2005

Registration of ‘NU-ARS AC2’ Crested Wheatgrass

Kenneth P. Vogel
University of Nebraska-Lincoln, kvogel1@unl.edu

D. Tober
USDA-NRCS

P. E. Reece
University of Nebraska, Scottsbluff, preece1@unl.edu

D. D. Baltsensperger
University of Nebraska, Scottsbluff

G. E. Schuman
USDA-ARS

See next page for additional authors

Follow this and additional works at: http://digitalcommons.unl.edu/usdaarsfacpub

http://digitalcommons.unl.edu/usdaarsfacpub/1928

This Article is brought to you for free and open access by the U.S. Department of Agriculture: Agricultural Research Service, Lincoln, Nebraska at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Publications from USDA-ARS / UNL Faculty by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
Cowpea aphid-borne mosaic virus (CABMV), and bacterial blight [caused by Xanthomonas campestris pv. vignicola (Burkholder)], and has early maturity. Yacine is adapted for dry grain production under rainfed conditions in the Sahelian Zone of northern Senegal where the annual monomodal rainyfall provides 200–400 mm per growing season. Yacine is not recommended for zones where flower thrips (Megalus thorrips sjostedti Trybom) are prevalent, such as those zones with higher rainfall, since it is more susceptible to flower thrips than ‘Melakh’.

Yacine was derived from the cross 86-5-2/Melakh which was made in 1989. The line 86-5-2 is a selection from the landrace ‘Mame Penda’ (Sène, 1966; Cissé and Hall, 2003) which is widely grown in northern Senegal. Farm families prefer Mame Penda for its desirable grain qualities (color, taste, and size), and it has resistance to bacterial blight. Mame Penda is, however, susceptible to cowpea aphids and CABMV. Melakh (Cissé et al., 1997) is also grown in northern Senegal and flowers and matures earlier than Mame Penda. Melakh has resistance to cowpea aphid, CABMV, and bacterial blight.

Single plant selections for resistance to mosaic virus and bacterial blight were made in 1990–1991 at the F1, F2, and F3 under artificial inoculation. The F1 was included in a preliminary yield trial under the designation ISRA-819 during the 1991 growing season and was bulk harvested. A single F1 plant that had no infestation of cowpea aphid and no symptoms of mosaic virus or bacterial blight under field conditions was selected based on various seed qualities and earliness from an observational nursery in 1998. Reselection for resistance to cowpea aphid was made under artificial inoculation at F2. F2 seeds of resistant plants were bulked and introduced in yield trials in Senegal from 1999 through 2003. Tests were conducted at two sites (Bambey and Thilmaaka) per year and at 50 on-farm sites from 2001 to 2003. Selection for uniform seed color was made at F2. The resulting lines were bulked as Breeder seed of Yacine.

Yacine is erect and belongs to the same maturity group as Melakh, whereas Mame Penda has an indeterminate growth habit and a greater biomass production. Under well-watered conditions Yacine reaches physiological maturity 62 d after sowing, whereas Mame Penda reaches maturity at 75 d. Yacine produced 40% more grain (1434 kg ha⁻¹) than Mame Penda (1020 kg ha⁻¹) and had similar grain yield as Melakh. Yacine produced less hay (dry shoot biomass minus pods) than either Mame Penda or Melakh. Seeds of Yacine are brown with a small, white eye and are larger (23 g 100 seed⁻¹) than those of Mame Penda (18 g 100 seed⁻¹) and Melakh (19 g 100 seed⁻¹). On-farm yields of Yacine in pure culture were similar to those of Melakh (750 kg ha⁻¹) and 30% greater than those of Mame Penda (580 kg ha⁻¹). Grain taste of Yacine has been rated superior to that of Melakh and Mame Penda by farm families.

Breeder seed will be maintained by ISRA at the National de Recherches Agronomiques, BP53 Bambey, Senegal.

N. Cissé,* M. Ndiaye, and A. Sène


References


Published in Crop Sci. 45:413–414 (2005).
Registration of ‘Haymaker’ Intermediate Wheatgrass

‘Haymaker’ intermediate wheatgrass [Elytrigia intermedia (Host) Nevski subsp. intermediate = Thinopyrum intermedium (Host) Barkw. & D.R. Dewey] (Reg. no. CV-27, PI 634506) is a broadly adapted cultivar that produces high, stable forage yields when used for cool-season grass hay production or for pastures in the tall, mid-grass, and short-grass ecoregions of the central and northern Great Plains. It was released in April 2003 by USDA-ARS; Agricultural Research Division, Institute of Agricultural and Natural Resources, University of Nebraska–Lincoln; and USDA-NRCS. Haymaker was tested under the experimental designation NE TI3.

Haymaker is a synthetic cultivar or population produced by interseeding selected plants from intermediate wheatgrass germplasm accessions and an adapted cultivar, Slate (Newell, 1974). The accessions originated from collections made by Douglas Dewey, USDA-ARS Plant Geneticist, in the former USSR in 1977. Three accessions with high forage yields, in vitro dry matter digestibility (IVDMD), and overall forage evaluation scores were identified. Superior plants in these accessions and from ‘Slate’ were identified prior to flowering in 1985 in an evaluation nursery at Mead, NE. All other plants were mowed and seed was harvested from the selected plants. The evaluation nursery had 20 plants of each accession. The increase nursery contained used to establish an increase nursery of the strain designated NE TI3 in the fall of 1985. The increase nursery contained 1100 spaced plants which produced the Syn 2 seed of NE TI3 in the fall of 1985. The increase nursery was maintained as high, stable forage yields when used for cool-season grass hay production or for pastures in the tall, mid-grass, and short-grass ecoregions of the central and northern Great Plains. It was released in April 2003 by USDA-ARS; Agricultural Research Division, Institute of Agricultural and Natural Resources, University of Nebraska–Lincoln; and USDA-NRCS. Haymaker was tested under the experimental designation NE TI3.

Haymaker is a synthetic cultivar or population produced by interseeding selected plants from intermediate wheatgrass germplasm accessions and an adapted cultivar, Slate (Newell, 1974). The accessions originated from collections made by Douglas Dewey, USDA-ARS Plant Geneticist, in the former USSR in 1977. Three accessions with high forage yields, in vitro dry matter digestibility (IVDMD), and overall forage evaluation scores were identified. Superior plants in these accessions and from ‘Slate’ were identified prior to flowering in 1985 in an evaluation nursery at Mead, NE. All other plants were mowed and seed was harvested from the selected plants. The evaluation nursery had 20 plants of each accession. The increase nursery contained used to establish an increase nursery of the strain designated NE TI3 in the fall of 1985. The increase nursery contained 1100 spaced plants which produced the Syn 2 seed of NE TI3 used to establish evaluation trials in the Great Plains.

Haymaker was tested across several ecoregions (Bailey, 1995) of the central and northern Great Plains at the following sites: Prairie (Mead, NE), Steppe (Hays, KS; Ft. Pierre, SD), Dry Steppe (Sidney, NE; Cheyenne, WY; Hettinger, ND) during the period 1990–1997. Haymaker had the greatest average forage yields at both the central and northern Great Plains sites when compared with released cultivars and other experimental strains of intermediate wheatgrass. The forage quality of Haymaker as measured by IVDMD and protein concentration is less than that of ‘Beefmaker’ (Vogel et al., 2005), but
is similar to that of other released cultivars of intermediate wheatgrass. Haymaker is recommended for dryland hay production in the central and northern Great Plains, USA in USDA Plant Hardiness Zones 3, 4, and 5 (Cathey, 1990).

Haymaker has an erect growth habit and has rhizomes typical of intermediate wheatgrass. Its culms and leaves are glabrous and non-glaucous, and leaf margins are smooth. Leaves are green-yellow or Munsell 5GY 5/4 (Munsell Color, 1977). Sheaths have ligules, auricles are usually absent, and sheath margins are smooth. Spikes are oblong, erect, and have green, lanceolate glumes. Spike density is lax. Anthers are yellow. At 41° N lat. in the central Great Plains, Haymaker has anthesis the last week of June. The spike height of Haymaker varies with environment but is typically taller than other intermediate wheatgrasses and has a wider flag leaf.

Breeder seed will be jointly maintained and produced as needed by USDA-ARS and the University of Nebraska-Lincoln with random-mated isolations based on the Syn 2 seed used in evaluation trials. Foundation seed production of Haymaker will be managed by the Nebraska Foundation Seed Division, University of Nebraska-Lincoln, Lincoln, NE 68583. Foundation seed will be made available for Certified seed production on a non-exclusive basis to seed producers who contractually agree to produce and market the seed only as Certified seed using the cultivar name Haymaker. A technology development and transfer fee will be assessed by the University of Nebraska.

Limited amounts of seed for research purposes will be provided upon written request to the corresponding author. Recipients are asked to recognize the source if it contributes to the development of a cultivar or germplasm or is used for other research purposes. U.S. Plant Variety Protection will be sought for Haymaker.


Acknowledgments

Appreciation for the technical support of Keith Glewen, James Kube, Patrick Callahan, Steve Masterson, Marty Schmer, and Kevin Grams is acknowledged.

References

Munsell Color. 1977. Munsell color charts for plants. 2nd ed. Munsell Color (Firm), Baltimore, MD.

K.P. Vogel, USDA-ARS, 344 Keim Hall, P.O. Box 830937, Univ. of Nebraska, Lincoln, NE 68583-0937; D. Tober, USDA-ARS, North Dakota State Office, 220 Rosser Avenue, P.O. Box 1458, Bismarck, ND, 58502-1458; P.E. Reece and D.D. Baltensperger, Panhandle Research & Extension Center, University of Nebraska, 4502 Ave. I, Scottsbluff, NE 69361-4939; G.E. Schuman, High Plains Grasslands Research Station, USDA-ARS, 8408 Hildreth Road, Cheyenne, WY 82009-8899; R.A. Nicholson, KSU Agricultural Research Center and Dept. Biological Sciences, Fort Hays State University, Hays, KS 67601. Registration by CSSA. Accepted 30 June 2004. *Corresponding author (kpv@unlserve.unl.edu).


Registration of ‘NU-ARS AC2’ Crested Wheatgrass

‘NU-ARS AC2’ crested wheatgrass [Agropyron cristatum (L.) Gaertn.—A. cristatum var. pectinatum (M. Bieb.) Tzvelev] (Reg. no. CV-28, PI 634507) is a broadly adapted, complex composite population produced by allowing selected plants from fairway-type germplasm accessions to randomly intermate. It originates from collections made by Douglas Dewey, USDA-ARS Plant Geneticist, in the former USSR in 1977. It was released in September 2002 by USDA-ARS; Agricultural Research Division, Institute of Agricultural and Natural Resources, University of Nebraska-Lincoln; and the USDA-NRCS. NU-ARS AC2 was tested under the experimental designation NE AC2.

Seed of fairway-type crested wheatgrass accessions obtained from Dewey’s collections were used to establish evaluation trials at Mead and Alliance, NE. Accessions were evaluated during the period 1979–1983 in space-transplanted evaluation trials. Four accessions with high forage yields, high in vitro dry matter digestibility (IVDMD), and overall superior forage evaluation ratings were identified. Superior plants of these accessions were visually selected in the evaluation nursery at Mead, NE, in 1985 prior to anthesis. All non-selected plants in the evaluation nursery were mowed prior to anthesis and seed was harvested and bulked from the selected plants. The Dewey accessions and the numbers of plants selected from each accession to form NU-ARS AC-2 were as follows: D-1458 (18), D-1462 (6), D-1610 (13), and D-1654 (9). The Dewey accessions have been entered into the USDA Plant Germplasm System. D-1458 was a single plant collection (D.R. Dewey, personal communication, 1980) which was combined with D-1457 to form PI 440062. D-1462 was a bulk collection and assigned PI 439922. Both PI 440062 and PI 439922 are fairway-like in appearance and were collected from a site 52 km southeast of Stavropol, Russia. PI 440062 has subsequently been classified as A. cristatum var. pectinatum and is a tetraploid. D-1610 was assigned PI 439926 and D-1654 was assigned PI 439929. PI 439926 and PI 439929 were classified as A. cristatum. PI 439926 was collected on a seeded site near Stavropol, Russia and believed to be the cultivar Krasnokovskii 305 (D.R. Dewey, personal communication, 1980). PI 439929, a diploid, was collected about 50 km southeast of Svetlograd, Russia. Bulked seed from selected plants was used to establish an increase nursery in the fall of 1985 at Mead, NE. Seed harvested from the increase nursery (Syn 2 generation) produced the synthesized population, NE AC2, which was used to plant evaluation trials.

NU-ARS AC2 was tested across several eco-regions (Bailley, 1995) in the Central and Northern Great Plains at the following sites; Prairie (Mead, NE), Steppe (Hays, KS; Ft. Pierre, SD), Dry Steppe (Sidney, NE; Cheyenne, WY; Het-tinger, ND) during the period 1990–1997. In both the Central and Northern Plains locations, NU-ARS AC2 had greater average forage yields than the other fairway-type crested wheatgrass entries and was equivalent to the best standard crested wheatgrass cultivars. The in vitro dry matter digestibility (IVDMD) and protein content of NU-ARS AC2 was similar to that of the other strains and cultivars evaluated. Seed yields were 200 and 260 kg ha⁻¹ in 2000 and 2001, respectively, under rainfed conditions at Mead, NE.

NU-ARS AC2 has an erect, caespitose growth habit typical of crested wheatgrasses. Its culms and leaves are glabrous and non-glaucous, and leaf margins are smooth. Leaves are green-
yellow or Munsell 5GY 4/4 (Munsell Color, 1977). Sheaths have ligules, sheath margins are smooth, and auricles are absent. Spikes are dense, tapering, erect, and have green, lanceolate, awned glumes. At 41° N lat. in the central Great Plains, NU-ARS AC2 heads the last 10 d of May. Approximately 95% of the plants in a population of NU-ARS AC2 are diploids, the remainder are tetraploids. No triploids were identified in almost 100 seedlings produced from Breeder seed. Although NU-ARS AC2 is genetically heterogeneous, it is similar in phenotypic uniformity to other fairway-type crested wheatgrasses. It is typically about 3–5 cm taller in height than A. cristatum cultivars such as Fairway or Parkway and 10 to 12 cm in height shorter than A. desertorum or standard crested wheatgrass cultivars such as HyCrest and Nordan. Spike length is shorter and spike width is greater than standard crested wheatgrass cultivars. NU-ARS AC-2 is adapted to USDA Plant Hardiness Zones 3, 4, and 5 (Cathey, 1990).

Breeder seed will be jointly maintained and produced as needed by USDA-ARS and the University of Nebraska-Lincoln with random mated isolations based on the Syn 2 Breeder seed. Foundation seed production of NU-ARS AC2 will be managed by the Nebraska Foundation Seed Division, University of Nebraska-Lincoln, Lincoln, NE 68583. Foundation seed will be made available for Certified seed production on a non-exclusive basis to seed producers who contractually agree to produce and market the seed only as Certified seed using cultivar name NU-ARS AC2. A fee for technology development and transfer will be assessed by the University of Nebraska. Limited amounts of seed for research purposes will be provided upon written request to the corresponding author. Recipients are asked to recognize the source if it contributes to the development of a cultivar or germplasm or is used for other research purposes. U.S. Plant Variety Protection will be sought for NU-ARS AC2.


Acknowledgments

Appreciation for the technical support of Keith Glewen, James Kube, Patrick Callahan, Steve Masterson, Marty Schmer, and Kevin Grams is acknowledged.

References


K.P. Vogel, USDA-ARS, 344 Keim Hall, P.O. Box 830937, Univ. of Nebraska, Lincoln, NE 68583-0937; D. Tober, USDA-NRCS, North Dakota State Office, 220 East Rosser Avenue, P.O. Box 1458, Bismarck, ND. 58502-1458; P.E. Reece and D.D. Baltensperger, Panhandle Research & Extension Center, Univ. of Nebraska, 4902 Ave. J, Scottsbluff, NE 69361-4939; G.E. Schuman, High Plains Grasslands Research Station, USDA-ARS, 8408 Hildreth Road, Cheyenne, WY 82009-8899; R.A. Nicholson, KSU Agricultural Research Center and Dep. Biological Sciences, Fort Hays State Univ., Hays, KS 67601. Registration by CSSA. Accepted 30 June 2004. *Corresponding author (kpv@unlserve.unl.edu).