USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

SIBERIAN WHEATGRASS

Agropyron fragile (Roth) Candargy

Plant Symbol = AGFR

Contributed by: USDA NRCS Aberdeen Plant Materials Center and ARS Forage and Range Research Laboratory, Logan, Utah

'Vavilov II' Siberian wheatgrass seed production field. Photo by Loren St. John, Aberdeen PMC

Alternate Names

Scientific Alternate Names: Agropyron cristatum ssp. *fragile, A. cristatum* var. *fragile, A. fragile* ssp. *mongolicum, A. fragile* ssp. *sibiricum, A. fragile* var. *sibiricum, A. mongolicum, A. sibiricum*

Uses

Grazing/rangeland/hayland: The best use of Siberian wheatgrass is as a component in a grazing system in conjunction with native rangeland (Jensen, et al., 2001). It is palatable to all classes of livestock and wildlife (Ogle, et al., 2009). It is a preferred feed for cattle, sheep, horses, elk, deer, and antelope in spring and also in the fall if green-up or re-growth occurs. Forage value and palatability decline as the forage matures and is not considered a desirable feed during the summer but does maintain greenness and palatability later into the growing season than does crested wheatgrass (Jensen, et al., 2001). In spring, the protein levels can be as high as 18 percent and decreases to about 4 percent as it matures. Digestible carbohydrates remain high throughout the active growth period. It is commonly utilized for winter forage by cattle and horses, but protein supplements are required to ensure good animal health (Mayland, 1986). It is noted for its ability to withstand heavy grazing pressure (65-70 percent utilization) once stands are established.

Erosion control/reclamation: Siberian wheatgrass is well adapted to stabilization of disturbed soils. It competes well with other aggressive introduced plants during the establishment period. When planted in a diverse seed mix, Siberian wheatgrass will control invasive weeds and still coexist with native grasses. However, in an established monoculture of Siberian wheatgrass it will restrict establishment of less competitive native species. The drought tolerance, fibrous root system, and good seedling vigor make Siberian wheatgrass an ideal species for reclamation in areas receiving 8 to 16 inches annual precipitation (Ogle et al., 2011). Siberian wheatgrass can also be used in urban areas where irrigation water is limited to provide ground cover, weed control, and to stabilize ditch banks, dikes, pipelines, power lines, and roadsides. It can also be used as a vegetative firebreak or green strip (St. John, et al., 2009).

Wildlife: Birds and small rodents eat Siberian wheatgrass seeds. Deer, antelope, and elk graze it, especially in spring and fall. Upland and songbirds utilize stands for nesting.

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

General: Grass Family (Poaceae). Siberian wheatgrass is a long-lived, introduced, drought tolerant, cool season bunchgrass. Plants are 25-110 cm tall. Stems are hollow, smooth and glabrous. Leaves are 2-4 mm wide, 8-15 cm long and flat. The lower leaves are longest and the leaves toward the tip are shorter. The upper leaf surface is deeply grooved and the lower surface is smooth. The auricles are about 1 mm long and the membranous ligule is 0.5 mm long. The spikes are 3-15 cm long and 5-20 mm wide. Spikelets are appressed or diverging from the rachis at less than 35 degrees. Spikelets are 7-10 mm long and 4-9 flowered. The glumes are 5-7 mm long and

ovate-lanceolate. Lemmas are usually unawned but sometimes mucronate and glabrous to minutely pubescent on the back. The palea has fine pubescence and the margins are toothed (Barkworth, et al., 2007; Majerus, 2009; Skinner, 2010). There are diploid (2n=2x=14), and tetraploid (2n=4x=28) forms of Siberian wheatgrass (Jensen, et al., 2012).

Siberian wheatgrass is very similar to fairway crested wheatgrass (*A. cristatum*) and standard crested wheatgrass (*A. desertorum*), but has finer leaves and stems, narrower and awnless glumes and lemmas, and the spikelets are more ascending, giving the spike a narrow, oblong, sub-cylindrical shape. Genetic introgression occurs between Siberian wheatgrass and standard crested wheatgrass in nature and is evident in 'Vavilov' and 'Vavilov II' Siberian wheatgrass cultivars (Jensen, et al., 2012).

Distribution: Siberian wheatgrass was introduced from Asia and is naturalized from the Pacific coast to New York. It is most commonly used in the northern Great Plains and the Intermountain West in areas where annual precipitation is less than 14 inches. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Habitat: The natural habitat of Siberian wheatgrass is the steppe regions of European Russia and southwestern Siberia. It is found on sandy soils in areas that receive 7-18 in annual precipitation (Jensen, et al., 2012).

Adaptation

Siberian wheatgrass is adapted for non-irrigated seedings where annual precipitation averages 8-14 in and where the frost-free period is generally less than 160 days. It is well adapted to sandy, sandy loam, loam and silt loam droughty soils. Siberian wheatgrass has been seeded in areas with as little has 5 in of annual precipitation with some success. It is cold tolerant and can withstand moderate periodic flooding not to exceed 7-10 days in the spring. It will not tolerate long periods of standing water, poorly drained soils, or excessive irrigation. It is very tolerant of fire.

Establishment

Siberian wheatgrass should be seeded with a drill at a depth of ½ inch or less on medium to fine textured soils and 1 inch or less on coarse textured soils. The seeding rate recommended for Siberian wheatgrass is 6 pounds Pure Live Seed (PLS) per acre or 24 PLS seeds per square foot (Ogle, et al., 2011). There are approximately 160,000 seeds per pound (Ogle, et al., 2011).

Siberian wheatgrass can be successfully mixed with other grasses or legumes such as alfalfa (*Medicago* spp.), sainfoin (*Onobrychis viciifolia*), yellow sweetclover (*Melilotus officinalis*), or cicer milkvetch (*Astragalus cicer*). If used as a component of a mix, adjust to percent of mix desired. For critical area erosion control, the seeding rate for Siberian wheatgrass should be increased to 12 pounds PLS per acre or 50 PLS seeds per square foot. Mulching and light irrigation on highly disturbed, droughty areas are beneficial for stand establishment.

The best seeding results are obtained from seeding in very early spring on heavy to medium textured soils and as dormant seeding in late fall (most commonly preferred seeding period) on medium to light textured soils. Late summer (August - mid September) seedings are not recommended unless irrigation is available.

Siberian wheatgrass establishes quickly, with Vavilov and Vavilov II being noted for seedling vigor. It should not be seeded with native species unless seeding rates are low (generally < 2 pounds per acre) for Siberian wheatgrass. It may compliment native stands that are already partially established. Under favorable conditions it provides good weed competition.

Stands may require weed control measures during establishment, but application of 2,4-D should not be made until plants have reached the four to six leaf stage. Mowing the stand when weeds are beginning to bloom will reduce weed seed development. Grasshoppers and other insects may also damage new stands and use of pesticides may be required. Be sure to read and follow pesticide labels.

Management

Siberian wheatgrass produces new growth in the spring about 10 days after bluegrass species and about two weeks earlier than most native wheatgrass species. It makes good spring growth, little summer growth and good fall growth if moisture is available.

New stands of Siberian wheatgrass should not be grazed until they are well established and have started to produce seed heads. Six inches of new growth should be made in the spring before grazing is allowed in established stands. Three inches of stubble should remain at the end of the grazing season to maintain the long-term health of the plant (Ogle et al., 2009). In addition, leaving three inches or more stubble will result in a 10 to 14 day earlier growth period or "green-up" the following spring.

Siberian wheatgrass is a low maintenance plant requiring little additional treatment or care. However, spring/fall deferment or grazing rotations are recommended to maintain plant health and to maximize forage production potential (Ogle, et al., 2009).

Siberian wheatgrass is competitive with weedy species, but can be crowded out by some aggressive introduced weedy species and native woody species.

Siberian wheatgrass is not recommended for hay production, but is best suited to dryland pasture use. Light infrequent applications of nitrogen (25 pounds/acre)

and light irrigation will increase total biomass production and lengthen the growing period. Re-growth following grazing is generally poor.

Pests and Potential Problems

There are no serious disease problems in Siberian wheatgrass but it is a major host of the black grass bug (*Irbisia* and *Labops* spp.). Black grass bugs feed on a variety of range grasses and most introduced wheatgrasses are preferred. The bugs have a piercing-sucking beak and feed on the mesophyll cells of leaf blades. Damage occurs in spring from both nymphs and adults. Heavily infested plants will have reduced green-leaf area and appear frosted, yellow or straw colored. Heavy feeding damage can reduce forage yield, plant height and seedhead production. Forage quality can also be affected by reducing crude protein and increasing acid detergent/neutral fibers. Widespread insecticidal control for forage grasses is usually not practical or economically feasible. Heavy fall/spring grazing and burning dead grass may reduce successful egg hatch in the spring. Planting mixtures of different grass species can reduce widespread damage by black grass bugs (Hodgson, 2008).

Environmental Concerns

Siberian wheatgrass is long-lived and spreads primarily via seed. It is not considered "weedy" or an invasive species. Most seedings do not spread beyond original plantings. It does not cross with native species.

Siberian wheatgrass resists cheatgrass (*Bromus tectorum*) competition better than most native species, because it germinates earlier and grows more rapidly at colder temperatures than many other perennial grasses. This is an important competitive advantage when dealing with winter annual species such as cheatgrass.

Properly managed (grazed) stands of Siberian wheatgrass generally exclude native grasses and forbs. When inter-seeded into native stands, Siberian wheatgrass commonly co-exists with native grasses, forbs and shrubs. Some native shrubs, such as big sagebrush and rabbitbrush, often invade Siberian wheatgrass stands if native seed sources are nearby.

Due to the past practice of commonly planting monocultures (single species), some feel Siberian wheatgrass is not ecologically appropriate, especially on publicly owned rangeland. It is important to consider this opinion and to plant multiple species mixes to avoid this perception.

Seed and Plant Production

Seed production of Siberian wheatgrass has been very successful under cultivated conditions. Row spacing of 24 to 36 inches when irrigated and 36 inches under dryland conditions (14 to 16 + inches annual precipitation) are recommended. The recommended seeding rate for seed production in 36 in row spacing is 2.7 pounds PLS/ac (Cornforth, et al., 2001).

Early spring or late fall seedings are recommended under dryland conditions. Early spring seedings are recommended under irrigated conditions. When irrigated, spring seedings consistently yield more seed during the first year of seed production. To obtain maximum seed production, fall plantings are not recommended in irrigated regions.

Control weeds during stand establishment and long term management of stand by clipping, hand rouging or light rates of herbicide (2,4-D or Bromoxynil according to label) after the five-leaf stage.

Fertilizer is generally not recommended during establishment. If soil nitrogen and phosphorus are low, an application of 10-15 pounds per acre nitrogen and 20-30 pounds per acre phosphorus may be applied prior to planting. Fertilize for full seed production following the establishment year in early fall or use a split application in early fall and again in early spring (Cornforth, et al., 2001). Very early spring application of nitrogen may be beneficial on sandy soils to promote vegetative growth. When irrigated, apply adequate moisture for germination, establishment, and to bring soils to field capacity. Following stand establishment, fertilize and irrigate soon after seed harvest in fall to stimulate seed development for the subsequent harvest the following year. Do not stress plants during re-growth and tillering in the fall, late boot stage, and during pollination. Avoid sprinkler irrigation during flowering.

Seed fields are productive for four to five years. Average production of 150 to 200 pounds per acre can be expected under dryland conditions in 14 inch plus rainfall areas. Average production of 400 to 500 pounds per acre can be expected under irrigated conditions (Cornforth, et al., 2001). The seed heads do not readily shatter, but some shatter can be expected. Harvesting is best completed by direct combining when the top of the seed head begins to shatter or windrowing at hard dough stage and combining with pickup attachment about 5 to 7 days following windrowing operation. Seed is generally harvested in mid July to mid August.

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

'Stabilizer' was released by the USDA Agricultural Research Service, Forage and Range Research Laboratory in 2011. It is a low-growing, rapidly establishing grass for use on rangelands, roadsides and green strips (vegetative fire breaks). It originated from six collections made in Kazakhstan in 1992. Selection and development was based on seedling establishment, persistence, seed production, pubescence, and reduced forage yield. It is the only true Siberian wheatgrass to be released since

recent reports suggest that Vavilov and Vavilov II have some introgression with (*A. desertorum*). Breeder and Foundation seed is maintained by the USDA ARS Forage and Range Laboratory in Logan, Utah (Jensen et al., 2012).

'Vavilov' was developed from collections originating from the former USSR, Turkey, and P-27 by ARS Forage and Range Laboratory in Logan, Utah. ARS and the Utah Agricultural Experiment Station released it in 1994. Seedling vigor is similar to 'Hycrest' and 'Hycrest II' crested wheatgrass and it is consistently better than 'P-27' (the first release of Siberian wheatgrass released by NRCS in 1953 and discontinued in 2010). It is more drought tolerant and better adapted to sandy soils than other crested wheatgrass releases. It is best adapted to 8 inches and above annual precipitation and elevations below 7,000 feet. It is noted for tolerating longer drought periods once established than crested wheatgrass. ARS Forage and Range Laboratory maintains Breeder and Foundation seed and certified seed is available (Asay, et al., 1995).

'Vavilov II' expanded the genetic base of Vavilov and has superior seedling establishment and stand persistence compared to Vavilov. It is a broad-based 50-clone synthetic that was developed and tested as part of a testing program to identify and develop wear-resistant plants for use on military training lands. It was released in 2009 in cooperation with the U.S. Army, Utah Agricultural Experiment Station and USDA-NRCS. Breeder seed is maintained by the ARS Forage and Range Laboratory, Foundation seed is produced by the Aberdeen Plant Materials Center and certified seed is available (Jensen, et al., 2009). It has plant variety protection under the Plant Variety Protection Act of 1970. Vavilov II may be marketed only as a class of certified seed.

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