

## TALL WHEATGRASS

*Thinopyrum ponticum* (Podp.)

Z. –W. Liu & R. –C. Wang

Plant Symbol = THPO7

Contributed by: USDA NRCS Plant Materials Center, Pullman, Washington



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### Alternate Names

Rush wheatgrass, *Agropyron elongatum* (Host) P. Beauv., *Agropyron varnense* (Velen.) Hayek., *Elymus elongatus* (Host) Runemark, *Elymus elongatus* (Host) Runemark var. *ponticus* (Podp.) Dorn, *Elymus varnensis* (Velen.) Runemark, *Elytrigia elongata* (Host) Nevski, *Elytrigia pontica* (Podp.) Holub., *Elytrigia pontica* (Podp.) Holub. spp. *pontica*, *Lophopyrum elongatum* (Host) A. Löve.

### Uses

**Grazing/pasture/hayland:** Tall wheatgrass is used for hay and pasture in the northern Great Plains and

intermountain region. It produces high yields of good quality forage, however it is typically less palatable than other wheatgrasses. It is best suited for early season rotational grazing.

**Erosion control:** Tall wheatgrass is often used for erosion control along roadsides and other critical areas (Barkworth et al, 2007). It has been recommended in the northern Great Plains for passive terrace formation (Aase and Pikul, 1995).

**Saline and sodic soils:** Tall wheatgrass is planted as forage on saline and sodic soils where few other species will survive (Roundy, 1985; Retana et al., 1993). It is one of the most saline tolerant grasses commercially available. In the San Joaquin Valley of California, it is used to manage salinity in irrigation water recovery systems (Blunk et al., 2005; Zheng et al., 2005).

**Biofuel:** Tall wheatgrass is currently being evaluated as a possible source of cellulosic ethanol. Problems may exist, however, with biomass production of tall wheatgrass in saline environments due to high concentrations of salts and heavy metals, as well as potentially high emission levels of nitrous and sulfuric oxides (Blunk et al., 2005).

**Nutrient removal:** In Texas, applications of composted dairy manure increased dry matter yields and phosphorus and potassium concentrations in tall wheatgrass, indicating it could be used for nutrient removal (Butler and Muir, 2006).

**Particleboard:** The American Society of Agricultural Engineers (ASAE) has determined high quality particleboard can be produced by using tall wheatgrass (Zheng et al., 2005).

**Windbreaks:** In a study in Saskatchewan, tall wheatgrass windbreaks with several years' growth improved soil moisture levels and alfalfa yields (Steppuhn and Waddington, 1996).

**Wildlife:** Tall wheatgrass provides nesting cover and food for upland birds (Asay and Jensen, 1996).

**Plant breeding:** Tall wheatgrass is used in breeding programs to transfer genes for salinity, drought and disease resistance to annual wheat (Dewey, 1984; Sharma & Gill, 1983; Colmer et al., 2006).

### Status

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.

### Description

*General:* Grass family (Poaceae). Tall wheatgrass is a tall, long lived perennial bunchgrass reaching 1 to 3 m (3 to 10 ft) tall. Leaves are green or glaucous bluish with blades flat to curling, 2 to 8 mm (0.08 to 0.31 in) wide. The blades are often covered with short, stiff hairs making them scratchy to the touch. Auricles are well developed and ligules reach ca 0.7 mm (0.02 in) long. The inflorescence is a spike with a continuous rachis. Internodes in the spike are about 7 to 20 mm (0.3 to 0.8 in) long. Spikelets are solitary at each node each with five to 18 flowers. Glumes are thick and hardened, 6 to 11 mm (0.2 to 0.4 in) long with 5 to 7 nerves. The tips of the glumes are truncate (abruptly rounded). Lemmas are also thick and hardened, 9 to 13 mm (0.4 to 0.5 in) long with a truncate to acute apex. Anthers are 4 to 7 mm (0.15 to 0.20 in) long.  $2n=14, 28, 42, 56$  or  $70$  (Welsh et al 2003).

*Distribution:* Tall wheatgrass is originally from Turkey, Asia Minor and Russia. It was introduced to the U.S. from Turkey in 1909 (Weintraub, 1953) and is now found throughout all western states of the U.S. and most Canadian provinces (USDA, 2008; Barkworth, et al., 2007).

### Adaption

Tall wheatgrass is adapted to a wide range of soil types and climates. It is often recommended for 12 - 14 inch and higher precipitation zones or sites with high water tables at 4,300 to 6,000 feet elevation zones. It is well adapted to wet, alkaline soils such as greasewood and saltgrass sites where the water table is from a few inches to several feet below ground surface. It is less drought tolerant than crested wheatgrass, however it is adapted to sagebrush, mountain brush and juniper sites. Basin wildrye is a good indicator of where tall wheatgrass will be successful.

Tall wheatgrass is one of the most saline or alkali tolerant cultivated grasses. It can tolerate up to 1% soluble soil salts (Vallentine 1961). Tall wheatgrass increases production yields with salinity levels of 6000 to 18000 ppm and persists in soils with conductivity up to electrical conductivity (EC) of 26 mmhos/cm (Ogle et al., 2008).

Because of its late maturing characteristic, tall wheatgrass provides a long grazing period (USDA, 2005). It has been evaluated in several western states for its potential to extend the grazing season. Studies indicate it performs well in New Mexico and Kansas (Holechek et al., 1989; Harmony, 2007), but not in Montana (Haferkamp et al., 2005), and results are variable in Oklahoma and Texas (Griggs and Matches, 1991; Malinkowski et al, 2003; Gillen and Berg, 2005; Hopkins, 2005).



Greg Fenchel, USDA NRCS NMPMC, Los Lunas, NM

### Establishment

Tall wheatgrass should be planted with a drill into a firm, weed-free seed bed. The drill should be set to a depth of ½ of an inch on medium to fine textured soils and no more than 1 inch deep on coarse textured soils. Recommended seeding rates are 10 pounds Pure Live Seed (PLS) per acre on non-saline soils and 15 pounds PLS per acre on saline soils. It is usually seeded in pure stands or in mixtures with grasses also having moderate palatability. If seeded in a mix, adjust seeding rate accordingly. Under dryland conditions, heavy to medium textured soils should be seeded in the very early spring, and medium to light textured soils should be seeded in the late fall. Irrigated land should be seeded in spring or late summer. Late summer (August – September) seedings are not recommended unless irrigation is available.

Tall wheatgrass has excellent seedling vigor but is slow to establish. Applications of 2,4-D may be necessary to control weeds. The herbicide should not be applied until plants have reached four to six leaf stage. Weeds should be mowed at or prior to bloom stage.

To ensure plants become well established, haying and grazing should be deferred for at least two growing seasons on dryland one growing season on irrigated land.

### **Management**

Tall wheatgrass responds well to irrigation and fertilization. Apply nitrogen in fall or early spring at a rate based on soil test results and fertilizer guide recommendations.

To maintain stands, 6 inches of stubble should be left at the end of the growing season. Grazing the following season should be delayed until there is at least 8 inches of new growth. Tall wheatgrass is most palatable during the early spring months and should be managed during this time. If the grass is not managed, old coarse growth may inhibit grazing the following year. Tall wheatgrass must be grazed heavily to maintain plants in the vegetative state. However it does not tolerate continuous close grazing and a rest period is required between grazing events (USDA, 2005). In a study to determine influence of clipping frequency on yield, Undersander and Naylor (1987) found the highest yields of tall wheatgrass were produced when clipped at 4 week intervals. Supplemental protein must be provided if used for winter forage (USDA, 2005).

*Environmental concerns:* Tall wheatgrass is long-lived and spreads slowly. It is not considered a "weedy" or invasive species, but can spread into adjoining vegetative communities under favorable climatic and environmental conditions. Research indicates that most seedlings do not spread from original plantings. It is known to coexist with native taxa. On sites where it is best adapted, it can maintain dominance and exist as monoculture. There is no documentation that it crosses with native species.

### **Seed Production**

Tall wheatgrass grown for seed production should be planted in 28 to 36- inch rows and cultivated, or 12 to 14- inch rows uncultivated. It typically produces 300 pounds of seed per acre under dryland conditions and 600 pounds of seed per acre under irrigated conditions (NRCS figures).

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

Six cultivars of tall wheatgrass have been released in the U.S. and Canada. Four of the six cultivars: Alkar, Nebraska 98526, Orbit and Platte, were all derived from PI 98526, which was presented to the USDA by N.I. Vavilov in 1932 (Alderson and Sharp, 1994). A new release is planned for 2008 from Nebraska that has improved forage quality (Vogel, 2008). It was also developed from PI 98526.

'**Alkar**' tall wheatgrass was developed by the NRCS Pullman PMC with seed originating from PI 98526. It was released in 1951, under accession P-2326 for certified seed production in Idaho, Washington and Oregon. In 1958 it was named 'Alkar' and was accepted for certification in those states and California. Its intended use was for pasture in wet, alkaline conditions and semi-arid regions of the west within 270 – 5500 feet elevation. Certified seed is commercially available and the Pullman PMC maintains breeder seed.

'**Jose**' tall wheatgrass was selected at the former NRCS nursery in Albuquerque, NM from seed received by Beltsville, MD as BN-3654 and PI 150123. It is native to Eurasia but was introduced from Australia. It was selected for its drought and saline tolerance. The nursery released 'Jose' in 1965 cooperatively with the New Mexico AES and Plant Materials Center in Los Lunas, NM. It is used in areas where only very saline water is available for use. It is not as coarse as other tall wheatgrasses. Certified seed is commercially available and breeder seed is maintained by the Los Lunas PMC.

'**Largo**' tall wheatgrass was developed by the former NRCS nursery in Albuquerque, NM as A-1876, and at Utah AES, Logan, ARS cooperating, as PI 109452. Seed was originally collected by the Westover-Enlow expedition near Bandirma, Turkey. It was introduced as *Agropyron intermedium* (Host) Beauv., now *Thinopyrum intermedium* (Host) Barkworth & D.R. Dewey, and later identified as *A. elongatum* (Host) Beauv. It was selected for forage production on saline and sodic soils. The Los Lunas PMC maintains breeder seed. Certified seed is not commercially available. 'Largo' has been replaced by 'Jose'.

'**Nebraska 98526**' tall wheatgrass was increased at NRCS nurseries in cooperation with Nebraska AES in Lincoln. The seed was first grown at Colorado AES in Fort Collins, and in 1936 distributed by the NRCS as PI 98526 to nurseries in the Dakotas and Nebraska. In 1950 it was grown on Nebraska farms

for seed production under field certification by Nebraska Crop Improvement Association on recommendation of Nebraska AES, NRCS and ARS. Its intended use was for sodic and saline soils in the central and northern Great Plains and intermountain west. It has been replaced by the variety 'Platte', and is no longer commercially available. Nebraska AES maintains breeder seed.

'Orbit' tall wheatgrass was developed by the Canada Department of Agriculture Research Station in Swift Current, Saskatchewan. It was developed from crosses made between 'Nebraska 98526' and locally selected strains. It was released in 1966 by the Canada Department of Agriculture. It was selected for its superior winter hardiness and was intended for hay, pasture and conservation plantings in the northern Great Plains. It withstands flooding for three to four weeks in the spring. Certified seed is commercially available. The Canada Department of Agriculture Research Station in Swift Current maintains breeder seed.

'Platte' tall wheatgrass was developed by the Nebraska AES in Lincoln, ARS, with L.C. Newell cooperating. It was developed as a cross between 'Nebraska 96526' and a selection of introductions with unknown origin from the Cheyenne, WY, Horticultural Field Station. It was released in 1972 cooperatively by the Nebraska AES and USDA-ARS, University of Nebraska-Lincoln. Its intended use was for vegetating saline-alkali soils in the Great Plains. Certified seed is commercially available. The Nebraska AES and USDA-ARS, University of Nebraska-Lincoln maintains breeder seed.

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