

## DESERT WHEATGRASS

*Agropyron desertorum* (Fisch.  
ex Link) J.A. Schultes  
Plant Symbol = AGDE2

Contributed By: USDA, NRCS, Idaho State Office

### Alternate Names

standard crested wheatgrass,  
crested wheatgrass

### Uses

Fairway or crested wheatgrass, *Agropyron cristatum* (L.) Gaertn; standard, standard crested, or desert wheatgrass, *Agropyron desertorum* (Fisch. ex Link) J.A. Schultes; and Siberian wheatgrass, *Agropyron fragile* (Roth) Candargy are perennial introduced grasses commonly seeded in the arid sections of the western United States. They are long-lived, cool season, drought tolerant, and winter hardy grasses with extensive root systems.

### Grazing/rangeland/hayland:

Crested wheatgrass is commonly recommended for forage production. It is palatable to all classes of livestock and wildlife. It is a preferred feed for cattle, sheep, horses, and elk in spring and also in the fall if green-up occurs. It is considered a desirable feed for deer and antelope in spring and fall, if "green-up" occurs. It is not considered a desirable feed for cattle, sheep, horses, deer, antelope, and elk in summer. 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. It is noted for its ability to withstand

very heavy grazing pressure (65-70 percent utilization) once stands are established. Crested wheatgrasses are good forage producers in the areas where best adapted. Crested wheatgrasses are generally not recommended above 12-14 inches of precipitation because better forage species alternatives are available. Crested wheatgrass stands generally produce from 1.5 to 2 times more than the native stands, generally in the bluebunch wheatgrass (*Pseudoroegneria spicata*) ecosystems, they replace. The best forage types, in order, are Siberian, standard, and fairway.

**Erosion control/reclamation:** Crested wheatgrasses are well adapted to stabilization of disturbed soils. They compete well with other aggressive introduced plants during the establishment period. Crested wheatgrass is not compatible in mixes with native species because it is very competitive and will out-compete slower developing native species. Their drought tolerance, fibrous root systems, and good seedling vigor make these species ideal for reclamation in areas receiving 8 to 16 inches annual precipitation. In areas above 14 inches annual precipitation, 'Roadcrest' and 'Ephraim' may exhibit their rhizomatous traits and make excellent low maintenance lawns when broadcast seeded to establish thick lawns. These grasses can 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.

**Wildlife:** Birds and small rodents eat crested wheatgrass seeds. Deer, antelope, and elk graze it, especially in spring and fall. Upland and songbirds utilize stands for nesting. Historically, this species has been planted in monocultures, which decreases biodiversity. Consider diverse species mixes for wildlife when planting this species.

### Status

This species is introduced from Asia. Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.



Hitchcock (1950)

## Description

*General:* Desert wheatgrass is introduced from Asia. Within the crested wheatgrasses, three species are recognized: Fairway or crested wheatgrass (*Agropyron cristatum*), standard or desert wheatgrass (*Agropyron desertorum*), and Siberian wheatgrass (*Agropyron fragile*). Fairway has short-broad spikes that taper at the top, smaller seeds, grows shorter, and has finer leaves and stems than standard wheatgrass. Standard has longer spikes than fairway, but vary in spike shape from comb-like to oblong. Fairway and standard grow from 1 to 3 feet tall with seed spikes 1.5 to 3 inches long. Spikelets flattened, closely overlapping, oriented at a slight angle on the rachis. The lemmas are linear-lanceolate narrowing to a short awn. Glumes are awl shaped and firm, and keeled. Culms are erect. Leaves are flat, smooth below, slightly scabrous (coarse) above and vary in width from 2 to 6 mm. Siberian is very similar to fairway and standard, 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. Siberian is more drought tolerant and retains its greenness and palatability later into the summer than either standard or fairway types.

## Distribution

This species is introduced into the U.S. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

## Establishment

*Adaptation:* Crested wheatgrasses are adapted for non-irrigated seedings where annual precipitation averages 8-16 inches or more (fairway should average 10 inches or more) and where the frost-free period is generally less than 140 days. Standard and hybrid crosses are superior above 8 inches annual precipitation in spring recovery and grazing readiness. On droughty sites with 7-10 inches annual precipitation, Siberian wheatgrass may be the best choice, it is known to surpass Standard and hybrid crosses in rate of establishment, stand persistence, and total forage yield on the more arid sites. Siberian has been seeded in areas with as little as 5 inches of precipitation with some success.

Crested wheatgrass should generally be seeded below 7,000 feet elevation. Fairway does well up to 9,000 feet elevation. Crested wheatgrass does well on shallow to deep, moderately coarse to fine textured, moderately well to well drained soils. Under saline conditions, vigor and production are reduced. Fairway is not well adapted to silty soils. Siberian is well adapted to light-sandy, droughty soils. All

crested wheatgrasses are cold tolerant and can withstand moderate periodic flooding, not exceeding 7-10 days in the spring. They are very tolerant of fire. They will not tolerate long periods of inundation-standing water, poorly drained soils, or excessive irrigation.

*Planting:* Crested wheatgrass should be seeded with a drill at a depth of 1/2 inch or less on medium to fine textured soils and 1 inch or less on coarse textured soils. Single species seeding rates recommended for all crested wheatgrasses are 5-7 pounds Pure Live Seed (PLS) per acre or 20 to 30 PLS per square foot. Single species seeding rates recommended for Siberian wheatgrass is 6-8 pounds PLS per acre or 24-30 PLS per square foot. If used as a component of a mix, with alfalfa (*Medicago* spp.), sainfoin (*Onobrychis viciifolia*), yellow sweetclover (*Melilotus officinalis*), cicer milkvetch (*Astragalus cicer*), or others adjust to percent of mix desired. For mined lands and other harsh critical areas, the seeding rate should be increased to 10-12 pounds PLS per acre or 40 to 50 PLS 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 on medium to light textured soils. Late summer (August - mid September) seedings are not recommended unless irrigation is available.

Crested and Siberian wheatgrasses establish quickly, with 'Hycrest' and 'Vavilov' noted for their seedling vigor. They should not be seeded with native species, unless seeding rates are very low (< 2 pounds per acre). They may compliment native stands that are already partially established. Under favorable conditions, they are good weed barriers.

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 stages. Mow when weeds are beginning to bloom to reduce weed seed development. Grasshoppers and other insects may also damage new stands and use of pesticides may be required.

## Management

Crested wheatgrass "greens-up" in the spring about 10 days after bluegrass species and about 2 weeks earlier than native wheatgrasses. They make good spring growth, little summer growth, and good fall growth, if moisture is available.

Crested wheatgrasses have good palatability for livestock and some wildlife. Livestock and wildlife will graze crested wheatgrass throughout the spring growing season until it becomes too coarse, and again in fall if regrowth occurs. Established stands can withstand very heavy grazing.

New stands of crested wheatgrass should not be grazed until they are firmly established and have started to produce seed heads. Six inches of new growth should be attained in 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. In addition, leaving three inches or more stubble will result in a 10 - 14 day earlier growth period or "green-up" in spring.

Crested wheatgrasses are low maintenance plants requiring little additional treatment or care. However, spring/fall deferment or grazing rotations is recommended to maintain plant health and to maximize forage production potential.

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

Crested wheatgrass can be used for hay production and will make nutritious feed, but is more suited to 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 of crested wheatgrasses is slow.

*Environmental Concerns:* Crested wheatgrasses are introduced, long-lived, and spread primarily via seed. Spread of rhizomatous varieties is very slow in the case of the 'Roadcrest' and 'Ephraim'. They are not considered "weedy" or invasive species. Most seedlings do not spread beyond original plantings. They will cross with each other, but do not cross with native species.

Crested wheatgrasses resist cheatgrass competition better than most native species, because it germinates earlier and grows more rapidly at colder temperatures. This has an important competitive advantage when dealing with winter annual species, such as cheatgrass.

Full, properly managed stands of crested wheatgrass generally withstand encroachment by native grasses and forbs. When inter-seeded into native stands, crested wheatgrass commonly co-exists with native grasses, forbs, and shrubs. Some native shrubs, such

as big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus* spp. and *Ericameria* spp.), often invade crested wheatgrass stands, especially if native seed sources are nearby.

Due to commonly being planted in monoculture (single species) stands in the past, some feel-crested wheatgrasses are not ecologically appropriate and contribute to a lack of biodiversity. If planting this species, it is important to consider a diverse species mix to benefit many species.

### **Seed production**

Seed production of crested wheatgrasses has been very successful under cultivated conditions. Row spacing of 24 to 30 inches when irrigated and 36 inches or greater under dryland conditions are recommended. 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.

Control weeds during stand establishment and long term management of stand by clipping, hand rousing 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. 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 head primordia development. Do not stress plants during re-growth and tillering in the fall, late boot stage, and during pollination. Avoid irrigating during flowering.

Seed fields are productive for four to five years. Average production of 200 to 300 pounds per acre can be expected under dryland conditions in 14 inch plus rainfall areas. Average production of 500 to 600 pounds per acre can be expected under irrigated conditions. 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 wind-rowing at hard

dough stage and combining with pickup attachment in about 5 to 7 days. Seed is generally harvested in mid July to mid August.

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

Please check the Vendor Database, expected to be on-line through the PLANTS Web site in 2001 by clicking on Plant Materials. Foundation and registered seed is available through the appropriate state Crop Improvement Association or commercial sources to grow certified seed.

*Agropyron desertorum* is more drought tolerant than fairway. It is not as drought tolerant as Siberian wheatgrass. Standard crested wheatgrass is adapted to the northwest, intermountain, and Great Plains regions with at least 8 inches ('Douglas' requires 13-14 inches) of annual precipitation below 6500 feet elevation. It does well on shallow to deep, moderately coarse to fine textured, moderately well to well drained and weakly acidic to moderately alkaline soils. Under saline conditions, vigor and production are reduced. Standard crested wheatgrass is considered slightly more saline tolerant and more productive than Fairway.

ARS at the Northern Great Plains Research Laboratory, Mandan, North Dakota, developed 'Nordan'. ARS and ND Agricultural Experiment Station released Nordan in 1953. It is uniform, erect, with heavy seeds that are awnless. The seed heads are dense and compressed. It has good seedling vigor and seed quality and long-term forage yields are equal to the newer varieties. It is very palatable in spring and fall, but less so in summer. Certified seed is available. ARS at the Great Plains Research Laboratory maintains breeder and foundation seed.

'Summit' was introduced from Western Siberian Experiment Station, Omsk, former USSR. Canada Department of Agriculture released it in 1953. It is considered very similar to 'Nordan'. Certified seed is available. The Canada Department of Agriculture, Saskatoon, Saskatchewan, maintains breeder and foundation seed.

*Agropyron cristatum* × *Agropyron desertorum* is a hybrid cross of the Fairway and Standard types, which results in a plant with excellent seedling vigor. These are considered Standard type crested wheatgrasses.

ARS in Logan, Utah released 'CD-II' in 1996. CD-II is a selection of 'Hycrest' and was released to ensure the genetic purity of the cross. It has increased

growth characteristics under cold temperatures. Characteristics and performance are the same as Hycrest. Certified seed is available. ARS Logan, Utah maintains breeder and foundation seed.

ARS in Logan, Utah developed 'Hycrest' by crossing Fairway and Standard type crested wheatgrasses. ARS, NRCS, and Utah Agricultural Experiment Station released it in 1984. It is easier to establish than either of its parents and is more productive during the establishment period than either parent. Long-term productivity exceeds the Fairway type and it is equal to the Standard type. The leaves and stems are coarser and it has more stems than the Fairway type. Good stands have been established in the 8 inch or greater precipitation zones. It is best adapted to 5,000 to 9,000 feet elevation zones, but good stands are common to 2,500 feet. It does well on shallow to deep, coarse to fine textured, moderately well to well drained soils. Under slightly saline conditions, vigor and production are reduced. It is not adapted to excessively saline areas. Certified seed is available. ARS, Logan, Utah, maintains breeder and foundation seed.

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