Big bluestem
Andropogon gerardii Vitman

Genus *Andropogon*, Greek *andro* 'man', and *pogon* 'beard'; species *gerardii* , after John Gerard, English botanist of the late 16th and early 17th centuries.

Family: Grass (Poaceae)

Other Common Name(s): Turkey foot

Description: Native perennial, warm-season grass, flowering culms 3'-7' tall, smooth. Leaf sheaths compressed, purplish at base, lower sheath sometimes hairy. Leaf blades 1'-2' long, 1/4" wide, ligule is a fringe of hairs (ciliate). Seed head consist of 2-6 finger-like panicles, commonly 3, giving rise to the name 'turkey foot'. Big bluestem is sod forming spreading from short rhizomes, but often appears bunch-like.

Adaptation/Habitat: Wet-mesic to mesic soil conditions, full sun. Moist, loamy, deep, well-drained soils preferred for seed production.

Threatened/Endangered Status: Not listed

General Comments: Big bluestem is a dominant component of the tallgrass prairie ecosystem. This species establishes readily from direct seeding, particularly if seeded into crop ground where good weed control has been achieved (i.e. following a glyphosate-resistant crop, for example). Takes two to three years for stand to develop, with good management and weed control.

Establishment for Seed Production (Appendix A)

Direct seeding rate(s):

•Row Spacing:	36"	24"	12"	Solid Stand
•PLS lbs/acre:	3.6	4.8	9.7	10-12

Seeding Depth: 1/4"-1/2"
Seeding Methods: native grass drill
Time of Seeding: Mid to late spring
Weed Control: Prepare clean, firm, weed free seedbed prior to seeding.

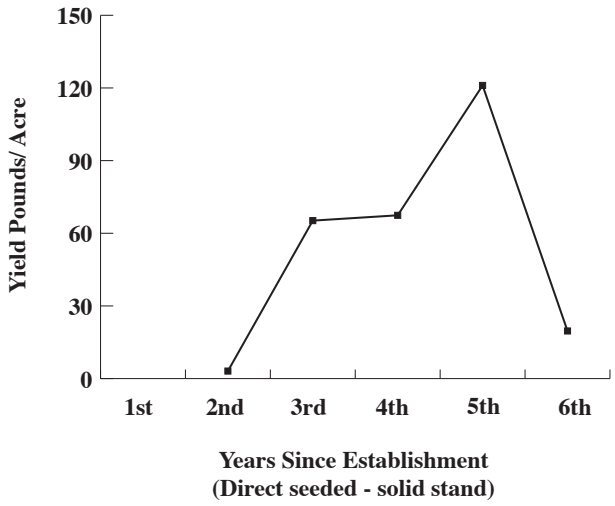
Greenhouse:
Seed pre-treatment: No stratification necessary. Germination of grass seed usually improves with proper storage (cool, dry conditions) throughout the first year after harvest. Sow seed in greenhouse two months before last frost free date at 1/4" depth. Transplant after all danger of frost.

Stand Management

Weed Control: During establishment - Mow stand high (6–12 inches) first growing season to prevent weed canopy from shading seedlings. Established stand – Atrazine, 2,4-D, Plateau (imazapic), Outlook (Dimethenamid-P).
Pests – yellow midges may infest florets, reducing seed yields
Diseases – Smut fungus affects florets
Pollination: Wind pollinated

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of 2nd growing season from direct seeding, three years for stand to fill out.
- Yield/Acre: 80-150 bulk lbs/ac (solid stand)
- Stand Life: Peak harvests 3rd year and after. If seed yields decline because stands are sod-bound, they can be chisel plowed to reinvigorate. Annual spring fire when green shoots are 2" tall helps control weeds and increase flowering and seed production. (Note: This recommendation is strictly for production fields, NOT REMNANT PRAIRIES). Productive stand life 10-15 years.
- Flowering Date: Flowering occurs early August to mid-September
- Seed Maturity: October
- Seed Retention: Shattering begins in mid to late October
- Harvest date range at TPC (2002-2006): Oct. 5 – Oct. 15
- Recommended Harvest Method: Combine at medium to hard dough stage, when some shattering is just beginning to occur of the very top of the main panicles.



Seed Cleaning (Appendix C)

Cleaning Process: Air-dry material, remove awns with debearder or brush machine, then air-screen.

Seed Characteristics (Appendix D)

Seed count (debearded): 10,000 seeds/oz (160,000/lb); [144,000/lb USDA PLANTS DATABASE]

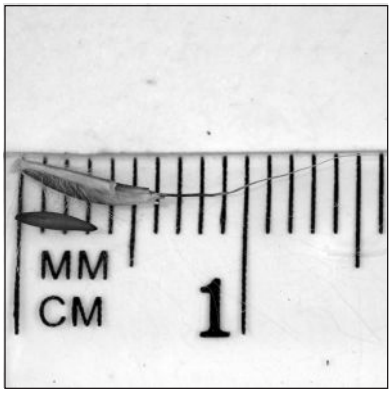


Photo credit: Dave Williams

Description: Fertile spikelet with long awn, 1-2 cm long (1/2 – 3/4"), attached stalk(s) are covered with hairs prior to debearding. Caryopsis smooth brown, 3-5 mm long. Stores well in refrigerated conditions (33-50 F, 30-50% RH). Germination often improves up to a year after harvest.

Typical Seed Test (%):

- Purity: 70-95
- Germination: 40-50
- Dormancy: 15-50

Released Germplasm (Appendix E)

Source Identified Material: Northern, Central, Southern Iowa Natural Selections™; Northern Missouri, 'OH-370', 'Refuge' (MO); Suther Germplasm, Cabarrus County, North Carolina.
Cultivated Varieties: Midwestern adapted varieties include Kaw (KS), Rountree (IA)

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 24 January 2007.

Plant Fact Sheet, Big bluestem, Andropogon gerardii Vitman. USDA-NRCS Elsberry Plant Materials Center. August 2000.

An Illustrated Guide to Iowa Prairie Plants, p. 202 Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

North American Range Plants, 4th Edition. P. 32-33. Stubbendieck, J., S.L. Hatch, C.H. Butterfield. University of Nebraska Press, Lincoln, NE. 1992

Notes:

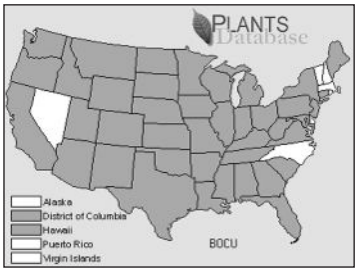
Sideoats grama
Bouteloua curtipendula (Michx.) Torr.

Genus *Bouteloua*, named after the brothers Claudio (1774-1842) and Estéban (1776-1813) Boutelou, Spanish botanists and horticulturists; species *curtipendula* Latin curtus 'short, broken', and pendulus 'hanging, pendent', for the short, interrupted arrangement of spikes hanging to one-side of the rachis. The oat-like spikelets hanging on one-side of the flowering stalk give rise to the common name 'side-oats'.

Family: Grass (Poaceae)

Other Common Name(s): Sideoats

Description: Native perennial warm-season bunch grass. Flowering culms 1.5- 2' tall, slightly hairy. Leaf sheath mostly smooth. Leaf blades are 6- 8" long, tapered to a sharp point. Stiff hairs with glandular bases arise from the leaf margins, sticking out at a right-angle from the main axis of the blade. Ligule is a very short fringe of hairs. Seedhead is 4- 12" long, and consists of many short spikes (1/2- 1 1/4" long), each with 3-7 spikelets, all turned to one side of the main stem. Lower leaves curl and turn a light, tawny color when dry.



Adaptation/Habitat: Found on mesic to dry soil conditions, in fine textured, calcium-rich soils, full sun. Well-drained soil preferred for seed production.

Threatened/Endangered Status: Endangered (CT, NJ, NY); Threatened (MI, PA); Special Concern (KY)

General Comments: This species is an important component of tall and mixed-grass prairies, occurring on well-drained, dry, rocky, alkaline soils. This species establishes readily from direct seeding, particularly if seeded into crop ground where good weed control has been achieved (i.e. following a glyphosate-resistant crop, for example).

Establishment for Seed Production (Appendix A)

Direct seeding rate(s):

•Row Spacing:	36"	24"	12"	Solid Stand
•PLS lbs/acre: *(spikelets)*	3.0	4.0	8.0	9.0

Seeding Depth: 1/4"-1/2"
Seeding Methods: native grass drill
Time of Seeding: late spring when soil temperature reaches 55° F
Weed Control: Prepare clean, firm, weed free seedbed prior to seeding.

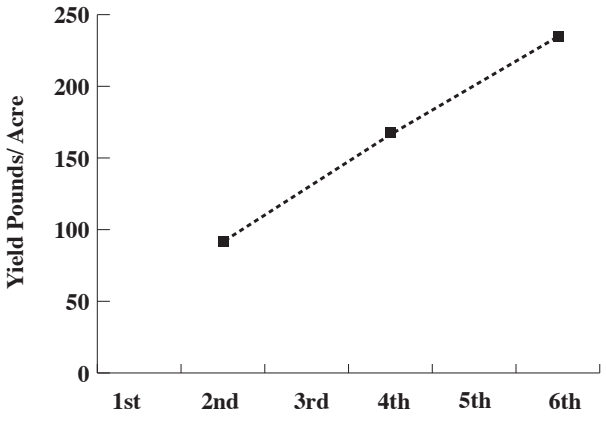
Greenhouse:
Seed pre-treatment: No stratification necessary. Germination of grass seed usually improves with proper storage (cool, dry conditions) throughout the first year after harvest. Sow seed in greenhouse two months before last frost free date at 1/4" depth. Transplant after all danger of frost.

Stand Management

Weed Control: During establishment – Mow stand high (6–12 inches) first growing season to prevent weed canopy from shading seedlings. Do not use atrazine the year of establishment. Established stand – Plateau (imazapic); Outlook (dimethenamid-P), 2,4-D; hand rouging, cultivation.
Pests – No serious pest known.
Diseases – No serious diseases known.
Pollination: Wind pollinated

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of second growing season from greenhouse grown transplants
- Yield/Acre: 50-250 bulk lbs/ac (solid stand)
- Stand Life: Peak harvests 3rd year and after. Annual late spring fire when shoots are 1 inch tall helps control weeds and increase flowering and seed production. (Note: This recommendation is strictly for production fields, NOT REMNANT PRAIRIES). Stand should persist up to 10 years if properly matched to soils, and well managed.
- Flowering Date: Flowering occurs mid-June to early July
- Seed Maturity: September
- Seed Retention: Holds seed fairly well, shattering occurs in October
- Harvest date range at TPC (2002-2006): Sept.. 22 – Oct. 7
- Recommended Harvest Method: Combine at hard dough stage



Seed Cleaning (Appendix C)

Cleaning Process: Sideoats can be air screened initially to sort off spikelets. Larger intact spikes can be run quickly through a debearder or hammer mill to break up spikes, and re-air screen.

Seed Characteristics (Appendix D)

Seed count: 11,900 seeds/oz (191,000/lb) [159,200/lb. USDA PLANTS DATABASE]

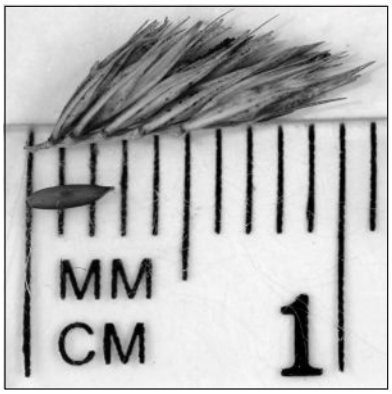


Photo credit: Dave Williams

Description: Seed unit is the spikelet, up to 1/4" long. Caryopsis 3-4 mm long, smooth brown.
Stores well in refrigerated conditions (33-50˚ F, 30-50% RH). Germination often improves up to a year after harvest in warm-season grasses.

Typical Seed Test (%):

- Purity: 85+
- Germination: 90
- Dormancy: 0

Released Germplasm (Appendix E)

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections™*

Cultivated Varieties: Midwest adapted cultivars include El Reno (KS), Killdeer (ND), Pierre (ND).

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 30 January 2007.

Planting Guide, *Bouteloua curtipendula* (Michx.) Torr. USDA-NRCS Elsberry Plant Materials Center. 4/24/2000.

An Illustrated Guide to Iowa Prairie Plants, p. 203. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

North American Range Plants, 4th Edition. P. 78-79. Stubbendieck, J., S.L. Hatch, C.H. Butterfield. University of Nebraska Press, Lincoln, NE. 1992

Notes:

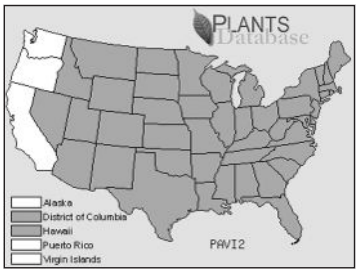
Switchgrass
Panicum virgatum (L.)

Genus *Panicum*, Latin *panicul* 'with panicles'; species *virgatum* Latin 'twig, wand-like'.

Family: Grass (Poaceae)

Other Common Name(s): Thatchgrass, Wobsqua grass, Blackbent

Description: Native perennial warm-season grass, flowering culms 3-5 feet tall, smooth stem. Leaf sheaths smooth. Leaf blades 5/16 inch wide, 6-22 inches long, hairy on upper surface, especially near the ligule. Ligule is a fringe of dense hairs about 1/8 inch tall. Seedhead consists of an openly branched, airy panicle, with spikelets near the ends of the branches. Spreads from seeds, tillers, and rhizomes.



Adaptation/Habitat: Wet-mesic to mesic soil conditions, full sun. May become abundant in disturbed prairies, much less common in high-quality prairies. Fertile, well-drained soils preferred for seed production.

Threatened/Endangered Status: Not listed

General Comments: A number of cultivars of switchgrass have been developed for forage and seed production, winter hardiness, and grazing tolerance by the USDA-NRCS Plant Materials program. These cultivars have been planted widely as mono cultures and in early prairie reconstructions. Because seed has been commercially available at affordable prices for decades, it was usually seeded heavily and tended to dominate stands. For these reasons it has been considered aggressive. Switchgrass can form dense colonies on lowland prairies, but is usually uncommon on high-quality remnant upland prairies and tends to occur in isolated patches near disturbance activities such as gopher mounds (Weaver 1954). Switchgrass establishes readily from seed, is relatively easy to harvest and clean.

Establishment for Seed Production (Appendix A)

Direct seeding rate(s):

•Row Spacing:	36"	24"	12"	Solid Stand
•PLS lbs/acre:	2.6	3.5	6.0	6.0

Seeding Depth: 1/4"

Seeding Methods: native grass drill, or broadcast seed and cultipack for solid stand

Time of Seeding: Spring

Weed Control: Prepare clean, firm, weed free seedbed prior to seeding

Greenhouse:

Seed pre-treatment: Moist stratify seed for 4 weeks to improve germination. Sow seed in greenhouse two months before last frost free date at 1/4" depth. Transplant after all danger of frost, into rows convenient for tillage equipment.

Stand Management

Weeds – Mow stand high (6–12 inches) first growing season to prevent weed canopy from shading seedlings. Broadleaf herbicides can be used to control broadleaf weeds in established stands. Switchgrass is atrazine resistant, and can be applied at the label rate at planting time.

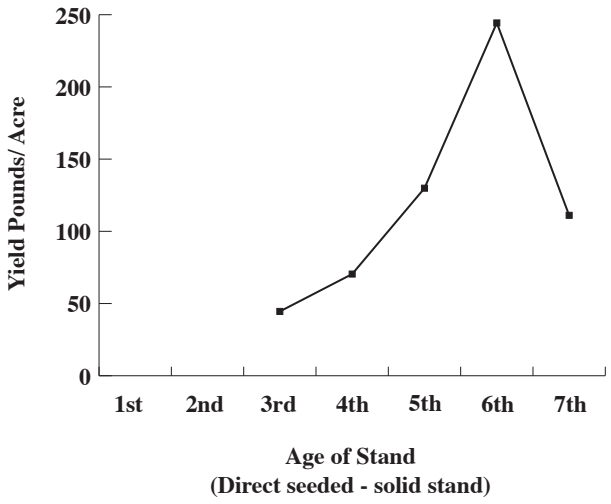
Pests – No serious pest known

Diseases – Seed smut, if left unchecked, can seriously decrease seed yields on switchgrass. The smut is caused by a fungus, *Tilletia maclaganii*. Glumes may exhibit an uncharacteristic purple coloration, and seeds are replaced by fungal spores that are red-orange when immature turning dark brown at maturity. Fields may need to be destroyed or relocated if diseased (NRCS 2003).

Pollination: Wind pollinated

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of first growing season from greenhouse grown transplants, second growing season from direct seeding.
- Yield/Acre: 100-250 bulk lbs/ac (solid stand)
- Stand Life: Stands should persist 10-15 years. Good seed production 2nd year and after.
- Flowering Date: Flowering occurs from late July to early September
- Seed Maturity: September
- Seed Retention: Shattering begins in late September to early October
- Harvest date range at TPC (2002-2006): Sept.. 24 to Oct. 8
- Recommended Harvest Method: Combine at hard dough stage before significant shattering has occurred



Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2' and 1/4" mesh to remove large particles. Brush to remove all floral parts from the grain, air-screen to clean.

Seed Characteristics (Appendix D)

Seed count: 14,000 seeds/oz (224,000/lb) [259,000/lb USDA PLANTS DATABASE]

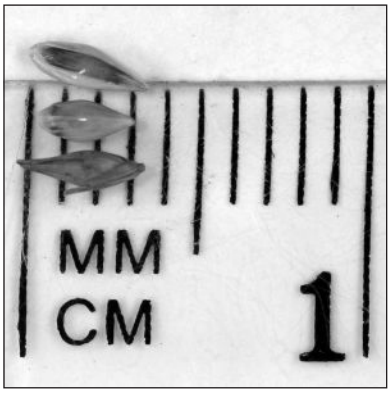


Photo credit: Dave Williams

Description: Spikelet is two-flowered, fertile floret uppermost, smooth. No awn. Grain is shiny, smooth, 3-4 mm (about 1/8 inch) long. Stores well in refrigerated conditions (33-50˚ F, 30-50% RH). Germination often improves up to a year after harvest in warm-season grasses.

Typical Seed Test (%):

- Purity: 95+
- Germination: 40
- Dormancy: 50

Released Germplasm (Appendix E)

Source Identified Material: Central Iowa *Natural Selections™*

Cultivated Varieties: Mid-west adapted include Blackwell (KS), Cave-In-Rock (IL), Dacotah, Forestburg (ND), Nebraska 28 (NE), Shawnee (MO).

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 9 February 2007.

Seed Smut of Switchgrass. USDA-NRCS Plant Materials Program. Manhattan Plant Materials Center Newsletter, Vol. 10, No. 3. July 2003.

Notice of Release of Central Iowa Germplasm, Switchgrass. USDA-NRCS Elsberry Plant Materials Center. 2003.

An Illustrated Guide to Iowa Prairie Plants, p. 216. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

North American Range Plants, 4th Edition. P. 152-153. Stubbendieck, J., S.L. Hatch, C.H. Butterfield. University of Nebraska Press, Lincoln, NE. 1992

North America Prairie. pp. 33-34. Weaver, J.E. Johnson Publishing Company, Lincoln, NE 1954.

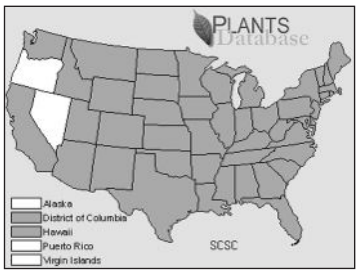
Notes:

Little bluestem
Schizachyrium scoparium, (Michx.) Nash

Genus *Schizachyrium*, Greek *schizo* meaning 'to split', and *achyron* 'chaff', referring to the divided lemma; species *scoparium*, Latin *scopae* 'broom'.

Family: Grass (Poaceae)
Other Common Name(s): Prairie beardgrass, Broom beardgrass

Description: Native perennial warm-season grass, flowering culms 2-3" tall, smooth. Leaf sheaths strongly flattened (keeled), usually smooth, sometimes hairy. Leaf blades narrow, up to 8" long . Ligule is a fringed (ciliate) membrane. Seed heads consists of single spikes, about 1" long, arising from upper leaf axils, appearing as white, fluffy appendages at maturity. Little bluestem is bunch-forming in growth habit.



Adaptation/Habitat: Dry-mesic to dry soil conditions, full sun. Well-drained, moderately moist soils are preferred for seed production.

Threatened/Endangered Status: Not a listed species

General Comments: Little bluestem is a dominant component on dry or well-drained soils within the tallgrass prairie region. Careful site selection, seedbed preparation, and weed control are critical to successful establishment from seed. No-till drilling with a native seed drill into cropland following a glyphosate-resistant crop, (soybeans for example) is an excellent method. Takes two to three years for stand to develop.

Establishment for Seed Production (Appendix A)

Direct seeding rate(s):

•Row Spacing:	36"	24"	12"	Solid Stand
•PLS lbs/acre:	2.4	3.2	6.4	8.0

Seeding Depth: 1/4"
Seeding Methods: native grass drill
Time of Seeding: Late spring, early summer
Weed Control: Prepare clean, very firm, weed free seedbed prior to seeding

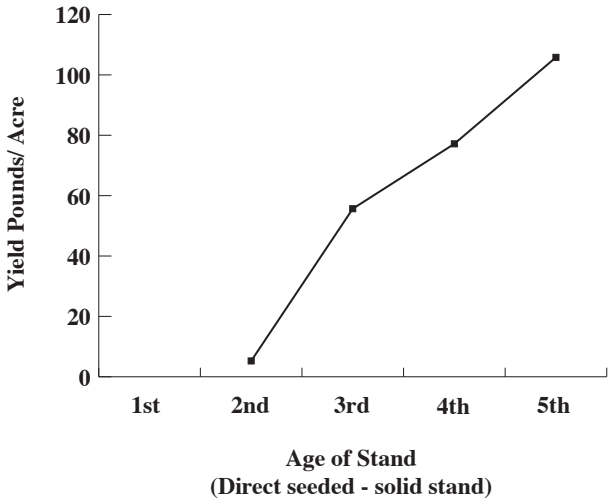
Greenhouse:
Seed pre-treatment: No stratification necessary. Germination of grass seed usually improves with proper storage (cool, dry conditions) throughout the first year after harvest. Sow seed in greenhouse two months before last frost free date at 1/4" depth. Transplant after all danger of frost.

Stand Management

Weeds – Mow stand high (6–12 inches) first growing season to prevent weed canopy from shading seedlings. Plateau (imazepic) can be used to control grass and broadleaf weeds in established stands. Pre-emergent grass and broadleaf herbicides can also be used for weed control. Check chemical labels.
Pests – No serious pest known
Diseases – No serious diseases known
Pollination: Wind pollinated

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of 2nd growing season from direct seeding, three years for stand to fill out.
- Yield/Acre: 50-120 bulk lbs/ac (solid stand)
- Stand Life: Peak harvests 3rd year and after. If seed yields decline stands can be chisel plowed to reinvigorate. Annual late spring fire helps control weeds and increase flowering and seed production. (Note: This recommendation is strictly for production fields, NOT REMNANT PRAIRIES). Productive stand life 10-15 years.
- Flowering Date: Flowering occurs late July to late August.
- Seed Maturity: Late September to October
- Seed Retention: Shattering is moderate, beginning in late September
- Harvest date range at TPC (2002-2006): Oct. 10 – Oct. 29
- Recommended Harvest Method: Stripper, or Combine at hard dough to maturity, when most of spikes are fluffed out and shattering is just beginning to occur.



Seed Cleaning (Appendix C)

Cleaning Process: Air-dry material, remove awns with debearder or brush machine, then air-screen.

Seed Characteristics (Appendix D)

Seed count (debearded): 15,000 seeds/oz (240,000/lb); [220,000/lb USDA PLANTS DATABASE]

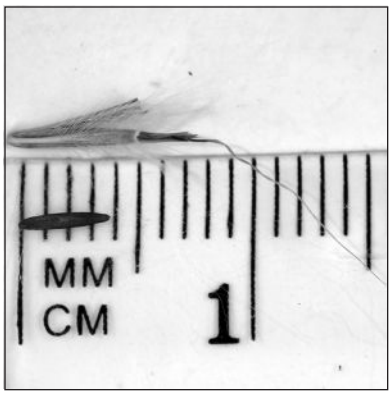


Photo credit: Dave Williams

Description: Fertile spikelet with bent, twisted awn, 9-16 mm long (1/4-5/8 inches), attached stalks (rachis and pedicel) hairy prior to debearding. Caryopsis smooth, brown, thickened, about 3-5 mm long. Stores well in refrigerated conditions (33-50˚ F, 30-50% RH). Germination often improves up to a year after harvest.

Typical Seed Test (%):

- Purity: 80+
- Germination: 54
- Dormancy: 33

Released Germplasm (Appendix E)

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections™*; Northern, Western, Southern Missouri;

Cultivated Varieties: Midwest adapted varieties include 'Aldous (KS); 'Camper', 'Blaze' (NE, KS); 'Cimmaron' (KS, OK).

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 25 January 2007.

Grasses of Iowa, website: http://www.eeob.iastate.edu/research/iowagrasses/index.html. Iowa State University Department of Ecology, Evolution, and Organismal Biology. Accessed 8 February 2007.

Plant Fact Sheet, Little bluestem, *Schizachyrium scoparium* (Michx.) Nash. USDA-NRCS Elsberry Plant Materials Center. January 2001.

An Illustrated Guide to Iowa Prairie Plants, p. 219. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

North American Range Plants, 4th Edition. P. 40-41. Stubbendieck, J., S.L. Hatch, C.H. Butterfield. University of Nebraska Press, Lincoln, NE. 1992

Notes:

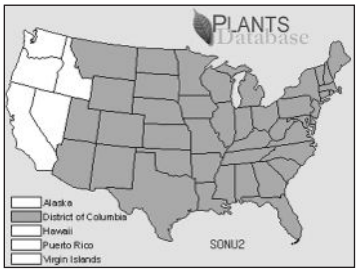
Indiangrass
Sorghastrum nutans (L.) Nash

Genus *Sorghastrum*, Greek meaning 'a poor imitation of sorghum'; species *nutans* Latin 'to nod, sway', in reference to nodding, plume-like seed head.

Family: Grass (Poaceae)

Other Common Name(s): Yellow Indiangrass

Description: Native perennial warm-season grass. Flowering culms 3-5 ' tall, smooth. Leaf sheaths smooth. Leaf blades up to 12" long, constricted at the base, then widening to about 3/8", and tapered to a point. Ligule is a thin membrane, with prominent pointed leaf-like projections (auricles) on either side. These are sometimes referred to as the 'gun-sight', 'mule-ears', or 'boot straps' character of Indiangrass. Seedhead consists of a dense, yellowish plume-like panicle up to a foot in length. Indiangrass has short scaley rhizomes, but is bunch-forming in growth habit.



Adaptation/Habitat: Wet-mesic to dry-mesic soil conditions, full sun. Deep, moist, well-drained soils preferred for seed production.

Threatened/Endangered Status: Endangered (ME)

General Comments: Indiangrass is a dominant component of the tallgrass prairie ecosystem. This species generally establishes readily from seed, if good seed bed preparation and good weed control are achieved (i.e. following a glyphosate-resistant crop, for example). Takes two to three years for stand to develop.

Establishment for Seed Production (Appendix A)

•Row Spacing:	36"	24"	12"	Solid Stand
•PLS lbs/acre:	3.3	5.0	10	10-12

Seeding Depth: 1/4"-1/2"
Seeding Methods: native grass drill
Time of Seeding: late spring, early summer
Weed Control: Prepare clean, very firm, weed free seedbed prior to seeding.

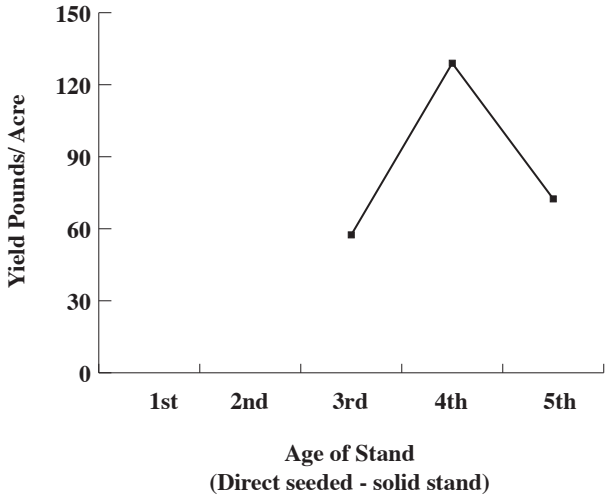
Greenhouse:
Seed pre-treatment: No stratification necessary. Germination of grass seed usually improves with proper storage (cool, dry conditions) throughout the first year after harvest. Sow seed in greenhouse two months before last frost free date at 1/4" depth. Transplant after all danger of frost.

Stand Management

Weeds – Mow stand high (6–12 inches) first growing season to prevent weed canopy from shading seedlings. Established stands – Plateau (imazepic) for grass and broadleaf control, Atrazine for grass control.
Pests – No serious pest known
Diseases – No serious diseases known
Pollination: Wind pollinated

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of 2nd growing season from direct seeding, three years for stand to fill out.
- Yield/Acre: 50-130 bulk lbs/ac (solid stand)
- Stand Life: Peak harvests 3rd year and after. If seed yields decline stands can be chisel plowed to reinvigorate. Annual late spring fire helps control weeds and increase flowering and seed production. (Note: This recommendation is strictly for production fields, NOT REMNANT PRAIRIES). Productive stand life 10-15 years.
- Flowering Date: Flowering occurs mid-August to mid-September
- Seed Maturity: Late September to early October
- Seed Retention: Shattering occurs soon after maturity. **Very susceptible to seed shattering from wind.** A single, windy afternoon when seed is mature and dry can take most of the crop.
- Harvest date range at TPC (2002-2006): Oct. 1 – Oct. 9.
- Recommended Harvest Method: Seed stripper, or Combine at medium to hard dough stage



Seed Cleaning (Appendix C)

Cleaning Process: Air-dry material, remove awns with debearder or brush machine, then air-screen.

Seed Characteristics (Appendix D)

Seed count (debearded): 12,000 seeds/oz (192,000/lb); [175,000/lb USDA PLANTS DATABASE]

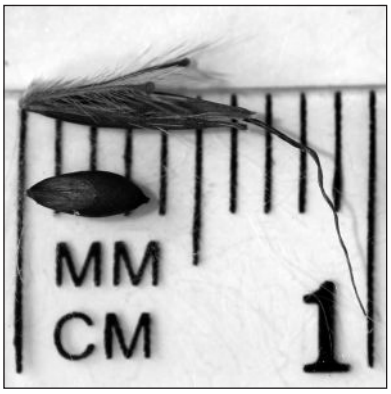


Photo credit: Dave Williams

Description: Fertile spikelet with a bent, twisted awn, about 1.2 cm long (1/2 inches), attached stalks (rachis and pedicel) hairy prior to debearding. Caryopsis smooth, brown, thickened, about 3-5 mm long. Stores well in refrigerated conditions (33-50 F, 30-50% RH). Germination often improves up to a year after harvest.

Typical Seed Test (%):

- Purity: 90+
- Germination: 28
- Dormancy: 59

Released Germplasm (Appendix E)

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections*™; Northern, Western Missouri

Cultivated Varieties: Midwestern adapted varieties include 'Cheyenne', 'Osage' (KS); 'Holt' (NE); 'Oto' (KS,NE) 'Rumsey' (IL).

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 25 January 2007.

Plant Fact Sheet, Indiangrass, *Sorghastrum nutans* L, USDA-NRCS Elsberry Plant Materials Center. January 2001.

An Illustrated Guide to Iowa Prairie Plants, p. 220. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

North American Range Plants, 4th Edition. P. 42-43 Stubbendieck, J., S.L. Hatch, C.H. Butterfield. University of Nebraska Press, Lincoln, NE. 1992

Notes:

Tall dropseed
Sporobolus compositus, (Poir.) Merr. *var. compositus*

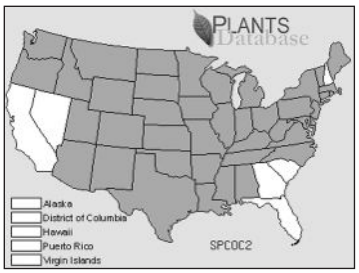
(Formerly *Sporobolus asper* (Beauv.) Kunth)

Genus *Sporobolus*, Greek *sporo* 'seed' and *ballein* 'to throw', referring to the free seeds that are dropped or forcibly ejected in some species of this genera; species *compositus* Latin meaning 'compound'. Former species name *asper*, Latin meaning 'rough'.

Family: Grass (Poaceae)

Other Common Name(s): Rough dropseed, Dropseed. Flag grass

Description: Native perennial warm-season grass, flowering culms 1.5-3 feet tall, smooth. Leaf sheaths smooth, tuft of hairs on each side near the junction with the blade (collar) and at the throat. Leaf blades about 3/16 " wide, up to 9" long, tapered to a threadlike tip, upper surface rough. Ligule is a short fringe of hairs (ciliate). Seedhead consists of a narrow contracted spike-like panicle 4-8" long, developing within the sheath of uppermost leaf, and is only partially exposed at maturity.



Adaptation/Habitat: Dry-mesic to dry, on well-drained clay or silt loams. Also on intermittently wet and dry sandy or rocky soils, full sun. Preferred well-drained loamy soils for seed production.

Threatened/Endangered Status: Endangered (ME, VT); Special Concern (CT).

General Comments: Tall dropseed may become abundant on dry sites, as a bunchgrass or spreading by short rhizomes. Also common on the shoulders of gravel roads in some areas. This species produces abundant seed, is very competitive when direct seeded into appropriate soils, and is relatively easy to harvest and clean. It has potential as an important nurse or cover crop for high diversity native plantings where quick establishment is needed when planting time is during warm soil temperatures.

Establishment for Seed Production (Appendix A)

Direct seeding rate(s):

• Row Spacing:	36"	24"	12"	Solid Stand
• PLS lbs/acre:	1.2	1.8	3.6	3.6

Seeding Depth: 1/4"

Seeding Methods: native grass drill, or broadcast for solid stand

Time of Seeding: Late spring

Weed Control: Prepare clean, firm, weed free seedbed prior to seeding

Greenhouse:

Seed pre-treatment: No stratification necessary. Germination of grass seed usually improves with proper storage (cool, dry conditions) throughout the first year after harvest. Sow seed in greenhouse two months before last frost free date at 1/4" depth. Transplant after all danger of frost.

Stand Management

Weeds – Mow stand high (6–12 inches) first growing season to prevent weed canopy from shading seedlings. Herbicides include Outlook (dimethenamid-P) for grass control. Pendimax (pendimethalin) can be used to control broadleaf weeds in established stands.

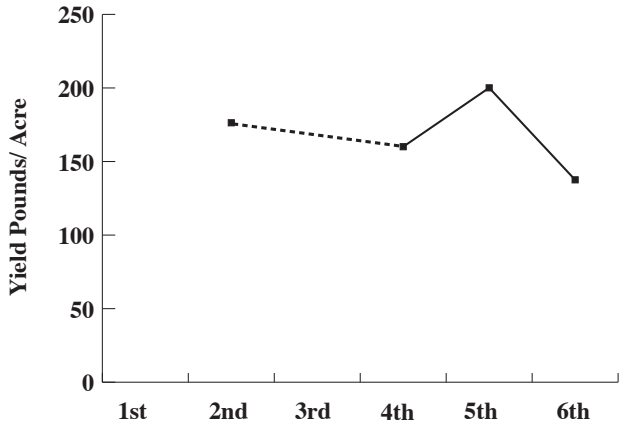
Pests – no serious pest

Diseases – no serious diseases

Pollination: Wind pollinated

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of second growing season from direct seeding.
- Yield/Acre: 150-250 bulk lbs/ac (solid stand)
- Stand Life: Stand remains productive over several years, projected stand life 10-15 years. Annual late spring fire helps control weeds and increase flowering and seed production.
- Flowering Date: Flowering begins in mid- to late-August.
- Seed Maturity: Mid to late September
- Seed Retention: Shattering occurs soon after maturity.
- Harvest date range at TPC (2002-2006): Oct. 1-Oct. 15
- Recommended Harvest Method: Combine. Tall dropseed has very tough stems and leafy material that tends to clog the sickle bar cutting head. Slow groundspeed to compensate.



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Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2" and 1/4" mesh if necessary to remove large particles. Glumes can be removed with a brush machine prior to air-screening if desired, or simply air-screen to clean.

Seed Characteristics (Appendix D)

Seed count: 30,000 seeds/oz (480,000/lb) [759,362 USDA PLANTS DATABASE]

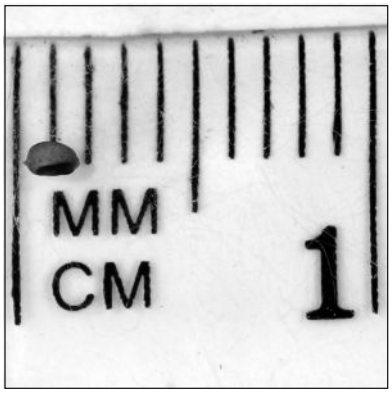


Photo credit: Dave Williams

Description: Spikelets are one-flowered, no awns present, 3.3-7mm long (about 1/4" inch). Grain is about 2 mm (1/16") in diameter, smooth, rounded, often dark brown. Stores well in refrigerated conditions (33-50˚ F, 30-50% RH).

Typical Seed Test (%):

- Purities: 99
- Germination: 90
- Dormancy: 0

Released Germplasm (Appendix E)

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections™*; Northern Missouri

Cultivated Varieties: None known

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 9 February 2007.

Grasses of Iowa, website: http://www.eeob.iastate.edu/research/iowagrasses/index.html. Iowa State University Department of Ecology, Evolution, and Organismal Biology. Accessed 8 February 2007.

Plant Solutions, Iowa Germplasm, Tall Dropseed. USDA-NRCS Elsberry Plant Materials Center. March 2000.

An Illustrated Guide to Iowa Prairie Plants, p. 222. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

North American Range Plants, 4th Edition. P. 138-139. Stubbendieck, J., S.L. Hatch, C.H. Butterfield. University of Nebraska Press, Lincoln, NE. 1992

Notes:

Prairie dropseed
Sporobolus heterolepis, (Gray) Gray

Genus *Sporobolus*, (see definition under Sporobolus asper); species *heterolepis* Latin *heteros* 'different, unlike' and *lepis* 'scale', reference to the unequal, scale-like glumes of the spikelet in this species.

Family: Grass (Poaceae)

Other Common Name(s): Northern dropseed

Description: Native perennial warm-season grass, flowering culms 2-3' tall, smooth stem. Leaf sheaths smooth, with tuft of hairs at throat and collar. Leaf blades about 1/16" wide, up to 2' long, tapered to thread-like point. Ligule is a short fringe of hairs. Seedhead consists of a diffuse, openly branched panicle. Bunchgrass forming large clumps. The long leaves and seedheads create a 'fountain-like' effect making this species desirable for horticultural landscape plantings. Glands at the base of branches in the panicle give off a buttery odor when in flower and seed set.

Adaptation/Habitat: Infrequent on mesic to dry prairies, full sun. Well-drained loamy soils preferred for seed production. This species is seldom abundant in prairies, occurring in groupings as scattered clumps.

Threatened/Endangered Status: Endangered (CT, KY, MD, NC, PA); Threatened (NY, OH)

General Comments: Seedlings develop slowly, so this species is best propagated in the greenhouse and transplanted in rows convenient for tillage equipment as into a well-prepared, weed-free, and firmly packed increase field. Plants are very long-lived, forming large clumps after 2-3 growing seasons. Spring burning stimulates prolific flowering and seed production, but bunches can also be killed or damaged by burning if soil conditions are excessively dry. Timing of seed harvest is critical, since seed drops soon after maturity.

Establishment for Seed Production (Appendix A)

Direct seeding rate(s):
NOT RECOMMENDED FOR THIS SPECIES (slow seedling development)

Greenhouse:
Seed pre-treatment: Moist stratify seed at 35-40° F for 4 weeks. Sow seed in greenhouse two months before last frost free date at 1/4" depth. Transplant (after all danger of frost), into rows convenient for tillage equipment.

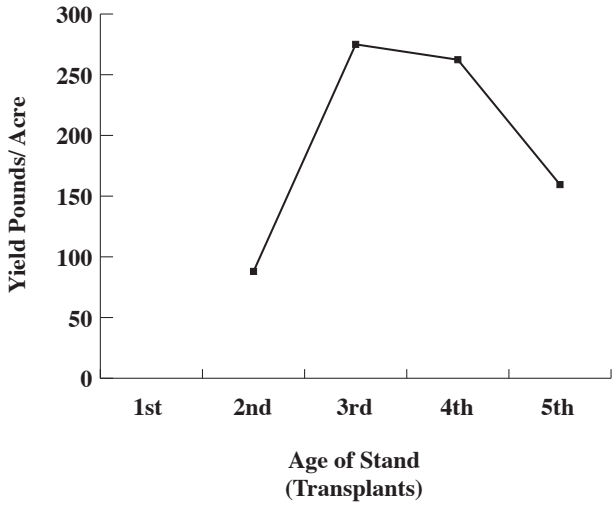
Vegetative reproduction: Large established clumps in the production field can be divided in early spring by spading down into the middle of a clump and lifting out half, leaving remaining half undisturbed. Further divide lifted material, if desired, and replant immediately.

Stand Management

Weed Management – Transplant into well-prepared, weed free increase field. Pre-emergent herbicides may be used after transplanting. Be sure to water in transplants to help seal soil around roots so pre-emergent won't chemically damage root systems. Cultivate, hoe, and hand rogue around young plants later in the season, if necessary.
Pests – No serious pests known
Diseases – No serious diseases known
Pollination: Wind pollinated

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of second growing season from greenhouse grown transplants
- Yield/Acre: 100-250 bulk lbs/ac (34" rows)
- Stand Life: Stand remains productive over several years, projected stand life 10-15 years.
- Flowering Date: Flowering occurs mid-August to early September
- Seed Maturity: Late September to early October
- Seed Retention: Shattering occurs soon after maturity
- Harvest date range at TPC (2002-2006): Oct. 1- Oct. 15
- Recommended Harvest Method: Combine harvest when



Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2" and 1/2" mesh to remove large particles, if necessary. Air-screen to clean.

Seed Characteristics (Appendix D)

Seed count: 16,000 seeds/oz (256,000/lb)

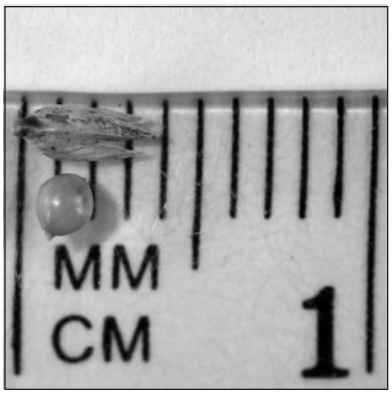


Photo credit: Dave Williams

Description: Spikelets are one-flowered, no awns present, about 4 mm long (5/32 inch), Grain round, firm about 2.5 mm (3/32 inch) long.
Seed reportedly has a high oil content that can shorten viability in storage. Some producers recommend storing seed at freezing temperatures for extended storage after proper drying and cleaning. Store seed in moisture-proof containers before freezing. Seed should not be left at room temperatures for more than a few weeks after harvest. Refrigerated conditions (33-50˚ F, 30-50% RH) are adequate for at least a year after harvest.

Typical Seed Test(%):

- Purity: 99
- Germination: 43
- Dormancy: 6-10

Released Germplasm (Appendix E)

Source Identified Material: Southern Iowa *Natural Selections™*

Cultivated Varieties: None known

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 9 February 2007.

An Illustrated Guide to Iowa Prairie Plants, p. 223. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Notes:

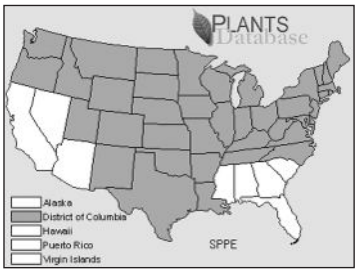
Prairie Cordgrass
Spartina pectinata Bosc ex Link

Genus *Spartina*, Greek *spartine* 'a type of cord made from vegetable fibers', a possible reference to the long, fibrous leaves, or the cord-like appearance of the stout rhizomes; species *pectinata* Latin 'comb' referring to the comb-like one-sided inflorescence and seedhead.

Family: Grass (Poaceae)

Other Common Name(s): Slough grass, Marshgrass, Ripgut

Description: Native perennial warm-season grass, flowering culms up to 10 feet tall, smooth. Leaf sheath smooth with ridges (striate). Leaf blades 6-15 mm wide (to just over 1/2 inch), and 20-120 cm (8 inches to 4 feet) long. Ligule is a short fringe of hairs (ciliate), 1-3 mm long (1/16-1/8 inch). Seedhead consists of a one-sided panicle, 4-15 cm long (2-6 inches). Margins of leaves are serrate, and easily cause minor lacerations on exposed skin, hence the name ripgut. This species is strongly rhizomatous, forming large colonies in wet and wet-mesic soils. Rhizomes are stout, 4-10 mm thick (1/4 –1/2 inch), and scaley.



Adaptation/Habitat: Prefers wet to wet-mesic soil conditions, swale, roadside ditches, marshy areas, drainage areas, wetlands. Full sun. It will grow on seasonally dry sites, but won't tolerate prolonged flooding. Ability to irrigate production stand is necessary for good seed production.

Threatened/Endangered Status: Sensitive (WA)

General Comments: Cordgrass has a reputation for poor seed production. It's primary mode of growth is vegetative, spreading by rhizomes. Cordgrass often forms large, dense colonies with few flowering stalks, and these mostly situated on the outer, leading edges of the colony. Insect predation of the seed heads further limits seed production from native stands. Yet cordgrass does grows readily from good seed, as long as it's viable. Direct seeding for a seed increase stand, however, is not recommended.

Establishment for Seed Production (Appendix A)

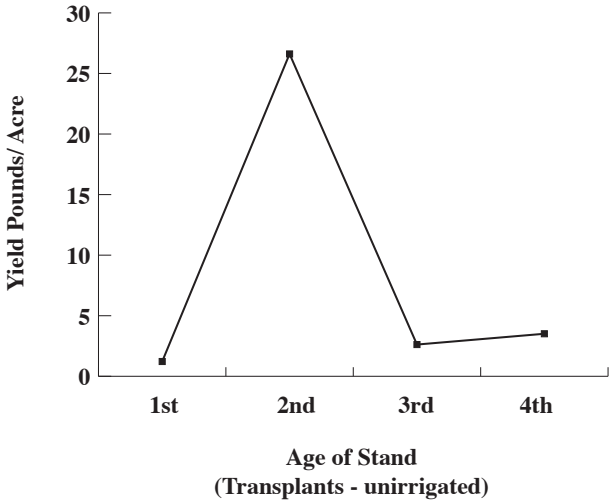
Direct seeding rate(s):
NOT RECOMMENDED FOR THIS SPECIES

Greenhouse:
Seed pre-treatment: Moist stratify seed for up to 4 weeks, or soak in water for 24 hrs and freeze over night to improve germination. Sow seed in greenhouse two months before last frost free date at 1/2" - 3/4" depth. Transplant after all danger of frost. Greenhouse grown plugs can be transplanted into wide row spacing, 6-8 feet between rows, and plants should be 2-3 feet apart within the rows. This gives the newly established plants adequate root-space for rhizome spread, and promotes more flowering and seed set after establishment.

Vegetative Production: Cordgrass can be vegetatively propagated from pieces of rhizome, as long as some roots and buds are present. The best time to transplant is early spring. New shoots are sharply pointed, and arise from rhizomes at the base of the previous years growth, and make ideal transplant material. Our approach has been to establish nursery beds from greenhouse grown seedlings to capture more genetic diversity. In subsequent years, these nurseries provide rhizome material for transplanting into larger production fields.

Stand Management

Weed Control – Pre-emergent herbicides can be used after transplanting seedling plugs or pieces of rhizome. It's critical to water-in transplants to seal soil around roots to prevent herbicide from coming into contact with and possibly damaging roots.
Pests – Insects of the genera *Batra* bore through the seedhead and severely reduce seed production. A stem-boring insect in the genus *Eucosma* can also reduce seed yield (USDA-NRCS Manhattan Plant Materials Center 1998). Reportedly controlled with insecticide application during flowering. Also reportedly less predation when grown in northern climes (e.g. North Dakota)
Diseases – No serious diseases known
Pollination: Wind pollinated



Seed Production (Appendix B)

- First Harvest: Some flowering and seed set occur in the second growing season from greenhouse grown transplants. Seed production may occur the first year from transplanted rhizomes.

- Yield/Acre: 15-30 bulk lbs/ac. (un-irrigated stand) Reported averages of 31 bulk lbs/acre (USDA-NRCS Manhattan PMC 1992); Yields of 30-75 bulk lbs/acre reported for Red River variety at USDA-NRCS Bismarck PMC.
- Stand Life: Irrigation is critical to successful establishment and good seed production of this species over the first few years of stand life. Expect 2-3 years for stand to establish. Stand may become root-bound by 5th year and seed production curtailed. Best to establish new stand from rhizomes.
- Flowering Date: Flowering occurs from mid-July to early September
- Seed Maturity: Late September to early October
- Seed Retention: Shattering occurs by mid to late October
- Harvest date range at TPC (2002-2006): Oct. 7 – Oct. 29
- Recommended Harvest Method: Combine at maturity and before shattering. (No combine settings available in Appendix).

Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2" and 1/4" mesh to remove large particles. Remove awns with debearder. Seeds are long and flat, and easily damaged by a brush machine. Air-screen to clean. Refer to Appendix C for settings.

Seed Characteristics (Appendix D)

Seed count: 66,000 seeds/oz (105,600/lb) [183,000/lb reported by USDA-Bismarck PMC]

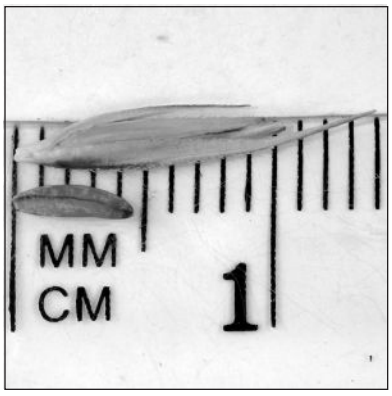


Photo credit: Dave Williams

Description: One-flowered spikelet with short awn (less than 1/4 inch). Seeds are very flat. Caryopsis about 5 mm long.
Stores well in refrigerated conditions (33-50˚ F, 30-50% RH). Germination often improves up to a year after harvest in warm-season grasses.

Sample Seed Test (%):
- Purity: 85+
- Tetrazolium (TZ): 91

Released Germplasm (Appendix E)

Source Identified Material: Iowa germplasm *Natural Selections*^{TM} (pending development)
Cultivated Varieties: Red River Natural Germplasm, Selected Class (ND, SD, & MN); Atkins (Selected Class, vegetative material only, KS);

References:

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 14 February 2007.

Plant Guide, Prairie cordgrass, *Spartina pectinata* Link. USDA-NRCS Bismarck Plant Materials Center. Bismarck, ND.

An Illustrated Guide to Iowa Prairie Plants, p. 221. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Notice of Selected Class Release of Atkins Germplasm Prairie Cordgrass. USDA-NRCS Manhattan PMC/Kansas State University Agricultural Experiment Station, Manhattan, KS. 1998.
(http://plant-materials.nrcs.usda.gov/pubs/kspmcrnsppe.pdf). Accessed 14 February 2007.

North American Range Plants, 4th Edition. P. 106-107. Stubbendieck, J., S.L. Hatch, C.H. Butterfield. University of Nebraska Press, Lincoln, NE. 1992.

Species Guide for Wetland Plantings, Spartina pectinata (Draft). Wynia, R.L. USDA-NRCS Manhattan Plant Materials Center. March 1992. (http://plant-materials.nrcs.usda.gov/pubs/kspmcpgsppe.pdf). Accessed 14 February 2007.

Notes: