

# Crested Wheatgrass

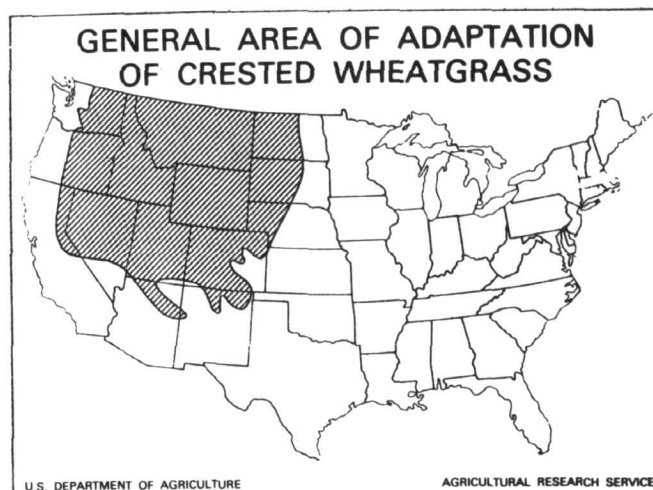
Jerry L. Holechek

Crested wheatgrass (*Agropyron cristatum*, *A. desertorum* and related species) is the most commonly used perennial grass species for range revegetation in the western United States. It is a bunchgrass of intermediate height that starts growth early in the spring, has high drought resistance, and is not injured by severe frosts. It is quite palatable and nutritious to both livestock and game animals in the spring and early summer. In addition to providing forage for livestock, it has been effective in revegetating highway roadsides, controlling erosion, and providing cover for wildlife.

My own experience with crested wheatgrass dates back to my early boyhood days when I lived on a cattle ranch in central Oregon near the Crooked River. Much of the rangeland in the area was highly deteriorated from over grazing. My folks reseeded some of their land to crested wheatgrass in the late 1950's. The seedings were successful and improved the ranch's forage resource by 4 to 5 fold. In addition the nutritional status and productivity of our livestock was enhanced because high quality spring forage was available. In the mid-1970's I worked with strip-mine spoils reclamation in southeastern Montana. Crested wheatgrass was the most effective of all perennial grasses tested in terms of establishment and soil stabilization. Seedlings of this grass on the mine spoils have endured without irrigation and with little input of fertilizer while other species of native and introduced grasses have perished.

## History

Crested wheatgrass was introduced into the United States from the cold, dry, plains of Russia and Siberia. F. Hansen, who was on a trip to Russia for the U.S. Department of Agriculture in 1897, observed crested wheatgrass at the Valuika Experiment Station 150 miles north of Stalingrad (Dillman 1946). He noted the grass grew well under cold, dry conditions and brought back samples to the United States. Crested wheatgrass from this introduction was grown in a nursery at Highmore, South Dakota, to increase the seed supply for further testing. However in 1901 the Highmore Station was placed under new management and the grass nursery was plowed up. According to Dillman (1946) there was apparently no increase or distribution of seed from Hansen's first introduction. A second importation of seed was made in 1906 from the same source as the first. Successful plantings of this source made at the Belle Fourche Station, Newell, South Dakota, and the Northern Great Plains Field Station, Mandan, North Dakota, between 1908 and 1920 were responsible for the early distribution and estab-



General area of crested wheatgrass adaptation in the United States (Rogler 1960).

lishment of crested wheatgrass in the Northern Great Plains (Dillman 1946).

Crested wheatgrass attracted little attention until the 1930's. Between 1900 and 1930, millions of acres of rangeland in Northern Great Plains of the United States and Canada were plowed and planted to wheat. However, the dry years of the middle 1930's demonstrated an urgent need for a grass to revegetate abandoned croplands. By this time experiments by the U.S. Department of Agriculture had proven the hardiness, productivity, and longevity of crested wheatgrass on the Northern Great Plains. It played the key role in revegetation of the Northern Great Plains following the dust bowl years. Later in the 1940's crested wheatgrass was found well suited to the reseeding of lands in the intermountain area of the western United States following big sagebrush (*Artemisia tridentata*) control.

## Varieties

Presently three varieties of crested wheatgrass are available, which include Nordan, Summit, and Fairway. Nordan was developed at the Northern Great Plains Field Station at Mandan, North Dakota, and released in 1954. Rogler (1960) reported this variety is easy to establish, has high plant uniformity, is resistant to lodging, has high seed availability, is widely adapted, and grown throughout the West. Fairway crested wheatgrass, which was developed by the University of Saskatchewan, has shorter stems, heads, and seeds than Nordan and is also leafier. For this reason it has received

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considerable use for dryland lawns and turf plantings. It requires more favorable site conditions than Nordan or Summit. Summit was developed in Canada and is grown primarily in the southern prairie areas of Alberta and Saskatchewan.

### Distribution and Environmental Requirements

Crested wheatgrass has been established in 14 of the attached western states. Figure 1 from Rogler (1960) shows the general distribution of crested wheatgrass in the United States. Introductions into the Canadian provinces of British Columbia, Alberta, Saskatchewan, and extreme southwestern Manitoba have also been successful. Although exact information is unavailable on the acreage of crested wheatgrass in the United States, discussion with other workers suggests that there are approximately 20 million acres in the United States and probably around 6 million acres in Canada.

Crested wheatgrass grows on a wide variety of sites. Rogler (1960) reported the grass is very well adapted to the Northern Great Plains but also does well in the big sagebrush zone, in park areas of the ponderosa pine zone, in pinyon-juniper woodlands, and in openings of the mountain brush type. It is important to recognize that within the range of crested wheatgrass, there are many small areas where it is not adapted or other grasses may be more productive.

Crested wheatgrass is most suited to arid and semiarid climates having cool winters and from 9 to 15 inches of annual precipitation. In Russia where it is native, most of the precipitation comes in the early summer. In the southern part of its range it has been successful only in areas between 5,000 to 9,000 feet in elevation and with at least 12 inches of precipitation. In northern areas fair stands have been established in the 8-inch precipitation zone under a combination of favorable precipitation distribution (most of rainfall in the spring), moderate temperature, and permeable soils. How-



*Crested wheatgrass clump near Taos, New Mexico*

ever, seedings where annual rainfall is below 8 inches often established in above-average precipitation periods. Drought coupled with grazing often makes these stands short-lived. It has high drought resistance since it goes into dormancy during hot, dry weather and uses soil moisture very efficiently (Rogler 1960).

Crested wheatgrass performs well on soils ranging from light, sandy loams to heavy clays. It is reportedly low in tolerance to alkali soils (Forsberg 1953). However it has been successfully seeded on mine soils in Montana that were alkaline. Salt tolerance of crested wheatgrass is comparable to that of most native range grasses associated with arid sites. Although it has been established in the Great Basin on soils with mild salinity, tall wheatgrass (*Agropyron elongatum*) is generally better suited to these areas. Crested wheatgrass will not establish on areas subjected to periodic flooding.

### Germination and Establishment

When compared with other range grasses, crested wheatgrass ranks high in germination. However, seed loses viability rapidly after the first year of storage, and by the end of 5 years viability is low. A characteristic that favors establishment of harsh rangeland sites is the ability to germinate under conditions of low temperature and intermittent drought. Drilled seedings have generally been superior to broadcast seedings. However when seeds are planted over an inch in depth germination drops off. Seedbeds prepared by plowing or disking have given better stands than burning or total lack of seedbed preparation. Rogler (1960) emphasized it should have a firm seedbed as free from competing plants as possible.



*Agropyron cristatum*

*Agropyron desertorum*

Seeding rates from 2 to 24 pounds of crested wheatgrass seed per acre have generally produced satisfactory stands. Light seeding rates require comparatively long protection periods, but may eventually result in complete stands. Heavy seeding rates minimize competition and result in a satisfactory stand sooner. Rogler (1960) recommended 8 pounds of seed per acre in more favorable areas such as the Northern Great Plains but suggested 4 to 6 pounds of seed per acre for the harsher areas of the Intermountain West. In areas where it will grow, alfalfa can be seeded with crested wheatgrass to increase the productivity and longevity of the stand.

Crested wheatgrass is usually seeded in the early fall or spring depending on soil-moisture availability and the type of site. In areas with an extended period of fall moisture, early fall seedings are best since they allow the seedlings to be well developed by June when moisture stress may occur. Early spring seeding is best for areas with a short fall growing season or if seeding cannot be accomplished in the early fall.

#### Disease and Insect Resistance

Crested wheatgrass has been relatively free from disease in North America although root rotting, leaf decay, and leaf spotting organisms have caused some problems in certain areas. An insect known as the black grass bug (*Labops hesperius*) has caused considerable damage to crested wheatgrass stands in localized areas of the intermountain region. Black grass bugs lay eggs in the stems where they hatch and the larvae feed. The grass stems are killed by this activity and the seeding may be rendered unfit for forage. Recently it has been found that black grass bug damage can be minimized by prevention of accumulations of standing dead material.

#### Longevity and Productivity

In many parts of the west, crested wheatgrass seedings have become a permanent part of the vegetation. There are pastures at Mandan, North Dakota that are 50 years old and receive grazing every year which are yielding more than when the stands were new. Crested wheatgrass seedings usually reach their greatest productivity in their second to fourth growing season, and then productivity levels off. On sites to which it is adapted, crested wheatgrass production has in most cases equalled or exceeded that of native range.

#### Grazing

Few of the native grasses are as resistant to grazing as crested wheatgrass. One of the reasons it can survive under heavy grazing is its strong root system which resists pull up.

Because of its early spring growth, it is best suited for forage in May and June. Early growth is high in protein and palatable to all livestock. Palatability decreases in the summer, and crested wheatgrass has little value for winter grazing. A primary undesirable feature is still culms that become unpalatable and interfere with subsequent grazing. For this reason, a stand should have full and uniform utilization by July. In the fall when regrowth occurs, it can again be grazed if the stand is rested during the summer. The two crop system of spring and fall grazing has proven quite effective in managing crested wheatgrass stands.



*Crested wheatgrass in northcentral New Mexico.*

#### Wildlife Benefits

Crested wheatgrass has been a useful grass for developing wildlife habitat. Upland gamebirds use it for both food and cover. It is one of the most important grass species used in restoring big game range. Deer and elk seek the early spring foliage of crested wheatgrass following snow melt, and they also use the fall growth. However, it must be pointed out that large blocks of crested wheatgrass over 400 acres in size may be detrimental to some game species (Value 1974). This is because of a lack of shrubs which provide important cover and food for game animals particularly during the winter.

#### Conclusions

Crested wheatgrass is resistant to heat, drought, cold, and is little damaged by disease. This species is thus adapted to a wide variety of conditions. It exhibits palatability, persistence under abuse, good competitive ability, excellent seed production, ease of establishment, and sufficient seedling vigor to volunteer successfully. Even when heavily grazed, crested wheatgrass will form a good stand if properly managed. However, it is not a "universal panacea" for rangeland improvement in the West. Undesirable characteristics of crested wheatgrass include poor palatability after reaching maturity and dormancy during the summer. Control of the black grass bug which has inflicted considerable damage to crested wheatgrass seedings in some parts of the Intermountain West still remains a problem.

#### Literature Cited

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