
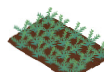



# Side-oats grama


## *Bouteloua curtipendula*

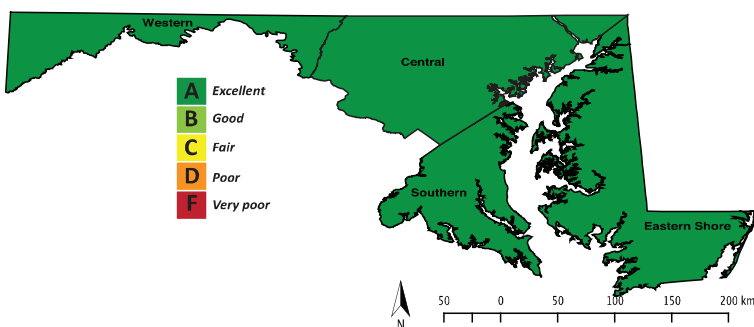
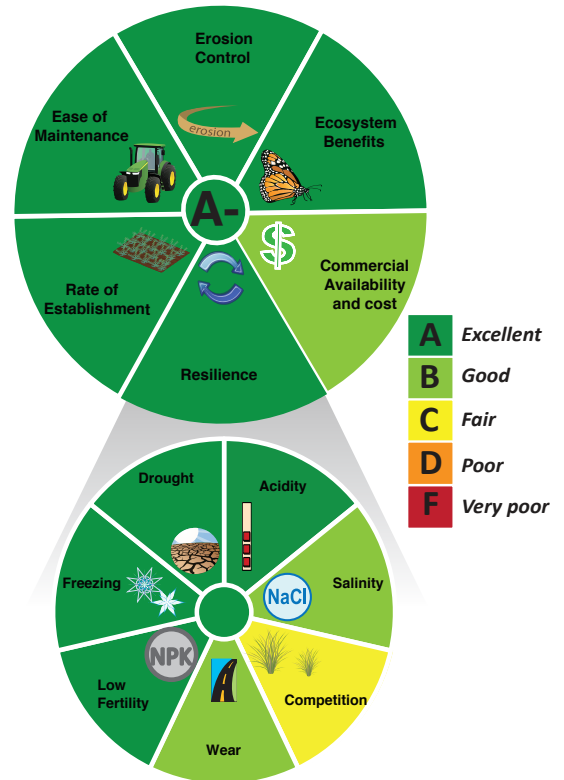
Side-oats grama is native to the Great Plains of North America but occurs in the mid-Atlantic region in areas that are dry and hot. As such, side-oats grama has excellent resilience to drought, freezing, low soil fertility, and high soil pH. Further, side-oats grama germinates well and has excellent seedling vigor; produces medium height plants that thrive under low-maintenance; is an excellent species to use in bank stabilization when mixed with other species; and has excellent ecosystem benefits. Among the 20 assessed species, side-oats grama is ranked within the top three roadside species for use along roadsides with a rating of Excellent to Good (grade = A-) with a few management challenges:

 Side-oats grama is commercially available. Seed costs are high but seeding rate is low to decrease cost per acre.

 Side-oats grama germinates rapidly but establishment of adequate cover is slow owing to slow lateral spread. This species is therefore best mixed with other native species.

 Side-oats grama has poor mowing tolerance and therefore should be used only in areas where low-intensity culture is desired.

 Side-oats grama is not a good competitor and should only be used in areas where propagule pressure from other species is low.



Side-oats grama is a suitable grass species for planting along roadsides throughout Maryland, especially on dry south facing slopes that are mowed infrequently.



Cultivars suitable in Maryland include Butte, El Reno, Killdeer, and Trailway. Development of ecotypes for the mid-Atlantic region is recommended. Seed costs need to be reduced to increase use over larger areas.

**Biology:** Side-oats grama is a perennial warm season species that is native to the Great Plains of North America (Johnson 2000) but is more wide-spread than blue grama and buffalograss (Beard 1973). It grows from southern Canada to northern Mexico but also outside the Great Plains eastward to Virginia (Leithead et al. 1971, Johnson 2008). Side-oats grama was important in the recovery of grasslands after the 1930's drought (Weaver and Albertson 1944). Side-oats grama is mostly observed growing on poorly developed shallow soils, steep slopes, and ridgetops (Sedivec et al. 2001). Side-oats grama is considered to be state-rare (S2) in Maryland, but is documented to occur on the Eastern shore, Montgomery County, and Allegany and Washington County of western Maryland (Maryland Biodiversity Project). In Pennsylvania, side-oats grama is state listed (Rhoads and Klein 1993) and is the characteristic and dominant graminoid species of xeric limestone prairies (Laughlin and Uhl 2003), restricted to dry, south-southwest facing slopes within the Ridge and Valley region.

*Seeds per pound:* 159,000 seeds per pound (Ernst Conservation Seed)

*Cost per pound:* \$12 per pound from Chesapeake Valley Seed and Ernst Conservation Seed

*Cost per acre:* \$144.00 per acre

*Suggested sowing rate:* 12 pounds per acre (Chesapeake Valley Seed)

*Sowing depth:* ¼ inch on fine textured soils and ¾ inch on coarse textured soil (USDA Plant Guide)

*Germination time:* 7 days when moisture is adequate (USDA Plant Guide)

*Seeding timing:* May 1 to July 20 (Meyer and Gaynor 2002)

*Length of growing season:* early spring to fall (Leithead et al. 1971)

*Leaf height:* 4-8 inches (Leithead et al. 1971)

*Height at seed head stage:* up to 30 inches but low growing growth forms up to 14 inches (Leithead et al. 1971), 15-30 inches (USDA Plant Fact Sheet)

*Shade tolerance:* Moderately tolerant (USDA Plant Guide)

*Suggested mowing height:* side-oats grama is best managed as a mow-mow grass

*Tolerance of wet conditions:* tolerant of spring flooding (USDA Plant Guide)

*Humidity tolerance:* prefers xeric landscapes but can tolerate humid climates

*Disease resistance:* Grasshoppers can destroy seedlings. Stem and leaf rust may occur during wet years. Side-oats grama is susceptible to several leaf spot and root rot fungi (USDA Plant Guide).

#### Services:



**Commercial availability and cost:** Side-oats grama is commercially available with seed costing less than buffalograss and blue grama. Seeding side-oats grama over a large area is affordable because seeding rate per acre is relatively low.



**Rate of establishment:** Side-oats grama can be propagated vegetatively and through seeding (Beard 1973). Fifty percent germination was observed in side-oats grama whereas 80% germination was observed for buffalograss (Harrington and Meikle 1992). Likewise, Tinsley et al. 2006 report a germination rate of 73% for side-oats grama, 93% for buffalograss, and 66% for little bluestem. Once germinated, excellent seedling vigor results in rapid establishment of side-oats grama (Sedivec et al. 2001). Rhizomes spread slowly such that lateral spread of plants is slow (Beard 1973). Side-oats grama was used in roadside trial in Virginia (Doak et al. 2004) but establishment was poorest for side-oats grama grown alone or with little bluestem (35% cover in

both cases). Cover across 6 years never exceeded 53%. Side-oats grama, similar to blue grama, did not survive past the establishment year on reclaimed mine soil in southeast Ohio (Thorne and Cardina 2011) whereas eastern gamagrass and western wheatgrass established well. Native grass mixtures containing 32-35% side-oats grama by weight were slow to establish in Minnesota low-input trials (Miller et al. 2013).



*Ease of maintenance:* Side-oats grama is taller than blue grama and buffalograss. Yet, it thrives under low-intensity culture where mowing is minimal (Beard 1973). Under no-mow conditions in Minnesota, two native grass mixtures containing side-oats grama produced the best quality and had low weed cover compared to 6 other turfgrass mixtures (Miller et al. 2013).



*Erosion control:* Side-oats grama produces short rhizomes that form a weak sod compared to blue grama (Beard 1973). However, the root system is moderately deep, fibrous, branching, and spreading (Beard 1973, USDA Plant Guide). It is therefore used for bank stabilization in species mixes.



*Ecosystem benefits:* Side-oats grama provides high quality forage to livestock and wildlife (Willard and Schuster 1971, Sedivec et al. 2001) and remains palatable even into winter (USDA Plant Guide). Wild turkey eat its seed (Leithead et al. 1971). It is used widely for reseeding disturbed lands and croplands (Leithead et al. 1971) and is especially successful in rocky and shallow soils such as stony hillsides and breaks (USDA Plant Guide).



#### Resilience:



*Drought:* Side-oats grama is very drought tolerant (Sedivec et al. 2001, Johnson 2008) but inferior in drought tolerance to blue grama (Beard 1973). Similarly, Mueller and Weaver (1942) observed side-oats grama seedlings to be less tolerant than blue grama and dropseed but more drought tolerant than prairie junegrass.



*Low fertility:* Side-oats grama is adapted to shallow ridges and rocky slopes but responds well to fertilizer (Leithead et al. 1971). In low-input trials in Minnesota (Miller et al. 2013), two native grass mixtures containing 32-35% side-oats grama by weight performed well after the initial establishment year.



*Freezing:* Side-oats grama has excellent freezing tolerance. It can grow well in northern environments and has been observed at elevations of 7,000 feet (USDA Plant Fact Sheet). Side-oats grama had 84% winter mortality between the first and second growing season (Meyer and Gaynor 2002).



*Salinity:* Side-oats grama is moderately salt sensitive (Marcum 2002, 2008a). Side-oats grama was more salt sensitive than buffalograss and 5 other grasses (Marcum 1999). In a salinity experiment, Biesboer and Jacobson (1994) observed side-oats grama to be more salt sensitive than buffalograss and blue grama but, more salt tolerant than little bluestem, prairie dropseed, and sand dropseed. Similarly, Harrington and Meikle (1992) observed lower tolerance than buffalograss but higher tolerance than little bluestem. In contrast, Roberts and Zybura (1967) observed side-oats grama to be more tolerant of salt than buffalograss and blue grama but less tolerant than sand lovegrass and tall fescue.



**Acidity:** Side-oats grama is better adapted to calcareous and moderately alkaline soils than to neutral and acid soils (Leithead et al. 1971). However, it can grow on soils with pH ranging from 5.5 to 8.5 (Thorne and Cardina 2011).



**Wear tolerance:** Side-oats grama has poor mowing tolerance (Johnson 2008) and therefore requires a low-intensity culture (Beard 1973), if mowed at all (Johnson 2000). A southern Canada study that compared the responses of 24 native species and cultivars to three mowing heights (Mintenko et al. 2002) found that side-oats grama performed poorly compared to buffalograss and especially blue grama. However, side-oats grama is adapted to grazing suggesting that it can withstand infrequent mowing.



**Competition:** Side-oats grama rarely forms monospecific stands (Johnson 2008). Root and shoot biomass of side-oats grama were reduced in the presence of indianguass (Weatherford and Myster 2011).

**Mixes:** Side-oats grama frequently occurs in native communities with blue grama and buffalograss (Beard 1973, Johnson et al. 2000, Tinsley et al. 2006). It is rarely planted alone but planted with other species, such as blue grama and little bluestem, to add diversity and visual interest (Johnson 2008). In a Minnesota low-input study of 8 seed mixtures, Miller et al. (2013) included side-oats grama at 32-35% by weight in two native seed mixtures. Both mixtures were the slowest to establish and had low quality and high weed cover in the establishment year. However in the second and third year of the study, turfgrass quality ratings were second and third only to a tall fescue blend. Weed cover sowed in native grass mixtures was higher or equal to plots seeded with tall fescue and fine fescues but lower than plots containing Kentucky bluegrass. A mix of little bluestem and side-oats grama used in a Virginia roadside trial established poorly and never exceeded 53% cover (Doak et al. 2004). Side-oats grama failed to become established in a stand of buffalograss (Willard and Schuster 1971).

**Cultivars:** Released varieties include 'Butte' from Nebraska, 'El Reno' from Oklahoma, 'Haskell' from Texas, 'Niner' from New Mexico, 'Premier' from Mexico, 'Killdeer' from North Dakota, and 'Pierre' from South Dakota (Johnson 2008). Cultivar 'Trailway' from Nebraska is winter hardy, long-lived, and late maturing and cultivar 'Vaughn' from New Mexico is easy to establish with good seedling vigor (USDA Plant Guide).