

Poverty oatgrass

Danthonia spicata

Poverty oatgrass is a native grass species that is widely adapted to a range of environmental conditions encountered along roadsides. It is best used in species mixtures. Poverty oatgrass requires minimal maintenance because of its low stature. It establishes quickly, is resilient to roadside conditions, provides erosion control in plant mixtures, and is a biodiversity enhancer. Poverty oatgrass is rated Fair to Good (grade = C+) with three major management concerns:



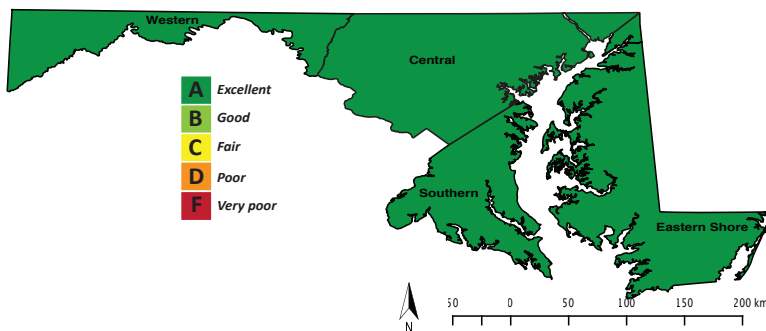
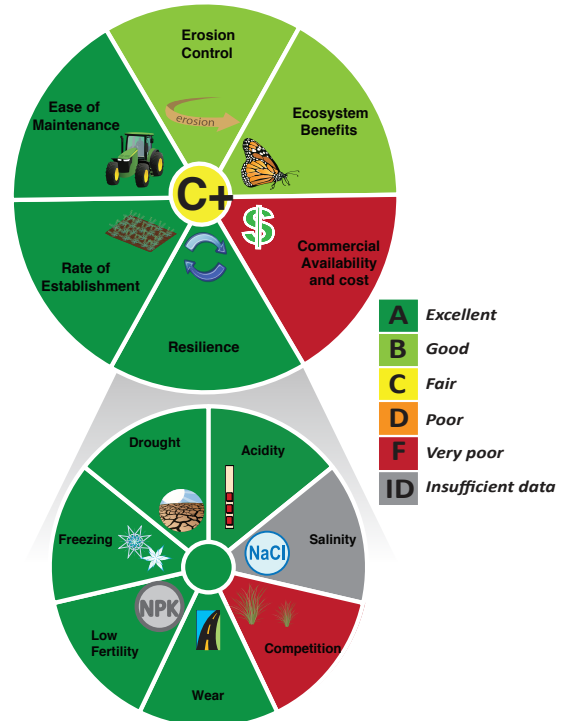
Commercial availability is poor and seed cost is currently prohibitive for use in larger quantities despite low seeding rates per acre.



Poverty oatgrass is a pioneer species which decreases in density as more competitive species establish. However, this trait is important in mixed communities that are established in highly disturbed areas such as roadsides.



Salinity tolerance of poverty oatgrass is unknown.



Poverty oatgrass is adapted to environmental conditions throughout Maryland.



If seed availability and cost can be improved, poverty oatgrass has the potential to become a highly rated roadside grass species.

Biology: Poverty oatgrass is a perennial cool season grass that is widespread in the United States except for in the Southwestern United States (USDA Plants Profile). It is particularly secure in the eastern United States and in temperate and boreal North America (Darbyshire and Cayouette 1989). Poverty oatgrass has no rhizomes or stolons (Darbyshire and Cayouette 1989) and therefore persists in the landscape through limited seed dispersal, a persistent seedbank, and by tillering (Darbyshire and Cayouette 1989). It forms low stature tufts in a variety of habitats including pastures, grasslands, and forests on poor, dry and rocky soils (Nature Serve Version 7.1) and is particularly known to occur on 'sterile' soil (Core 1929) such as cleared foothills, minelands and roadsides. Poverty oatgrass prefers sunny locations where it develops distinctive curled and twisted blades.

Seeds per pound: 400,000

Cost per pound: \$480 per pound from Chesapeake Valley Seed

Cost per acre: \$4,800.00 per acre

Suggested sowing rate: 10 pounds per acre (Chesapeake Valley Seed)

Sowing depth: unknown

Germination time: unknown

Seeding timing: spring

Length of growing season: Poverty oatgrass will grow in the early spring and in the fall. It is commonly dormant in the summer months (U.S. Forest Service).

Leaf height: 2.4-8 inches (Darbyshire and Cayouette 1989)

Height at seed head stage: 3.9-39.3 inches (Darbyshire and Cayouette 1989)

Shade tolerance: Poverty oatgrass is phenotypically plastic and can grow in both sunny and shady environments and exhibit different morphologies depending on light conditions (Darbyshire and Cayouette 1989).


Suggested mowing height: Can be used in no-mow or minimally mowed areas.


Tolerance of wet conditions: Requires well drained soil (Darbyshire and Cayouette 1989)

Humidity tolerance: Requires a precipitation rate of 9.8-11.8 inches per year (Darbyshire and Cayouette 1989).

Disease resistance: Susceptible to clavicipitaceous fungal parasites, which affect productivity, reproduction, and fitness. Also susceptible to a common fungal disease caused by the parasite *Atkinsonella hypoxylon*, which causes choke (Darbyshire and Cayouette 1989, Scheiner 1989).

Services:

 *Commercial availability and cost:* Some native nurseries carry this species, however it is in short supply. The seed is expensive and could only be used in mixture with other native grasses. Planting in large areas as a monostand is cost prohibitive.

 *Rate of establishment:* Poverty oatgrass produces a persistent seedbank that can stay viable in the soil for decades or more (NatureServe 2015). Although highly dormant (Darbyshire and Cayouette 1989), they will germinate readily on mineral soil (U.S. Forest Service). Seeds

germinated best when alternating temperatures between room temperature and 35°C. A 71% sulfuric acid treatment also facilitates germination by weakening the seed coat. Prechilling at 3°C with a potassium nitrate treatment may also be effective for germination (Darbyshire and Cayouette 1989).



Ease of maintenance: Poverty oatgrass is a low-stature plant and can therefore be used in minimal mow or no-mow conditions (Miller et al. 2013).



Erosion control: Owing to its fibrous roots (Darbyshire and Cayouette 1989), poverty oatgrass is considered to be a useful grass for erosion control and protects the soil against excessive nutrient leaching (Darbyshire and Cayouette 1989). It will grow well in fire-disturbed areas and clearcuts of the eastern United States (U.S. Forest Service). However, plants are only loosely rooted and easily uprooted with attached soil (Darbyshire and Cayouette 1989) suggesting that poverty oatgrass would, by itself, be inadequate for stabilizing soil.



Ecosystem benefits: Poverty oatgrass is native and widespread in North America particularly in temperate and boreal regions (Darbyshire and Cayouette 1989, Nature Serve 2015). It is a common component of native grasslands that also include little bluestem, prairie junegrass, fescues, and bluestems but will occasionally be found as a weed on cultivated land (Darbyshire and Cayouette 1989). Because of its low stature, cover benefits for wildlife are negligible. Its forage value is generally considered poor (Dustman and Shriver 1929) but is an important spring forage species for wildlife (Dustman and Shriver 1929). Poverty oatgrass is the host of the leaf hopper *Latalus personatus*, the butterfly *Oeneis chryxus strigulosa*, grass aphids, and a chalcid wasp *Harmolita danthoniae* (Darbyshire and Cayouette 1989).



Resilience:



Drought: Poverty oatgrass grows well in varying environments including dry and rocky soils with low soil moisture (Darbyshire and Cayouette 1989). In central Ontario, the abundance of poverty oatgrass is reduced in areas of higher soil moisture (Reznicek and Maycock 1983 in Darbyshire and Cayouette 1989). Some ecosystems that are dominated by poverty oatgrass may be drought-dependent (U.S. Forest Service). When soils are dry, the leaves of poverty oatgrass curl and twist, which is a characteristic trait.



Low fertility: Poverty oatgrass is adapted to low-fertility environments and is therefore considered to be a useful grass for roadsides (U. S. Forest Service). It is known to invade agricultural fields that are depleted in nutrients, which makes it a good indicator of soil fertility (Darbyshire and Cayouette 1989). A West Virginia pasture study observed an increase in poverty oatgrass populations with a decrease in phosphorus and potassium (Baker and Nestor 1979 in Darbyshire and Cayouette 1989).



Freezing: Poverty oatgrass is frost-heave resistant (Darbyshire and Cayouette 1989). As a cool-season grass, it is adapted to cold environments and is widespread even in boreal regions (Darbyshire and Cayouette 1989). Therefore, it has excellent freezing tolerance.



Salinity: unknown



Acidity: Poverty oatgrass has a wide tolerance to substrate pH and can be found on acid bedrock as well as limestone barrens (Darbyshire and Cayouette 1989). A West Virginia study observed an increase in poverty oatgrass populations with a decrease in pH (Baker and Nestor 1979 in Darbyshire and Cayouette 1989).



Wear tolerance: The cleistogamous flowers are basally located, which allows poverty oatgrass to be resilient to mowing and grazing. Active grazing favors poverty oatgrass (Darbyshire and Cayouette 1989, Dunwiddie 1997), suggesting that mowing would do the same.



Competition: Poverty oatgrass is a pioneer species (Darbyshire and Cayouette 1989, Dunwiddie 1997), which colonizes recently disturbed areas and then decreases in abundance as other more competitive species move in (Dustman and Shriver 1929). Therefore, it is not a competitive species and will decrease in abundance as resources, such as light, become limiting. Poverty oatgrass appears to grow well with goldenrod (Darbyshire and Cayouette 1989) but competes with vernalgrass (*Anthoxanthum*; Kelley 1985). Common grass species that co-occur with poverty oat grass include little bluestem, prairie junegrass, fescues, and bluegrasses (U.S. Forest Service).

Mixes: Poverty oatgrass was used in one of eight grass mixtures in low maintenance trials in Minnesota (Miller et al. 2013). The mixture contained only natives: 1% poverty oatgrass, 53% little bluestem, 32% side-oats grama, 10% blue grama, 3% prairie junegrass, and 1% kalm's brome. The mixture was the slowest to establish with 47% cover 56 days after seeding as opposed to 95% cover for the best performing mixtures (tall fescue blend and fine fescue mixture). However, after underperforming in the first year of establishment, the native mixture received very good turf quality ratings in the second and the third year of growth under minimal mowing conditions. Percent weeds in the third year was moderate (12%). Under no-mow conditions, the mixture obtained the best quality ratings by the third year and supported few weeds (7%).

Cultivars: No cultivars are reported. Phenotypic plasticity may be more important than genetic diversity in microhabitat selection. Variants are not correlated with habitat differences and are mixed within populations (Darbyshire and Cayouette 1989, Scheiner 1989). Different accessions are associated with vesicular arbuscular endogonaceous mycorrhizal fungi to varying degrees with some accessions showing no colonization (Darbyshire and Cayouette 1989).