

## REGISTRATIONS OF CULTIVARS

## Registration of 'Aquila' Spring Barley

'Aquila' spring barley (*Hordeum vulgare* L.) (Reg. no. CV-319, PI 635120) was developed at the Utah Agricultural Experiment Station and released in 2003. Aquila has been tested as the breeding line UT97B1480-1632 and is a six-rowed spring feed barley. Its main characteristics are an early heading date, a low propensity for lodging, and a test-weight equal or superior to that of two-rowed cultivars.

Aquila was named after the genus name of several eagle species, including the golden eagle (*Aquila chrysaetos* L.). This species is found in mountainous regions, steppes, and high elevation deserts of most of the northern hemisphere.

Aquila has the pedigree UT-S.D.B1-1009/M72-395/3/Utah Short#2//ID633019/'Woodvale'/4/'Steptoe'/M27//'Westbred Gustoe' (Dewey, 1972; Muir and Nilan, 1973). UT-S.B1-1009 is a sib to 'Bracken' (Albrechtsen, 1993). Utah Short #2 is a six-rowed, semidwarf line selected at Logan, UT, from the cross S.D.S.S (a South Dakota breeding line)/'Primus' (Price, 1969) made by Dr. Phil B. Price at South Dakota State University. M27 is a short stature breeding line involving the parents 'Jotun' (PI539136), 'Kindred' (PI6969), and 'Vantage' (Johnston, 1965).

F<sub>1</sub> plants were grown in the greenhouse during the winter of 1992–1993. Segregating generations (F<sub>2</sub>–F<sub>5</sub>) were grown at Logan, UT, as space-planted modified bulk populations. Desirable plants (for spike size, stiff straw, vigor) were selected each year between 1993 and 1996, and seeds were bulked. Individual spikes from F<sub>5</sub> plants were selected in the summer of 1996 and their seeds were sown as head rows in 1997. Head row number UT97B1480-1632 was selected for vigor, stiff straw, spike appearance, and threshing ability. Seed increase and limited performance trials were performed in 1998 and 1999 at Logan, UT. Aquila has been further performance-tested annually in three to four Utah locations from 2000 through 2003. It was tested under the same number in the Western Regional Irrigated Spring Barley Nursery from 2001 through 2003. In the summer of 2002, 100 heads were selected among F<sub>5-11</sub> progenies at Logan, UT. These 100 head spikes were grown in a 2002–2003 winter increase at Yuma, AZ, where off types were rogued. Retained rows were harvested in bulk to constitute the Breeder seed. Foundation seed was produced at Cache Junction (USU Farm) in the summer of 2003. Registered Class seed will be produced in 2004 and made available for further commercial increase.

Aquila is a six-rowed, early-heading spring feed barley. It has a lax spike with limited overlapping of upper lateral spikelets. The peduncle is slightly curved. The rachis has short hairs on its edges. At the bottom of the spike, the collar is of closed type or V-shaped. The basal rachis internode has a short straight to curved shape. The length of the rachis internodes is relatively constant from top to bottom of the spike. Glumes are hairy on dorsal surfaces and edges. Glume awns are longer than the glumes. No hairs or only a few are visible on the ventral surface of glumes. The awns are long, and of the fully rough type. The seed is covered, midlong to long with a depressed crease at the lemma base. Lemma teeth are few and confined to nerves, the rachilla is of the short-haired type, hulls are slightly wrinkled, and the aleurone color is white.

Aquila is recommended for growing under irrigation in the intermountain region of the USA. In three years (2001–2003,

37 site-years) of Western Regional Irrigated Spring Barley tests, Aquila's yield (5588 kg ha<sup>-1</sup>) was not statistically different ( $P \leq 0.05$ ) from that of Steptoe (5575 kg ha<sup>-1</sup>) or Baronesse (5445 kg ha<sup>-1</sup>). Average test weight of Aquila for these trials (672.2 kg m<sup>-3</sup>) was equal to that of Baronesse (673.0 kg m<sup>-3</sup>) and significantly higher ( $P \leq 0.05$ ) than that of Steptoe (626.7 kg m<sup>-3</sup>). Average heading date (30 site-years) for Aquila (175 Julian days) is one day and six days earlier than those of Steptoe and Baronesse, respectively. For two years (2001, 2002), it was the earliest heading barley line among a field of 39 and 37 breeding lines and checks, respectively. Average percentage of lodged plants for Aquila (18 site-years, 9%) was lower than those of Baronesse (34%) and Steptoe (36%). Average height of Aquila (76.2 cm) was similar to that of Steptoe (75.4 cm) but significantly greater than that of Baronesse (70.7 cm) ( $P \leq 0.05$ ). In 2002 to 2003 (5 site-years), average percentage protein of grain for Aquila (12.3%) was lower than that of Baronesse (13.5%) but higher than that of Steptoe (11.1%) ( $P \leq 0.05$ ).

Aquila has been tested for four consecutive years (2000–2003) in several locations in the state of Utah (15 site-years). Aquila's yield (5380 kg ha<sup>-1</sup>) is not significantly different from those of Steptoe (5465 kg ha<sup>-1</sup>) and Baronesse (5520 kg ha<sup>-1</sup>) ( $P \leq 0.05$ ). In these Utah trials, test weight for Aquila (680.0 kg m<sup>-3</sup>) is similar to that of Baronesse (679.5 kg m<sup>-3</sup>) and significantly higher than that of Steptoe (653.8 kg m<sup>-3</sup>) ( $P \leq 0.05$ ). Aquila's performance in rainfed conditions is still under testing.

Aquila has shown field resistance to barley loose smut [caused by *Ustilago nuda* (Jens.) Rostr.] and covered smut [caused by *U. hordei* (Pers.) Lagerh.]. Preliminary tests have shown Aquila to be susceptible to barley stripe rust (caused by *Puccinia striiformis* Westend.).

The generation sequence of seed production of Aquila is Breeder, Foundation, Registered, and Certified. Breeder seed is maintained by the Utah Agricultural Experiment Station, Department of Plants, Soils, and Biometeorology, Utah State University, Logan, UT 84322-4820. Foundation Seed is available from the Utah Crop Improvement Association, Utah State University, Logan, UT 84322-4820. U.S. Plant Variety Protection of Aquila has been applied for.

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## References

- Albrechtsen, R.S. 1993. Registration of 'Bracken' Barley. *Crop Sci.* 33:1413–1414.
- Dewey, W.G. 1972. Registration of 'Woodvale' barley. *Crop Sci.* 12:125.
- Johnston, W.H. 1965. Keystone, Parkland and Vantage barleys. *Crop Sci.* 5:195.
- Muir, C.E., and R.A. Nilan. 1973. Registration of 'Steptoe' barley. *Crop Sci.* 13:770.
- Price, P.B. 1969. Registration of 'Primus' and 'Primus II' barley. *Crop Sci.* 9:679.
- Dep. of Plants, Soils, and Biometeorology, Utah State University, Logan, UT 84322-4820. *Utah Agric. Exp. Stn. Journal No. 7613*. Registration by CSSA. Accepted 30 Nov. 2004. \*Corresponding author (droche@mendel.usu.edu).

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### Registration of 'Jerome' Wheat

'Jerome' (Reg. no. CV-964, PI 632712) is a hard red spring wheat (*Triticum aestivum* L.) developed by the Idaho Agricultural Experiment Station and released in February 2004. Jerome, named for Jerome, ID, was released for its superior grain yield and baking quality compared with current irrigated hard red spring cultivars in the intermountain zone of the western United States. Jerome is well adapted to both irrigated and rain-fed production systems.

Jerome was derived from the cross, A91197S 'Sunstar II' (PI 559378)/'Westbred 926', which was made at Aberdeen, ID, in 1991. Sunstar II is a hard red spring wheat released by Sunstar Plant Breeding, Twin Falls, ID, and derived from a field cross of 'Westbred 906R' (PI 483455) to an unknown second parent. Westbred 926, developed by Westbred L.L.C., Bozeman, MT, is a hard red spring wheat with a proprietary pedigree. The F<sub>1</sub> seed of A91197S was produced in the greenhouse during the winter of 1991–1992 and seed from the hybrid was advanced through F<sub>2</sub> to F<sub>4</sub> generations using the bulk method (without intentional selection) in the field at Aberdeen. In 1994, approximately 200 heads were harvested from short plants in the F<sub>4</sub> bulk population and the grain from the heads visually inspected for kernel characteristics, with seed samples consisting of small or shriveled seed being discarded. In 1995, 67 F<sub>4.5</sub> headrows were planted at Aberdeen and selected for short stature and stripe rust resistance (causal organism *Puccinia striiformis* Westend.; plots inoculated with spores of uncharacterized races collected at Aberdeen). One of those headrows, designated A91197S-9, was selected and evaluated in yield trials in southeastern Idaho from 1996 to 1999. In 2000, A91197S-9 was designated IDO566 and entered into the Tri-State Regional Spring Wheat Nursery. IDO566 was advanced to the Western Regional Spring Wheat Nursery in 2001 where it was evaluated for 3 yr. In 2000, approximately 200 heads of IDO566 were selected at Aberdeen and planted as headrows at Aberdeen in 2001. Rows of IDO566 that were uniform for height, heading date and head type (approximately 150), were harvested, and bulked to form the Breeder seed for the cultivar Jerome. Jerome was evaluated in on-farm testing by the University of Idaho cooperative extension service in 2002 and 2003 and by the Pacific Northwest Wheat Quality Council in 2003. Jerome is uniform for plant type without obvious phenotypic variants and has remained stable during six generations of evaluation, 1996 to 2001.

Jerome is most similar in appearance to the cultivar Westbred 926. Jerome has an unpigmented coleoptile and an erect seedling growth habit. Jerome has a semidwarf plant type, with an average plant stature in Idaho field trials (42 trials) of 82 cm compared with 77 cm for 'Westbred 936' (PI 587200) and 85 cm for the tall semidwarf cultivar Jefferson (PI 603040) (Souza et al., 1999). Jerome has dark-green foliage with recurved and twisted flag leaves. The inflorescence of Jerome is awned, middense, tapered, with glumes that are midwide, long, and with elevated shoulders and acuminate beaks. The auricles and anthers of Jerome are unpigmented. Jerome has a waxy bloom on its glumes at flowering and a bright white chaff color at maturity. Seed of Jerome is red, ovate, and with a shallow, wide crease and rounded cheeks, similar to Sunstar II. The brush on Jerome's seed is medium in length and not collared. Jerome has large seed, averaging 41 mg per kernel, greater than Jefferson (36 mg per kernel), but not significantly different from Westbred 926 (42 mg per kernel). Jerome carries the high molecular weight glutenin alleles *Glu-A1b* (2\*), *Glu-B1i* (17+18), and *Glu-D1d* (5+10).

Jerome is an early maturing spring wheat, with an average

heading date in Idaho of 172 d after January 1 (22 field trials, 1998–2003). By comparison, Jefferson headed 2 d later ( $P < 0.01$ ) and Westbred 936 headed 1 d later ( $P < 0.05$ ) than Jerome. Jerome has excellent lodging resistance, similar to Westbred 936. In most trials from 1998 to 2003, Jerome had no lodging. However, in 21 of 48 yield trials within Idaho, where significant lodging did occur, Jerome, Westbred 936, and Jefferson respectively, had 17, 16, and 29% of plants lodged per plot (Jerome and Jefferson different at  $P < 0.01$ ). In 48 yield trials grown in Idaho from 1998 to 2003, Jerome had an average grain yield of 5740 kg ha<sup>-1</sup>, significantly greater ( $P < 0.01$ ) than Jefferson (5460 kg ha<sup>-1</sup>) and Westbred 936 (5477 kg ha<sup>-1</sup>). In the same yield trials, Jerome had an average grain volume-weight of 778 kg m<sup>-3</sup>, greater than Westbred 936 (769 kg m<sup>-3</sup>,  $P < 0.01$ ), yet less than Jefferson (784 kg m<sup>-3</sup>,  $P < 0.05$ ). In 11 yield trials grown in Idaho from 2000 to 2003, Jerome had an average grain protein concentration of 131 g kg<sup>-1</sup>, compared with 139 g kg<sup>-1</sup> for Jefferson, and 142 g kg<sup>-1</sup> for Westbred 936 (standard error of values 7 g kg<sup>-1</sup>).

Jerome has stripe rust resistance comparable to Jefferson. In four years of field trials (2000–2003) at Pullman and Mount Vernon, WA, stripe rust-caused lesions did not occur on Jerome or Jefferson in 8 site-years of observations where the susceptible check cultivar 'Lemhi 66' had more than 50% of its leaf area covered in lesions. The race spectrum of the stripe rust pathogen during this time period was complex (dominant races: Pst 98 and Pst 100; Chen et al., 2002). The reaction of Jerome to Pacific Northwestern U.S. populations of the Hessian fly [*Mayetiola destructor* (Say), predominant biotypes GP, E, F, and O] is resistant based on replicated laboratory evaluations of Jerome using Hessian fly populations collected near Lewiston, ID (Ratcliffe et al., 2000; Schotzko and Bosque-Pérez, 2002). In a naturally infested, replicated field trial at Genesee, ID, in 2002, Jerome had no infested plants, similar to the resistant hard red spring cultivar Hank (PI 613585). Both cultivars had less ( $P < 0.05$ ) infestation than the susceptible genotype Westbred 936 with 54% infested plants (1.4 puparia per tiller) and 'Lolo' (PI 614840; Souza et al., 2003) with 97% infested plants (9.3 puparia per tiller). Both Hank and Jerome derive their Hessian fly resistance from Westbred 926 (D. Clark, personal communication, 2004).

The University of Idaho Wheat Quality Laboratory evaluated the end-use quality of Jerome by milling and baking seed samples of each entry from 21 yield trials grown in Idaho from 1998 to 2002. Wheat was milled using a Quadrumat Senior experimental flour mill (AACC 26-21A), a mixograph for dough strength (AACC 54-21), and a pup loaf bread bake (AACC 10-10B) to assess loaf volume (AACC, 1998). Jerome had a milling yield of 678 g kg<sup>-1</sup> on the Quadrumat Senior mill, similar to Jefferson (680 g kg<sup>-1</sup>) and greater than Westbred 936 (657 g kg<sup>-1</sup>,  $P < 0.01$ ). Mixograph dough mixing time for Jerome in 20 bake evaluations was moderate (2.5 min), but shorter ( $P < 0.01$ ) than the long mix-time genotypes Westbred 936 (2.7 min) and Jefferson (3.2 min). In 20 bread bakes using flour grain grown in southern Idaho field trials from 1998 to 2002, Jerome had an average flour protein concentration of 119 g kg<sup>-1</sup> and a pup loaf volume of 1109 mL. In contrast, in the same bakes Jefferson had a flour protein concentration of 122 g kg<sup>-1</sup> and a volume of 1112 mL and Westbred 936 a flour protein concentration 131 g kg<sup>-1</sup> and loaf volume of 1158 mL (protein standard error: 1 g kg<sup>-1</sup>; loaf volume standard error: 14 mL).

Seed of Jerome will be maintained by the University of Idaho, Foundation Seed Program and may be obtained by contacting the corresponding author. U.S. Plant Variety Pro-

tection with Title V protection has been applied for with the recognized classes of Foundation, Registered, and Certified seed.

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### References

- AACC. 1998. Approved methods of the AACC. 9th ed. Am. Assoc. Cereal Chemists, St. Paul, MN.
- Chen, X., M. Moore, E.A. Milus, D.L. Long, R.F. Line, D. Marshall, and L. Jackson. 2002. Wheat stripe rust epidemics and races of *Puccinia striiformis* f.sp. *tritici* in the United States in 2000. *Plant Dis.* 86:39–46.
- Ratcliffe, R.H., S.E. Cambron, K.L. Flanders, N.A. Bosque-Pérez, S.L. Clement, and H.W. Ohm. 2000. Biotype composition of Hessian fly (Diptera: Cecidomyiidae) populations from the southeastern, midwestern, and northwestern United States and virulence to resistance genes in wheat. *J. Econ. Entomol.* 93:1319–1328.
- Schotzko, D.J., and N.A. Bosque-Pérez. 2002. Relationship between Hessian fly infestation density and early seedling growth of resistant and susceptible wheat. *J. Agric. Urban Entomol.* 19:95–107.
- Souza, E., M. Guttieri, and R. McLean. 2003. Registration of 'Lolo' wheat. *Crop Sci.* 43:734–735.
- Souza, E., J.M. Windes, D.W. Sunderman, and K. O'Brien. 1999. Registration of 'Jefferson' wheat. *Crop Sci.* 39:296–297.
- E.J. Souza and M.J. Guttieri, Aberdeen Research and Extension Center, P.O. Box 870, University of Idaho, Aberdeen, ID 83210. N. Bosque-Pérez, D.J. Schotzko, S.O. Guy, and R.S. Zemetra, University of Idaho, Dep. Plant, Soils, and Entomol. Sci., Moscow, ID 83844-2339. B. Brown, University of Idaho, Parma Research and Extension Center, 29603 U of I Lane, Parma, ID 83660. Research funded in part by the Idaho Wheat Commission and the Idaho Agric. Exp. Stn. Hatch Project IDA 1222. Registration by CSSA. Accepted 30 Nov. 2004. \*Corresponding author (esouza@uidaho.edu).

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### Registration of 'Ambassador' Chewings Fescue

'Ambassador' Chewings fescue (*Festuca rubra* L. subsp. *commutata* Gaud.) (Reg no. CV-94, PI 632986) was released by Lebanon Seaboard Inc., Lebanon, PA, in March 2002. Germplasm from the New Jersey Agricultural Experiment Station (NJAES) was used in the development of Ambassador. Ambassador was tested under the experimental designation LTP-5001. The first Certified seed was produced in 2001 and marketed in the spring of 2002.

Ambassador is an advanced generation synthetic cultivar selected from the maternal progenies of 39 clones. Clones were selected from two nurseries established in 1994 and 1995 at the Rutgers Plant Biology and Pathology Research and Extension Farm, Adelphia, NJ. The 1994 nursery contained 1680 plants selected from the 1992 and 1993 fine fescue turf trials at Adelphia, and the 1993 fine fescue test at North Brunswick, NJ. The 1995 nursery contained 780 plants that were separately selected from the same populations as the 1994 nursery. Forty-seven plants were selected from these nurseries for characteristics including dark-green color, high shoot density, shorter mature plant stature, early anthesis and seed maturity, and freedom from disease. The 47 selected plants were moved before anthesis in the spring of 1996 to an isolated crossing block. Thirty-nine plants from 14 different maternal lines were individually harvested from the crossing block. The harvested plants exhibited higher seed yield potential, better floret fertility, and increased vigor when compared to other clones in the crossing block.

In the fall of 1996, one turf plot from each harvested plant was established at Adelphia, and 2 g of seed from each line were sent to Lebanon Seaboard for further screening and evaluation in Oregon. One thousand seeds from each of the

39 plants were randomly seeded in groups of 10 seeds per pot in a greenhouse near Independence, OR. The soil medium in each pot contained a high level of *Pythium* spp. common to the Pacific Northwest, USA. This soil medium was mixed and spread evenly among all pots to provide a uniform inoculum source. At 21 d after sowing, approximately 75% of the seedlings in all pots showed symptoms of *Pythium*. The seedling that was most vigorous and disease free and had the darkest green color was selected from each pot of 10 seedlings resulting in 100 seedlings from each of the 39 parental clones. These seedlings were allowed to grow in the greenhouse for another 2 wk. Twenty-five seedlings from each progeny of the 39 clones were then selected for dark-green color and freedom from disease. These 975 plants were moved to an isolated crossing block near Independence in the late fall of 1996. The isolation block was rogued during the summer, fall, and winter of 1997. Roguing continued during the spring and summer of 1998. Plants that showed any sign of disease, low vigor, or a lighter color were removed. Additionally, plants corresponding to any single-plant progeny turf plot at Adelphia, which were below the mean for overall turf performance, were rogued more intensively than those with above average turf performance.

By anthesis in 1998, 67 plants remained in the isolated crossing block. Sixty-two plants that exhibited excellent seed yield potential in terms of floret fertility and panicle number were subsequently hand harvested and bulked as Breeder seed for Ambassador. The harvested seed was used to establish an experimental Foundation field near Imbler, OR, and sent to the National Turfgrass Evaluation Program (NTEP) for testing.

Thirty of the 62 harvested plants exhibited a few choke stroma, the reproductive structure of the *Epichloe festucae* (Chardl) endophyte. Twenty-two of the plants contained an endophyte referred to as the Cambridge endophyte, which was discovered in plants selected from Longfellow Park in Cambridge, MA. Three plants contained an endophyte referred to as the Delaware endophyte, which was discovered in plants selected from 4 Delaware Drive in East Brunswick, NJ.

Approximately 49% of the maternal germplasm used in the development of Ambassador Chewings fescue trace to plants selected from or related to 'Longfellow' (Edminster et al., 1993), and 38% trace to plants selected from or related to 'Magic' Chewings fescue. Two percent of the maternal germplasm trace to a plant selected from a cemetery in Ewing, NJ, in 1989.

The above germplasm and the remaining 11% of the maternal germplasm used in the development of Ambassador Chewings fescue were developed from the germplasm collection and population improvement program initiated at the NJAES in 1962. This germplasm from the NJAES also traces to plants selected from old lawn-type turfs from the grounds of Fort McHenry, Baltimore, MD; Johnson Park in Piscataway, NJ; the College Avenue Campus of Rutgers University, New Brunswick, NJ; the Bridgehampton Golf Course, Bridgehampton, NJ; Longfellow Park in Cambridge, MA (the source of the Cambridge endophyte); Westview Cemetery in Atlanta, GA; old parks in Philadelphia, PA; Tennant Cemetery, in Tennant, NJ; and a home lawn located at 4 Delaware Drive, East Brunswick, NJ (the source of the Delaware endophyte).

Ambassador, along with a few other improved elite turf types, have superior overall turf performance compared to common types. Ambassador is a low-growing, turf-type cultivar that is able to produce an attractive, fine-textured turf of medium-high density and a dark-green color. Ambassador had excellent overall turf performance in the 1998 National Fine Fescue Test (Morris, 1999). It excelled in overall turf quality, under conditions of full sun, shade, and fairway traffic. It also rated well for genetic color, drought tolerance, and resistance to leaf spot [caused by *Drechslera dictyoides* (Drechs.) Shoem.], dollar spot [caused by *Sclerotinia homoeocarpa* (F.T. Bennet)],

brown patch (caused by *Rhizoctonia solani* Kühn), and summer patch (caused by *Magnaporthe poae* Landschoot & Jackson) (Morris, 1999).

Ambassador is useful for lawns, roadside, and conservation uses in temperate climates where medium maintenance turf is desired. It can be mixed with adapted blends of dark-green Kentucky bluegrass (*Poa pratensis* L.) cultivars and dark-green, turf-type perennial ryegrasses (*Lolium perenne* L.). Turfs of Ambassador with a significant percentage of endophyte should have improved resistance to many harmful insect pests, greater persistence, improved drought tolerance, and improved resistance to the dollar-spot disease (Funk and White, 1997). Light but varying percentages of choke stroma may be found in seed production fields and low maintenance turfs of Ambassador containing endophyte. Ambassador seed from the 1998 NTEP test assayed 44% endophyte infection (DaCosta et al., 1999). Ambassador has proved to be an excellent seed yielder in the eastern Oregon area near Imbler (William Merrigan, personal communication, 15 July 2002).

Breeder seed of Ambassador is maintained by Lebanon Seaboard Corporation. Certified propagation is restricted to three generations from Breeder seed: one each of Foundation, Registered, and Certified. Application no. 200300158 has been made for U.S. Plant Variety Protection.

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#### References

- DaCosta, M.B. Bhandari, J. Carson, J. Johnson-Cicalese, and W.A. Meyer. 1999. Incidence of endophytic fungi in seed of cultivars and selections in the 1998 National Fine Fescue Test. *Rutgers Turfgrass Proc.* 30:185–190.
- Edminster, C.W., G.W. Pepin, M.C. Engelke, M.L. Fraser, and C.R. Funk. 1993. Registration of 'Longfellow' Chewings fescue. *Crop Sci.* 33:1415–1416.
- Funk, C.R., and J.F. White, Jr. 1997. The use of natural and transformed endophytes for turf improvement. p. 229–239. *In* C.W. Bacon and N.S. Hill (ed.) *Neotyphodium/grass interactions*. Plenum Press, New York.
- Morris, K.N. 1999. National fineleaf fescue test 1998, NTEP No. 00–3. 1999 Progress Rep. *Natl. Turfgrass Eval. Progr., USDA-ARS, Beltsville, MD.*

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#### Registration of 'Steele-ND' Wheat

'Steele-ND' (Reg. no. CV-965, PI 634981) is a hard red spring wheat (*Triticum aestivum* L.) cultivar developed at North Dakota State University (NDSU) and released by the North

Dakota Agricultural Experiment Station (NDAES) in January 2004. Steele-ND was released because it combines a good level of Fusarium head blight (FHB) [caused by *Fusarium graminearum* Schwabe [telomorph *Gibberella zeae* (Schwein.) Petch]] resistance, high grain yield, and high end-use quality for the domestic and export wheat markets.

Steele-ND was selected from the cross 'Parshall' (PI 613587)/5/ 'Grandin' (PI 531005)/3/IAS20\*4/H567.71/'Amidon' (PI 527682)/4/Grandin\*2/'Glupro' (PI 592759) that was made in 1996. Grandin, Amidon, Glupro, and Parshall are hard red spring wheat (HRSW) cultivars developed by NDSU and released by NDAES in 1988, 1989, 1995, and 1999, respectively. IAS20\*4/H567.71 is a breeding line introduced from the International Wheat and Maize Improvement Center (CIMMYT), Mexico; for its high resistance to leaf rust (caused by *Puccinia triticina* Eriks.). The F<sub>1</sub> was grown in the greenhouse and F<sub>2</sub> grown in the field at Casselton, ND, in spring and summer of 1997. Two hundred spikes were selected from F<sub>2</sub> and advanced to F<sub>3</sub> in the greenhouse in fall of 1997 using single seed descent. Selection of spikes in the F<sub>2</sub> generation was based on agronomic appearance and reactions to FHB and foliar diseases. One spike from each F<sub>3</sub> plant was selected, harvested, threshed, and planted in a F<sub>3,4</sub> plot in 1998 at Casselton. The selected F<sub>3,4</sub> plot of Steele-ND was harvested, threshed in bulk, and included in the Preliminary Yield Trial (PYT) as an F<sub>3,5</sub> at two locations (Prosper and Casselton, ND) in 1999. Ten F<sub>3,5</sub> selected spikes from the Casselton PYT were harvested, threshed in bulk, and sent to Christchurch, New Zealand (NZ), in 1999–2000 for seed increase and generation advancement (F<sub>3,6</sub>) in a four-row 5-m-long plot. F<sub>3,7</sub> seed from the NZ increase was used to establish the Advanced Yield Trial in ND in 2000. Subsequently, the line was tested as ND 741 (F<sub>3,8</sub>) in the ND Variety Trials (NDVT) from 2001 to 2003. Steele-ND was also tested in the HRSW Uniform Regional Nursery (URN) and Uniform Regional Scab Nursery (URSN) from 2001 to 2003 in North Dakota, Minnesota, South Dakota, Nebraska, Montana, Wyoming, Washington, and Manitoba, Canada. The first seed purification of Steele-ND was in 2001 at Prosper, ND, when tall, early, and awnless variants were rouged before harvest. Further seed purifications of Steele-ND were done in the F<sub>3,9</sub> and F<sub>3,10</sub> generations by discarding variants from the seed increase fields before harvest.

Steele-ND is an awned cultivar with middense, inclined, and tapering spikes. The culms are white and the peduncle is slightly recurved. The awns are white and 8 to 10 cm in length. The glumes are white, medium, elevated, acuminate; and the shoulder and beak are medium width. The kernels are rounded, hard, red, and oval; the germ is midsized; and the brush is medium.

Plant height of Steele-ND (82 cm) is similar to 'Gunner' (PI 594043), 5 cm taller than 'Alsen' (PI 615543), and 3 cm shorter than Parshall in 19 site-years of NDVT. Steele-ND heads on average (60 d after planting) 1 d later than Alsen and 1 d earlier than Gunner. Steele-ND has moderate resistance to grain shattering, comparable to Alsen, and has medium straw strength that is similar to Gunner.

In 23 site-years of testing in the NDVT and AYT, grain yield of Steele-ND (3958 kg ha<sup>-1</sup>) was similar to 'Reeder' (PI 613586) (3951 kg ha<sup>-1</sup>) and Parshall (3843 kg ha<sup>-1</sup>), but significantly ( $P < 0.05$ ) higher than Alsen (3716 kg ha<sup>-1</sup>). In 47 site-years of testing in the URN trials conducted from 2001 to 2003, Steele-ND yielded 3682 kg ha<sup>-1</sup> compared to 3507, 3562, and 2647 kg ha<sup>-1</sup> for 'Keene' (PI 598224), 'Verde' (PI 592561), and 'Chris' (CItr 13751), respectively (LSD 0.05, 163 kg ha<sup>-1</sup>).

Mean grain volume weight of Steele-ND (770 kg m<sup>-3</sup>) over 16 site-years in NDVT was similar to Reeder (769 kg m<sup>-3</sup>).

and Alsen (765 kg m<sup>-3</sup>), but significantly ( $P < 0.05$ ) lower than 'Dapps' (PI 633862) (799 kg m<sup>-3</sup>) and Parshall (780 kg m<sup>-3</sup>). In the URN trials however, Steele-ND averaged significantly ( $P < 0.01$ ) higher grain volume weight (768 kg m<sup>-3</sup>) than Chris (731 kg m<sup>-3</sup>), Verde (754 kg m<sup>-3</sup>), and Keene (754 kg m<sup>-3</sup>). Similarly, grain protein of Steele-ND (158 g kg<sup>-1</sup>) was comparable to Reeder (157 g kg<sup>-1</sup>) and Parshall (160 g kg<sup>-1</sup>), but lower ( $P < 0.05$ ) than Alsen (163 g kg<sup>-1</sup>) and Dapps (162 g kg<sup>-1</sup>).

Flour yield for Steele-ND from 19 trials averaged 703 g kg<sup>-1</sup> compared to 692, 691, and 681 g kg<sup>-1</sup> for Alsen, Parshall, and Reeder, respectively (LSD 0.05, 15 g kg<sup>-1</sup>). Water absorption was 66.6%, significantly ( $P < 0.05$ ) higher than Reeder (64.3%) and Parshall (64.7%), but not different from Alsen (65.3%). Mixogram mix time (after 3 h fermentation) was 2.25 min, greater ( $P < 0.05$ ) than Reeder (2.0 min), similar to Parshall (2.3 min), and less than Alsen (2.4 min). The mixing tolerance of Steele-ND (18.2 min) was longer ( $P < 0.05$ ) than Reeder (16.4 min) and comparable to Alsen (19.5 min) and less than Parshall (20.1 min). Loaf volume was 1126 mL, comparable to Parshall (1126 mL) and Alsen (1110 mL), but superior ( $P < 0.05$ ) to Reeder (1084 mL).

Based on seedling and adult plant screening tests conducted under greenhouse conditions from 2001 to 2003, Steele-ND exhibited a high level of resistance to pathotype THBL, the predominant race of leaf rust in the region. Steele-ND was evaluated from 2000 to 2003 at the USDA-ARS, Cereal Crop Research Unit, Fargo, ND, for resistance to stem rust (caused by *Puccinia graminis* Pers.:Pers. f. sp. *tritici* Eriks. & E. Henn) and was found to be highly resistant to pathotypes Pgt-QCCJ, -QTHJ, -RTOQ, -TMLK, -TPMK, and -HPHJ. Steele-ND was also screened in the greenhouse for *Septoria nodorum* [caused by *Stagonospora nodorum* (Berk.) Castellani & E.G. Germano] and tan spot [caused by *Pyrenophora tritici-repentis* (Died.) Drechs]. On a scale of 1 to 5 where 1 is resistant and 5 susceptible, Steele-ND had average scores of 4 and 3 in reaction to *Septoria nodorum* and tan spot compared to 5 and 5 for the susceptible cultivar Alsen and 1 and 1 for the resistant check 'Erik' (PI 476849), respectively.

Steele-ND is moderately resistant to FHB based on 12 field site-years in ND mist-irrigated and artificially inoculated FHB, URN, and URSN nurseries conducted between 2001 and 2003. Average FHB severity for Steele-ND was 35.5% comparable to Alsen (34.7%) but significantly ( $P < 0.01$ ) lower than the susceptible check '2398' (72.6%). Visual scabby kernels of Steele-ND (26%) was also very low ( $P < 0.01$ ) compared to the susceptible check 2398 (69%), but similar to Alsen (25%). Steele-ND does not include 'Sumai 3' (PI 481542) in its pedigree and the source of resistance is being investigated. A population of 212 F<sub>2,7</sub> recombinant inbred lines (RIL) derived from the cross of FHB susceptible line, ND 735 with Steele-ND was developed for the purpose of mapping the FHB genes involved in Steele-ND. Preliminary results (Mergoum, unpublished data, 2004) on molecular marker *Xgwm533*, which maps to 3B, the location of QTL for genes for resistance coming from Sumai 3 (Anderson et al., 2001), showed that resistance in Steele-ND is different from Sumai 3.

Breeder seed of Steele-ND will be maintained by the Seed Stocks Project, Agricultural Experiment Station, North Dakota State Univ., Fargo ND 58105-5051. Steele-ND is protected under the U.S. Plant Variety Protection Act with recognized classes of Foundation, Registered, and Certified seed (PVP no. 200400188).

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## References

Anderson, J.A., R.W. Stack, S. Liu, B.L. Waldron, A.D. Fjeld, C. Coyne, B. Moreno-Sevilla, J.M. Fetch, Q.J. Song, P.B. Cregan, and R.C. Frohberg. 2001. DNA markers for Fusarium head blight resistance QTL in two wheat populations. *Theor. Appl. Genet.* 102:1164-1168.

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## Registration of 'Improved Purple Marker' Rice Germplasm

Rice (*Oryza sativa* L.) germplasm line Improved Purple Marker (Reg. no. GP-104, PI 636344) was released by the Arkansas Agricultural Experiment Station on 15 Feb. 2001. Improved Purple Marker is a purple-leaf rice line with good erectness and no dormancy or leaf and seed pubescence. The primary purpose for releasing Improved Purple Marker germplasm is to provide a purple-leaf rice line with good erectness, nondormant seed characteristics, and nonpubescent leaves and seed. This combination of traits is currently lacking in purple-leaf rice lines used in southern U.S. rice-breeding programs.

Improved Purple Marker originated from the cross 'Newbonnet'/PI 408449 made at the Rice Research and Extension Center, Stuttgart, AR, in 1992. Newbonnet (Johnston et al., 1984) is a high-yielding, blast-susceptible long-grain rice with excellent straw strength. PI 408449 lodges easily, has both pubescent leaves and grain, and possesses a high degree of seed dormancy. PI 408449 and other purple-leaf rice lines are commonly used in breeding programs as markers and also to demarcate cross changes in early generation selection nurseries. Improved Purple Marker is a bulk of F<sub>6</sub> seed from the 1995 panicle rows P18-137 and P18-138. The F<sub>1</sub> was grown in the greenhouse during the winter of 1992-1993, and the winter nursery in Lajas, PR, was used to grow the F<sub>4</sub> generation. The remaining generations were grown in Stuttgart, AR. A small panicle row increase was grown in both 1996 and 1997.

On the basis of data taken in 1997, Improved Purple Marker is 6, 7, and 9 d later in maturity than Newbonnet, 'Cypress', and 'Bengal', respectively. This later maturity may be beneficial to prevent outcrossing when Improved Purple Marker is grown in close proximity to other rice lines. The new germplasm has a plant height similar to Cypress, making it shorter in stature than Newbonnet. Like Newbonnet, Improved Purple Marker has stiff straw and is resistant to lodging. The seedling vigor of the germplasm is excellent based on observations from Arkansas, Louisiana, and the winter nursery in Puerto Rico.

In 1997, seed dormancy tests were conducted comparing Improved Purple Marker, PI 408449, Cypress, Bengal, and two red rice biotypes. As expected, the red rice biotypes were highly dormant following dry-after ripening periods of 7, 14, and 28 d. PI 408449 was intermediate between the red rice

biotypes and Cypress and Bengal. Dormancy characteristics of Improved Purple Marker were similar to Cypress and Bengal, indicating that seed dormancy will not be a problem with this new germplasm line.

Field observations indicate that Improved Purple Marker is moderately resistant to both rice blast [caused by *Pyricularia grisea* (Cooke) Sacc.] and sheath blight (caused by *Rhizoctonia solani* Kühn) diseases, two of the most problematic diseases in the southern U.S. Other disease reactions have not been encountered and are unknown at this time.

The lemma and palea of Improved Purple Marker are straw colored with pronounced anthocyanin pigmentation. Plants of the germplasm have erect culms and leaves and glabrous lemma, palea, and leaf blades. Leaf and culm color is purple, although newly emerging leaves may be green for a short time. Improved Purple Marker was crossed with Cypress, and the resulting  $F_1$  plants all had green leaves. The subsequent  $F_2$  generation had a segregation ratio of 13 (green leaf):3 (purple leaf) as shown by chi-square analysis ( $0.60 < P < 0.70$ ). We propose that the purple leaf trait of Improved Purple Marker is inherited in a manner controlled by a single recessive gene and a dominant color-inhibiting gene (I). Genotypes with  $iiC_-$  would exhibit purple phenotype, whereas genotypes with  $I_C_-$ ,  $I_{cc}$ , and  $iicc$  would exhibit green phenotypes (Burns, 1980). The endosperm of Improved Purple Marker is nonglutinous, nonaromatic, and covered by a light brown pericarp. Results from the USDA-ARS Cooperative Regional Rice Quality Laboratory at Beaumont, TX, indicate that Improved Purple Marker has atypical cooking characteristics compared to the commonly grown long-grain and medium-grain rices of the southern USA. The germplasm has an apparent amylose content of  $196 \text{ g kg}^{-1}$  and low gelatinization temperature, as indicated by an average alkali ( $17 \text{ g kg}^{-1} \text{ KOH}$ ) spreading reaction of 6.0.

Seed will be placed in the National Small Grains Collection, USDA-ARS, 1691 South 2700 West, Aberdeen, ID 83210, where it is available for research purposes, including development and commercialization of new cultivars. If this germplasm contributes to the development of new cultivars, it is requested that appropriate recognition be given to the source.

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### References

- Burns, G.W. 1980. The science of genetics. 4th ed. Macmillan Publishing Co., Inc., New York.
- Johnston, T.H., K.A. Kuenzel, F.N. Lee, B.R. Wells, S.E. Henry, and R.H. Dilday. 1984. Registration of 'Newbonnet' rice. *Crop Sci.* 24:209–210.

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### Registration of 'Tamcot 22' High-Yielding Upland Cotton Cultivar

'Tamcot 22' upland cotton (*Gossypium hirsutum* L.) (Reg. no. CV-121, PI 635877) was developed by the Cotton Improvement Laboratory, Department of Soil and Crop Sciences, Texas Agricultural Experiment Station in 2004 as part of an ongoing effort to create germplasm and cultivars with improved yield potential and excellent fiber quality adapted to central and south Texas. Tamcot 22 was derived by hybridization and pedigree selection at Weslaco, TX, and initially evaluated for production in south Texas.

Tamcot 22 resulted from the cross of TAM 87G<sup>3</sup>-27 (Smith and Niles, 1994), a breeding line developed in the Cotton Improvement Laboratory with pedigree AET-108/1209-619-2S-77//PD 6992, and TAM 88G-104, a high-yielding picker-type upland cotton with resistance to silverleaf whitefly [*Bemisia argentifolli* (Perring and Bellows)] (Smith, 2001). Tamcot 22 was derived from a single  $F_{3.4}$  progeny row following selection of single plants in the  $F_2$  and  $F_3$  generations. Plant selections and  $F_4$  progeny rows were selected on the basis of apparent yield potential, high volume instrument fiber properties, and overall plant conformation. Tamcot 22 was treated subsequently as a pure line and evaluated throughout central, south, and north Texas (Weslaco, Corpus Christi, College Station, Uvalde, Thrall, Dallas, and Chillicothe) for three years (2000–2002) under the strain designation 96WD-22.

Tamcot 22 is a midseason maturity, picker-type upland cotton with growth habit similar to 'Deltapine 50' (Calhoun et al., 1994) when grown with irrigation at College Station, TX. Trichome density of leaves of Tamcot 22 averages 33 trichomes  $\text{cm}^{-2}$  (ranging from 7–72 trichomes  $\text{cm}^{-2}$ ) while leaves of Deltapine 50 and 'Tamcot CAB-CS' (Bird et al., 1986) average 12 and 4 trichomes  $\text{cm}^{-2}$ , respectively. Trichome density on the main stem averages 8 trichomes  $\text{cm}^{-2}$  compared with 6 trichomes  $\text{cm}^{-2}$  on Deltapine 50 and 0.4 trichomes  $\text{cm}^{-2}$  on Tamcot CAB-CS. Tamcot 22 possesses normal-shaped leaves and bracts and is glanded and nectaried. Flowers from plants of Tamcot 22 have cream-colored petals, anthers, and pollen. Full-size green bolls are longer than their width and are broader in the middle. Bolls have four locks with five occasionally. Open bolls resist shattering but are not stormproof and are thus suitable for picker harvesting.

Tamcot 22 is resistant to the silverleaf whitefly and moderately resistant to bacterial blight [caused by *Xanthomonas campestris* pv. *malvacearum* (Smith) Dye]. Tamcot 22 has similar levels of resistance to other insects and diseases affecting cotton as nontransgenic commercial cultivars available to producers in central and south Texas.

Averaged across 2 yr of irrigated production at College Station, Tamcot 22 reached 60% open bolls 130 d from planting, while 'Tamcot Sphinx' (El-Zik and Thaxton, 1996) required 126 d and Texas 418 required 136 d. Averaged across the 14 performance trials in central and south Texas in 2000 and 2001, Tamcot 22 produced 17% more lint yield than 'FiberMax 832', and 32% more lint than Tamcot Sphinx. Tamcot 22 has higher gin turnout ( $P = 0.05$ ) than Tamcot Sphinx, 'Sure-Grow 125', or FiberMax 832.

Over 14 trials in Texas during 2001 and 2002, the average upper half mean fiber length of Tamcot 22 was longer ( $P = 0.05$ ) than Tamcot Sphinx, but was 6% shorter than FiberMax 832. Average fiber bundle strength of FiberMax 832 was 14% stronger than Tamcot 22, but Tamcot 22 was equal to Tamcot Sphinx. Micronaire readings of Tamcot 22 averaged 4.2 compared with 4.8 for Tamcot Sphinx and 4.4 for FiberMax 832.

The Foundation Seed Service of the Texas Agricultural Experiment Station produces, maintains, and sells Foundation seed to producers of Registered and Certified classes. U.S. Plant Variety Protection (PVP no. 200500006) for Tamcot 22 has been applied for requiring that it be sold by variety name only as a class of Certified seed.

Research leading to the development of Tamcot 22 was supported in part by grants from the Texas Food and Fibers Commission and Cotton Incorporated's Texas State Support program. Small quantities of Tamcot 22 seed may be obtained for breeding purposes from the corresponding author.

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### References

- Bird, L.S., K.M. El-Zik, and P.M. Thaxton. 1986. Registration of 'Tamcot CAB-CS' upland cotton. *Crop Sci.* 26:384–385.

- Calhoun, D.S., D.T. Bowman, and O.L. May. 1994. Pedigrees of upland and pima cotton cultivars released between 1970 and 1990. Miss. Agric. For. Exp. Stn. Bull. 1017. Mississippi State, MS.
- El-Zik, K.M., and P.M. Thaxton. 1996. Registration of 'Tamcot Sphinx' cotton. *Crop Sci.* 36:1074.
- Smith, C.W. 2001. Registration of TAM 88G-104 high-yielding upland cotton germplasm. *Crop Sci.* 41:1369-1370.
- Smith, C. W., and G.A. Niles. 1994. Registration of four upland cotton germplasm lines having improved fiber quality: TAM 86G<sup>3</sup>-30, TAM 87D<sup>3</sup>-24, TAM87D<sup>3</sup>-2527, and TAM 87G<sup>3</sup>-27. *Crop Sci.* 34: 1413-1414.

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### Registration of 'Burton' Barley

'Burton' is a Russian wheat aphid [*Diuraphis noxia* (Mordvilko)] resistant two-rowed hulled spring feed barley (*Hordeum vulgare* L.) (Reg. no. CV-318, PI 634714) developed cooperatively and released in 2004 by the USDA-ARS and the Idaho, Colorado, Nebraska, and New Mexico Agricultural Experiment Stations. Burton is best adapted to environments with moderate to high yield potential. The name honors Dr. Bob Burton (deceased, USDA-ARS entomologist), who was instrumental in organizing and implementing the USDA-ARS Russian wheat aphid research program.

Burton has the pedigree 'Baronesse'/3/'Crystal'/2/'Klages'\*3/ STARS 9301B. Baronesse is a two-rowed feed barley developed in Germany and marketed in the USA by Peterson Seed and Western Plant Breeders. Crystal (Wesenberg et al., 1991) and Klages (Wesenberg et al., 1974) are both two-rowed malting barley cultivars developed by the USDA-ARS. The source of Russian wheat aphid resistance in Burton is the germplasm line STARS-9301B (Mornhinweg et al., 1995a). STARS-9301B was developed from PI 366450, a six-rowed landrace collected in Afghanistan and held in the USDA National Small Grains Collection at Aberdeen, ID.

Burton has semilax spikes that nod at maturity. Awns are long and rough, rachilla hairs are long, hairs on glumes are banded, and glume awns are rough. Lateral florets are absent, a distinctive characteristic derived from the Baronesse parent. Hulls are wrinkled, with prominent, barbless lateral veins. Kernels have a transverse crease at the base and the aleurone is white.

Burton was derived from a population of Russian wheat aphid-resistant F<sub>2</sub> plants that were identified as homozygous for resistance (based on greenhouse assays of F<sub>3</sub> progeny), and advanced to F<sub>4</sub> generation via single head selections from phenotypically attractive F<sub>3</sub> and F<sub>4</sub> plants. Burton was selected from the F<sub>4.5</sub> headrow no. 251 in 1998 and entered replicated testing at Aberdeen and Tetonia, ID, in 1999, under the line designation 98ID251. It has since been tested at a wide variety of irrigated and dryland locations in Idaho, Colorado, Nebraska, and New Mexico. Despite its relatively early-generation derivation, 98ID251 was uniform in appearance. Comparisons of Burton to Baronesse over 31 location-years in the absence of significant Russian wheat aphid infestations show no significant differences for maturity, height, yield, test weight, and percentage plump kernels. It has shown superior resistance to lodging (15 vs. 33% for Baronesse). The performance of Burton in the 2003 Western Regional Dryland Spring Barley nursery, relative to the cultivars Steptoe (Muir and Nilan, 1973), Hector (Wells, 1973), Clark (Hockett et al.,

1985), and Munsing (Robertson, 1965), was as follows: heading date 4, 2, 1, and 2 d later; plant height 93, 90, 90, and 112%; grain yield 91, 105, 105, and 107%; test weight 106, 99, 101, and 98%; percentage plump kernels 92, 113, 115, and 106%, respectively. Burton is more responsive to environmental conditions than Baronesse and Steptoe, and in particular, Burton is less tolerant of extreme heat.

Burton is highly resistant to damage caused by Russian wheat aphid feeding. The major component of the resistance is tolerance. Data from 3 yr of testing at Yellow Jacket, CO, where significant infestations of Russian wheat aphids were present, showed Burton to exceed (LSD comparisons,  $P = 0.05$ ) the performance of Baronesse for yield (113%), test weight (103%), and percentage plump kernels (109%). STARS-9301B has been found to have two genes conditioning resistance (*Rdn1* and *Rdn2*, originally designated *Dnb1* and *Dnb2*; Mornhinweg et al., 1995b). Burton is thought to carry both resistant alleles, based on its high level of resistance. This source of resistance has been shown to provide significant protection against the loss of agronomic performance and malting quality (Bregitzer et al., 2003). Burton is resistant to the original Russian wheat aphid biotype that was discovered in Texas in 1986. Field and greenhouse observations (Mornhinweg, unpublished data, 2004) indicate that it is resistant also to the new biotype that was discovered in Colorado in 2003 (Haley et al., 2004).

Burton has been tested primarily in the intermountain region of the western United States, where disease pressures are generally negligible. In two environments where powdery mildew (caused by *Erysiphe graminis* DC. f. sp. *hordei* Ém. Marchal.) infection was prevalent on six-rowed cultivars and breeding lines, Burton and other two-rowed cultivars and breeding lines suffered negligible infections. Based on pedigree, Burton is not expected to be resistant to stripe rust (caused by *Puccinia striiformis* Westend. f. sp. *hordei*), nor would it be expected to be resistant to the variety of foliar diseases that are prevalent in more humid climates such as the midwestern United States.

The initial Breeder seed of Burton was developed from approximately 200 F<sub>9</sub> head selections that were morphologically similar and that were verified as having high levels of resistance to Russian wheat aphid feeding damage. Foundation seed of Burton will be maintained by the Idaho Agricultural Experiment Station, Foundation Seed Program. Requests for seed should be directed to the Coordinator, Foundation Seed Program, College of Agriculture, Kimberly Research and Extension Center, 3793 N 3600 E, Kimberly, ID 83341. It is requested that appropriate recognition of source be given when this germplasm contributes to research or development of new breeding lines or cultivars.

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### References

- Bregitzer, P., D.W. Mornhinweg, and B.L. Jones. 2003. Resistance to Russian wheat aphid damage derived from STARS 9301B protects agronomic performance and malting quality when transferred to adapted barley germplasm. *Crop Sci.* 43:2050-2057.
- Haley, S.D., F.B. Peairs, C.B. Walker, J.B. Rudolph, and T.L. Randolph. 2004. Occurrence of a new Russian wheat aphid biotype in Colorado. *Crop Sci.* 44:1589-1592.
- Hockett, E.A., K.M. Gilbertson, H.F. Bowman, C.F. McGuire, D.E. Baldrige, and A.L. Dubbs. 1985. Registration of 'Clark' barley. *Crop Sci.* 25:197.
- Mornhinweg, D.W., D.R. Porter, and J.A. Webster. 1995a. Registra-

- tion of STARS-9301B Russian wheat aphid resistant barley germplasm. *Crop Sci.* 35:603.
- Mornhinweg, D.W., D.R. Porter, and J.A. Webster. 1995b. Inheritance of Russian wheat aphid resistance in spring barley. *Crop Sci.* 35: 1368–1371.
- Muir, C.E., and R.A. Nilan. 1973. Registration of 'Steptoe' barley. *Crop Sci.* 13:770.
- Robertson, D.W. 1965. 'Colsess', 'Moravian', 'Musing', and 'Otis' barleys. *Crop Sci.* 5:197.
- Wells, S.A. 1973. 'Hector' barley. *Can. J. Plant Sci.* 53:497.
- Wesenberg, D.M., R.M. Hayes, H.C. McKay, N.N. Standridge, E.D. Goplin, and F.C. Petr. 1974. Registration of 'Klages' barley. *Crop Sci.* 14:337.
- Wesenberg, D.M., B.L. Jones, D.E. Burrup, J.C. Whitmore, and G.S. Robbins. 1991. Registration of 'Crystal' barley. *Crop Sci.* 31:481.

P. Bregitzer and D.J. Fiedler, USDA-ARS, 1691 S. 2700 W., Aberdeen, ID 83210; D.W. Mornhinweg, USDA-ARS, 1301 N. Western St., Stillwater, OK 74075; J.C. Whitmore, University of Idaho, Teton, ID, 83436; R. Hammon, Colorado State University, P.O. Box 20000-5028, Grand Junction, CO 81502; M. Stack, Colorado State University, P.O. Box 233, Yellow Jacket, CO 81335; D.D. Baltensperger and G.L. Hein, University of Nebraska, 4502 Ave. I, Scotts Bluff, NE 69361; M.K. O'Neill, New Mexico State University, 300 Navajo Rd., Farmington, NM 87499. Registration by CSSA. Accepted 30 Nov. 2004. \*Corresponding author (pbregit@uidaho.edu).

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### Registration of 'MISCOT 8839' Cotton

'MISCOT 8839' cotton (*Gossypium hirsutum* L.) (Reg. no. CV-122, PI 619602) was developed by the Mississippi Agricultural and Forestry Experiment Station (MAFES) and released in February 2002. Exclusive marketing rights were granted to Emergent Genetics Inc., Memphis, TN, in 2002 following a bid offering by MAFES. MISCOT 8839 is an early-maturing, smooth-leaf cultivar with high yield potential and excellent fiber properties adapted to the midsouthern and southeastern cotton-growing regions of the USA. MISCOT 8839 was tested in official cotton cultivar trials in Mississippi in 1999 and 2000 under the experimental designation 8839-3-10-2 and as MISCOT 8839 in 2001.

The pedigree of MISCOT 8839 is 'DES 119'/'Deltapine Acala 90'. DES 119, a widely adapted, early-maturing cultivar, originated from the cross DES 24/DES 2134-047 (Bridge, 1986). Deltapine Acala 90 was developed from a cross between DP 6516 and DP 6582 (Calhoun et al., 1997). The pedigree of Deltapine Acala 90 includes one or more parents of the Acala family of cottons recognized for their superior fiber quality traits. The cross was made in the field at the Plant Science Research Farm, Mississippi State University, MS, and F<sub>1</sub> plants were grown in the greenhouse for seed increase. The resulting F<sub>2</sub> plants were grown in the field and selected for superior fiber quality traits, followed by evaluation in F<sub>2,3</sub> progeny rows. Individual plants were selected before machine harvest of F<sub>3</sub> progeny rows. A single F<sub>3</sub> plant was selected based on fiber quality in addition to lint yield of the progeny row from which it was selected. A F<sub>3,4</sub> progeny row was planted for seed increase followed by multilocation yield testing and seed increase. In 1994, individual plants within the F<sub>3,7</sub> line were further selected for fiber quality and low trichome density and planted to F<sub>7,8</sub> progeny rows in 1995. MISCOT 8839 was derived from the bulk harvest of a F<sub>7,8</sub> progeny row selected for uniformity, superior fiber qualities, and reduced leaf trichomes.

MISCOT 8839 is an upland cultivar with an open boll suitable for picker-type harvesting. MISCOT 8839 is glanded and possesses normal-shaped leaves and bracts with sparse trichomes on the abaxial leaf surface. Trichomes present occur

on midveins. MISCOT 8839 combines excellent yield with a highly desirable upper half mean fiber length (UHM) and micronaire reading. Three-year averages (1999–2001) for the Delta Region of Mississippi Cotton Variety Trials (Creech et al., 2002) show that MISCOT 8839 produced 7.3% greater lint yield, 5.5% greater fiber strength, and 6.1% lower micronaire readings compared with 'Stoneville 474'. Lint yield of MISCOT 8839 was 6.4% greater than that of Stoneville 474 and 13.9% greater than that of 'Suregrow 501' in official cultivar trials conducted in 2000 across 34 locations in the states of Arkansas (Benson et al., 2001), Georgia (Day et al., 2001), Mississippi (Creech et al., 2001), North Carolina (Bowman, 2000), Louisiana (Caldwell et al., 2000), and Texas (Smith et al., 2001). The UHM fiber length of MISCOT 8839 in 2000 across locations in Arkansas, Georgia, Louisiana, and North Carolina was 5.6% greater than that of Stoneville 474. Averaged across all locations of the Mississippi official cultivar trials in 1999 (Creech et al., 2000) and 2000 (Creech et al., 2001), UHM fiber length of MISCOT 8839 was 3.7% greater and micronaire reading 4.9% less than both Stoneville 474 and Suregrow 501. Fiber strength was equal to that of Stoneville 474 but 11.5% less than that of Suregrow 501. The longer fiber length and reduced micronaire reading of MISCOT 8839 should be desirable traits for both rotor and air-jet spinning systems (Deussen, 1993). Lint fraction of MISCOT 8839 (36.4%) is less than both Stoneville 474 (39.8%) and Suregrow 501 (38.4%).

MISCOT 8839 was evaluated for incidence of Fusarium wilt [caused by *Fusarium oxysporum* Schlecht. f. sp. *vasinfectum* (Atk.) Snyder & Hans.] in the 2000 National Cotton Fusarium Wilt Test (Glass et al., 2000). Compared with the susceptible standard 'Rowden', MISCOT 8839 exhibited 25% fewer wilted plants, indicating moderate resistance to Fusarium wilt.

Breeder seed of MISCOT 8839 will be maintained by Emergent Genetics, Inc. Small quantities (25 g) may be requested from Emergent Genetics Inc., 6625 Lenox Park Drive, Ste. 117, Memphis, TN, 38115, USA. Application for U.S. Plant Variety Protection (Application no. 200100271) has been made for MISCOT 8839.

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### References

- Benson, N.R., F.M. Bourland, W.C. Robertson, J.M. Hornbeck, and F.E. Groves. 2001. Arkansas cotton variety tests 2000. *Ark. Agric. Exp. Stn. Res. Series* 481. (Available online at [www.aragriculture.org/cropsoilwtr/cotton/varietyields/default.asp](http://www.aragriculture.org/cropsoilwtr/cotton/varietyields/default.asp); verified 2 Jan. 2005.) Univ. of Arkansas, Fayetteville, AR.
- Bowman, D.T. 2000. 2000 Performance of soybean and cotton varieties in North Carolina [Online]. Available at [www.ovt.ncsu.edu/ovt.asp?fmtinfo=1,400,133#here](http://www.ovt.ncsu.edu/ovt.asp?fmtinfo=1,400,133#here) (verified 2 Jan. 2005). North Carolina State Univ., Raleigh, NC.
- Bridge, R.R. 1986. Registration of 'DES 119' Cotton. *Crop Sci.* 26: 646–647.
- Caldwell, W.D., E.A. Payne, R.C. Griffin, D.J. Boquet, S. Hague, S. Stewart, S. Moore, J.I. Dickson, P.D. Colyer, G.O. Myers, R. Gable, J. Thomas, A.B. Coco, P.R. Vernon, M. Deloach, and E.P. Millholton. 2000. 2000 Cotton variety trials in Louisiana. Louisiana State Univ. Agric. Center Res. & Ext. Research Summary No. 129. (Available online at [www.agctr.lsu.edu/cotton/cotprod.htm](http://www.agctr.lsu.edu/cotton/cotprod.htm); verified 2 Jan. 2005.) Louisiana State Univ., Baton Rouge, LA.
- Calhoun, D.S., D.T. Bowman, and O.L. May. 1997. Pedigrees of upland and pima cotton cultivars released between 1970 and 1995. *Miss. Agric. For. Exp. Stn. Tech Bull.* 1069. Mississippi State Univ., Mississippi State, MS.
- Creech, J.B., J.C. Fieber, T.P. Wallace, J.R. Johnson, D.M. Ingram, N.W. Buehring, and W.H. McCarty. 2000. 1999 Mississippi cotton variety trials. *Miss. Agric. For. Exp. Stn. Info. Bull.* 370. (Available

- online at [www.msstate.edu/dept/drec/cip/mscvt.htm](http://www.msstate.edu/dept/drec/cip/mscvt.htm); verified 2 Jan. 2005). Mississippi State Univ., Mississippi State, MS.
- Creech, J.B., T.P. Wallace, J.R. Johnson, N.W. Buehring, W.H. McCarty, and B. Boyd. 2001. 2000 Mississippi cotton variety trials [Online]. Available at [www.msstate.edu/dept/drec/cip/mscvt.htm](http://www.msstate.edu/dept/drec/cip/mscvt.htm) (verified 2 Jan. 2005). Mississippi State Univ., Mississippi State, MS.
- Creech, J.B., T.P. Wallace, W.H. McCarty, J.R. Johnson, B. Boyd, N.W. Buehring, and D. Dobbs. 2002. 2001 Mississippi cotton variety trials [Online]. Available at [www.msstate.edu/dept/drec/cip/mscvt.htm](http://www.msstate.edu/dept/drec/cip/mscvt.htm) (verified 2 Jan. 2005). Mississippi State Univ., Mississippi State, MS.
- Day, J.L., A.E. Coy, W.D. Branch, O.L. May, S.S. LaHue, and L.G. Thompson. 2001. 2000 Peanut, cotton and tobacco performance tests. Univ. of Georgia, Coll. Agric. Env. Sci. Res. Rep. 671. (Available online at [www.ces.uga.edu/ES-pubs/RR671-contents.htm](http://www.ces.uga.edu/ES-pubs/RR671-contents.htm); verified 2 Jan. 2005). Univ. of Georgia, Athens, GA.
- Deussen, H. 1993. Rotor spinning technology. 1st ed. Schlafhorst Inc., Charlotte, NC.
- Glass, K.M., W.S. Gazaway, and E.V. Santen. 2000. 2000 National cotton fusarium wilt report. Alabama Agric. Exp. Stn. Ser. 238. Auburn Univ., Auburn, AL.
- Smith, C.W., D.G. Bordovsky, J. Cruz, D. Deno, C. Eixmann, M. Jakubik, R. King, W.C. Langston, N. Namken, K. Schaefer, and C. Stichler. 2001. Cotton cultivar tests for 2000 in central and south Texas. Dep. Soil Crop Sci., 2001 Tech. Report no. SCS-2001-11. Texas Agric. Exp. Stn., Texas A&M Univ., College Station

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### Registration of 'Mustang' Altai Wildrye

'Mustang' Altai wildrye [*Leymus angustus* (Trin.) Pilger], (Reg. no. CV-240, PI 634756) was developed by a research team at the USDA-ARS, Forage and Range Research Laboratory at Utah State University, Logan, UT, and was released on 4 March 2004 in cooperation with the Utah Agricultural Experiment Station. Mustang was evaluated in field trials as M5 and DT-3185. Mustang is recommended for use on arid and semiarid rangelands as a winter forage and a revegetation grass in the Intermountain Region and Northern Great Plains of western USA.

The parental germplasm from Mustang was derived from selections within PI 499650 (DT-3185; 79%), 'PrairieLand' (7%) (Lawrence, 1976), 'Eejay' (7%) (Lawrence et al., 1991a), and 'Pearl' (7%) (Lawrence et al., 1991b). PI 499650 was collected 10 Aug. 1983 by Drs. Douglas R. Dewey and William Tai approximately 50 km southwest of Urumqi on the road to South Mountain, Xinjiang Province, People's Republic of China, at an elevation of 1600 m.

PI 499650 was identified as a superior accession from an evaluation nursery in 1989 near Logan, UT, that contained collections from Russia and all Plant Introductions of Altai wildrye in the National Plant Germplasm System. Spaced-plant source nursery of PI 499650 consisting of 825 plants was established at Bluecreek, UT, in 1990. On the basis of vegetative vigor in 1991, open-pollinated (OP) seed from 112 plants were selected. On the basis of a selection index that included total seed yield and 100-seed weight, seed from 14 single OP plants were selected and 58 seedlings from each plant were established in 1992 at the Evans Research Farm, Logan, UT, in a completely randomized design with 58 replications to initiate cycle-2 selection.

On the basis of vegetative vigor and retention of green leaves under drought, OP seed from 84 cycle-2 plants were selected in 1994. With additional emphasis placed on seed

yield, 100-seed weight, and seedling emergence from a 7.6-cm planting depth (Maguire, 1962), this number was reduced to 66 selected plants. Open-pollinated progeny from these 66 plants were established with representative plants of cultivars PrairieLand, Eejay, and Pearl at Richmond, UT, in 1995. On the basis of vegetative vigor in 1997, OP seed from 65 cycle-3 plants were selected (7%), which included selections from PrairieLand, Eejay, and Pearl. These selections were subsequently screened for seedling vigor (emergence from a deep planting depth) in 1997. On the basis of superior emergence from a deep planting depth, 723 seedlings were recovered representing the 14 best plants and were subsequently established in 1998 at Bluecreek, UT, where equal quantities of seed was bulked from each plant to produce Breeder seed starting in 1999. Breeder seed was produced as described above in 2000, 2001, 2002, and 2003.

Mustang is significantly taller, with longer flag leaves that are oriented higher on the culm than PrairieLand, Eejay, and Pearl. In addition, Mustang is green in color with wider flag leaves and longer inflorescences. Mustang Altai wildrye is a dodecaploid ( $2n = 12x = 84$ ) and has the same ploidy level as the commercially available cultivars PrairieLand, Eejay, and Pearl.

Amplified fragment length polymorphisms (AFLP) (Vos et al., 1995) were used to compare Mustang with other released cultivars of Altai wildrye. The neighbor-joining tree demonstrated that all but one of the 24 Mustang samples group together relative to PrairieLand, Eejay, and Pearl (Page, 1996; DeHaan et al., 2002). The average number of fragments detected in Mustang was not significantly different from Eejay or Pearl (Excoffier et al., 1992; Leonard et al., 1999). However, the average number of fragments in Mustang was significantly less than PrairieLand. Mustang displays more DNA variation than Eejay, Pearl, or PrairieLand. The E.ACAG//M.CTTG primer combination distinguished Mustang from the other cultivars.

Mustang Altai wildrye was evaluated in the Northern Plains Regional Trials (NPA) at Bluecreek, UT; Green Canyon, UT; Mead, NE; Sidney, NE; Mandan, ND; and Miles City, MT, for dry matter forage production, initial stand, and persistence. When combined over six locations and 3 yr, Mustang Altai wildrye (3026 kg ha<sup>-1</sup>) produced significantly more forage dry matter than cultivars PrairieLand (2394 kg ha<sup>-1</sup>) and Pearl (2247 kg ha<sup>-1</sup>) Altai wildrye, Magnar (2220 kg ha<sup>-1</sup>) and Trailhead (2214 kg ha<sup>-1</sup>) basin wildrye [*Leymus cinereus* (Scribn. & Merr.) A. Love], and Bozoisky-Select (2525 kg ha<sup>-1</sup>), Mankota (2434 kg ha<sup>-1</sup>), and Tetra-1 (2118 kg ha<sup>-1</sup>) Russian wildrye [*Psathyrostachys juncea* (Fisch.) Nevski]. Within locations, Mustang Altai wildrye consistently produced (not always significant) more dry matter forage than commercially available Altai wildrye cultivars. Combined over six locations and 3 yr in the NPA trials, Mustang Altai wildrye had superior seedling establishment (83%) compared to Pearl (68%) and PrairieLand (64%) Altai wildrye. After 4 yr at Mead and Sidney, NE; Mandan, ND; and Miles City, MT, Mustang (71%) Altai wildrye was more persistent than PrairieLand (39%) and Pearl (50%).

Seedling vigor of Mustang Altai wildrye, as indicated by seedling emergence from a deep planting depth (7.6 cm), was better than PrairieLand and comparable to Pearl. Individual seed weight of Mustang was comparable to PrairieLand and Eejay, but significantly lighter than Pearl. At 100% purity, there are approximately 138 888 seeds kg<sup>-1</sup>.

Breeder, Foundation, and Certified seed classes will be recognized. Breeder seed will be maintained by the USDA-ARS Forage and Range Research Laboratory at Logan, UT. Foundation seed will be produced by the USDA-ARS at Logan and made available for certified seed production on a

nonexclusive basis to seed producers by the Utah Crop Improvement Association. U.S. Plant Variety Protection will not be pursued for Mustang. It is requested that appropriate recognition be made if this cultivar contributes to the development of a new breeding line or cultivar.

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### References

- DeHaan, L.R., R. Antonides, K. Belina, and N.J. Ehlke. 2002. Peak-matcher: Software for semi-automated fluorescence-based AFLP. *Crop Sci.* 42:1361–1364.
- Excoffier, L., P.E. Smouse, and J.M. Quattro. 1992. Analysis of molecular variance inferred from metric distances among DNA haplotypes: Application to human mitochondrial DNA restriction data. *Genetics* 131:479–491.
- Lawrence, T. 1976. Prairieland, Altai wildrye. *Can. J. Plant Sci.* 56:991–992.
- Lawrence, T., P.G. Jefferson, and C.D. Ratzloff. 1991a. Eejay, Altai wildrye. *Can. J. Plant Sci.* 71:551–553.

- Lawrence, T., P.G. Jefferson, and C.D. Ratzloff. 1991b. Pearl, Altai wildrye. *Can. J. Plant Sci.* 71:547–549.
- Leonard, A.C., S.E. Franson, V.S. Hertzberg, M.K. Smith, and G.P. Toth. 1999. Hypothesis testing with the similarity index. *Mol. Ecol.* 8:2105–2114.
- Maguire, J.D. 1962. Speed of germination-aid in selection and evaluation for seedling emergence and vigor. *Crop Sci.* 2:176–177.
- Page, R.D. 1996. TREEVIEW: An application to display phylogenetic trees on personal computers. *Comput. Appl. Biosci.* 12:357–358.
- Vos, P., R. Hogers, M. Bleeker, M. Reijans, T. Van de Lee, M. Hornes, A. Frijters, L. Pot, J. Peleman, M. Kuiper, and M. Zabeau. 1995. AFLP: A new technique for DNA fingerprinting. *Nucleic Acids Res.* 23:4407–4414.

USDA-ARS, Forage and Range Res. Lab., Utah State Univ., Logan, UT 84322-6300. Utah Agric. Exp. Stn. Journal Article No. 7593. Registration by CSSA. Accepted 31 July 2004. \*Corresponding author (kevin@cc.usu.edu).

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## REGISTRATIONS OF GERMPLASMS

### Registration of FC201, a Heterogeneous, Disease-Resistant, Monogerm, O-type Sugarbeet Population

Sugarbeet (*Beta vulgaris* L.) germplasm FC201 (Reg. no. GP-246, PI 634018) was developed by the USDA-ARS at Fort Collins, CO, and Salinas, CA, in cooperation with the Beet Sugar Development Foundation (BSDF), Denver, CO. FC201 is a segregating population with a high frequency of the *Rz1* allele conferring resistance to rhizomania caused by *Beet necrotic yellow vein virus*. It is segregating for resistance to root-rotting strains (AG-2-2) of *Rhizoctonia solani* Kühn and to the sugarbeet root aphid (*Pemphigus betae* Doane), has moderate resistance to *Cercospora* leaf spot (caused by *Cercospora beticola* Sacc.), *Aphanomyces* root rot (caused by *Aphanomyces cochlioides* Drechsl.), and *Beet curly top virus*. FC201 is a heterogeneous population from which to select disease-resistant, monogerm, O-type parents to infuse multiple disease resistance on the female side of hybrids. There is no CMS equivalent. FC201 is released from Salinas seed production 01-FC1014 and has been tested as 00-FC1014 and 01-FC1014.

FC201 is an O-type germplasm segregating for self-sterility (*S*<sup>s</sup>), hypocotyl color (50% *rr*) and monogermity (90% *mm* in seed harvested from monogerm plants). It is the F<sub>4</sub> of the cross 'C890'aa (Lewellen, 1998) × 'FC708' (Hecker and Ruppel, 1981) (23 F<sub>1</sub> plants) bulked with the cross 'C859'aa (Lewellen, 1995) × 'FC708' (Hecker and Ruppel, 1981) (18 F<sub>1</sub> plants). Seed from both F<sub>1</sub> populations was combined for bulk increase of the F<sub>2</sub> after germination testing to make the parental contribution 25% from C890, 25% from C859, and 50% from FC708. The F<sub>2</sub> seed was planted in Salinas and selected for rhizomania resistance, agronomic performance, and percentage sucrose. The F<sub>3</sub> population was a bulk increase of 25 monogerm plants selected from 600 grown in the field under severe rhizomania conditions and increased in the greenhouse. Seed from the F<sub>3</sub> production was sent to Oregon for steckling production and the F<sub>4</sub> was an increase at Salinas of about 250 stecklings without selection; seed from only male-sterile plants was harvested. Half-sib family grow-outs indicated that the male-sterility was genetic male-sterility (*aa*) and genetic-cytoplasmic male-sterility (CMS). Progeny testing could be used to identify and separate genetic-male sterility from CMS and to produce a near equivalent CMS counterpart to the male fertile, O-type.

FC201 was tested at Fort Collins, CO, in 2002 and 2003 for resistance to *Rhizoctonia* root rot under strong disease pressure (Ruppel et al., 1979). In 2002, the FC201 population was not significantly different from the susceptible check or from the highly resistant check, and individual roots (approximately 30%) were scored as resistant; that is, DI < 3 (DI of 0 = no root rot and 7 = all plants dead). In 2003, the FC201 population was not significantly different from the susceptible check and significantly different from the resistant checks, but again individual roots were scored as resistant. In a greenhouse test for resistance to sugarbeet root aphid at Shakopee, MN, in 2003 again, although the population was not different from the susceptible control, there were a number of roots which were scored as 1 (1 = free from aphids to 4 = heavily infested with aphids).

When tested at Fort Collins, CO, and Rosemount, MN, in 2002 and 2003 for resistance to *Cercospora* leaf spot (Ruppel and Gaskill, 1971), the scores were intermediate (significantly more resistant than the susceptible check and significantly less resistant than the resistant check). Intermediate resistance also was seen when FC201 was tested at Shakopee, MN, in 2002 and 2003 for resistance to *Aphanomyces* root rot. In the BSDF curly top nursery at Kimberly, ID, in 2003, FC201 had a DI of 5.0 over three replications (not statistically analyzed) compared to 'US H11' with a DI of 3.3 and 'Monohikari' with a DI of 7.0 (1 = no damage to 9 = plant dead). When FC201 was tested for O-type, restorer genes were present at a very low frequency.

In observation and evaluation tests at Salinas in 2002 and 2003, FC201 was moderately susceptible to powdery mildew (caused by *Erysiphe polygoni* DC.); intermediate in reaction to *Erwinia* root rot [caused by *Erwinia carotovora* (Jones) Bergey et al. subsp. *betavasculorum* Thomson et al.] with 60 to 70% resistant plants; and moderately susceptible to intermediate for bolting tendency in fall plantings. Sucrose concentration was intermediate to a group of monogerm populations and inbred lines. The canopy of FC201 is dark green with leaf shape similar to FC708.

Breeder seed of FC201 is maintained by USDA-ARS and will be provided in quantities sufficient for reproduction on written request to Sugarbeet Research, USDA-ARS, Crops Research Laboratory, 1701 Center Ave., Fort Collins, CO 80526-2083. Genetic material of this release will be deposited

in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new varieties and cultivars. We request that appropriate recognition be made of the source when this germplasm contributes to a new cultivar. U.S. Plant Variety Protection will not be requested for FC201.

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### Acknowledgments

Tests at Shakopee and Rosemount, MN, were conducted at Betaseed, Inc. by M. Rekoske and J. Miller, and reaction to BCTV was tested in the BSDF nursery at Kimberly, ID.

### References

- Hecker, R.J., and E.G. Ruppel. 1981. Registration of FC 708 and FC 708 CMS sugar beet germplasm. *Crop Sci.* 21:802.
- Lewellen, R.T. 1995. Registration of C859 germplasm of sugarbeet resistant to Rhizomania. *Crop Sci.* 35:289-290.
- Lewellen, R.T. 1998. Registration of 10 sugarbeet germplasm C890 lines with resistance to rhizomania. *Crop Sci.* 38:902-903.
- Ruppel, E.G., and J.O. Gaskill. 1971. Techniques for evaluating sugarbeet for resistance to *Cercospora beticola* in the field. *J. Am. Soc. Sugar Beet Technol.* 16:384-389.
- Ruppel, E.G., C.L. Schneider, R.J. Hecker, and G.J. Hogaboam. 1979. Creating epiphytotics of *Rhizoctonia* root rot and evaluating for resistance to *Rhizoctonia solani* in sugarbeet field plots. *Plant Dis. Rep.* 63:518-522.

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### Registration of Nine Indica Germplasms of Rice

USDA-ARS and the Arkansas Agricultural Experiment Station released nine indica germplasms of rice (*Oryza sativa* L.), indica-1, indica-2, indica-3, indica-4, indica-5, indica-6, indica-7, indica-8, and indica-9 (Reg. no. GP-95 to 103, PI 634575 to PI 634583) in 2004. These nine lines are recombinants from indica  $\times$  indica crossing, which was initiated as a means of base broadening in U.S. rice, where very narrow genetic bases, essentially all in japonicas, have evolved because of the need for adaptation to temperate climates and to specific grain quality requirements. Long-grain cultivars in the USA are tropical japonicas while short- and medium-grain cultivars are temperate japonica (Mackill, 1995). The grain quality requirements for each of these groups are so demanding that infusions of germplasm from non-japonica sources usually has been limited to individual characters such as disease resistance and semidwarfing, followed by backcrossing to the japonica parent to recover satisfactory grain quality. The present nine germplasm lines were selected for early maturity and amylose contents similar to U.S. long-grain cultivars. Although having weak straw compared to japonicas, the indicas generally are competitive in yield, have resistance to blast disease [*Pyricularia grisea* (Cooke) Sacc.] and kernel smut [*Tilletia barclayana* (Bref.) Sacc. & Syd. in Sacc.], tolerance to rice water weevil (*Lissorhoptrus oryzophilus* Kuschel), are less susceptible to rice stalk borer (*Chilo plejadellus* Zincken), and more susceptible to rice stink bug [*Oebalus pugnax* (F.)] damage. They should provide useful sources of indica diversity for U.S. rice improvement programs.

The lines were derived by crossing a very early maturing

indica cultivar, Zhe 733 (PI 629016) from China (Yan and Cai, 1991), which is about 20 d earlier than U.S. cultivars and has higher amylose, ca 250 g kg<sup>-1</sup>, than desired for U.S. markets, with the indica cultivar IR64 (IRRI, 1985) and six indica experimentals graciously provided by G.S. Khush of IRRI (personal communication, 20 Dec. 1995). The IRRI materials have amylose contents similar to U.S. long-grain cultivars,  $\approx$ 200 to 230 g kg<sup>-1</sup>. IR64 is similar in maturity to Arkansas cultivars while the six experimentals generally are 20 d later maturing. Brown rice dimensions of the IRRI materials are similar to the U.S. long-grain cultivars, while Zhe 733 has shorter and heavier grains.

Crosses were made in the greenhouse during the winter of 1997-1998, then materials were advanced in the field in Stuttgart, AR, and the winter nursery in Lajas, PR. Initial selection for early maturity was conducted in the 1999 F<sub>2</sub> when only about 10% of the total F<sub>2</sub> populations of over 30 000 plants was harvested. Subsequent maturity selection in the 2000 F<sub>5</sub> population reduced the number to 328 lines. After selection for intermediate amylose content in the 2000 F<sub>5</sub> and 2001 F<sub>7</sub> generations, the number was reduced to 59 lines. Yield testing was initiated in 2001 with these 59 lines.

The 2001 and 2002 yield tests were conducted in replicated six-row plots, 1.2 m long with 0.3 m row width. Nitrogen fertilizer was applied pre-flood at the rate of 112 kg ha<sup>-1</sup>. Zhe 733 was included as an indica check, and LGRU *ef* (PI 632957, Rutger et al., 2004) was included as a tropical japonica check. In 2002, the weak straw of many indicas became apparent, when severe lodging following 10 cm of rainfall in one week shortly after heading resulted in inconclusive yield data. For the 2003 tests the number of lines was reduced to nine that had performed well in 2001, and the nitrogen rate reduced to 56 kg ha<sup>-1</sup>. Replicated six-row plots were used in 2002, in rows 5.1 m long and 0.3 m row width. Zhe 733 and the tropical japonica cultivar Francis (Moldenhauer et al., 2002) were included as checks. In all tests, the two center rows were harvested.

For all nine lines, Zhe 733 was the female parent. The male parents of the nine lines, designated indica-1 to indica-9, were: indica-1, IR65629-22-1-3-3-3-1; indica-2, IR65629-67-3-3-1-1-2; indica-3, 4, 5, IR65629-157-3-2-3-2-1; indica-6, IR65450-3-3-2-3-3-2; indica-7, IR53936-60-3-2-3-1; indica-8, IR60864-88-1-1-1-2; and indica-9, IR64. These nine indica germplasms have similar amylose contents to and are similar to or earlier than the Arkansas tropical japonica check cultivar Francis (Table 1). The indica lines, derived from crossing semidwarf parents, are "tall" semidwarfs, inasmuch they are 13 to 27 cm taller than the conventional height cultivar Francis (Table 1). Yields in 2001 ranged from 7410 to 9480 kg ha<sup>-1</sup> compared to 6690 and 5020 kg ha<sup>-1</sup> for Zhe 733 and LGRU *ef*, respectively. In 2003, yields ranged from 7480 to 8930 kg ha<sup>-1</sup>, compared to 8410 and 7240 kg ha<sup>-1</sup> for Zhe 733 and Francis, respectively. Brown rice grain dimensions generally meet U.S. long-grain standards, although indica-3 and -5 had relatively heavy grains. Whole grain milling yields of the indicas ranged from 46 to 57% compared to 54% for Francis and 45% for Zhe 733 (Table 1).

In 2001, soil core samples, 10 by 10 cm, were evaluated for rice water weevil larvae. Although indica lines generally had as many or more larvae per core sample as the tropical japonica checks, yields exceeded the checks. The apparent tolerance of the indicas to water weevil injury led to the decision to conduct further tests in 2003 (Bernhardt and Rutger, 2004).

In 2003, the nine germplasms were evaluated in the Rice Entomology Trial at Stuttgart, in nine-row plots, 2.4 m long and rows 18 cm apart, 56 kg ha<sup>-1</sup> of nitrogen applied pre-flood and a similar amount at mid season. Three tropical japonica check cultivars received 118 kg ha<sup>-1</sup> of nitrogen pre-flood and

**Table 1. Characteristics of nine indica germplasms and two check cultivars.**

Germplasm	Year grown									
	2000 + 2001 + 2003			2003		2001		2003		Whole grain milling
	Amylose	Days to head	Height	Yield	Yield	Length	L/W ratio	100 grain wt.		
g kg <sup>-1</sup>		cm	kg ha <sup>-1</sup>	kg ha <sup>-1</sup>	mm		g	%		
indica-1	217	93	116	8570	8040	7.7	3.4	2.07	54	
indica-2	206	91	117	7900	7930	7.4	3.3	2.06	54	
indica-3	217	91	117	7570	7550	7.9	3.2	2.63	47	
indica-4	222	95	117	8200	8760	7.9	3.4	2.31	50	
indica-5	216	92	121	9200	8070	8.0	3.2	2.68	46	
indica-6	211	97	116	9480	8840	7.9	3.5	2.22	48	
indica-7	221	90	114	8570	8930	7.3	3.0	2.26	55	
indica-8	211	98	118	7410	7810	7.3	3.2	2.03	57	
indica-9	224	92	107	7880	7480	7.1	2.8	2.45	57	
Zhe 733	252†	82	97	6690	8410	6.9	2.7	2.32	45	
Francis	224‡	97	94	—	7240	7.4	3.3	2.00	54	
LGRU <i>ef</i>	221§	81§	—	5020§	—	—	—	—	—	
LSD 0.05		1	6	1190	930					

† Average of 2001 and 2003 Stuttgart.

‡ 2003 Stuttgart only.

§ 2001 Stuttgart only.

50 kg ha<sup>-1</sup> at midseason (Bernhardt and Rutger, 2004). Severe lodging (not recorded) again occurred in the indicas, and yields ranged from 7020 to 9550 kg ha<sup>-1</sup>, compared to 7940 to 9670 kg ha<sup>-1</sup> for the three checks. In rice water weevil evaluations, larvae were found in all genotypes, including checks, from 22.0 to 38.9 larvae per core sample. However, in insecticide-treated versus untreated plots, only two of the nine indicas, indica-3 and -9 benefited from insecticide treatment while all three japonicas benefited from treatment. The other seven indicas apparently were able to tolerate rice water weevil larvae better than japonicas.

In rice stalk borer evaluations, the indicas ranged from 0.3 whiteheads per plot (resistant) to slightly susceptible levels of 10.3 whiteheads per plot, while the three japonicas ranged from 2.3 to 65.0 whiteheads per plot (Bernhardt and Rutger, 2004). In rice stink bug evaluations, the indicas ranged from 1.17 to 2.38% stained kernels, susceptible, in brown rice, compared to 0.57 to 1.09% in the three japonica checks. None of the indicas was as susceptible to kernel smut as the tropical japonicas Cocodrie (PI 606331, Linscombe et al., 2000) and LaGrue (PI 568891, Moldenhauer et al., 1994). Thus the insect evaluations indicated the indicas as a group, compared to the japonicas, had tolerance to water weevil and were less susceptible to rice stalk borer and more susceptible to rice stink bug.

In 2003, the nine germplasms also were tested in Rice Breeding trials at Stuttgart and Rohwer, AR, in 20-cm row spacings. At a nitrogen level of 168 kg ha<sup>-1</sup> at Stuttgart, such complete lodging occurred that the test was not harvested. At Rohwer, nitrogen level 202 kg ha<sup>-1</sup>, severe lodging again occurred, ranging from 70 to 100% compared to 0% for the Arkansas check cultivar Wells (U.S. patent 6,287,416, Moldenhauer, 2001). In spite of the severe lodging, yields were obtained, ranging from 5340 to 9490 kg ha<sup>-1</sup>, compared to 10 610 kg ha<sup>-1</sup> for Wells. Leaf blast disease scores recorded on a 1 to 9 basis (where 1 = resistant, 9 = very susceptible) were obtained by the Rice Breeding program at Pine Tree, AR, a high blast-incidence testing site. Four indica germplasms, indica-1, -4, -6, and -7, had scores of 1; three germplasms, indica-5, -8, and -9, scores of 2; while the two remaining germplasms, indica-2 and -3, and the Wells check had scores of 4.

Germplasm amounts of seed (≤5 g) of the above lines may be obtained by writing to J. Neil Rutger, Dale Bumpers National Rice Research Center, USDA-ARS, P.O. Box 1090, Stuttgart, AR. Seed also will be placed in the National Small Grains Collection, USDA-ARS, 1691 South 2700 West, Aber-

deen, ID 83210, where it is available for research purposes, including development and commercialization of new cultivars. If this germplasm contributes to the development of new cultivars, it is requested that appropriate recognition be given to the source.

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## References

- Bernhardt, J.L., and J.N. Rutger. 2004. Susceptibility of nine indica germplasm lines to three rice insect pests. Proc. 30th Rice Technical Working Group, New Orleans, LA. 29 Feb.–3 Mar. 2004. Louisiana State Agric. Univ. Agric. Cent., Rice Res. Stn., Crowley, LA.
- IRRI. 1985. IR64: An improved rice variety released by the Philippine Seedboard, 29 May 1985 [Leaflet]. Int. Rice Res. Inst., Los Banos, Laguna, Philippines.
- Linscombe, S.D., F. Jodari, P.K. Bollich, D.E. Groth, L.M. White, Q.R. Chu, R.T. Dunard, and D.E. Sanders. 2000. Registration of 'Cocodrie' rice. Crop Sci. 40:294.
- Mackill, D.A. 1995. Classifying japonica rice cultivars with RAPD markers. Crop Sci. 35:889–894.
- Moldenhauer, K. 2001. Rice cultivar Wells. U.S. patent 6,281,416. Date issued: 28 August.
- Moldenhauer, K.A.K., J.W. Gibbons, F.N. Lee, J.L. Bernhardt, R.J. Norman, C.E. Wilson, R. Cartwright, M.M. Anders, N.A. Slaton, M.M. Blocker, and A.C. Tolbert. 2002. 'Francis', a high-yielding, long-grain rice variety. p. 39–44. In R.J. Norman and J.F. Meullenet (ed.) B.R. Wells Rice Research Studies 2001. Res. Ser. 495. Ark. Ag. Exp. Stn., Univ. of Arkansas.
- Moldenhauer, K.A.K., K.A. Gravois, F.N. Lee, R.J. Norman, J.L. Bernhardt, B.R. Wells, R.S. Helms, R.H. Dilday, P.C. Rohman, and M.M. Blocker. 1994. Registration of 'LaGrue' rice. Crop Sci. 34:1123–1124.
- Rutger, J.N., K.A.K. Moldenhauer, J.W. Gibbons, M.M. Anders, and R.J. Bryant. 2004. Registration of LGRU *ef* early flowering mutant of rice. Crop Sci. 44:1498.
- Yan, W., and G. Cai. 1991. Zhe 733, a high yielding, blast (Bl)-resistant, good quality indica rice for China. Int. Rice Res. Newsl. 16(6):14.

J.N. Rutger and R.J. Bryant, USDA-ARS, P.O. Box 1090, Stuttgart, AR 72160; J.L. Bernhardt and J.W. Gibbons, University of Arkansas, Rice Research and Extension Center, 2900 Hwy 130 East, Stuttgart, AR 72160. Registration by CSSA. Accepted 31 Oct. 2004. \*Corresponding author (jnrtuger@spa.ars.usda.gov).

### Registration of TAM 96WD-18 Upland Cotton Germplasm Line with Improved Fiber Length and Strength

TAM 96WD-18 upland cotton (*Gossypium hirsutum* L.) germplasm (Reg. no. GP-789, PI 635879) developed by the Cotton Improvement Laboratory, Department of Soil and Crop Sciences, Texas Agricultural Experiment Station was released in 2004 as part of an ongoing effort to create germplasm and cultivars with improved yield potential and fiber quality. TAM 96WD-18 is a pubescent leaf and stem line that combines high yield potential with excellent fiber qualities. TAM 96WD-18 is a midseason maturity, picker-type upland cotton with a growth habit similar to 'Deltapine 50' when grown with supplemental irrigation at College Station and is adapted to south and central Texas.

TAM 96WD-18 was derived by hybridization and pedigree selection at Weslaco, TX, followed by early generation evaluation in south Texas. TAM 96WD-18 resulted from the cross of TAM 87G<sup>3</sup>-27, a breeding line with pedigree AET-108/1209-619-2S-77//PD 6992 developed in the Cotton Improvement Lab (Smith and Niles, 1994), and TAM 88G-104, a high-yielding picker-type upland cotton with resistance to silverleaf whitefly [*Bemisia argentifolli* (Perring and Bellows)] (Smith, 2001). TAM 88G-104 was developed from the cross of 'Deltapine 90' (Calhoun et al., 1994) and CS-8606 (Smith and Niles, 1988), and released as 'Texas 418'. TAM 96WD-18 was derived from a single F<sub>2,3</sub> plant selected on the basis of its apparent yield potential, fiber properties, and overall plant conformation. The resulting F<sub>3,4</sub> progeny row was selected as a pure line for further evaluation under the name of 96WD-18.

Field evaluations of TAM 96WD-18 were conducted from 1998 to 2002 at three to eight locations in Texas (Weslaco, Corpus Christi, San Patricio County, College Station, Thrall, Uvalde, Dallas, and Chillicothe) for yield, gin turnout, and fiber quality. TAM 96WD-18 was performance tested in preliminary strain trials during 1999 and 2000 at Weslaco, Corpus Christi, and College Station, TX, and the following two years at all eight locations. In the various performance tests, TAM 96WD-18 was compared with Deltapine 50 (Calhoun et al., 1994), 'Sure-Grow 125' (Calhoun et al., 1994), and 'Tamcot Sphinx' (El-Zik and Thaxton, 1996), popular cultivars in south and central Texas in the late 1990s. Deltapine 50 was not used as a check cultivar after 2000 because of its decline in popularity, while 'FiberMax 832' replaced Sure-Grow 125 in 2001 because of its excellent fiber quality and large production areas in south and central Texas.

Compared with Sure-Grow 125, Tamcot Sphinx, and FiberMax 832, TAM 96WD-18 was not different ( $P = 0.05$ ) in yield in performance trials averaged over eight locations in 2001 and 2002. Over locations, TAM 96WD-18 expressed a lower gin turnout ( $P = 0.05$ ) than the same cultivars. The average upper-half mean fiber length of TAM 96WD-18 was similar to FiberMax 832, and 48% longer than those of Tamcot Sphinx and Sure-Grow 125 ( $P = 0.05$ ). The mean fiber bundle strength of TAM 96WD-18 averaged 6% lower ( $P = 0.05$ ) than that of FiberMax 832 but was 7 and 17% stronger, respectively, than those of Tamcot Sphinx and Sure-Grow 125. Averaged across eight locations and two years (2001-2002), micronaire readings of TAM 96WD-18 were 2% lower than FiberMax 832, 12% lower than Tamcot Sphinx, and 11% lower than those of Sure-Grow 125 and Tamcot Sphinx ( $P = 0.05$ ). Micronaire readings of TAM 96WD-18 deviated from the Commodity Credit Corporation defined base range of 3.5 to 4.9 in only three of 23 performance trials between 2000 and 2002, indicating a low tendency to produce fiber with undesirably high micronaire readings.

Research leading to the development of TAM 96WD-18 was supported in part by grants from the Texas Food and Fibers Commission and Cotton Incorporated's Texas State Support program. Small quantities of TAM 96WD-18 seed may be obtained for breeding purposes from the corresponding author.

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#### References

- Calhoun, D.S., D.T. Bowman, and O.L. May. 1994. Pedigrees of upland and pima cotton cultivars released between 1970 and 1990. Miss. Agric. For. Exp. Stn. Bull. 1017. Mississippi State, MS.
- El-Zik, K.M., and P.M. Thaxton. 1996. Registration of 'Tamcot Sphinx' cotton. Crop Sci. 36:1074.
- Smith, C.W. 2001. Registration of TAM 88G-104 high-yielding upland cotton germplasm. Crop Sci. 41:1369-1370.
- Smith, C.W., and G.A. Niles. 1988. Registration of fourteen cotton germplasm lines. Crop Sci. 28:578-579.
- Smith, C.W., and G.A. Niles. 1994. Registration of four upland cotton germplasm lines having improved fiber quality: TAM 86G<sup>3</sup>-30, TAM 87D<sup>3</sup>-24, TAM 87D<sup>3</sup>-2527, and TAM 87G<sup>3</sup>-27. Crop Sci. 34:1413-1414.

P.M. Thaxton and C. Wayne Smith, Dep. of Soil and Crop Sciences, Texas Agric. Exp. Stn., Texas A&M Univ. System, College Station, TX 77843-2474; Roy Cantrell, Cotton Incorporated, 6399 Weston Parkway, Cary, NC 27513. Registration by CSSA. Accepted 30 Nov. 2004. \*Corresponding author (pthaxton@ag.tamu.edu). Registration

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### Registration of TAM 96WD-69s Glabrous Upland Cotton Germplasm Line

TAM 96WD-69s, upland cotton (*Gossypium hirsutum* L.) germplasm line (Reg. no. GP-790, PI 635878), was developed by the Cotton Improvement Laboratory, Department of Soil and Crop Sciences, Texas Agricultural Experiment Station (TAES) and released in 2004 as part of an ongoing effort to create glabrous germplasm and cultivars with improved yield potential, fiber quality, and resistance to fleahopper [*Pseudatomoscelis seriatus* (Reuter)] and silverleaf whitefly [*Bemisia argentifolli* (Perring and Bellows)]. TAM 96WD-69s is a near glabrous leaf and stem line that combines high yield potential with good fiber qualities and is adapted to south and central Texas.

TAM 96WD-69s was derived from the cross of TAM 88G-104 (Smith, 2001) with 87AAA-1, an unreleased glabrous breeding line developed by the Cotton Improvement Laboratory of the TAES at College Station, TX. TAM 88G-104, released and marketed as 'Texas 418', is a high-yielding picker-type upland cotton with resistance to silverleaf whitefly. Hybridization and pedigree selection leading to the development of TAM 96WD-69s was performed at Weslaco, TX. TAM 96WD-69s was derived from a single F<sub>2,3</sub> plant selected on the basis of its fiber properties, apparent yield potential, overall plant conformation, and smooth leaves. The resulting F<sub>3,4</sub> progeny row was selected on the basis apparent yield potential, smooth phenology, and high volume instrument fiber properties.

TAM 96WD-69s is a midseason maturity, picker-type cotton with normal leaf and bract shapes, and smooth leaves and stems. Fully expanded leaves of TAM 96WD-69s averaged 9 trichomes cm<sup>-2</sup> while leaves of 'Deltapine 50' (Calhoun et al., 1994), 'Tamcot 22' (Thaxton and Smith, 2005), and 'Tamcot CAB-CS' (Bird et al., 1986) averaged 12, 33, and 4 trichomes cm<sup>-2</sup>, respectively. The stems of TAM 96WD-69S averaged 1 trichome cm<sup>-2</sup> compared with 6 trichomes cm<sup>-2</sup> on Deltapine

50, 8 trichomes  $\text{cm}^{-2}$  on Tamcot 22, and 0.4 trichomes  $\text{cm}^{-2}$  on Tamcot CAB-CS. The number of trichomes on bract margins of TAM 96WD-69s was 76  $\text{cm}^{-2}$  while Deltapine 50, Tamcot 22, and Tamcot CAB-CS averaged 86, 242, and 72  $\text{cm}^{-2}$ , respectively.

Levels of square damage due to cotton fleahopper in 2001 and 2002 for 20 cotton lines were quantified in the field and greenhouse (Mekala, 2004). TAM 96WD-69s sustained a low level of square damage, similar to 'Lankart 142', 'Sure-Grow 747', Deltapine 50, and 'Stoneville 474', and lower than MAR-PD22 (glabrous), 'Acala Maxxa', TAM-96WD22s (near-smooth isoline of Tamcot 22), and 'All-Tex Atlas'. Hence, TAM 96WD-69s was relatively resistant to fleahopper based on the percentage square set.

TAM 96WD-69s was performance tested at Weslaco, Corpus Christi, and College Station in 1998 and 1999, and evaluated across eight locations (Weslaco, Corpus Christi, San Patricio County, College Station, Uvalde, Thrall, Dallas, and Chillicothe) for yield, gin turnout, and fiber quality under the name 96WD-69s from 2000 to 2002. TAM 96WD-69s was compared with Deltapine 50, Sure-Grow 125, and 'Tamcot Sphinx' (El-Zik and Thaxton, 1996), all popular cultivars in south and central Texas in the late 1990s. Deltapine 50 was deleted as a comparison cultivar in 2001 and 2002, and 'FiberMax 832' replaced Sure-Grow 125 in 2001 because of its excellent fiber quality and production in large areas of south and central Texas. The performance trials were grown with irrigation at Weslaco, College Station, Uvalde, and Chillicothe, and without irrigation at Corpus Christi, Thrall, and Dallas. TAM 96WD-69s produced similar or higher yields ( $P = 0.05$ ) than Sure-Grow 125, Deltapine 50, and Tamcot Sphinx in 20 of 23 performance trials and exhibited similar fiber quality traits. TAM 96WD-69s exhibited a lower gin turnout ( $P = 0.05$ ) than the same cultivars. TAM 96WD-69s has similar upper-half mean fiber length (UHM) ( $P = 0.05$ ) to those of Sure-Grow 125 and Tamcot Sphinx, and fiber bundle strength was similar to or better ( $P = 0.05$ ) than Sure-Grow 125. TAM 96WD-69s has 8% shorter UHM fiber length and 12% weaker fiber bundle strength than FiberMax 832. The micronaire reading of TAM 96WD-69s averaged 0.3 units lower than Tamcot Sphinx and Sure-Grow 125, but similar to that of FiberMax 832.

Research leading to the development of TAM 96WD-69s was supported in part by grants from the Texas Food and Fibers Commission, and Cotton Incorporated's Texas State Support program. Small quantities of seed may be obtained for breeding purposes from the corresponding author.

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## References

- Bird, L.S., K.M. El-Zik, and P.M. Thaxton. 1986. Registration of 'Tamcot CAB-CS' upland cotton. *Crop Sci.* 26:384-385.
- Calhoun, D.S., D.T. Bowman, and O.L. May. 1994. Pedigrees of upland and pima cotton cultivars released between 1970 and 1990. *Miss. Agric. For. Exp. Stn. Bull.* 1017. Mississippi State, MS.
- El-Zik, K.M., and P.M. Thaxton. 1996. Registration of 'Tamcot Sphinx' cotton. *Crop Sci.* 36:1074.
- Mekala, K.D. 2004. Screening of upland cotton for resistance to cotton fleahopper (Heteroptera: Miridae). M.S. Thesis. Texas A&M Univ., College Station, TX.
- Smith, C.W. 2001. Registration of TAM 88G-104 high-yielding upland cotton germplasm. *Crop Sci.* 41:1369-1370.
- Thaxton, P.M., and C.W. Smith. 2005. Registration of 'Tamcot 22' high-yielding upland cotton cultivar. *Crop Sci.* 45:1165-1166 (this issue).

P.M. Thaxton and C. Wayne Smith, Dep. of Soil and Crop Sciences, Texas Agric. Exp. Stn., Texas A&M Univ. System, College Station, TX 77843-2474; Roy Cantrell, Cotton Incorporated, 6399 Weston

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## Registration of Arkot 8712 Germplasm Line of Cotton

An early maturing breeding line of cotton (*Gossypium hirsutum* L.), designated as Arkot 8712 (Reg. no. GP-791, PI 636101), was released in 2004 by the Arkansas Agricultural Experiment Station. Arkot 8712 was derived from the double cross of  $F_1$  ('Deltapine 50'/Miscot 7913-51)// $F_1$  (Miscot T8-27'/Miscot 7803-52). The germplasm lines Miscot 7913-51 (Bourland, 1988), Miscot T8-27 (Bourland and Bridge, 1988), and Miscot 7803-51 (Bourland and White, 1989) were developed by crossing lines from the Texas A&M Multi-Adversity Resistance Cotton Breeding program (Bird, 1982) with lines adapted to the Mississippi River Delta region. Deltapine 50 was a widely grown, smooth-leaf, early-maturing cultivar released in the early 1980s.

Arkot 8712 (tested as 8712-09-20) was evaluated in 43 replicated field tests at four Arkansas Agricultural Research Station sites in the Mississippi River Delta from 1995 through 2003. Lint yields of Arkot 8712 were greater than, equal to, and less than the check cultivars (DES 119 in 1995-1997, ST474 in 1999-2000, and PSC 355 in 2001-2003) in 6, 32, and 5 of the tests, respectively. Over all tests, lint yield, plant height, micronaire reading, fiber length uniformity, strength, and elongation varied less than 1% from the check cultivars. Arkot 8712 differed from the checks in lint fraction (significantly less than the checks in 20 of 43 tests), fiber length (significantly longer than the checks in 32 of 43 tests), and leaf pubescence (significantly smoother than checks in all tests). Based on the rating system published by Bourland et al. (2003), the average leaf pubescence rating of Arkot 8712 was 2.8 compared with 5.8 for the hairy-leaf checks.

Over 34 yr by location comparisons in the 1996 through 1999 High Quality Regional Cotton Variety Tests, Arkot 8712 yielded 92% as much lint as a check cultivar (SG125 in 1996-1998, SG747 in 1999). Highest relative yields of Arkot 8712 were obtained in the Arkansas, Mississippi, Georgia, and North Carolina test sites. As found above, Arkot 8712 tended to have lower lint fraction, longer fiber length, and similar micronaire and length uniformity indices compared with the check cultivar. Fiber strength and yarn tenacity of Arkot 8712 in these tests were 10% stronger than the check cultivars. Results of these tests (including additional fiber and seed parameters) are available online at <http://msa.ars.usda.gov/ms/stoneville/cgpr/rayburn.html> (verified 2 Jan. 2005).

During selection, Arkot 8712 was screened for resistance to races 1, 2, 7, and 18 of *Xanthomonas campestris* pv. *malvacearum* (Smith) Dye, the causal agent of bacterial blight. Resistance to these races conveys resistance to all known U.S. races of this pathogen. In subsequent tests, Arkot 8712 has not exhibited symptoms of bacterial blight even after field inoculations with the pathogen. In the 1997 and 2001 National Cotton Fusarium Wilt Tests at Tallahassee, AL, resistance of Arkot 8712 to Fusarium wilt [caused by *Fusarium oxysporum* Schlecht.:Fr. f. sp. *vasinfectum* (Atk.) Snyder & Hans.] was equal to the resistant check, M-315 (Glass and Gazaway, 1997; Glass et al., 2001).

The good fiber properties and specific adaptation of Arkot 8712 are unusual in an early maturing genotype. This combination of traits makes the line valuable as a breeding line. Small quantities of Arkot 8712 seed may be obtained for breeding purposes from the corresponding author. Unless approved by the Arkansas Agricultural Experiment Station, this line may

not be used as a recurrent parent in the development of a cultivar. Development of Arkot 8712 was supported in part by funding from Cotton Incorporated.

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### References

- Bird, L.S. 1982. The MAR (Multi-Adversity Resistance) system for genetic improvement of cotton. *Plant Dis.* 66:172–176.
- Bourland, F.M. 1988. Registration of Miscot 7913–51, Miscot 7913–83, and Miscot 7913–84 germplasm lines of cotton. *Crop Sci.* 28:200–201.
- Bourland, F.M., and R.R. Bridge. 1988. Registration of Miscot T8–27 cotton germplasm. *Crop Sci.* 28:1035.
- Bourland, F.M., J.M. Hornbeck, A.B. McFall, and S.D. Calhoun. 2003. A rating system for leaf pubescence of cotton. *J. Cotton Sci.* 7:8–15.
- Bourland, F.M., and B.W. White. 1989. Registration of Miscot 7803–51 and Miscot 7803–52 germplasm lines of cotton. *Crop Sci.* 29:242–243.
- Glass, K.M., and W.S. Gazaway. 1997. 1997 National cotton fusarium wilt report. *Agron. Soils Dep. Ser. No. 238.* Auburn Univ., Auburn, AL.
- Glass, K.M., W.S. Gazaway, and E. van Santen. 2001. 2001 National cotton fusarium wilt report. *Agron. Soils Dep. Ser. No. 238.* Auburn University, Auburn, AL.

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### Registration of N584, N587, and N588, Large-Seeded Grain Sorghum Germplasm

N584, N587, and N588 sorghum [*Sorghum bicolor* (L.) Moench] germplasms (Reg. no. GP-620, PI 635496), (Reg. no. GP-621, PI 635497), (Reg. no. GP-622, PI 635498) are large-seeded, photoperiod-insensitive germplasms that provide genetic diversity for developing large-seeded food-grade sorghum hybrids. Seed size, as weight per given kernel number, can be genetically manipulated and is of particular importance in this regard. Size of seed in sorghum contributes to yield through enhanced germination, establishment, seedling growth and vigor, and plant performance (Amthor 1983; Singh and Makne 1985; Swanson and Hunter 1936; Trabanino et al., 1989). Additionally, the production of large, uniform seed is desirable for cleaning and marketing.

These germplasms were developed in the sorghum breeding program at the University of Nebraska–Lincoln to produce large-seeded, food-grade hybrid parent lines adapted to the

Midwest region of the USA. These germplasms resulted from crosses made using nuclear male-sterility mutation ( $ms_3ms_3$ ) and emasculated 2-way and 3-way crosses made in the 2000 spring greenhouse between Nebraska Seed Size Cycle 5 (NSSC5) population selections and large seed size tropical introductions and conversion lines IS 9987, IS 23891, and PI 571344. NSSC5 is a broad genetic base, full-season, food-grade, and random-mating population containing B and R reaction for  $A_1$  cytoplasmic male sterility and containing the nuclear male sterility mutation  $ms_3$ . Pedigree selection was conducted in the  $F_2$  and  $F_3$  generation at Lincoln in 2001 and 2002 and  $F_4$  generation at Tampico, Mexico, in the 2003 winter nursery.  $F_5$  lines were grown at Lincoln in 2003 and evaluated for seed size, seed number, and other agronomic traits. We did not observe any segregation for  $ms_3$  by the  $F_5$  generation. Several lines were test-crossed with N267A $_1$  and N250A $_1$  to determine their male fertility restoration reaction.

Days to anthesis, plant height, panicle length, panicle exertion, seed weight, seed number per panicle, test weight, test-cross reaction, and plant and grain color of each germplasm are shown in Table 1. The germplasms labeled as restorers have either given fertile testcrosses or were sister lines of proven restorers. In general, these germplasms are average to short in height and medium to late in maturity. When grown at Lincoln in 2003, seed size ranged from 42 to 59 g 1000 seed $^{-1}$ , which is about double the size of BTx3042. Seed color is cream or yellow. Two germplasms have tan plant color (N584 and N587) and one has purple plant color (N588). Tillering habit is upright for all the germplasms. All three germplasms are photoperiod insensitive. Insect and disease resistance of these materials has not been determined.

The materials provide new genetic diversity for the development of large-seeded sorghum lines and hybrids. Germplasms with tan plant color and white or yellow seed can be used to develop food-grade hybrids with food-grade pollinator and seed parents. Seeds of N584, N587, and N588 are available for research purposes from the Department of Agronomy, University of Nebraska, Lincoln, NE 68583.

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### References

- Amthor, J.S. 1983. Sorghum seedling growth as a function of sodium chloride salinity and seed size. *Ann. Bot.* 52:915–917.

**Table 1. Three large-seeded, medium- to late-maturing grain sorghum germplasms grown with inbred lines and hybrid checks†.**

Germplasm	Parentage	Days to anthesis	Plant height	Panicle exertion	Panicle length	Seed weight‡	Seed number	Plant color	Seed color	Testcross reaction¶
			cm		cm	g 1000 seed $^{-1}$	no./panicle			
N584	NSSC5-122ms/(NSSC5A-1/IS9987)	73	100	Good	21.8	42.5	1481	Tan	Cream	B
N587	NSSC5-123msx(NSSC5A-1/PI571344)	67	0	Excellent	20.0	59.5	985	Purple	Yellow	R
N588	NSSC5-128ms/IS23891	69	127	Excellent	17.8	47.1	1405	Tan	Cream	R
Check hybrids and lines										
	Pioneer P87G57	57	113			26.1	1392			
	N250A	70	80			29.3	1430			
	BTx3042	65	112			23.6	1898			
LSD (0.05)		3	9		2.6	5.2	421			

† Data recorded are based on average of a 5 plant sample per row and three replications at Lincoln, NE, planted 6 June 2003.

‡ Seed weights were tested in three environments (Lincoln field 2003, Lincoln greenhouse, and Tampico, Mexico), and the variation among the lines was similar in range. Here we present the mean data collected from Lincoln in 2003.

¶ Testcross reaction R = male-fertile; B = male-sterile.

Singh, A.R., and V.G. Makne. 1985. Correlation studies on seed viability and seedling vigor in relation to seed size in sorghum. *Seed Sci. Tech.* 13:139–140.

Swanson, A.F., and R. Hunter. 1936. Effect of germination and seed size on sorghum stands. *J. Am. Soc. Agron.* 28:997–1004.

Trabanino, C.R., H.N. Pitre, K.L. Andrews, and D.H. Meekensstock. 1989. Effect of seed size, color, number of seed per hill and depth of planting on sorghum seed survival and stand establishment: Relationship to phytophagous insect. *Trop. Agric.* 66:225–229.

Department of Agronomy, Univ. of Nebraska, P.O. Box 830915, Lincoln, NE 68583-0915. Journal Article No.14697 by Univ. of Nebraska Agric. Res. Div. Registration by CSSA. Accepted 30 Nov. 2004. \*Corresponding author (idweikat2@unl.edu).

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### Registration of GA98066 Upland Cotton Germplasm Line

GA98066 cotton (*Gossypium hirsutum* L.) (Reg. no. GP-792, PI 635119) germplasm line was developed by the Georgia Agricultural Experiment Station (GAES) and released in 2004. GA98066 combines high yield potential, desirable fiber quality, and moderate resistance to *Fusarium* wilt (caused by *Fusarium oxysporum* Schlecht.:Fr. f. sp. *vasinfectum* Atk. Sny. & Hans.).

The pedigree of GA98066 is PD5363/GA88-186. PD5363 is a germplasm line with pedigree 'Delcot 311'/PD6131 developed by the USDA-ARS (Green et al., 1991), while GA88-186 is an unreleased germplasm line with pedigree GA81-225/'PD-1' bred by the GAES. The PD5363/GA88-186 F<sub>1</sub> was created in 1994, self-pollinated at the 1994–1995 USDA-ARS Cotton Winter Nursery in Mexico, and F<sub>2</sub> seed was then bulked from three-hill increase plots planted with three to five F<sub>1</sub> seeds per hill. The PD5363/GA88-186 F<sub>2</sub> population along with additional half-sib F<sub>2</sub> populations was tested in a replicated trial in 1995 at Florence, SC. The PD5363/GA88-186 F<sub>2</sub>-bulk population was selected for advance to the F<sub>3</sub> generation in 1996 because it had higher seed cotton yield ( $P < 0.10$ ) than the trial check, germplasm line PD-3-14 (May et al., 1996). In 1996, F<sub>3</sub> plants were visually selected for greatest boll production and then were individually harvested. Subsequently selection for lint fraction, 2.5% fiber span length, and fiber bundle strength was practiced. Fiber quality analyses were conducted with single-instruments (Steadman, 1997). The remaining selections were planted as F<sub>4</sub> progeny rows in 1997. The F<sub>3,4</sub> progeny rows were visually compared with the nearest plot of 'SureGrow 501' for relative yield potential. Progeny rows visually rated as having higher seed cotton yield than SureGrow 501 were selected for advance to the F<sub>5</sub> generation. Bolls were combined from selected plants within each F<sub>4</sub> progeny row for advance to the F<sub>5</sub> generation and initiation of replicated testing in 1998 at Florence. GA98066 derives from F<sub>5</sub> seed harvested from one F<sub>4</sub> progeny row that was subsequently reselected in an F<sub>7</sub> Breeder seed increase in 2000 at Tifton, GA. Within the Breeder seed increase, F<sub>8</sub> seed was combined among selected F<sub>7</sub> plants and subsequently GA98066 was tested as though it was a pure line.

Advanced generation testing of GA98066 was conducted in the 2002 and 2003 Georgia Official Cultivar Trials and the 2002 South Carolina Official Cultivar Trials. Averaged over years and locations of the 2002 and 2003 Georgia Later Maturity Cotton Cultivar Trials, GA98066 yielded ( $P < 0.10$ ) more than the popular cultivars Deltapine 448B, Deltapine 458BR, Deltapine 5415R, Deltapine 5690R, FiberMax 991R, and FiberMax 989R (Day et al., 2003, 2004). Averaged over three trials comprising the 2002 South Carolina Later Maturity Cotton

Cultivar Trial, lint yield of GA98066 was not different than that of Deltapine 458BR and 'Stoneville 4892BR', but exceeded ( $P < 0.10$ ) that of Deltapine 448B, 'Deltapine 451BR', 'Deltapine 655BR', 'FiberMax 989BR', 'Stoneville 5599BR', and 'Stoneville 5303R' (2002 Clemson University Official Cotton Cultivars Trials). Lint fraction of GA98066 averaged 39.6% in the 2002 and 2003 Georgia trials, less ( $P < 0.10$ ) than that of 'Deltapine 555BR' (43.1%) and Stoneville 4892BR (42.1%), but greater ( $P < 0.10$ ) than that of Deltapine 5690R (38.6%) and FiberMax 991R (38.8%).

GA98066 typically has longer upper-half mean fiber length, higher length uniformity index, greater bundle fiber strength, and lower micronaire readings than many popular cultivars produced in Georgia (Day et al., 2003, 2004). In the 2002 and 2003 Georgia Official Later Maturity Cotton Cultivar Trials, upper-half mean fiber length (29.5 mm) and uniformity index (84.2%) of GA98066 exceeded ( $P < 0.10$ ) those of Deltapine 448B, Deltapine 458BR, Deltapine 5415R, Deltapine 5690R, FiberMax 989R, Stoneville 5599BR, and Stoneville 4892BR. Fiber strength of GA98066 (319 kN m kg<sup>-1</sup>) was not different than that of Deltapine 5690R and FiberMax 989R, but exceeded ( $P < 0.10$ ) those of Deltapine 448B, Deltapine 458BR, Deltapine 555BR, Deltapine 5415R, Stoneville 5599BR, and Stoneville 4892BR. Averaged over the same 16 trials, micronaire reading of GA98066 (4.6) was less ( $P < 0.10$ ) than those of Stoneville 5599BR (4.9), Stoneville 4892BR (5.1), and Deltapine 5415R (4.9).

GA98066 is moderately resistant to *Fusarium* wilt. In the 2002 National Cotton *Fusarium* Wilt Test, seasonal percentage wilted plants of GA98066 (15%) were greater than that of the resistant control M-315-RNR (0.8%; LSD 0.05 = 13.2%), but was much less than that of the susceptible control Rowden (56.5%; Shepherd et al., 1996; Glass et al., 2002).

GA98066 may be useful to breeders as a source of high yield potential and fiber quality. Intellectual property rights will not be retained on GA98066, thus the use of GA98066 in cultivar development is unrestricted. For example, cultivar developers may use GA98066 as a recipient of transgenic traits followed by retention of intellectual property rights. Seed of GA98066 has been entered into the USDA National Plant Germplasm System for long-term curation and availability. Small quantities of seed (25 g) may be requested from the corresponding author. Requests for seed from outside the USA cannot be filled without an import certificate allowing the seed to enter the requestor's country. The University of Georgia may not be able to certify that seed of GA98066 is free of certain insects and pathogens specified on an import certificate, and in such instances seed of GA98066 cannot be supplied. Recipients of seed are asked to make appropriate recognition of the source of the germplasm if it is used in the development of a new cultivar, germplasm, parental line, or genetic stock.

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#### References

Day, J.L., A.E. Coy, S.S. LaHue, W.D. Branch, O.L. May, L.G. Thompson, and P.A. Rose. 2004. Georgia 2003 peanut, cotton, and

tobacco performance tests. Rep. 692. Georgia Agric. Exp. Stn., Athens, GA.

Day, J.L., A.E. Coy, S.S. LaHue, L.G. Thompson, P.A. Rose, and J.P. Beasley. 2003. Georgia 2002 peanut, cotton, and tobacco performance tests. Rep. 686. Georgia Agric. Exp. Stn., Athens, GA.

Glass, K.M., W.S. Gazaway, and E. VanSanten. 2002. 2002 National cotton fusarium wilt report [Online]. Available at [www.ag.auburn.edu/aaes/communications/agronomy/ay246fusarium02.pdf](http://www.ag.auburn.edu/aaes/communications/agronomy/ay246fusarium02.pdf) (verified 2 Jan. 2005). Auburn Agric. Exp. Stn., Auburn, AL.

Green, C.C., T.W. Culp, and B.U. Kittrell. 1991. Registration of two germplasm lines of upland cotton with high yield potential and fiber quality. *Crop Sci.* 31:853.

May, O.L., C.C. Green, T.W. Culp, and D.S. Howle. 1996. Registration of PD-3-14 germplasm line of upland cotton. *Crop Sci.* 36:1718.

Shepherd, R.L., J.C. McCarty, Jr., J.N. Jenkins, and W.L. Parott. 1996. Registration of nine cotton germplasm lines resistant to root-knot nematode. *Crop Sci.* 36:820.

Steadman, R.G. 1997. Cotton testing. *Textile Prog.* 27:1-66.

O.L. May, Dep. of Crop & Soil Sci., Univ. Georgia, Coastal Plain Station, P.O. Box 748, Tifton, GA 31793-0748; R.G. Cantrell and D.C. Jones, Cotton Incorporated, 6399 Weston Parkway, Cary, NC 27513. Registration by CSSA. Accepted 30 Nov. 2004. \*Corresponding author (lmay@tifton.uga.edu).

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## REGISTRATIONS OF PARENTAL LINES

### Registration of Bermudagrass Parental Lines A-3 and A-4

A-3 (Reg. no. PL-1, PI 617090) and A-4 (Reg. no. PL-2, PI 617091) bermudagrasses [*Cynodon dactylon* (L.) Pers.] are self-incompatible but cross-fertile bermudagrass parental lines maintained as clones by Pennington Seed/Seeds West, Yuma, AZ. These two parental clones are sprigged in alternating rows for production of the seed-propagated cultivar Princess-77. Princess-77 is an F<sub>1</sub> hybrid bermudagrass released in 1995 by Pennington Seed/Seeds West and tested under the experimental designations FMC-77 and SWI-77.

A crossing block was established in the late 1980s that consisted of 52 diverse elite clones with domestic (50%) and Australian origin (50%). The only clone in this crossing block that has been used in other variety development was NM30. NM30 was used in the development of 'NuMex Sahara', 'Sonesta', and 'Primavera' seeded bermudagrasses (Baltensperger, 1989; Baltensperger and Meier, 1993). Seed was harvested from this crossing block in bulk, and spaced plants derived from this seed were evaluated for fine leaf texture and high turf density. In 1991, eleven clones were selected for further crossing. The 11 clones were matched pairwise based on leaf color, leaf texture, and synchronized flowering into a group of eight single-crosses. For each single-cross, the two clones were sprigged in alternating rows in isolation. Seed yields were measured for each cross, and the seed harvested from each cross was planted into turf evaluation plots. From this group of eight single-crosses, three were selected based on preliminary seed yield and turf quality, to evaluate on a larger scale for seed yield. In 1993, a 0.2-ha crossing block was established for each of the three single-crosses. The highest yielding single-cross of this group was FMC-77, resulting from crossing A-3 and A-4.

A-3 has a mean culm height of  $30.7 \pm 3.6$  cm, and A-4 has a mean culm height of  $34.7 \pm 2.7$  cm on mature unmowed plants. The easiest means of distinguishing the parents clones is based on their stolon morphology. Mean stolon internode length as measured between the third and fourth terminal nodes on a stolon are  $28.5 \pm 4.5$  and  $15.0 \pm 5.0$  mm for A-3 and A-4, respectively. Mean stolon internode diameters are  $1.4 \pm 0.1$  and  $1.0 \pm 0.2$  mm for A-3 and A-4, respectively.

In addition to Princess-77, A-4 was also used as a parent

of the F<sub>1</sub> hybrid SWI-11 (other experimental designation: FMC-66). Therefore, Princess-77 and SWI-11 are 50% identical by descent.

A-3 and A-4 parent lines are highly self-incompatible, but cross-fertile tetraploid bermudagrass clones. Princess-77 seed is produced by sprigging A-3 and A-4 into seed production fields, and harvesting the resulting F<sub>1</sub> seed (Rodgers, 2003). No maternal effects of the parent clones have been observed.

Princess-77 exhibited good turf performance in the 1997 National Turfgrass Evaluation Program Bermudagrass Test, rivaling the elite vegetative cultivars 'Tifway', 'Tifgreen', and 'Midlawn'. Princess-77 exhibited good turf quality, turf density (spring, summer, and fall), dark-green color, fine leaf texture, and fall color retention (Morris, 2002). Princess-77 possesses significantly fewer seedheads than Arizona Common. Princess-77 has the potential for excellent turf performance in home lawns, parks, athletic fields, and golf courses in areas where bermudagrass is adapted.

A-3 and A-4 parental lines are maintained by Pennington Seed/Seeds West, 37860 W. Smith-Enke Rd, Maricopa, AZ 85239. Seed production of Princess-77 is limited to the F<sub>1</sub> hybrid generation, and is available as certified seed from Pennington Seed/Seeds West. U.S. Plant Variety Protection certificate no. 9500227 has been granted for Princess-77.

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### References

- Baltensperger, A.A. 1989. Registration of 'NuMex Sahara' Bermudagrass. *Crop Sci.* 29:1326.
- Baltensperger, A.A., and V. Meier. 1993. Registration of 'Sonesta' Bermudagrass. *Crop Sci.* 33:876.
- Morris, K.N. 2002. National Bermudagrass Test-1997. Final Report 1997-2001, NTEP No. 02-7. Natl. Turfgrass Eval. Prog. USDA-ARS, Beltsville, MD.
- Rodgers, C.A. 2003. You've come a long way, Bermuda. *Golf Course Manage.* 71(8):91-95.

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