

SLENDER WHEATGRASS *Elymus trachycaulus* (Link) Gould ex Shinnars

Plant Symbol = ELTR7

Contributed by: USDA NRCS Idaho Plant Materials Program



Slender wheatgrass seed production field at Aberdeen, Idaho.
Photo by Loren St. John, USDA-NRCS

Alternate Names

Agropyron trachycaulum

Bearded wheatgrass

Rough-stemmed wheatgrass

Uses

Grazing/rangeland/pasture:

Slender wheatgrass is both palatable and nutritious to livestock. Crude protein averages 22 to 25% in the spring and drops below 10% in late summer to fall. Average dry matter yield is between 1000 and 2300 lb/acre.

Wildlife:

Upland game birds and small mammals utilize the seed for food and the foliage for cover. Large ungulates, especially elk and bighorn sheep at higher elevations, readily graze this species.

Erosion control:

Slender wheatgrass is a short-lived perennial with good seedling vigor. It germinates and establishes quickly when seeded making it a good choice for quick cover on disturbed sites. It persists long enough for other, slower developing components of seeding mixtures to establish.

Reclamation:

Slender wheatgrass was among the first native grasses widely used for reclamation seedings in western Canada and the U.S (Alderson and Sharp, 1994). It has been successfully used for the reclamation of mine spoils, oil sands, roadsides right-of-ways, wildfire areas and other disturbed sites. It is especially valuable for use in saline soils.

Status

Slender wheatgrass is considered a species of special concern in Connecticut, endangered or extirpated in Maryland, endangered in New Jersey, and threatened in Ohio (USDA-NRCS, 2011).

Consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

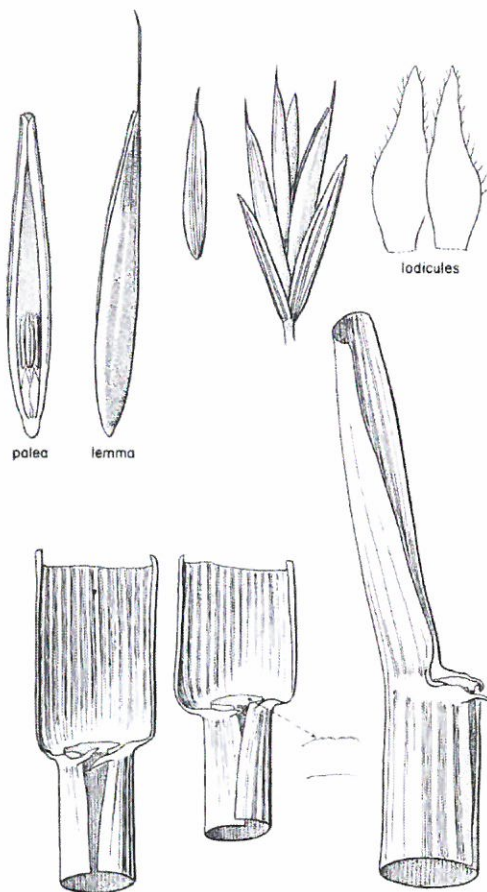
Taxonomy

Historically, slender wheatgrass has borne many different names. Carl Linnaeus originally placed all wheatgrasses in the genus *Triticum* along with cultivated wheat. Later authors classified slender wheatgrass as *Agropyron caninum*, however, it was separated to *A. trachycaulum* from that Old World species by having broader glumes (5 to 7 nerves instead of 3), glumes with membranous margins (not rigid), and having anthers averaging 1.5 mm (0.06 in) long as opposed to 2mm (0.08 in). More recently, it was determined through the use of molecular, morphological and cladistic analysis that in North America, the genus *Agropyron* should be left to the introduced crested wheatgrass complex (*A. cristatum*, *A. desertorum* and *A. fragile*), which moved slender wheatgrass to the genus *Elymus*. This move also required the change of the epithet to *trachycaulus* in order to match the Latin genders (Barkworth, 1997).

Description

General: Grass Family (Poaceae). Slender wheatgrass is a relatively short-lived (3 to 5 years) perennial, cool-season C3 type, bunchgrass native to Western North America. Plants are perennial,

occasionally producing short rhizomes. Culms are erect or decumbent at the base, reaching a height of 0.5 to 1.0 m (20 to 40 in) tall. Stems are noted as having a reddish to purplish tinge at the base. The leaves are flat, usually 2 to 8 mm (0.08 to 0.31 in) wide, stiffly ascending or somewhat lax. Sheaths are commonly glabrous or somewhat scabrous with auricles short or lacking. The inflorescence is a long, spicate raceme ranging from 5 to as much as 25 cm (2 to 10 in) long. Spikelets are solitary at each node of the rachis, 3 to 7 flowered and about 10 to 20 mm (0.4 to 0.8 in) long. Spikelets overlap along the inflorescence, the rachis internodes being 5 to 8 mm (0.2 to 0.3 in) long. Glumes are lanceolate to oblong with 5 to 7 nerves. The first glume ranges from 6 to 10 mm (0.24 to 0.4 in) long, while second glumes are slightly longer, from 7 to 12 mm (0.3 to 0.5 in) (Cronquist et al., 1997). Slender wheatgrass is self-pollinated and chromosome number is $2n=28$ (Heath, et al, 1985).



Slender wheatgrass seed and collar characteristics. Illustration by Jeanne R. Janish with permission from University of Washington Press

Distribution

Slender wheatgrass is found from 1,300 to 3,500 m (4,300 to 11,500 ft) in elevation. The species range

includes Canada, Siberia, Mexico and all states except those in the southeastern U.S.

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

Habitat:

Slender wheatgrass is found in many plant communities including Wyoming, basin and mountain big sagebrush, mountain brush, aspen, ponderosa, spruce-fir and lodgepole pine.

Adaptation

Slender wheatgrass grows naturally in moist to dry sites receiving more than 25 cm (10 in) annual precipitation. This species is less drought tolerant than crested and thickspike wheatgrass and may succumb to drought due to its late maturation. It prefers loamy to clayey soils. Slender wheatgrass is well adapted to basic soils (up to pH=8.8) and moderately saline conditions with a salinity tolerance ranging from 10 to 20 mmhos/cm.

Establishment

Seeds should be planted in a firm, weed-free seed bed. Dormant fall planting is preferred for dryland seedings made in areas receiving less than 16 inches mean annual precipitation. Areas receiving over 16 inches of mean annual precipitation and fields that are irrigated can be seeded in late fall or early spring (Skinner, 2004). (Note: dormant fall seedings are more prone to be negatively affected by soil crusting and mid to late spring seedings are more prone to drying out).

Seeds should be drilled to a depth of ¼ to ¾ inch at a Pure Live Seed (PLS) rate of approximately 6 lb PLS/acre for field plantings.

For critical area plantings, turf applications and broadcast plantings the PLS seeding rate should be 1.5 to 2.0 times the drill seeding rate.

For native seed mixtures, limit slender wheatgrass to 1 pound PLS/acre because higher rates effect the establishment of slower developing native species.

Fertilizer is not recommended for establishment, as it usually benefits the weeds. On disturbed sites fertilizer should be applied according to soil test results.

Management

Slender wheatgrass is best suited as a filler component in seed mixtures containing slower establishing, long-lived perennials (Ogle et al., 2010). It does well for hay and pasture when combined with legumes. Because this species is short-lived and only moderately tolerant of grazing, stands should be

managed carefully to ensure seed production occurs every other year for long-term survival.

Pests and Potential Problems

Slender wheatgrass is susceptible to head smut (*Ustilago bullata*) and stripe smut (*U. striiformis*) (Wheeler and Hill, 1957) and may be susceptible to infestations of the grass billbug (Heath, et al, 1985).

Environmental Concerns

Although slender wheatgrass is native to Western North America, it can be viewed as “weedy” due to its ability to quickly establish in disturbed areas.

Consult with your local NRCS Field Office, Cooperative Extension Service Office or state natural resource or agriculture department regarding this species’ status and use. Weed information is also available from the PLANTS Web site.

Seed and Plant Production

Plant at a rate of approximately 3.4 pounds PLS/acre or 25 to 30 seeds per linear foot of drill row at 36 inch row spacing (Ogle et al., 2010).

For stand establishment, apply 55 lb/acre of 11-55-0 (high phosphorus fertilizer) as a soil amendment prior to planting or during seeding. If planting into grain stubble, after initial seedling establishment, apply 30 lb/acre nitrogen for dryland or 60 to 80 lb/acre nitrogen for irrigated fields. No additional nitrogen is necessary if planting into summer fallow. Irrigate enough to keep soil moist for establishment and to prevent soil crusting. Seeds should germinate within 8 to 10 days. Weeds can be controlled after the 3 to 5 leaf stage with low rates of Bromoxynil. Be sure to read and follow all label directions when using any pesticide. Caution should be exercised when using cultivation on young seedlings because of the possibility of uprooting.

For established stands, apply 50 lb/acre nitrogen each year in late fall on dryland and 60 to 80 lb/acre nitrogen in late fall under irrigation.

On established stands keep soil moisture above fifty percent field capacity during the growth period. Before the flowering stage apply enough water to carry plants through pollination. After pollination, irrigate to recharge the soil profile for seed set (Cornforth and Ogle, 2001).

Control weeds chemically (Bromoxynil, Metribuzin, 2, 4-D or dicamba), by roguing or mechanical cultivating. Always read and follow label and safety instructions for each control method. USDA-NRCS does not guarantee or warranty any products or control methods named, and other products may be equally effective.

Seed is ready for harvest in late July to early August. The recommended harvest method is by direct combining or by swathing followed by combining. Windrows should be allowed to dry in the field for 6 to 7 days before combining.

Seed yields range from 200 to 400 lb/acre in dryland to 500 to 600 lb/acre under irrigation. Seed should be dried to 12 percent or less moisture prior to storage. When stored properly, cleaned seed should retain its viability for about five years. Stands can be expected to survive for 3 to 5 years.

Cultivars, Improved, and Selected Materials

‘Adanac’ was released by the Agriculture Canada, Saskatoon Research Station and the Agriculture Canada Experiment Farm in 1990. Plants are taller than those of Revenue, but have fewer leaves. Adanac averaged 7% higher hay yields than Revenue during a four-year study. Adanac also rated higher than Revenue in establishment, persistence, seed yield and productivity under saline conditions. However, digestibility and protein content are somewhat below those of Revenue. This release is recommended for use in Saskatchewan, Canada. Breeder seed is maintained by the Agriculture Canada, Saskatoon Research Station and the Agriculture Canada Experiment Farm, Indian Head.

‘AEC Hillcrest’ was released by the Alberta Environmental Centre in 1994. Its primary uses are in reclaiming and revegetation of disturbed sites in the mountains and foothills of Alberta. This cultivar belongs to a different subspecies than the others discussed here (*Elymus trachycaulus* ssp. *subsecundus*) and is therefore difficult to compare directly. Data show AEC Hillcrest producing similar plant cover to Revenue at elevations around 1800 meters. Hillcrest seeds also tend to ripen two weeks earlier than Revenue, an important quality in the shortened growing season of Alberta (Darroch and Acharya, 1995). Breeder seed is maintained by the Alberta Environmental Centre, Vegreville, Alberta. Foundation and Certified seed is maintained by Peace Valley Seeds, Rycroft, Alberta.

Copperhead Selected Class Germplasm was officially released in 2007 by the Bridger, Montana Plant Materials Center. This release is from a collection of at least 20 plants originating from approximately one-half mile north of Highway 1 across from the junction to Wisdom, Montana. The collection site was severely impacted by smelter fallout, surface wind, and water transported contaminants, as well as historic overflow from the canal transporting waste material to sediment ponds. The original collection site had a soil surface pH of 4.3, an average annual precipitation of 13.93 inches and an elevation of 5,000 feet. The accession was compared to two other collections from acid/heavy-metal impacted sites and

four released cultivars: 'Pryor' (Montana), 'San Luis' (Colorado), 'Revenue' (Canada), and 'Highlander' (Canada). Copperhead germplasm has been field tested at three impacted sites in the Anaconda area and in a controlled greenhouse environment utilizing contaminated soil. Copperhead germplasm has exhibited superior emergence, survival, and biomass production on amended acid/heavy metal impacted soil. Copperhead germplasm is intended for use on severely impacted sites with low pH and high concentration of heavy metals. G1 seed of Copperhead germplasm slender wheatgrass is available from the USDA-Natural Resources Conservation Service (NRCS) Plant Materials Center (PMC) in Bridger, Montana, through the Foundation Seed Program at Montana State University-Bozeman or the University of Wyoming.

'First Strike' was released in 2006 by the USDA-Agricultural Research Service and the US Army-Engineer Research and Development Center for use on arid and semiarid rangelands as a rapidly establishing revegetation grass in the Intermountain Region and Northern Great Plains of the western U.S. First Strike was selected for persistence and overall plant vigor in response to drought. In seeded trials at Yakima Washington, Guernsey, Wyoming, Fillmore, Utah and Malta, Idaho, First Strike had significantly more seedlings per unit area than Pryor during the establishment year. At Guernsey, Wyoming, forage production was 27% greater in First Strike than Pryor (Jensen et al., 2007). Foundation seed is available through the Utah Crop Improvement Association.

'Primar' was released by the NRCS Plant Materials Center in Pullman, Washington in 1946. Originally collected near Beebe, Montana, Primar was selected for use in sweetclover-grass conservation mixtures for pasture, hay and green manure. Plants are high in vegetative production and show resistance to leaf rust, stem rust and stripe rust. This cultivar is adapted to short-lived dryland seedlings in areas receiving over 16" annual precipitation. Pullman Plant Materials Center maintains Breeder seed and Washington Crop Improvement Association maintain Foundation seed.

'Pryor' was released cooperatively by the NRCS Plant Materials Center in Bridger, Montana and the Montana and Wyoming Agricultural Experiment Stations in 1988. The original collection was made in Carbon County, Montana, five miles north of Warren. It is superior to other previously released slender wheatgrasses in drought tolerance, saline tolerance and seedling vigor. It also matures earlier and has a larger mean seed size (213,000 seeds/kg compared to 320,000 seeds/kg). For these reasons it is used primarily in mixtures for reclamation and conservation plantings in low precipitation, alkali conditions. Breeder and Foundation seed are

maintained by the NRCS Plant Materials Center, Bridger, Montana.

'Revenue' was originally collected in Saskatchewan in 1961. It was selected from over 750 native and introduced collections evaluated between 1959 and 1969 and released in 1970 by the Canada Department of Agriculture. Revenue is said to be superior to Primar in establishment, forage and seed yield and in salinity tolerance. It also has a higher leaf-to-stem ratio, better digestibility and greater smut resistance than Primar. It is similar to Primar in maintaining good stands for three to five years. It is adapted for use on saline soils and in short pasture rotations. Breeder seed is maintained by the Canada Department of Agriculture.

'San Luis' was released cooperatively in 1984 by Colorado, and New Mexico Agricultural Experiment Stations, NRCS, and the Upper Colorado Environmental Plant Center. The original collection was made by Glenn Niner in 1975 near Center, San Luis Valley, Rio Grande County, Colorado. Due to its outstanding rapid establishment and longevity it is well suited for soil stabilization on slopes and disturbed sites. It performs best above 1,800 meters elevation in areas receiving over 35 cm (14 inches) of annual precipitation. It is recommended for ski slopes, roadsides, mine land reclamation, and transmission corridors. Breeder and Foundation seed is maintained by the Upper Colorado Environmental Plant Center, Meeker, Colorado.

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Citation

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SNAKE RIVER WHEATGRASS

Elymus wawawaiensis J. Carlson
 & Barkworth

Plant Symbol = ELWA2

Contributed by: USDA NRCS Idaho PM Program



Snake River wheatgrass. Tom Jones, USDA-ARS.

Uses

Grazing/rangeland/wildlife: Snake River wheatgrass is palatable to all classes of livestock and wildlife. It is a preferred feed in spring when protein levels can be as high as 20 percent. Protein levels decrease to about 4 percent as the grass matures in early to mid summer.

Erosion control/reclamation: Snake River wheatgrass is very drought tolerant, and is adapted to stabilization of disturbed soils. It is very compatible with slower developing native bunchgrass species, but does not compete well with aggressive introduced grasses. Its drought tolerance, extensive root system and fair to good seedling vigor, make this species ideal for reclamation in areas receiving 10 to 20 inches annual precipitation. This grass can be used in urban areas where irrigation water is limited to stabilize ditch banks, dikes, and roadsides as a component of a native mix.

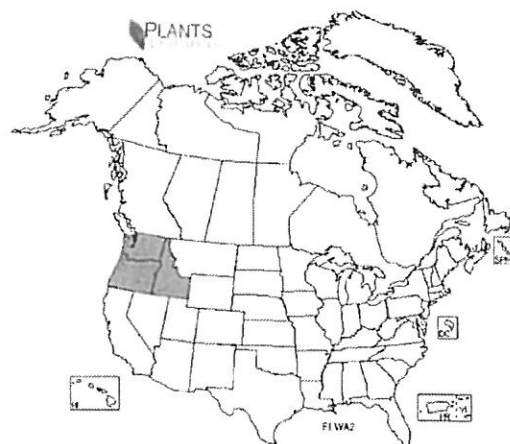
Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Description and Adaptation

Snake River wheatgrass is a long-lived, perennial, cool-season native bunchgrass with an extensive root system with strong tillers. Mature plants reach a height of approximately 36 inches. Snake River wheatgrass is similar in appearance to bluebunch wheatgrass and can be distinguished by floral and vegetative characters.

The natural distribution of Snake River wheatgrass is limited to eastern Oregon, eastern Washington, and west central to northern Idaho, but it is widely used as a surrogate for bluebunch wheatgrass for restoration, reclamation, and rehabilitation of rangelands in the Columbia Plateau, Northern Basin and Range, Central Basin and Range, and Snake River Plain. For a current distribution map, consult the Plant Profile page for this species on the PLANTS Website.



Snake River wheatgrass distribution from USDA-NRCS PLANTS Database.

Snake River wheatgrass does best on medium to coarse-textured soils, but can be found on heavy to coarse-textured soils over 10 inches deep, including fairly sandy sites. It tolerates weakly saline conditions, but does not grow on acidic sites. It is cold tolerant, moderately shade tolerant, and very tolerant of fire. It is intolerant of high water tables, and periods of extended inundation.

Snake River wheatgrass is most abundant in 8 to 20 inch annual precipitation areas at elevations from 500 to 10,000 feet. It performs best with 10 to 20 inches of annual precipitation but can establish with as little as 7 inches and tolerate up to 35 inches on very well-drained soils. It is a major component of native plant communities and generally occupies 20 to 60 percent of the overall composition by weight of the community.

Establishment

This species should be seeded with a drill at a depth of 1/2 inch or less on medium-textured soils, 1/4 inch on fine-textured soils and 3/4 inch or less on coarse-textured soils. The single species seeding rate is 8 pounds Pure Live Seed (PLS)/ac. If used as a component of a mix, adjust to percent of mix desired. For broadcast plantings, mined lands, and other harsh critical areas, the seeding rate should be doubled. Seedlings are significantly weaker than crested wheatgrass and a clean firm weed free seedbed is required for establishment.

Seed in very early spring on heavy to medium-textured soils and in late fall on medium to light-textured soils. Late summer (August to mid-September) seeding is not recommended unless irrigation is available. Dormant fall seedings will pre-chill seed and improve germination. Snake River wheatgrass establishes fairly quickly compared to other native grasses. Stands should be given up to 3 years to ensure establishment. It is compatible with other native species and can be used in seeding mixtures. It should not be seeded with competitive introduced species. Stands may require weed-control measures during establishment.

Management

Stands of Snake River wheatgrass should not be grazed for two to three growing seasons. Six inches of new growth should be attained in spring before grazing is allowed in established stands. The growing point of Snake River wheatgrass is fairly high and stands can be easily overgrazed. Spring grazing should occur no more than one out of three years and no more than 40 percent utilization should occur during rapid growth. Heavy early-spring grazing is especially damaging, and grazing should be delayed until new seedheads are emerging about halfway from the boot or protecting leaf. No more than 60 percent utilization should occur after seed ripens. Snake River wheatgrass is not suited to hay production and is best suited to rangeland, critical area stabilization, and cropland retirement type uses.

Environmental Concerns

Snake River wheatgrass is long lived and spreads primarily via seed. It is not considered a "weedy" or invasive species, but can spread into adjoining vegetative

communities under ideal conditions. It is known to cross with bluebunch wheatgrass, thickspike wheatgrass, quackgrass, and bottlebrush squirreltail. These interspecific hybrids generally exhibit low fertility and do not dominate a site or crowd out non-hybrid plants.

Cultivars, Improved, and Selected Materials (and area of origin)

'Discovery' was developed from four accessions that were found to have improved vigor in comparison to Secar. The populations used to generate Discovery trace to materials collected in Whitman and Asotin counties in southeastern Washington and Idaho County in central Idaho. Discovery was released in 2008, and Breeder seed is maintained by the USDA-ARS Forage and Range Research Laboratory, Logan, UT. Foundation, Registered and Certified seed is available to commercial growers through the Utah Crop Improvement Association.

'Secar' is the original cultivar release of Snake River wheatgrass. It was originally released as a bluebunch wheatgrass, but was later determined it to be Snake River wheatgrass. The original collection site for Secar is the Snake River Gorge near Lewiston, Idaho. The Idaho-Oregon, Montana, and Wyoming AES, Washington Agriculture Research Center, and Pullman Plant Materials Center released Secar in 1980. Certified seed is available and Breeder seed is maintained by Pullman PMC. Foundation seed is available through the Washington State Crop Improvement Association.

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SANDBERG BLUEGRASS

Poa secunda J. Presl

Plant Symbol = POSE

Contributed by: USDA NRCS Plant Materials
Program



Robert H. Mohlenbrock
USDA NRCS 1992
Western Wetland Flora
@USDA NRCS PLANTS

Alternate Names

big bluegrass; *Poa ampla*, *Poa canbyi*, *Poa confuse*, *Poa gracillima*, *Poa sandbergii*, *Poa scabrella*, *Poa nevadensis*, *Poa laevigata*, *Poa juncifolia*, *Poa incurve*; some of these synonyms, such as *Poa nevadensis* are sometimes recognized at the species level in some states.

Uses

Livestock: Early spring grazing by cattle or sheep is one of the primary uses of Sandberg bluegrass seedings. In adapted areas, there is no other grass that provides an equal volume of early spring forage. It makes good spring calving or lambing pasture.

Wildlife: Upland game birds, especially pheasants, choose fields of Sandberg bluegrass for nesting sites because Sandberg bluegrass has more early spring growth than other dryland grasses and the basal leaves provide good shade.

Woodland: Sandberg bluegrass has been successfully used for reseeding burned-over forest lands in pine forests of the West. It has a remarkable ability to produce roots which effectively suppress weed growth.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

Sandberg bluegrass is one of the native bluegrasses and is an important component of the sagebrush grassland vegetation in the western United States. It is a medium-sized cool season bunchgrass with numerous fine basal leaves 8 to 16 inches long. These leaves are a smooth, deep blue green and are folded with keel-shaped tips typical of bluegrasses. This long-lived perennial reaches 2 to 4 feet in height. Its inflorescence is a narrow panicle up to 8 inches long. It has a strong fibrous root system but will occasionally develop short rhizomes. The flower spikelets do not have a web of hairs at the base, unlike Kentucky bluegrass, which does.

Sandberg bluegrass begins growth early in spring, before crested wheatgrass, and matures in early summer unless moisture is sufficient to keep it green all summer. In this respect it is the most persistent of all the cool season grasses.

Adaptation and Distribution

This native bluegrass thrives on a variety of soils from moderately coarse sands to fine clays. It will tolerate coarse sands and dense clays, but will not grow under saline conditions and can tolerate weakly acid or alkaline soils. Well-drained mountain loams are a good place to look for Sandberg bluegrass stands.

Although it grows in moist conditions (15 to 20 inch precipitation zone) it will not tolerate early spring flooding, high water tables, or poor drainage. It does

best with cool winter moisture above 7,000 feet. It has excellent cold tolerance but does not do as well as other cool season grasses during drought. Its tolerance to shade and grazing is moderate but its ability to withstand burning is very low except when dormant.

Sandberg bluegrass is distributed throughout the West. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment

Seed of Sandberg bluegrass should be drilled at 1/4 to 3/4 inches deep depending upon soil type: 1/4 inch for fine, moist soils, 1/2 inch for medium textures, and 3/4 inch for coarse or dry soils. On semiarid lands, 3 pounds pure live seed (PLS) per acre is adequate. Harsh or erosive sites require doubling of the seeding rate as does broadcast seeding.

The seed should be planted 2 months prior to the most reliable precipitation: usually early spring, late summer or late fall depending upon the area. When seeding in spring it is advisable to plant as soon as possible since high soil temperatures will put the seedlings into dormancy. Prechilling will improve germination of the seed. Seedling vigor is moderate to good for a bluegrass. It does not respond significantly to irrigation and gives only moderate response to nitrogen applications. It is weakly compatible to seeding with other cool season species. It can be seeded with other grasses, forbs, legumes, or shrubs. Weed control may be needed.

Management

Sandberg bluegrass has good palatability to livestock in spring and fall and to deer in the spring. It has excellent palatability to elk all year. Cattle prefer Sandberg bluegrass in the spring and it should be grazed when it reaches eight inches in height. Livestock graze Sandberg bluegrass in the vegetative

stage, but avoid it when headed. Livestock should be removed while there is still enough moisture in the ground to allow regrowth before plants go dormant. Regrowth can be grazed after the plants turn green in the fall, but a 6-inch stubble should be left.

Overgrazing and severe trampling are injurious to native stands of this grass and without proper protective grazing, a range will deteriorate rapidly. New seedlings are easily pulled up by grazing animals and, therefore, should not be grazed until the stands are more than 2 years old and are sufficiently well-rooted to withstand grazing. Spring and fall

grazing are recommended. When properly managed, Sandberg bluegrass will compete with cheatgrass.

Pests and Potential Problems

The primary pests of Sandberg bluegrass are grasshoppers, jackrabbits, and rodents. Diseases include leaf and stem rusts and stem maggots.

Cultivars, Improved, and Selected Materials (and area of origin)

'Sherman' (OR). Seed can be obtained from most commercial seed stores.

Prepared By & Species Coordinator: USDA NRCS Plant Materials Program

Edited: 05Feb2002 JLK; 060809 jsp

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United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

THICKSPIKE WHEATGRASS

Elymus lanceolatus (Scribn. &
J.G. Sm.) Gould
Plant Symbol = ELLA3

Including

E. l. subsp. lanceolatus
Thickspike Wheatgrass
Plant Symbol = ELLAL

E. l. subsp. riparius (Scribn. &
J.G. Sm.) Barkworth
Streambank Wheatgrass
Plant Symbol = ELLAR

And

E. l. subsp. psammophilus (J.M.
Gillett & H. Senn) Å. Löve
Great Lakes Wheatgrass
Plant Symbol = ELLAP

Contributed by: USDA NRCS Idaho Plant Materials
Program

Alternate Names

Common Alternate Names:

E. l. subsp. psammophilus is also known as sand dune
wheatgrass

Scientific Alternate Names:

Agropyron dasystachyum, *A. lanceolatum*,

Although streambank wheatgrass (*E. l. subsp. riparius*) is currently not recognized by the PLANTS Data Center as a valid taxon (USDA NRCS 2012); separation of this subspecies is useful in describing ecological sites, predicting revegetation performance and in making land management decisions. In this light, the authors have decided to follow the treatment of the species following Barkworth et al. (2007).



Thickspike wheatgrass. Loren St. John, USDA NRCS.

Uses

Grazing/rangeland/hayland: Thickspike wheatgrass and its subspecies are palatable to all classes of livestock and wildlife. It is a preferred feed for cattle, sheep, horses, and elk in spring and is considered a desirable feed for deer and antelope in spring (Ogle and Brazee 2009). It is considered a desirable feed for cattle, sheep, horses, and elk in summer, fall, and winter. In the spring, the protein levels can be as high as 20 percent and decreases to about 4 percent, as it matures and cures. Digestible carbohydrates remain about 45 percent throughout the active growth period. This species is generally a relatively low forage producer with the exception of the cultivar, 'Bannock', but can be utilized as native hay when planted in association with other species. It has been noted as one of the highest yielding forage grasses in the Red Desert and Big Horn Basin of Wyoming (Krysl et al. 1984.).

Erosion control/reclamation: Thickspike wheatgrass and streambank wheatgrass are well adapted for the stabilization of disturbed soils. They do not compete well with aggressive introduced grasses during the

establishment period, but are very compatible with slower developing native grasses, such as Snake River wheatgrass (*Elymus wawawaiensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), western wheatgrass (*Pascopyrum smithii*), and needlegrass (*Stipa* and *Hesperostipa*) species. Their drought tolerance, dense root system and good seedling vigor make these species ideal for reclamation in areas receiving 200 to 500 mm (8 to 20 in) annual precipitation.

The low growth form, vigorous sod, and low maintenance requirements of streambank wheatgrass make it ideal for stabilization and ground cover purposes. These grasses can be used in urban areas where irrigation water is limited to provide ground cover and to stabilize ditch banks, dikes, and roadsides. It has even been used as cover for grassed airplane runways.

Wildlife: Thickspike wheatgrass provides some cover for small mammals and upland birds (Scher 2002). In addition to big game it is also grazed by jackrabbits (Ganskopp et al. 1993).

Status

Great Lakes wheatgrass (*E. l.* subsp. *psammophilus*) is threatened in Wisconsin (Wisconsin DNR 2012). Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Description

General: Grass family (Poaceae). Thickspike wheatgrass is a long-lived, strongly rhizomatous, perennial grass with erect culms 0.3 to 1.3 m (12 to 50 in) tall. The leaves are involute (rolled) or flat, 1.0 to 3.5 mm (0.04 to 0.14 in) wide and typically stiffly ascending. The leaf sheaths are glabrous or rarely ciliate to long-hairy on the margins (Welsh et al. 2003). Auricles are well-developed, 0.4 to 1.5 mm (0.02 to 0.06 in) long, and the ligule is membranous, 0.3 to 0.5 mm (0.01 to 0.02 in) long (Skinner 2010). The inflorescence is an erect spike, 6 to 22 cm (2.4 to 8.7 in) long with a continuous rachis. The internodes of the spike are approximately 5 to 16 mm (0.2 to 0.6 in) long. Spikelets are solitary at each node of the rachis, bear 3 to 12 florets, and closely overlap. The glumes are 4 to 10 mm (0.16 to 0.4 in) long, acute-acuminate with a 0.5 to 3 mm (0.02 to 0.1 in) awn. Lemmas are 8 to 12 mm (0.3 to 0.5 in) long and awn-tipped. Anthers are 3 to 5 mm (0.1 to 0.2 in) long (Welsh et al. 2003). There are approximately 135,000 seeds per pound (Ogle et al. 2011a).

Thickspike wheatgrass creates a dense rhizomatous matrix. The majority of the root mass is located in the upper 24 cm (9 in) of soil with some roots extending 38 cm (15 in) deep (USDA FS 1937).

The subspecies of *E. lanceolatus* can be separated primarily on the basis of lemma pubescence. Those with densely hairy lemmas with flexible hairs approximately 1 mm (0.04 in) long or longer are considered Great Lakes, or sand dune, wheatgrass (*E. l.* subsp. *psammophilus*). Plants with lemmas pubescent of stiff hairs less than 1 mm (0.04 in) are thickspike wheatgrass (*E. l.* subsp. *lanceolatus*), while plants with lemmas mostly glabrous to scabrous are considered streambank wheatgrass (*E. l.* subsp. *riparius*) (Barkworth et al. 2007).

Streambank and thickspike wheatgrasses are similar to western wheatgrass in appearance, except they are not as coarse, their rhizomatous trait is not as aggressive, and their coloration is somewhat greener. They are also more drought tolerant than western wheatgrass. In comparison to western wheatgrass, they "green up" and "head out" earlier and total biomass production is generally lower.

Distribution:

Thickspike wheatgrass and streambank wheatgrass occur throughout most of western North America with primary distribution in the Intermountain and Rocky Mountain areas. Great Lakes wheatgrass was described around the Great Lakes region; however specimens have also been identified throughout the western range of the species (Barkworth et al. 2007). For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Habitat:

Thickspike wheatgrass occurs from near sea level in the Great Lakes region to 10,000 feet in the Rocky Mountains (Scher 2002; Welsh et al. 2003). This is a very polymorphic species and is a component of the vegetation on such diverse sites as stabilized sand dunes in eastern Washington, glacial outwash fans in Montana and loess (wind blown silt loam) soils in southern Idaho (Scher 2002). Thickspike and streambank wheatgrass are components of many western native plant communities and generally occupy a small percentage of the overall composition. An exception to this may be short periods following fire in Juniper stands, when they may nearly dominate the site.

Species often associated with these wheatgrasses in the west include the big sagebrush (*Artemisia tridentata*) complex, juniper (*Juniperus* spp.), needlegrasses, and dropseed (*Sporobolus airoides*), prairie sandreed (*Calamovilfa longifolia*), bluebunch wheatgrass, Snake River wheatgrass, and Idaho fescue (*Festuca idahoensis*).

Adaptation

Thickspike and streambank wheatgrass prefer medium to coarse textured soils; however, streambank wheatgrass can also be found on slightly fine textured soils. Western wheatgrass may be a better choice on fine textured soils in sites receiving 300 mm (12 in) or more annual precipitation. Thickspike and streambank wheatgrass will

tolerate slightly acidic to moderately saline conditions with a pH of 6.0 to 9.5 (Scher 2002). They are cold tolerant, can withstand moderate periodic flooding in the spring, are moderately shade tolerant, and very tolerant of fire. They will not tolerate long periods of inundation, poorly drained soils, or excessive irrigation (Holzworth and Lacey 1993).



Second season 'Sodar' streambank wheatgrass growing in a 6-9 inch precipitation site northwest of Aberdeen, Idaho. Derek Tilley, USDA NRCS.

On native sites, streambank and thickspike wheatgrasses are most abundant in the 200 to 500 mm (8 to 20 in) annual precipitation zones. Seeded varieties do best with 250 to 500 mm (10 to 20 in) of precipitation; however they have been successfully established on sites receiving as low as 125 mm (5 in) of precipitation.

Establishment

These species should be seeded with a drill at a depth of 1.2 cm (0.5 in) or less on medium to fine textured soils and 1 inch or less on coarse textured soils. Single species seeding rates recommended for both grasses are 8 pounds Pure Live Seed (PLS) per acre or 20 to 25 PLS per square foot (Ogle et al. 2011a). If used as a component of a mix, adjust to percent of mix desired. For mined lands and other harsh critical areas, the seeding rate should be increased to 40 to 50 PLS per square foot. Mulching and light irrigation are beneficial for stand establishment.

The best seeding results are obtained from seeding in very early spring on fine to medium textured soils and in late fall on medium to coarse textured soils. Late summer (August - mid September) seedings are not recommended unless irrigation is available. There are reports of pre-chilling treatments aiding seed germination (Monsen et al. 2004); however others indicate seed is viable and non-dormant at maturation (Zhang and Maun 1994). Seedling vigor is good to excellent, exceeding that of western wheatgrass, but less than crested wheatgrass (*Agropyron cristatum*).

Thickspike and streambank wheatgrass establish more quickly than western wheatgrass. They are the most rapidly establishing native species next to slender wheatgrass (*Elymus trachycaulus*). They are compatible with other native species and can be used in seeding mixtures. They should not be seeded with strongly competitive introduced species.

Stands may require weed control measures during establishment, but application of 2,4-D should not be made until plants have reached the three to five leaf stage (Smith et al. 1996). Mowing the stand when weeds are beginning to bloom will reduce weed seed development.

Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

Management

This grass begins growth in the spring about 2 weeks after bluegrass (*Poa* spp.) species and about 3 weeks earlier than western wheatgrass. They make good spring growth, fair summer growth, and good fall growth if moisture is available.

Streambank wheatgrass is not recommended for forage production. Thickspike wheatgrass has good palatability for livestock and wildlife. Livestock and wildlife will graze thickspike wheatgrass throughout the growing season, until the plants become too coarse toward fall. Established stands can withstand heavy grazing.

New stands should not be grazed until they have firmly established and have headed out. Six inches of new growth should be attained in spring before grazing is allowed in established stands and four inches of stubble should be left at the end of the grazing season (Ogle, 2011b).

These wheatgrasses are low maintenance plants, requiring little additional care. However, on better sites, stands can become sod-bound and may need attention in the form of fertilization and moderate spring/fall grazing deferment. Stands may also benefit from ripping if sod-bound conditions occur to revitalize plants and to increase forage production. Care should be taken to avoid excessive tillage during ripping because stands may be damaged beyond their ability to respond to the positive influences of ripping.

Thickspike and streambank wheatgrass are competitive with weedy species, but can be crowded out by some aggressive introduced species.

Pests and Potential Problems

Under certain environmental conditions, rust can severely reduce seed yields (Skinner 2004). Head smut has also been noted as a problem in seed production fields (Skinner 2004). Grasshoppers and other insects may also damage new stands and the use of pesticides may be required.

Environmental Concerns

Thickspike wheatgrass are long-lived, spread primarily via vegetative means (rhizomes), but also spread via seed distribution. They are not considered "weedy" or invasive species, but can spread into adjoining vegetative communities under ideal climatic and environmental conditions. Most seedlings do not spread from original plantings, or if they do spread, the rate of spread is slow.

Thickspike wheatgrass has been shown to form hybrids with bluebunch wheatgrass. The resulting offspring has been described as Montana wheatgrass (*Elymus albicans*) (Dewey 1970).

Seed and Plant Production

Seed production of streambank and thickspike wheatgrass has been very successful under cultivated conditions.

Row spacing of 71 to 91 cm (28 to 36 in) is recommended. The seeding rate for 36 inch row spacing is 3.3 pounds PLS/ac. Row culture via cultivation should be maintained for optimum seed production however this can be difficult because of the rhizomatous nature of the grass. Vigorous mechanical cultivation between the rows is required to reduce the vegetative spread by rhizomes in order to maintain the row culture.

Seed fields are productive for two to four years. Average production of 100 to 250 pounds per acre can be expected under dryland conditions in 355 (14 in) plus rainfall areas. Average production of 200 to 400 pounds per acre can be expected under irrigated conditions (Cornforth et al. 2001; Smith et al. 1996). Seed is harvested by swathing, followed by combining of the cured windrows (Smith et al. 1996). The seed heads readily shatter and require close scrutiny of maturing stands. Seed is generally harvested in mid July to mid August.

Clean seed retains high germination for at least ten years under cool, dry storage conditions. High temperatures and/or high humidity reduce seed storage life (Skinner 2004).

Cultivars, Improved, and Selected Materials (and area of origin)

Foundation and registered seed is available through the appropriate state Crop Improvement Association or commercial sources to grow certified seed.

'**Bannock**' (*E. lanceolatus* spp. *lanceolatus*) was developed by the Aberdeen Plant Materials Center and released in 1995. It is a composite of collections from

near The Dalles, Oregon; Pocatello, Idaho; and Quincy, Washington. It is adapted to the Northwest and Intermountain regions where precipitation averages 200 mm (8 in) or above. It prefers moderately deep loamy soils, but does grow in sandy to clayey soils. It is noted for rapid establishment, moderate formation of sod, high forage production and ability to survive and thrive under dry conditions. Certified seed is available and Aberdeen PMC maintains Breeder and Foundation seed (Kiger et al. 1995). Variety protection has been granted under the Plant Variety Protection Act of 1970. Conditions of this license specify that Bannock seed can be marketed only as a class of certified seed.

'**Critana**' (*E. lanceolatus* spp. *lanceolatus*) was developed by the Bridger Plant Materials Center and released in 1971. The original collection site was in north central Montana near Havre. It is drought tolerant, has good seedling vigor and readily establishes on critically disturbed sites. It is especially good as a sand dune stabilization species. Critana is noted for its variable genetic expression. Certified seed is available and Bridger PMC maintains Breeder seed (Winslow and Hybner. 2009).

'**Schwendimar**' (*E. lanceolatus* spp. *lanceolatus*) was developed by the Pullman Plant Materials Center and released in 1994. It was collected on wind-blown sands along the Columbia River near The Dalles, Oregon. It is adapted to northwest sites with 8 inches or greater precipitation and is recommended primarily for quick stabilization of coarse textured soils (Alderson and Sharp 1994). Certified seed is limited. Washington State Crop Improvement Association maintains Breeder and Foundation seed.

'**Sodar**' (*E. lanceolatus* spp. *riparius*) was released by the Aberdeen Plant Materials Center in 1954. It is a variety of streambank wheatgrass and is a subspecies of thickspike wheatgrass. The original collection was made in Grant County, Oregon. Its drought tolerance, excellent seedling vigor, vigorous rhizomatous trait once established, and ability to compete with weeds characterizes it. It is most commonly used for stabilization of critical sites. Certified seed is available and Aberdeen PMC maintains Breeder and Foundation seed (Douglas and Ensign 1954).

References

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- Barkworth, M. E., L. K. Anderton, K. M. Capels, S. Long, and M. B. Piep, editors. 2007. Manual of Grasses for North America. Intermountain Herbarium and Utah State University Press, Logan, UT. 627p.
- Cornforth, B., St. John, J. and D. Ogle. 2001. Seed production standards for conservation plants in the