

CRESTED WHEATGRASS

Agropyron cristatum
(L.) Gaertn.

plant symbol = AGCR
and

Agropyron desertorum
(Fisch. ex Link) J.A.
Schultes

Plant symbol = AGDE2

Contributed By: USDA, NRCS, Idaho State Office



Ephraim crested wheatgrass
Loren St. John
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Alternate Names

Fairway wheatgrass, fairway crested wheatgrass,
standard crested wheatgrass, desert wheatgrass

Uses

Grazing/rangeland/hayland: Crested wheatgrass is a perennial, introduced grass commonly seeded in the

arid sections of the western United States. Crested wheatgrass is usually 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 additional growth occurs from late season rainfall. It is considered a desirable feed for deer and antelope during spring and fall. It is not considered a desirable feed for cattle, sheep, horses, deer, antelope, and elk in the summer. In spring, the protein levels can be as high as 18 percent and decreases to about 4 percent when dormant. 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 wheatgrass produces excellent forage yields in the areas where it is best adapted. Crested wheatgrass is generally not recommended for use in areas with more than 14 inches of annual precipitation because better alternative forage species are available. Crested wheatgrass stands generally produce from 1.5 to 2 times more forage than native grass stands.

Erosion control/reclamation: Crested wheatgrass is well adapted for stabilization of disturbed soils. It competes well with other aggressive introduced plants during the establishment period. Crested wheatgrass is generally not compatible in mixes with native species, because it is very competitive and commonly out-competes slower developing native species. However, when seeded at low rates with native species, outstanding mixed stands including Bluebunch wheatgrass, Snake River wheatgrass, Sandberg bluegrass and big bluegrass have been achieved.

Drought tolerance, fibrous root systems, and excellent seedling vigor makes crested wheatgrass ideal for reclamation in areas receiving 9 inches or more annual precipitation. In areas above 14 inches annual precipitation, 'Roadcrest' and 'Ephraim' may exhibit their rhizomatous traits and make excellent low maintenance turf when broadcast seeded to establish 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 birds and songbirds utilize stands for nesting. Where it is planted as a monoculture, the resulting biodiversity is lower than that found in a diverse seeded or native plant community.

Status

Consult the PLANTS Web site and your State Department of Natural Resources for status, such as state noxious status and wetland indicator values.

Description

General: Grass Family (Poaceae). Crested wheatgrass is a long-lived, cool season, drought tolerant, introduced, and winter hardy grass with an extensive root system. Related species include the following: Fairway crested wheatgrass (*Agropyron cristatum*), Standard crested wheatgrass (*Agropyron desertorum*) and Siberian wheatgrass (*Agropyron fragile*).

Fairway crested wheatgrass spikes are 2 to 7 cm long. The spikelets are more widely spreading with the glumes somewhat contoured, gradually tapering into awns 2 to 5 mm long. Fairway type crested wheatgrass has short-broad spikes that taper at the top, smaller seeds, is generally shorter statured, and has finer leaves and stems than standard type crested wheatgrass.

Standard crested wheatgrass has longer spikes than fairway, but vary in spike shape from comb-like to oblong. Both Fairway and standard crested wheatgrass grow from 1 to 3 feet tall with seed spikes 1.5 to 3 inches long. Spikelets are 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 wheatgrass is very similar to fairway and standard crested wheatgrass, but has finer leaves and stems, narrower and awnless glumes and lemmas, and the spikelets are more ascending, which gives 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.

Adaptation

Crested wheatgrass is adapted for non-irrigated seedings where annual precipitation averages 8-14 inches (Fairway should be planted in areas averaging 10 inches or more annual precipitation and Standard in areas receiving 9 inches or more), and where the frost-free period is generally less than 140 days. Standard crested wheatgrass including the hybrid crosses 'Hycrest' and 'CD-II' are superior above 9 inches annual precipitation in spring recovery and grazing readiness. On droughty sites with 8-10 inches annual precipitation, Siberian wheatgrass may be the best choice. It is known to surpass fairway and standard crested wheatgrass 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. Crested wheatgrass is cold tolerant and can withstand moderate periodic flooding, not exceeding 7-10 days in the spring but will not tolerate long periods of inundation, standing water, poorly drained soils, or excessive irrigation. Crested wheatgrass is very tolerant of fire.

Distribution

This species was introduced from Asia and is naturalized from the Pacific coast to New York. For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

Establishment

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 crested wheatgrass is 5 pounds Pure Live Seed (PLS) per acre or 20 PLS seeds per square foot. If used as a component of a mix, such as with alfalfa (*Medicago* spp.), sainfoin (*Onobrychis viciifolia*), yellow sweetclover (*Melilotus officinalis*), cicer milkvetch (*Astragalus cicer*) or others, adjust to percent of mix desired. For mine lands and other harsh critical areas, the seeding rate should be increased to 10

pounds PLS per acre or 40 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.

Crested wheatgrass establishes quickly, with 'Hycrest' and 'CD-II' noted for their seedling vigor. They should not be seeded with native species, unless crested wheatgrass seeding rates are very low (generally < 2 pounds per acre). They may compliment native stands that are already partially established. Under favorable conditions they provide good competition against weeds.

Stands may require weed control measures during establishment, but application of 2,4-D should not be made until grass seedlings have reached the four to six leaf stage. 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 begins to produce forage in the spring about 10 days after bluegrass species and about two weeks earlier than most native wheatgrasses. They make good spring growth, little summer growth and good fall growth if moisture is available.

Crested wheatgrass is palatable to 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 re-growth 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 going into the winter will result in a 10 - 14 day earlier growth period or "green-up" the following spring.

Crested 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.

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

Crested wheatgrass is not recommended for hay production, as it is best suited to grazing 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 wheatgrass is generally poor.

Environmental Concerns

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

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

Properly managed (grazed) stands of crested wheatgrass generally exclude 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 and rabbitbrush often invade crested wheatgrass stands if native seed sources are nearby.

Crested wheatgrass has commonly been planted in monoculture (single species) stands in the past and because of this; some people feel crested wheatgrass is not appropriate for use. It is important to consider this opinion and to plant multiple species mixes to avoid this perception.

Seed Production

Seed production of crested wheatgrasses has been very successful under cultivated conditions. Row spacing of 24 to 36 inches under irrigation and 36 inches under dryland conditions (14 inches plus annual precipitation) are recommended. Early spring or late fall seedings are preferred 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 for 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 for the subsequent crop. 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 500 to 700 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 5 to 7 days later. Seed is generally harvested from mid July to mid August.

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.

***Agropyron cristatum* - Fairway Type** is not as drought tolerant as standard crested wheatgrass or Siberian wheatgrasses. They are adapted to the Northwest, Intermountain, and Great Plains regions with at least 10 inches of annual precipitation. They do well on shallow to deep, moderately coarse to fine textured, moderately well to well drained and weakly

acidic to moderately alkaline (saline and sodic) soils. Under alkaline conditions, vigor and production are reduced. The Fairway type was first recognized in 1950 as being different than other crested types. Fairway is shorter, denser, finer stemmed, and less productive than standard crested wheatgrass at lower elevations and production may exceed standard crested wheatgrass production at higher elevations. Cultivars include the following:

'Douglas' PVP was selected by ARS in Logan, Utah and released in 1994 in cooperation with the Utah Agricultural Experiment Station and NRCS. The breeding populations were derived from accessions originating in the former USSR, Iran, and Turkey. One accession was characterized with very broad leaves and was used as the female parent in all crosses. Douglas has larger seed than other crested wheatgrass cultivars and has excellent seedling vigor. It produces less forage than other cultivars, but is leafier and remains green longer into the growing season suggesting improved forage preference and improved fire resistance. Douglas requires 13-14 inches or more annual precipitation. It is not recommended for turf applications, but may work very well in roadside applications. Certified seed is available. ARS in Logan, Utah maintains Breeder and Foundation seed.

'Ephraim' was selected by the Forest Service Shrub Science Laboratory in Provo, Utah and Utah Division of Wildlife Resources from an accession originating in Turkey. It was released in 1983 by the developing agencies in cooperation with NRCS and Agricultural Experiment Stations in Arizona, Idaho, and Utah. It is weakly rhizomatous, with rhizomes being expressed at higher precipitation zones above 14 inches. It is well adapted to disturbed areas, roadsides, and mine spoils. It has been used successfully as a low maintenance turf. It is not well adapted to silty soils. It is a good seed producer. Certified seed is available. Breeder and Foundation seed is maintained by Aberdeen PMC.

'Parkway' was selected by the Canada Department of Agriculture, Research Station, Saskatoon, Saskatchewan and released in 1969. It is recommended for hay and pasture. It is a good seed producer and has good lodging resistance. It is not recommended for turf applications. Certified seed is available. Agriculture and Agri-Food Canada, Research Station, Swift Current, Saskatoon, Saskatchewan, maintains Breeder and Foundation seed.

'Roadcrest' PVP was selected by ARS in Logan, Utah and released in 1998. It is a long-lived perennial, and is significantly more rhizomatous than Ephraim, the only other somewhat rhizomatous crested wheatgrass cultivar. Roadcrest is recommended for use along roadsides or similar low-maintenance turf application areas in 10 inch and higher rainfall areas. Certified seed is available. ARS in Logan, Utah maintains Breeder seed and Foundation seed is commercially produced.

'Ruff' was selected by ARS, Lincoln, Nebraska and released in 1974 by ARS and the Nebraska Agricultural Extension Service. It is recommended for a short season, spring forage crop. It can be used as a low maintenance turf on roadsides, parks, and playgrounds in low rainfall areas of the central Great Plains. Common seed is available, but Certified seed is not available.

***Agropyron desertorum* - Standard Type** is more drought tolerant than fairway crested wheatgrass. 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 9 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. It is considered slightly more saline tolerant and more productive than fairway wheatgrass. The following cultivars are Standard crested wheatgrasses:

'Nordan' was selected by ARS at the Northern Great Plains Research Laboratory, Mandan, North Dakota. 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, which results in a plant with excellent seedling vigor. The following cultivars are hybrid crosses and considered similar to Standard crested wheatgrass:

'CD-II' PVP was released by ARS in Logan, Utah 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 in Logan, Utah maintains Breeder seed and Foundation seed is commercially produced.

'Hycrest' was developed by ARS in Logan, Utah by crossing Fairway and Standard 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 Fairway and it is equal to standard crested wheatgrass. The leaves and stems are coarser and it has more stems than Fairway. Good stands have been established in the 9 inch or greater precipitation zones. It is best adapted to 5,000 to 9,000 feet elevation zones, but good stands are common to elevations as low as 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 'CD-II' has replaced Hycrest.



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