PLS/ac	lbs. PLS/ac	lbs. PLS/ac	lbs. PLS/ac
6.0	12	12	24

<sup>†</sup> Multiply the non-critical drill rate times 2; <sup>‡</sup> multiply the non-critical drill rate times 4.

## Management

As a mid-statured grass, sideoats grama is intermediate in many respects between the tall and short grass species. Sideoats grama has less resistance to grazing than blue grama because of its taller growth habit, but it remains green longer, thus extending the grazing season. Over use can lead to reduced forage production, carrying capacity, and livestock production. Sideoats grama is very resilient and will return to most ranges under proper grazing management.

## Seed Production

Seed production specifications are shown in Table 3. Harvest by direct combine prior to 10% of the seed heads turning brown and fluffy. Harvested material must be dried to prevent mold and decay. Seed production rates are highly variable.

Table 3. Seed production specifications for sideoats grama.

Row Spacing	Seeding Rate		Irrigated Seed Yield
inches	PLS seeds/ft <sup>2</sup>	lbs. PLS/ac	bulk lbs./ac
42 <sup>†</sup>	30	3.15	280

<sup>†</sup> Duckwitz, W., personal communication.

Seed of sideoats grama can be harvested using a stripper header or by straight combining. Seed shatter is not a major concern, but yield can be reduced under dry, windy conditions. The cultivar

“Pierre” has been harvested from August 10 to September 10 at Bismarck, ND, depending on environmental conditions during the harvest year. Seed production is variable, but averages 280 lb/ac under irrigation and annual fertilizer application. Annual, early-spring, prescribed burning may improve seed production. Sideoats grama varieties differ with respect to seed maturity depending on location of origin. ‘Pierre’, for instance, matures 25 to 35 days earlier than varieties of southern origin, such as ‘Butte’ and ‘Trailway’. Some varieties of southern origin will not consistently produce fully mature seed at northern locations.

Each sideoats grama seed crop utilizes approximately 150 pounds of nitrogen per acre (per year). More efficient use of nitrogen can be obtained by applying half this amount early—just before the crop begins growth—and the remainder two to three weeks later..

Irrigation and fertilization of cultivated rows of sideoats grama promotes increased seed production of this species. It responded well to nitrogen fertilization in seed production experiments. Significantly increased seed yields were obtained, given favorable moisture conditions, with supplemental nitrogen at all rates. Supplemental nitrogen did not increase seed yield under drought conditions at any rate.

On the open market sideoats grama seed can consist of spikes or spikelets, or a mixture of both, creating variability in the content of viable seed. When determining proper seeding rates, always base calculations on the percent PLS (Pure Live Seed).

### **Biomass Production**

Annual biomass production studies testing sideoats grama were conducted in North Dakota on four varieties recommended for northern climates. ‘Killdeer’ and ‘Pierre’ had the highest annual average production at the northernmost test sites, whereas ‘Trailway’ and ‘Butte’ were best at the southernmost locations. At the northernmost study site, Killdeer averaged 3,826 pounds per acre (lbs./ac) and Pierre averaged 3,468 pounds per acre. Trailway averaged 2,068 pounds per acre and Butte averaged 978 pounds per acre at the southernmost location, while Killdeer and Pierre averaged 827 pounds per acre and 1,036 pounds per acre, respectively. Trailway averaged 2,040 pounds per acre and Butte averaged 2,748 pounds per acre, when averaged across all locations and all years.

### **Limitations**

There are no reported serious pests of sideoats grama.

### **Releases**

Southern strains or seed sources of sideoats grama usually produce more forage but may not prove as winter hardy as northern strains. Use proven varieties for your area. In Montana and northern Wyoming, Killdeer and Pierre are often utilized with good success. In mid- to southern Wyoming, Butte and Trailway are reported to perform well.

The following describes varietal releases of sideoats grama for Montana and Wyoming, for information on additional released varieties refer to sideoats grama plant guide at found at USDA NRCS 2010. Plant Guide: Side-oats grama. [http://plants.usda.gov/plantguide/pdf/pg\\_bocu.pdf](http://plants.usda.gov/plantguide/pdf/pg_bocu.pdf).

‘Butte’ was selected by the Nebraska Agriculture Experiment Station (AES), Lincoln, Nebraska, USDA-Agriculture Research Service (ARS), and Soil Conservation Service (SCS) cooperatively by E.C. Conrad and L.C. Newell. It consists of native collections from Holt and Platte Counties in Nebraska that were combined and tested as “Nebraska 37”. Repeated field plantings revealed superior germination and establishment characteristics when compared with other sources.

**'Killdeer'** was informally released in the late 1960's by the Bismarck Plant Materials Center in Bismarck, North Dakota. It is composed of seed collected from native stands in 1965 near Bowman, Bowman County and Killdeer, Dunn County, North Dakota. Killdeer possesses outstanding leafiness, fair seed production, freedom from disease and persistence in a cold, semi-arid environment.

**'Pierre'** was informally released in 1960 by the Bismarck Plant materials Center and the South Dakota AES. The original seed for the release was collected in 1954 in Stanley County west of Pierre, South Dakota. The release is described as outstanding in vigor, leafiness, disease resistant, seeding vigor, and persistence in a semi-arid environment.

**'Trailway'** was cooperatively released in 1958 by Nebraska AES and the USDA-ARS. The original seed was collected in 1953 in northern Holt County by L.C. Newell. The release is described as winter hardy, long lived, late maturing with somewhat indeterminate heading and flowering response. Requires most of the growing season to mature a crop in eastern Nebraska and may fail to produce seed in areas with a shorter growing season.

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