REGISTRATIONS OF CULTIVARS

Registration of 'AC Pintoba' Common Bean

'AC Pintoba' pinto bean (*Phaseolus vulgaris* L.) (Reg. no. CV-200, PI 628748) was developed by the Agriculture and Agri-Food Canada Greenhouse and Processing Crops Research Centre (GPCRC), Harrow, ON, Canada. It was tested as HR55-1608 in the Prairie Cooperative Variety Registration Trials during 1993 through 1995 and registered (Registration no. 4668) by the Variety Registration Office, Canadian Food Inspection Agency, Ottawa, Canada on 16 Jan. 1998.

AC Pintoba was selected from the cross between 'Sierra' and 'Fiesta,' made in the spring of 1988 at GPCRC, Harrow. Sierra was used for its high yield potential and upright plant type, which might contribute to reduced white mold [caused by *Sclerotinia sclerotiorum* (Lib.) De Bary] and also would be a desired trait for direct combining of beans. Fiesta was used for its early maturity, good pinto bean seed type, and resistance to *Beancommon mosaic virus* (BCMV). The F_1 hybrids were grown in the fall of 1988 at Harrow. The F_2 bulks were advanced in the spring of 1989 and the F_3 plants were harvested individually. Plants were selected for desired pinto seed type and advanced in plant rows in the summer of 1989 and 1990 at Harrow. A pedigree row, PN48303, was harvested in bulk as C1608b-48303 for its early maturity, upright plant type, and good pinto bean seed type.

Main criteria for selection were early maturing, high yield potential, and upright vine type with acceptable seed quality. Upright plants that allow for direct combining were an important breeding objective because pinto beans have been produced traditionally by pulling and windrowing before threshing. Line C1608b-48303 was tested in a replicated yield trial at Harrow in 1991 and in advanced performance trials at Shetland, ON, and Morden, MB, in 1992. During 1993 through 1995, it was tested as HR55-1608 in the Prairie Cooperative Variety Registration Trials under irrigated and dry land conditions in 12 tests at eight sites in Manitoba, Saskatchewan, and Alberta. HR55-1608 was grown in an isolation plot for purification by rouging off types and multiplication at Harrow in 1992. In 1995, it was purified and multiplied by bulking about 100 plants from rows, on the basis of plant type, where stock seed was established at Harrow.

AC Pintoba out yielded the check 'Othello' by an average of about 385 kg ha^{-1} in an average of 16 cooperative cultivar trials in 1993 through 1995. Bean yields were about 41 and 10% more than Othello in dry and irrigated production fields, respectively. AC Pintoba was about 7 d later maturing than the check. It has similar seed mass to Othello, weighing approximately 338 g 1000 $seeds^{-1}$. AC Pintoba is taller than Othello but has less lodging. It has similar canning qualities as the standard pinto cv. Othello.

AC Pintoba and several other pinto bean cultivars–lines were tested in the Manitoba dry bean screening trials at four sites each year during 1998 through 2000. Average seed yield of AC Pintoba in 12 trials was 3480 kg ha^{-1} compared with the check 'AC Ole' which yielded 3216 kg ha^{-1}. AC Pintoba yielded more than 13% over the average seed yield of other pinto beans such as 'Remington', 'Apache', 'Maverick', and AC Ole. Its seed size was similar to Maverick, which averaged 372 g 1000 $seed^{-1}$ in 12 trials.

AC Pintoba is resistant to BCMV race 1 but susceptible to race 15 and it is susceptible to anthracnose [caused by *Colletotrichum lindemuthianum* (Sacc. & Magnus)] races α and delta. It is susceptible to common bacterial blight [caused by *Xanthomonas phaseoli* (Smith) Dowson], halo blight [caused by *Pseudomonas syringae* pv. *phaseolicola* (Burkholder) Young et al.], brown spot (caused by *Pseduomonas syringae* pv. *syringae* van Hall), and rust [caused by *Uromyces phaseoli* (Pres.) G. Wint] similar to the check, Othello. It is tolerant to white mold probably because of its upright plant type. AC Pintoba is resistant to Fusarium wilt [caused by *Fusarium oxysporum* Schlechtend:Fr. f. sp. *phaseoli* J.B. Kendrick & W.C. Snyder (Fop)] as in the parental line, Sierra (Ogg et al., 2000). It is susceptible to root rots [caused by *F. solani* (Mart.) Sacc. f. sp. *phaseoli* (Burkholder) W.C. Snyder & H.N. Hans], *Rhizoctonia solani* Kühn] and *Pythium ultimum* Trow., and similar to the check, Othello.

AC Pintoba has indeterminate growth habits with short vines, upright plants with a narrow canopy. The seedlings have green hypocotyls and the plants have white flowers. The pods have dark brown streaks on a light background when mature. Seeds have a brown irregular variegation on a light brown solid background with pale yellow hilum ring and shiny lustre.

Breeder seed of AC Pintoba is maintained by the Agriculture and Agri-Food Canada Research Centre, Harrow, ON N0R 1G0. AC Pintoba was released through Canterra Seed, Ltd., Manitoba for seed distribution. Small quantities of seed may be obtained from the corresponding author.

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Acknowledgments

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Registration of 'Bribri' Small Red Bean (Race Mesoamerica)

'Bribri' small red bean (*Phaseolus vulgaris* L.) (Reg. no. CV-201, PI 619437) was developed by the Escuela Agricola Panamericana (EAP), Zamorano, Honduras, and released in Costa Rica by the Bean Research and Technology Transfer Program (PITTA-Frijol, acronyms in Spanish) in July 2000 as a good yielding, well adapted to low soil fertility, and disease resistant cultivar.

Bribri was an $F_{2:6}$ derived line from the cross RAB310/XAN155//DOR391/'Pompadour G'. RAB310, XAN155 and DOR391 are small red bean breeding lines derived from the crosses DOR364//SEL277/BAT1514, BAT930/BAT93 and

DOR367//DOR364/IN101, respectively (CIAT, 1995). Pompadour G is a red mottled landrace collected by the Bean/Cowpea CRSP Program in the Dominican Republic. DOR lines mentioned here were selected as resistant to the bean golden yellow mosaic virus (BGMYV) (Beebe et al., 1996).

The F_1 was advanced in a screen house facility. Individual F_2 plants were selected under field condition at Zamorano for erect plant architecture, early-intermediate maturity, and commercial small red, race Mesoamerica seed type. The F_3 to F_6 were evaluated at Zamorano during 1992-1993, for the previously mentioned traits, as well as for resistance to natural incidence of *Beancommon mosaic virus* (BCMV) and anthracnose [caused by *Colletotrichum lindemuthianum* (Sacc. & Magnus) Lams.-Scrib.], and artificial inoculations with local isolates of common bacterial blight (CBB) [caused by *Xanthomonas campestris* pv. *phaseoli* (Smith) Dye]; the best plants from the selected families were harvested in bulk. The selected F_6–F_7 families were screened for resistance to BGYMV in field trials conducted at Comayagua, Honduras. Advanced lines trials were conducted in 1994 at five different sites in Honduras; these trials indicated that the breeding line coded MD 23-24 was resistant to BCMV and moderately resistance to anthracnose, BGYMV, CBB, and angular leaf spot [caused by *Phaeoisariopsis griseola* (Sacc.) Ferraris], and had superior grain yield when compared with local check cultivars.

During 1994-1995, Bribri was tested at 15 locations throughout Honduras as part of the National Bean Yield and Adaptation Nursery (VINAR), yielding an average of 1926 kg ha^{-1}, while the universal check (DOR 364) and local checks yielded 1903 and 1543 kg ha^{-1}, respectively. From 1996 to 1998, Bribri was included in the Adaptation Nursery (VIDAC) and the Yield and Adaptation Trial (ECAR) distributed to Central America and Caribbean countries members of the Regional Bean Research Network (PROFRIJOL).

Bribri was extensively evaluated in Costa Rica from 1996 to 1999. A great number of field trials were conducted at experimental stations and in farmer fields to determine its yield potential, disease resistant, and agronomic performance. Bribri was evaluated at several locations at altitudes ranging from 43 to 960 m and in the two main life zones, tropical wet and low mountainous tropical rain forests. At the second life zone, the most important regarding bean production and area planted, average temperatures vary from 22 to 27°C and annual rainfall from 1800 to 3600 mm; small bean farms are common and the majority of soils are ultisols of low fertility.

The verification and validation trials were conducted in nine and 11 locations of Costa Rica, respectively. Since farmer fields as well as traditional production practices were used, most trials of Bribri were conducted without adding fertilizers or applying fungicides. Under these conditions, Bribri outyielded the local check cultivars in 67 and 80% of the trials, respectively. The average experimental yield of Bribri varied from 939 to 1811 kg ha^{-1} (Araya et al., 1997–2000); in farmer trials, Bribri yields ranged from 972 to 1930 kg ha^{-1} (Hernández et al., 2000). In trials conducted in the north pacific coastal area, under temperatures higher than those normally present at traditional bean production regions, Bribri was among the few good yielding, heat tolerant lines (Rosas et al., 2000).

Results from numerous trials, suggested that the agronomic potential of Bribri was mainly attributed to its good productivity under low soil fertility, as well as its tolerance to angular leaf spot and web blight [caused by *Thanatephorus cucumeris* (A.B. Frank) Donk]. Bribri is recommended for the Brunca and North Huetar bean production regions of Costa Rica.

Bribri has an indeterminate bush, short vine Type II growth habit. Bribri is a midseason line, flowering at 38 to 41 d after planting (DAP) and maturing at 68 to 72 DAP. Stem color is green at vegetative stages turning pink at physiological maturity. Pod color is green at pod filling with pink shades at physiological maturity. Bribri plants are easily to thresh mechanically.

Bribri has an ovoid seed, averaging 20 g 100 seed^{-1}. Dry seed color is shiny red. Results from surveys and tests conducted with farmers and consumers found Bribri to have good commercial value and cooking qualities including good flavor, thick broad and short cooking time.

Small quantities of Breeder seed may be obtained from the corresponding author. Plant variety protection will not be sought for this cultivar.

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Registration of 'H78-4153' Sugarcane

'H78-4153' Sugarcane (a complex hybrid of germplasm from *Saccharum officinarum* L., *S. spontaneum* L., *S. sinense* Roxb. Amend. Jeswiet, and *S. robustum* Barndes and Jeswiet ex Grassl.) (Reg. no. CV-116, PI 631180) was selected by the staff of the Experiment Station, Hawaii Agriculture Research Center (formerly Hawaiian Sugar Planters' Association). It is a progeny of H57-5174. The progeny was derived from random pollination in a polycross made in 1977, at the Maunawili Breeding Station on the island of Oahu, HI, involving several commercial-type clones selected on the basis of resistance to culmicolous smut [caused by *Ustilago scitaminea* Syd. & P. Syd.]. H78-4153 was released as a cultivar in 1996.

H78-4153 is adapted to a 2-yr cropping cycle with high cane tonnage and average sucrose content compared to 'H65-7052' (Heinz et al., 1981) and 'H73-6110' (Heinz et al., 1984) the leading cultivars in leeward irrigated areas of Hawaii. H78-4153 is somewhat slow and erect in its early growth habit, proliferates a large number of young tillers which provide tolerance to lesser cornstalk borers (LCB) [*Elasmopalpus lignosellus* (Zeller)]. H78-4153 possesses very good ratooning

ability. It grows rapidly at about 6 mo of age and produces uniform, average sized purple colored stalks.

H78-4153 is resistant to common rust [caused by *Puccinia melanocephala* Syd. & P. Syd.], leaf scald [caused by *Xanthomonas albilineans* (Ashby) Dowson], yellow leaf syndrome [caused by *Sugarcane yellow leaf virus*], and moderately resistant to smut [caused by *Ustilago scitaminea* Syd. & P. Syd.] and eye spot [caused by *Bipolaris sacchari* (E.J. Butler) Shoemaker]. It has a soft rind and a few growth cracks making it susceptible to rats and beetle borers [*Rhabdoscelus obscurus* (Boisduval)] during the second year of growth as the cane lodges. H78-4153 must not be over dried in the ripening process.

Vegetative cuttings will be maintained by the Experiment Station, Hawaii Agriculture Research Center, Aiea, HI 96701.

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Registration of 'Avalanche' Wheat

'Avalanche' (Reg. no. CV-921, PI 620766) hard white winter wheat (*Triticum aestivum* L.) was developed by the Colorado Agricultural Experiment Station and released to seed producers in September 2001. Avalanche was released because of its hard white grain color and excellent adaptation for dryland production in eastern Colorado and the west-central Great Plains. Avalanche was selected from the cross KS87H325/'Rio Blanco' (PI 531244) made in 1988 at Hays, KS. KS87H325, an unreleased experimental line from the Kansas State University-Hays wheat breeding program, has the pedigree RL6005/RL6008//'Larned'/3/'Cheney'/Larned/4/'Bennett' sib/5/'TAM 107'. RL6005 and RL6008 are Canadian lines (Cereal Research Lab, Winnipeg) where *Lr16* and *Lr17*, respectively, were backcrossed into a 'Thatcher' background.

Avalanche was selected in 1993 at Hays, KS, as an $F_{4:5}$ line following bulk population advance in the F_2 and F_3 generations. Following preliminary yield testing in Kansas in 1994, Avalanche was given the experimental designation CO940611 by Colorado State University. Hand sorting of $F_{4:9}$ bulk seed samples for white kernel color was done in 1997. Breeder seed of Avalanche originated from a composite of 262 $F_{11:12}$ headrows selected in 2000 on the basis of visual uniformity and white kernel color purity.

Avalanche is an awned, white-glumed, medium maturity, semidwarf hard white winter wheat. Avalanche is medium maturing (142 d to heading from 1 January), 4 d later than TAM 107, similar to 'Akron', and 4 d earlier than 'Prowers 99'. Plant height of Avalanche is medium-short (76 cm), 3 cm taller than TAM 107, and 8 cm shorter than Prowers 99. The straw strength of Avalanche is similar to TAM 107 and Akron, but superior to Prowers 99. On the basis of field evaluations under natural infection in Colorado and cooperative evaluations through the USDA Regional Testing Program, Avalanche is resistant to stem rust (caused by *Puccinia graminis* Pers.:Pers. f. sp. *tritici* Eriks & E. Henn.), moderately susceptible to leaf rust (caused by *Puccinia triticina* Eriks.), and moderately susceptible to both *Wheat streak mosaic virus* (WSMV) and Barley yellow dwarf virus. Avalanche is susceptible to the Great Plains biotype of Hessian fly [*Mayetiola destructor* (Say)], greenbug [*Schizaphis graminum* (Rondani)], and Russian wheat aphid [*Diuraphis noxia* (Mordvilko)].

Avalanche was tested in 35 trial locations of the Colorado Dryland Variety Performance Trials from 1998 to 2001. In these trials, Avalanche (3413 kg ha^{-1}) yielded less than Alliance (3507 kg ha^{-1}; $P > 0.05$), similar to Akron (3426 kg ha^{-1}; $P > 0.05$), and significantly greater than TAM 107 (3272 kg ha^{-1}; $P < 0.05$). In comparison with other hard white winter wheat cultivars available in Colorado, Avalanche has yielded less than 'Trego' (3467 versus 3326 kg ha^{-1}; 25 locations, 1999-2001; $P > 0.05$) but greater than both 'Lakin' (2762 versus 2614 kg ha^{-1}; 15 locations, 2000-2001; $P > 0.05$) and 'Nuplains' (2762 versus 2526 kg ha^{-1}; 15 locations, 2000-2001; $P > 0.05$).

Milling and bread baking characteristics of Avalanche were determined from composite grain samples from eight subregional production zones (Peterson, 1992) from the 1999 and 2000 USDA Southern Regional Performance Nurseries and from the 1999 and 2000 Colorado Dryland Variety Performance Trials. Relative to the broadly adapted check cultivar TAM 107, Avalanche had higher grain volume weight (782.5 versus 755.5 kg m^{-3}), kernel weight (30.1 versus 29.6 mg $kernel^{-1}$), and flour yield (679 versus 664 g kg^{-1}) with similar flour protein (117 versus 119 g kg^{-1}) and ash contents (4.4 versus 4.2 g kg^{-1}). In bread baking tests, Avalanche had better crumb grain and texture scores (3.7 versus 3.1 score; 0, unacceptable to 6, excellent scale) and slightly lower bake water absorption (622 versus 630 g kg^{-1}) than TAM 107. Mixograph mixing time, mixograph tolerance score, and loaf volume were similar for Avalanche and TAM 107. Visual ratings of 0- to 24-h alkaline noodle color change have been similar to Trego.

Breeder seed of Avalanche will be maintained by the Colorado Agricultural Experiment Station. Avalanche has been submitted for U.S. Plant Variety Protection under P.L. 91-577 with the certification option. Small quantities of seed for research purposes may be obtained from the corresponding author for at least 5 yr from the date of this publication.

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Acknowledgments

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Registration of 'Everett' Quackgrass

'Everett' quackgrass [*Elytrigia repens* (L.) Nevski] (Reg. no. CV-223, PI 630974) was released by the Minnesota Agricultural Experiment Station on 1 Feb. 2001. Everett is an advanced-generation synthetic cultivar selected for high rhizome production.

Quackgrass is a competitive perennial cool-season grass which is classified as a noxious weed in Minnesota. Quackgrass is characterized by rapid establishment and extensive spreading by rhizomes with the potential for seed reproduction. Ten biotypes selected in northern Minnesota were characterized for growth and development by Westra and Wyse (1981). The biotypes differed in forage quality, forage yield, persistence, leaf width, shoot number and yield, shoot-to-rhizome mass ratio, and ability to spread by rhizomes. A subset of the 10 biotypes was evaluated for potential forage production (Sheaffer et al., 1990). The authors concluded that quackgrass would be a viable alternative to other cool-season forage grasses such as reed canarygrass (*Phalaris arundinacea* L.) and smooth bromegrass (*Bromus inermis* Leyss.), since forage yield and quality were not consistently different. On the basis of the growth habit and extensive rhizome development consistently observed, quackgrass is also a very desirable species for land stabilization and reclamation. Quackgrass is commonly used for this purpose in Europe, and the market potential for a quackgrass cultivar selected for high rhizome-to-shoot production appeared promising for the seed producers in northern Minnesota.

Everett quackgrass is a four-clone synthetic cultivar selected from among the 10 biotypes originally evaluated by Westra and Wyse (1981). The selection criteria included high rhizome-to-shoot dry weight ratio; low shoot, root, and total dry weight; and high rhizome bud number evaluated at Roseau and Rosemount, MN in 1978. On the basis of these data, biotypes 1, 4, 6, and 7 were selected to produce the synthetic. Five vegetative clones of each of the four biotypes were transplanted into an isolated crossing block on the Baumgartner Farm near Roseau, MN. Seed was harvested individually from each plant in 1994, and equal quantities of seed were composited to form the Syn_1 generation. Syn_1 seed was used to establish approximately 400 plants in the greenhouse in 1995 which were later transplanted into an isolated crossing block on the Baugartner Farm near Roseau, MN. Seed was harvested and bulked by individual plant in 1996 to form the Syn_2 generation. The Syn_2 seed was direct-seeded at Roseau, MN, in 1997 in isolation on the Baumgartner Farm to produce Breeder seed.

The performance of Everett quackgrass was compared with common quackgrass, 'Palaton' reed canarygrass and 'Orion' orchardgrass (*Dactylis glomerata* L.). These grasses were evaluated in monoculture and in binary mixtures with alfalfa (*Medicago sativa* L.) at Grand Rapids and St. Paul, MN, from 1996 to 1998. Forage yields of Everett in monoculture (5.1 and 10.7 Mg ha^{-1} at Grand Rapids and St. Paul, respectively) were similar to common quackgrass but were lower than Palaton reed canarygrass and Orion orchardgrass. Forage crude protein, acid detergent fiber, and neutral detergent fiber of Everett averaged 160, 333, and 530 g kg^{-1}, respectively, over three harvests across the two locations in 1987, and few differences were observed among the grass species for forage quality parameters. In replicated trials conducted at Roseau, MN, the seed production potential of Everett quackgrass was good, averaging 412 kg ha^{-1} and was not different from three common quackgrass populations.

Breeder seed of Everett will be maintained by the Minnesota Agricultural Experiment Station, St. Paul, MN. Foundation and Certified seed classes will be allowed: Foundation seed may be produced for three consecutive years, and Certified seed may be produced for five. An exclusive release of the Everett marketing rights has been granted to Norfarm Seeds, Inc. Roseau, MN. All seed of Everett is required to be sold as Certified seed in the state of Minnesota per directive of the Minnesota Commissioner of Agriculture, Minnesota Department of Agriculture. In Europe, quackgrass is an approved species on the Grass and Legume Seed Scheme by the Organization for Economic Co-operation and Development. U.S. Plant Variety Protection for Everett will not be sought.

D.L. Wyse, C.C. Sheaffer, N.J. Ehlke,* D.R. Swanson, and D.J. Vellekson

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Registration of 'TAMBAR 501' Barley

'TAMBAR 501' winter barley (*Hordeum vulgare* L.) (Reg. no. CV-303, PI 620639) was released in August 2001 by the Texas Agricultural Experiment Station, Texas A&M University System. TAMBAR 501 is a feed-type barley that has a combination of high grain yield, early maturity, good winter hardiness, and good disease resistance.

TAMBAR 501 was derived from a composite cross population (CC11) made in the spring of 1986. The maternal parent in CC11 was 'Post' (Edwards et al., 1985) and the pollen parent consisted of an equal mixture (by seed weight) of 'Hitchcock' (Schmidt et al., 1985), 'Kanby' (Heyne and Lawless, 1975), 'Milton' (Murphy, 1981), 'Paoli' (Patterson et al., 1978), 'Schuyler' (Jensen, 1972), 'TAMBAR 401', and 'TAMBAR 402' (Gardenhire et al., 1982). Pollen development on the female, Post, was controlled by a male gametocide (Rohm and Haas Seeds, Inc.). The pollen-donor mixture was sown on the two lengthwise sides of Post. Cross-pollination was allowed to occur, and the F_1 seed was harvested with a small plot combine. The F_1 through F_4 generations of CC11 were grown as bulk populations in the field at the Texas Agricultural Experiment Station, Prosper Research Farm from 1987 to 1990. The seed from each segregating generation was combine harvested and separated on a gravity table with the large, heavy seed saved from each generation. Single tillers were selected in CC11 in the spring of 1990 for disease resistance and plump, undiscolored seed. About 100 head rows were sown in the fall of 1990, and subsequently reselected for three years. In the fall of 1993, seed from the head row CC11PRO-8-12-1-9 was sown at Prosper as a single observation plot and given the designation TX94D632.

TX94D632 was tested in replicated, three-location preliminary and advanced trials in 1994-1995 and 1995-1996, respectively. In the 1996-1997 growing season, TX94D632 was tested in the Uniform Barley Elite Trial (UBET) for 4 yr (1997 through 2000). TX94D632 was tested in the USDA Uniform Winter Barley Yield Trial (UWBYT) in the 1997-1998 and 1998-1999 growing seasons. Purity and multiplication of TX94D632 began in the spring of 1996 with the selection of

1000 heads from a 0.4-ha increase block. Approximately 800 of the subsequent head rows were bulk harvested in 1997, and this seed served as the basis for further testing and increases. About 817 kg of seed of TX94D632, produced from an increase block at Prosper in the 1999-2000 growing season, was used to sow approximately 6 ha of Foundation Seed at Munday, TX, in December 2000.

TAMBAR 501 has semi-prostrate early growth. There are typically six nodes on each adult stem, with terminal stem extension of approximately 0 to 3 cm. The collar shape is closed and neck shape is straight. The flag leaf position is upright at boot stage. Head shape is oblong with no kernel overlap. Lemma awns are long and rough. Seed of TAMBAR 501 is midlong to long; hulls are slightly wrinkled and the aleurone is colorless.

Over 4 yr and 22 locations in the UBET, the grain yield of TAMBAR 501 was 4687 kg ha^{-1}, compared to 4181 kg ha^{-1} for Post 90, 4154 kg ha^{-1} for 'Starling' (Price et al., 1996) and 4101 kg ha^{-1} for 'TAMBAR 500' (Marshall et al., 1993). Similarly, the test weight in the UBET for TAMBAR 501, Post 90, Starling, and TAMBAR 500 were 622 kg m^{-3}, 609 kg m^{-3}, 593 kg m^{-3}, and 614 kg m^{-3}, respectively. Over 24 location years in the UWBYT, TAMBAR 501 had a grain yield of 4870 kg ha^{-1} and a test weight of 571 kg m^{-3}, whereas the common check for both years (1998 and 1999), 'Wysor' (Starling et al., 1987) had a grain yield of 4456 kg ha^{-1} and a test weight of 570 kg m^{-3}. Winter hardiness, when measured on a 0-to-5 scale (where 0 = no damage and 5 = plant death from cold damage), has averaged a 1.5 for TAMBAR 501 compared to a 2.5 rating for Post 90 and TAMBAR 500, and a 2.7 rating for Starling. TAMBAR 501 has had an average heading date of 95 d (Julian), compared to 98 d for Starling and 104 d for Post 90 and TAMBAR 500. The plant height of TAMBAR 501 has averaged 82 cm, compared to 84 cm for Post 90, Starling, and TAMBAR 500.

TAMBAR 501 has expressed good tolerance to Barley yellow dwarf virus (BYDV) as measured in the field by a 0-to-9 scale (where 0 = no symptoms and 9 = plant death from BYDV). The rating for TAMBAR 501 has averaged 2.2, whereas Starling, Post 90, and TAMBAR 500 averaged 2.7, 3.1, and 3.3, respectively. The field reaction of TAMBAR 501 to leaf rust (caused by *Puccinia hordei* Otth.) has been resistant when tested in the southern Great Plains, compared with a moderately susceptible reaction for TAMBAR 500, and susceptible reaction for Post 90 and Starling. Compared to Wysor over all the testing sites in the UWBYN, TAMBAR 501 was rated as resistant to leaf rust, whereas Wysor was susceptible. Similar to Wysor, TAMBAR 501 is moderately resistant to net blotch (caused by *Pyrenophora teres* Drechs.), spot blotch [caused by *Drechslera teres* (Sacc.) Shoemaker], and scald [caused by *Rhynchosporium secalis* (Oudem.) J.J. Davis]. For powdery mildew [*Blumeria graminis* (DC.) E.O. Spear], TAMBAR 501 is susceptible, compared with the resistant Wysor.

Breeder seed of TAMBAR 501 will be maintained by Texas A&M University and small quantities (5 g) may be obtained from the senior author for research purposes. Commercial distribution and sale of TAMBAR 501 has been licensed to Paramount Seed Farms, Quinter, KS. The Texas A&M University System retains ownership of TAMBAR 501 and has applied for U.S. Plant Variety Protection. Recognized seed classes of TAMBAR 501 are Breeder, Foundation, Registered, and Certified.

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Registration of 'NE422T' Winter Triticale

NE422T triticale (× *Triticosecale* Wittmack) (Reg. no CV-27, PI 629028) was developed cooperatively by the Nebraska Agricultural Experiment Station and the USDA-ARS. It was jointly released in 2001 by the developing institutions. NE422T was selected from the cross 'Trical'/'UB-UW26' where Trical is most likely 'Trical 100' (a forage triticale developed by Resource Seed Inc., a subsidiary of Goldsmith Seed Company, Gilroy, CA) and UB-UW26 is an unknown winter triticale germplasm line given to the breeding program in the 1980s. The cross was made in 1990. The F_1 generation was grown in the greenhouse in 1990-1991. The F_2 and F_3 generations were grown in bulk at the Agronomy Farm at Lincoln, NE, 1992 and 1993, respectively. Random heads were chosen from the F_3 bulk and planted as head rows, which were harvested in 1994. NE422T is an F_3-derived line that was visually selected in the F_4 generation on the basis of its forage potential. The F_3-derived F_5 family was harvested as a single observation plot in 1995. NE422T was identified as NE96T422 and was grown at three unreplicated locations in 1996 and in replicated trials thereafter. NE422T was released primarily for its superior forage production in rainfed winter cereal production systems in Nebraska and similar areas in adjacent states.

NE422T is an awned, white-glumed cultivar whose primary use will be as an annual forage crop. Its field appearance is most similar to Trical 100. Kernels are red colored, elliptical, large, and slightly wrinkled. After heading, the canopy is moderately closed and upright. The flag leaf is recurved and not twisted at the boot stage. The foliage is green with a waxy bloom at anthesis. The peduncle is glaborous. The spike is oblong in shape and middense. The glume is pubescent, tan, narrow, and midlong and the glume shoulder is wanting. The beak has an acuminate tip. The spike is usually nodding at maturity. Based on plump kernels, the kernel has no collar, a large brush of long length, rounded cheeks, large germ, and a narrow and deep crease.

NE422T was performance tested as NE96T422 in Nebraska

grain yield nurseries starting in 1997 and in forage yield trials in 1997 and 1998. In 2 yr of fall seeded forage testing in Nebraska cultivar performance trials, NE422T has performed extremely well throughout most of Nebraska in rainfed production systems. The average Nebraska rainfed forage yield cut at the R2 (fully headed but the peduncle not fully emerged) to R4 (anthesis, Nebraska scale; Moore et al., 1991) of NE422T (6 environments) was 9070 kg ha^{-1} dry matter; with an average in vitro dry matter digestability of 63.9% and an average protein content of 90 g kg^{-1}. These data compare favorably with Newcale (a grain triticale: 8730 kg ha^{-1}, 67.9%, and 85 g kg^{-1}) and Trical 100 (8530 kg ha^{-1}, 63.5%, and 90 g kg^{-1}). For further comparison, the forage yields of NE422T were higher than two commonly grown wheat (*Triticum aestivum* L.) cultivars Arapahoe (7200 kg ha^{-1}, 67.7%, 85 g kg^{-1}) and Pronghorn (7930 kg ha^{-1}, 67.0%, 86 g kg^{-1}). The wheat cultivars are earlier than NE422T and were cut at the R4 to S0 (caryopsis visible, Nebraska scale). NE422T grain yield over 10 environments were 2790 kg ha^{-1}. The grain yield was higher than Trical 100 (2040 kg ha^{-1}), but lower than grain triticale cultivars (Presto, 3620 kg ha^{-1}; Newcale, 3120 kg ha^{-1}). For comparison, the grain yield of Arapahoe was 3050 kg ha^{-1}, which is lower than the grain triticale yields and might be explained by triticale yield nurseries generally being planted near, but earlier than the wheat yield trials. The main advantages of NE422T when compared with most other forage triticale cultivars, within its area of adaptation, is its high forage yield coupled with a good grain yield and its broad adaptation in rainfed production systems.

Other measurements of performance from comparison trials show that NE422T is late in maturity: about 7 d later than Newcale, 6 d later than Presto, 5 d later than Arapahoe, and 1 d earlier than Trical 100. NE422T is a tall triticale (148 cm) that is 7.5 cm taller than Trical 100, 31 cm taller than Presto and Newcale, and 49 cm taller than Arapahoe. It has moderate straw strength for a tall, forage triticale. NE422T is slightly better lodging ratings than Trical 100, but worse than Presto, Newcale, and Arapahoe. The winter hardiness of NE422T is comparable to an average winter wheat cultivar and similar to Trical 100, which is one of the most winter hardy triticale cultivars currently available to growers.

On the basis of field observations, NE422T is moderately resistant to the currently prevalent races of stem rust (caused by *Puccinia graminis* Pers.: Pers. f. sp. *tritici* Eriks & E. Henn; most likely containing *Sr31*) and leaf rust (caused by *P. triticina* Eriks.). Like most rye (*Secale cereale* L.) and triticale cultivars, NE422T is moderately resistant to *Wheat streak mosaic virus* (WSMV). Ergot [caused by *Claviceps purpurea* (Fr:Fr) Tul.] has not been found in the cultivar when the disease was present in the other triticales under similar growing conditions. NE422T has an average grain volume weight for triticale.

NE422T should be well adapted to most rainfed winter annual forage production systems, with high forage yield potential in Nebraska. It should also perform well as a second crop in irrigated production systems, where NE422T is planted following a harvested summer annual crop and the forage is harvested the following year before planting another annual summer crop. In these cropping systems, water would not be limiting and three crops could be harvested in 2 yr.

NE422T has been uniform and stable since 1999. Less than 0.5% of the plants were rogued from the Breeder's seed increase in 1999. The rogued variant plants were taller in height (10–20 cm, 1:10,000 plants), or were shorter in height (25–30 cm) and later in maturity (3–4 d later, 1:8000 plants). Up to 1% (10:1000) variant plants may be encountered in subsequent generations.

The Nebraska Foundation Seed Division, Dep. of Agronomy and Horticulture, University of Nebraska-Lincoln, Lincoln, NE 68583 had NE422T Foundation seed available to qualified certified seed enterprises (members of NuPride Genetics Network, part of the Nebraska Crop Improvement Association) in 2000 for seed increase. The first commercial sale of NE422T was made in August, 2001. The U.S. Department of Agriculture will not have seed for distribution. The seed classes will be Breeder, Foundation, Registered, and Certified. The Registered seed class will be a nonsalable seed class. NE422T will be submitted for registration and U.S. Plant Variety Protection under P.L. 10577 with the certification option. A research and development fee will be assessed on all certified seed sales. Seed of NE422T is available for research purposes and as a parent for breeding.

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Registration of 'Dellmati' Rice

'Dellmati' (*Oryza sativa* L.) (Reg. no. CV-115, PI 629291) is an aromatic, elongating, very early maturing, and slender long-grain rice developed at the Rice Research Station at Crowley, LA, by the Louisiana State University Agricultural Center in cooperation with the USDA-ARS, the Arkansas Agricultural Experiment Station, the Mississippi Agricultural and Forestry Experiment Station, the Florida Agricultural Experiment Station, and the Texas Agricultural Experiment Station. Dellmati was officially released in 1999.

Dellmati was developed from the cross 'Domsiah'//'Lemont'/'Newbonnet'/3/'Lemont'/'Della' made at the Rice Research Station in 1987 (87CR054). Domsiah is an aromatic, elongating basmati-type Iranian variety (Nematzadeh et al., 2000). Lemont is a high yielding, semidwarf, long-grain variety developed by the USDA-ARS in conjunction with the Texas A&M University Agricultural Research and Extension Center, Beaumont, TX (Bollich et al., 1985). Newbonnet is a high yielding, short-statured, long-grain rice developed jointly by the USDA-ARS and the Arkansas Agricultural Experiment Station (Johnston et al., 1984). Della is an aromatic variety having conventional U.S. long-grain cooking quality developed at the Rice Research Station, Crowley, LA (Jodon and Sonnier, 1973). Immature panicles were collected from a population of F_2 plants of the original cross and were used with anther culture techniques to derive Dellmati. A population of anther culture-derived progeny (89AC7153) were evaluated over five subsequent generations of selection and in 1992 a stable panicle row (9227487) was identified. Bulked seed of this line was tested in the preliminary yield trials at Crowley, LA, in 1993 and 1994 and entered the Cooperative Uniform Regional Rice Nurseries (URRN) in 1995 with the designation of RU9502171.

The principal reasons for releasing Dellmati as a special

purpose rice are cooked kernel elongation comparable with imported basmati rice, strong aroma, and early maturity. Quality tests conducted by the USDA-ARS, Rice Research Unit, Beaumont, TX, indicate that the lengthwise elongation ratio averaged 2.16 for Dellmati compared with 2.25 of imported basmati and 1.64 of conventional Cypress. The average concentrations (in ng g^{-1}) of 2-acetyl-1-pyrroline, the primary rice aroma compound in aromatic rices (Buttery et al., 1988) over 4 yr were 804, 965, and 845 for Dellmati, Della, and 'Dellrose', respectively. The average days from emergence to 50% heading for Dellmati is 82 d as compared with 89 d for Della and 91 d for Cypress (URRN 1995–1998).

In the URRN tests grown in Arkansas, Louisiana, Mississippi, and Texas and in statewide multilocation tests in Louisiana during 1995 through 1998, the average height of Dellmati was 119 cm, whereas Della and Cypress were 132 and 99 cm, respectively. The flag leaf of Dellmati is narrow and remains below the panicle at heading. The leaves, lemma, and palea are pubescent. The spikelet is straw-colored and the tips of panicles have awns up to 1.5 cm on the lemma at maturity. The apiculus is purple, but fades at maturity. The endosperm of Dellmati is nonglutinous and covered by a light brown pericarp.

Dellmati has moderate grain and milling yields and high ratoon yield. In 32 statewide and regional tests during 1995 through 1998, average grain yield of Dellmati was 5330 kg ha^{-1} compared with 5556 and 8281 kg ha^{-1} for Della and Cypress, respectively. In 14 state and regional tests (1995–1998), average ratoon yield for Dellmati is 2287 kg ha^{-1} compared with 2233 kg ha^{-1} and 772 kg ha^{-1} for Cypress and Della, respectively. When evaluated in 21 state and regional tests from 1995–1998, milling yields (mg g^{-1} whole milled kernels: mg g^{-1} total milled rice) at 120 g kg^{-1} moisture were 515:694 for Dellmati, 549:683 for Della, and 625:694 for Cypress. A comparison of kernel dimensions of Dellmati with other commercial long-grain varieties indicates that it has a relatively long and very slender kernel (Table 1), which is typical of basmati-type rices and is associated with lower milling yields. Dellmati has an intermediate apparent amylose content of 216 g kg^{-1} and an intermediate gelatinization temperature (70–75°C), as indicated by an average alkali (17 g kg^{-1} KOH) spreading value of 4.1.

Dellmati is moderately susceptible to the physiological disorder straighthead, rating a 6 on a disease scale of 0 = immune, 9 = highly susceptible. Dellmati is also moderately susceptible to sheath blight (caused by *Rhizoctonia solani* Kühn), rating a 6 on the disease scale compared with 7 for Cypress. Dellmati is resistant or moderately resistant to blast [caused by *Pyricularia grisea* (Cooke) Sacc.], leaf smut (caused by *Entyloma oryzae* Syd. & P. Syd.), and narrow brown leaf spot [caused by *Cercospora janseana* (Racib.) O. Const.], rating a 2, 3, and 1, compared with a 4, 3, and 3 for Cypress, respectively.

Off-types observed and removed from increase fields included plants that were taller or plants that were shorter and later. The total number of off-types was less than 1 per 5000 plants. Breeder and Foundation seed of Dellmati will be maintained by the Louisiana State University Agricultural Center, Louisiana Agricultural Experiment Station, Rice Research Station, P.O. Box 1429, Crowley, LA 70527-1429. Limited quantities of seed are available upon request to the corresponding author.

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Table 1. Average paddy, brown, and milled individual grain dimensions and weight of Dellmati, Della, and Cypress rice grown at Crowley, LA, in 2001.

Variety	Length (L)	Width (W)	Thickness	L/W Ratio	Weight
		mm			mg
		Paddy rice			
Dellmati	9.74	2.39	1.95	4.08	24.4
Della	9.49	2.52	1.95	3.77	24.6
Cypress	9.30	2.51	1.99	3.71	24.7
		Brown rice			
Dellmati	7.79	2.02	1.71	3.86	19.7
Della	7.29	2.19	1.70	3.33	19.6
Cypress	7.11	2.23	1.81	3.19	20.3
		Milled rice			
Dellmati	7.62	1.95	1.65	3.91	18.1
Della	7.12	2.15	1.62	3.31	17.8
Cypress	6.81	2.19	1.73	3.11	18.8

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Registration of 'Persist' Orchardgrass

'Persist' orchardgrass [*Dactylis glomerata* (L.)] (Reg. no. CV-16, PI 618722) was developed by the Tennessee Agricultural Experiment Station and released 15 Dec. 2000. Persist was tested under the experimental designation TN-OG-SYN-2.

Persist is a six clone synthetic that traces to a collection made from 1959 to 1961 from 6-yr-old or older stands of orchardgrass throughout Tennessee (Fribourg and Burns, 1961). Seeds were collected from 97 ecotypes (strains) in 45 counties. The seeds were used to establish single solid-seeded rows 6 m long and 0.9 m apart. Each strain was replicated twice at the Knoxville, Plateau (Crossville), and West Tennessee (Jackson) Experiment Stations (Gray and Fribourg, 1966, p. 15–18). After the first year establishment, the plants were subjected to a severe treatment of clipping or grazing to a height of approximately 2.5 cm three or four times during the spring and summer for 4 yr. No fertilizer was applied to the plots during this period. Individual surviving plants were selected from each of the three locations and multiplied. Clones comprising Persist originated from individual plant selections at the West Tennessee Experiment Station. Ten replicates of each of 42 clones were established in a crossing block at

Knoxville in September 1976. Data were recorded on an individual plant basis for flowering date, vigor, and incidence of disease, primarily stem rust (caused by *Puccinia graminis* Pers.: Pers.) and leaf rust (caused by *Puccinia coronada* Corda). Seed was also harvested on an individual plant basis and yield data were recorded. Seed was bulked within each clone and used to establish progeny tests at Jackson and Knoxville. On the basis of performance of both parents and progeny, the six most outstanding clones that were synchronous in flowering date were chosen as the parental clones of Persist.

Persist is a productive and persistent cultivar that is adapted from the northern to the extreme southern range of the mid-southern USA. It is similar in maturity date to 'Potomac' and 'Benchmark', but consistently produces more forage later in the season. Persist is easily established and has excellent seedling vigor.

Persist and six other orchardgrass cultivars were tested for forage yield at the Highland Rim Experiment Station (Springfield) for 4 yr and at Knoxville for 5 yr. The yield of Persist exceeded that of the mean in each year and was significantly greater in the last 2 yr at Knoxville, indicating longer persistence. In trials at Lexington and Princeton, KY, in 1993 and 1994, which included 22 cultivars and experimental breeding lines, Persist produced the highest yield over the 2 yr at both locations. Persist was also included in forage yield trials for 3 yr at Tangent, OR. Forage yield was not significantly different than that of the other entries in the trial indicating wide adaptation. Seed yield of Persist was 116.4% of Potomac over a 2-yr period, 1997 and 1998. Although not significantly different, it was the highest ranking of five entries for seed yield in 1998. Persist was equal to Benchmark, Potomac, 'Haymate', and 'Warrior' in crude protein, acid detergent fiber, and neutral detergent fiber concentrations.

In an experiment at Ames Plantation in Southwest Tennessee, in which the performance of early-weaned steer calves was compared on pastures containing Persist and Benchmark, with and without clovers, the performance of calves grazing Persist was equal to that of those grazing Benchmark (Waller et al., 2001). Persist also produced more available forage, both with and without clover. The most significant and important attribute of Persist is persistence. After 4 yr of the grazing experiment, in which there was additional grazing and drought stress during the last 2 yr, there was a 70 to 80% stand of Persist compared to a 0 to10% stand of Benchmark in the pastures that were initially seeded in pure stand (without clovers).

It is expected that Persist will be adapted throughout the USA where orchardgrass is grown, but that it will have superior adaptation, compared to currently available cultivars, in southern regions.

The six parental clones will be maintained by the University of Tennessee. Breeder seed (Syn 1) is being released to Smith Seed Services, Halsey, OR. Smith Seed Services will be responsible for producing Foundation, Registered, and Certified classes of seed. U.S. Plant Variety Protection of Persist has been applied for (PVP Application no. 2002000147).

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Registration of 'UC 933' Barley

'UC 933' is a six-rowed spring feed barley (*Hordeum vulgare* L.) (Reg. no. CV-304, PI 614822) released by the California Agricultural Experiment Station in 2001. UC 933 was selected from the cross 'Sma1'/'Sunbar 401'/3/'Gus'/'Kombyne'//Sma1 (Matchett, and Cantu, 1978). Sma1 has the parentage 'Steptoe'/2*Diamant'/3/Minn Dwarf 64.98-8/'Briggs'/4/'Asse' (Muir and Nilan, 1973; Schaller and Prato, 1968). Robert Matchett made the final cross at Woodland, CA, in 1983. Subsequent generations were handled in a pedigree selection program. Robert Matchett provided a $F_{3:6}$ seed sample to the University of California for testing in 1987. Head selections were made in the 1990-1991 growing season, and head rows were grown out in the 1991-1992 growing season at Davis. Lynn Gallagher selected a single head row for agronomic appearance and designated it as UCD 92-10,585 for preliminary yield trials in 1992.

UCD 92-10,585 was designated UC 933 and placed into California regional yield trials for evaluation from 1994 through 2001. In grain yield tests (15 trials) in the San Joaquin Valley, UC 933 averaged 5961 kg ha^{-1}, 8% more than 'UC 937' (Gallagher et al., 2002). In the Sacramento Valley (13 trials), UC 933 averaged 5861 kg ha^{-1}, 16% more than UC 937. In rainfed environments (16 trials), UC 933 averaged 3235 kg ha^{-1}, 14% more than UC 937.

UC 933, has the *sdw1* gene and is short statured, averaging 86 cm, and is 2.5cm shorter than UC 937, averaged over 29 location-years in Central Valley and Central Coast environments. UC 933 is intended for late fall to early winter (November–December) sowing in the Central Valley and surrounding foothills of California. Heading time of UC 933 is 3 to 4 d earlier than that of UC 937, with mid-November to mid-December emergence under short daylengths in California. UC 933 matures about 2 d earlier than UC 937.

UC 933 is moderately resistant to Barley yellow dwarf virus, leaf rust (caused by *Puccinia hordei* Otth.), powdery mildew [caused by *Erysiphe graminis* DC. f. sp. *hordei* Esm. Marchal; syn. *Blumeria graminis* (DC.) E. O. Speer], net blotch (caused by *Pyrenophora teres* Drechs.), and scald [caused by *Rhynchosporium secalis* (Oudem.) J. J. Davis]. UC 933 is resistant to pathotypes of stripe rust (caused by *Puccinia striiformis* Westend. f. sp. *hordei*) existing in the Central Valley of California. In 2 yr of stripe rust observations at Cochabamba, Bolivia, in 1994 and 1995 (W.M. Brown, V. Velasco, and J.P. Hill, personal communication, 1994 and 1995), UC 933 was scored TrR and 5MS compared with 100S and 90S, respectively, for 'UC 828' (Gallagher et al., 1996).

The spike of UC 933 is rough awned, mid-dense, waxy, and semierect. The covered kernels are beige with a white aleurone. Kernel weight averages about 40.5 mg, which is 1 mg less than that of UC 937. Kernels are long (>10 mm) and slightly wrinkled with hairs on the ventral furrow. Rachilla hairs are long. Test weight averages 60.8 kg hL^{-1}. Resistance to shattering is good and similar to that of UC 937.

Breeder and Foundation seed classes are maintained by the Foundation Seed and Certification Services, Univ. of California, Davis, CA 95616.

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L.W. Gallagher, L.F. Jackson, Y.P. Puri (retired), and H.E. Vogt, Dep. of Agronomy and Range Science, Univ. of California, Davis, CA 95616; R.W. Matchett, Resource Seeds, Zamora, CA 95698. Registration by CSSA. Accepted 31 July 2002. *Corresponding author (lwgallag@scarlet.ucdavis.edu).

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Registration of 'UC 969' Barley

'UC 969' barley (*Hordeum vulgare* L.) (Reg. no. CV-305, PI 619353) is a six-rowed feed barley released by the California Agricultural Experiment Station in 2001. UC 969 was selected from the cross 'Sma1'/'Sunbar 401'/3/'UC 337' (Schaller et al., 1990b). Sma1 has the parentage 'Steptoe'/2*'Diamant'/3/Minn Dwarf 64.98-8/'Briggs'/4/'Asse' (Muir and Nilan, 1973; Schaller and Prato, 1968). Y.P. Puri made the final cross in 1991 and subsequent generations were handled in a pedigree selection program. Lynn Gallagher selected a F_4 head row in 1995 and designated it as UCD 95-2,407 for preliminary yield trials.

In 1996, the selection was designated UC 969 and placed into California regional grain yield trials for evaluation. In 43 yield trials from 1997 through 2001, UC 969 averaged 4,973 kg ha^{-1}, 15.3% more than that 'UC 603' (Schaller et al., 1990a) and 12.5% more than 'UC 937' (Gallagher et al., 2002). UC 969 yielded 100% of 'UC 933' (Gallagher et al., 2002) averaged over all environments. UC 933 and UC 937 are semidwarf cultivars resistant to stripe rust (caused by *Puccinia striiformis* Westend. f. sp. *hordei*), while UC 969 and UC 603 are moderately susceptible to stripe rust.

Heading time for UC 969 was 3 d earlier than UC 603, 8 d earlier than UC 933, and 11 d earlier than UC 937. Time to maturity for UC 969 is 3 d earlier than UC 603 and 8 d earlier than UC 933 and UC 937. UC 969 is meant to replace UC 603 in environments where early heading time is desirable.

UC 969 was taller (90 cm) than the semidwarf cultivars UC 933 (84cm) and UC 937 (85 cm) and the double-dwarf UC 603 (82cm) averaged over 25 location-years in Central Valley and Central Coast environments. UC 969 has lodging resistance superior to UC 933 and UC 937, but inferior to UC 603.

UC 969 is moderately resistant to *Barley yellow dwarf virus*, leaf rust (caused by *Puccinia. hordei* Otth.), scald (caused by *Rhynchosporium secalis* Oud.), and net blotch (caused by *Pyrenophora teres* Drechs.). UC 969 is moderately susceptible to existing pathotypes of stripe rust, but does not sustain grain yield reduction because of its early maturity.

The spike of UC 969 is smooth awned, mid-dense, semierect, and heterogeneous for glossy or waxy spikes. Kernel weight for UC 969 averaged 40.7 mg/kernel, which was ≈2 mg less than that for UC 933, 4 mg more than UC 603, and similar to UC 937. Test weight for UC 969 averages 65.5 kg hL^{-1} and is superior to UC 603, UC 933, and UC 937, which ranged from 59.5 to 62.8 kg hL^{-1}. The kernels are covered and the aleurone is white. Grains are long (>10 mm), slightly wrinkled, and have no hairs on the ventral furrow. Rachilla hairs are long.

Breeder and Foundation seed classes are maintained by the Foundation and Certification Services, University of California, Davis, CA 95616.

L.W. Gallagher,* L.F. Jackson, H.E. Vogt, and Y.P. Puri

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Registration of 'Champagne' Kentucky Bluegrass

'Champagne' Kentucky bluegrass (*Poa pratensis* L.) (Reg. no. CV-65, PI 614851) is a turf-type cultivar released in March 2000 by Lebanon Seaboard, Lebanon, PA. It was developed from germplasm obtained from the New Jersey Agricultural Experiment Station. The experimental designations of Champagne were A91-621 and LTP-621.

Champagne Kentucky bluegrass originated as a single, facultatively apomictic plant identified as 89-2194-4. Its maternal parent, A80-336, is an exceptionally vigorous, moderately apomictic F_1 hybrid selected from the progeny of a cross between Warren's A25 (Dale et al., 1975) and 'Touchdown' Kentucky bluegrass (Rewinski et al., 1978). Open pollinated seed of A80-336 was planted in a turf trial at the Rutgers Plant Biology and Pathology Research and Extension farm at Adelphia, NJ, in the late summer of 1988. After intense interplant competition eliminated most of the weaker plants, promising seedlings were selected from this plot and transferred to a spaced-plant nursery for evaluation and seed production. Plant 89-2194-4 was selected from this nursery, and its seed was used to establish turf plot A91-621 at the Adelphia farm during the late summer of 1991. A91-621 is approximately 85% apomictic. Additional turf trials and spaced-plant nurseries were established at Adelphia in 1992, 1993, 1994, and 1995. Four and one half kg of seed of A91-621 was sent to Lebanon Seaboard in August 1995 for experimental seed increase and seed yield evaluation. Additional seed was submitted for testing to the National Turfgrass Evaluation Program (NTEP) for inclusion in the 1995 National Kentucky bluegrass test. An experimental Foundation seed field was established in the spring of 1998. Certified seed was produced in 1999.

Champagne has a medium plant height, medium-fine leaf width, medium-dark bright green color, medium-high shoot density, and above average turf quality under medium-high maintenance in the NTEP tests established in 1995 (Morris, 2000). Champagne has a large seed size, good seedling vigor, early spring green up, and good winter color. Champagne exhibited good resistance to stripe smut [caused by *Ustilago striiformis* (Westend.) Niessl] and dollar spot (caused by *Sclerotinia homoeocarpa* F.T. Bennet) and moderate resistance to

melting out [caused by *Drechslera poae* (Baudys) Shoemaker] and summer patch (caused by *Magnaporthae poae* Landschoot & Jackson) (Morris, 2000). Champagne has exhibited good tolerance to drought stress but moderate susceptibility to billbugs (*Sphenophorus* spp.). Freshly harvested seed of Champagne, like most other cool-season turfgrasses, can exhibit moderate after-ripening dormancy when seeded during warm temperatures of late summer; however, establishment is normal during cooler fall temperatures or with seed stored until the after-ripening dormancy is overcome (Funk, 2002).

Champagne was developed for turf uses including lawns, athletic fields, golf courses, and recreation areas. It should perform well in regions where Kentucky bluegrass is adapted, as a monoculture or in blends with other Kentucky bluegrass cultivars. It should also perform well in mixtures with newer improved fine-leafed fescues (*Festuca* spp.), tall fescues (*Festuca arundinacea* Schreb.), and perennial ryegrasses (*Lolium perenne* L.). Champagne maintained above average turf quality at 1.3- to 2.5-cm-mowing height and exhibited very good wear tolerance in Iowa, indicating its potential for successful use on athletic fields (Morris, 2000).

Lebanon Seaboard maintains Breeder seed of Champagne. Seed production is restricted to three generations of increase from Breeder seed: one each of Foundation, Registered, and Certified. U.S. Plant Variety Protection of Champagne has been applied for (PVP Application no. 200000350).

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Registration of 'Secretariat' Perennial Ryegrass

'Secretariat' perennial ryegrass (*Lolium perenne* L.) (Reg. no. CV-224, PI 599215) was released in 1996 by Grassland West Company, Clarkston, WA. Germplasm obtained from the New Jersey Agricultural Experiment Station was used in its development. Secretariat was tested as RPBD. The first Certified seed was produced in 1996.

Secretariat is an advanced-generation synthetic cultivar selected from the maternal progenies of 33 clones, each of which contained a *Neotyphodium* endophyte. Progenies of five endophyte-free clones served as additional pollen parents. Most of the parental germplasm of Secretariat traces to plants selected from old turfs located in New York City, Pennsylvania, Maryland, and New Jersey during the period from 1962 to 1977. About 4% of the plants were derived from Loretta, a cultivar of European origin (Alderson and Sharp, 1994).

Selected plants were evaluated in spaced-plant nurseries established at the Rutgers Plant Biology and Pathology Research and Extension Farm, Adelphia, NJ, as well as in greenhouse disease screening tests. Progenies resulting from intercrosses of the best performing clones were evaluated in single-plant progeny tests maintained as closely mowed turf plots. Tillers were selected from the best performing plots after surviving severe interplant competition in stressful environments. Cycles of selection in spaced-plant nurseries and in turf trials continued until the summer of 1992. The 40 most attractive plots were selected from over 2000 turf plots. Forty-eight plants from each of the 40 turf plots were transferred to an isolated spaced-plant nursery at Adelphia, NJ. Before anthesis in 1993, 60% of the plants were rogued to increase plant uniformity. Selection criteria included attractive appearance; bright, dark-green color; leafy, medium-low turf-type growth habit; high seed yield potential; and freedom from disease. Breeder seed was subsequently harvested from 322 plants showing good floret fertility, freedom from disease, and attractive appearance. All plants contained a *Neotyphodium* endophyte. Breeder seed was used to establish a Foundation seed increase field during the late summer of 1993. Foundation seed harvested from this field was entered in the National Turfgrass Evaluation Program in 1994.

Secretariat is a medium-early maturing, medium-low growing, turf-type perennial ryegrass, with bright, dark-green color and fine leaf texture. It has shown superior turf quality throughout the USA, with mean quality ratings statistically similar to the top performing cultivar in the National Perennial Ryegrass Test established in 1994 (Morris and Shearman, 1999). Secretariat showed excellent seedling vigor, density, early spring green-up, and good mowing quality. It also showed moderate resistance to dollar spot disease [caused by *Sclerotinia homoeocarpa* (F.T. Bennett)], and good resistance to brown patch (caused by *Rhizoctonia solani* Kühn).

Secretariat is recommended for sports turf, lawns, parks and recreation areas where perennial ryegrass is well adapted. Freshly harvested seed of Secretariat perennial ryegrass contains a *Neotyphodium* endophyte. Perennial ryegrasses containing selected strains of this endophyte have shown enhanced resistance to many, but not all, harmful insects as well as increased persistence and improved performance under some conditions (Ahmad et al., 1986; Funk et al., 1985; Funk et al., 1983). This endophyte is present in most seed produced by an infected plant and is transmitted only through the maternal parent. Perennial ryegrass seed containing a *Neotyphodium* endophyte can be very useful for turf and conservation plantings. However, this endophyte may adversely affect the health and performance of animals consuming large amounts of endophyte-infected forage under some conditions (Fletcher, 1982). There is reason for caution in using straw from high endophyte seed fields as the sole or primary diet of horses, sheep, or cattle.

Seed production of Secretariat is limited to one generation

each of Foundation, Registered, and Certified seed classes. Breeder seed of Secretariat is maintained by Grassland West Company. U.S. Plant Variety Protection of Secretariat has been applied for (no. 9700375).

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REGISTRATIONS OF GERMPLASMS

Registration of Rust and Late Leaf Spot Resistant Peanut Germplasm Lines

Four peanut (*Arachis hypogaea* L.) germplasm lines, ICGV 99001 (Reg. no. GP-118, PI 631072), ICGV 99003 (Reg. no. GP-119, PI 631073), ICGV 99004 (Reg. no. GP-120, PI 631074), and ICGV 99005 (Reg. no. GP-121, PI 631075), were released in 2001 by the Plant Materials Identification Committee of International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, AP, India, for their resistance to foliar fungal diseases. These lines were derived from *A. hypogaea* and wild *Arachis* species crosses. ICGV#99001 and 99004 belong to subsp. *fastigiata* var. *vulgaris* while ICGV#99003 and 99005 belong to subsp. *hypogaea* var. *hypogaea*. ICGV# 99001 and 99004 possess resistance to late leaf spot (LLS) [(caused by *Phaeoisariopsis personata* (Berk. & Curt.) v. Arx = *Cercosporidium personatum* (Berk. & Curt.) Deighton], and ICGV# 99003 and 99005 have resistance to rust (caused by *Puccinia arachidis* Speg.).

The pedigrees of these germplasm are *A. hypogaea* × *A. villosa* for ICGV 99001; *A. hypogaea* × [*A. duranensis* × *A. stenosperma*] for ICGV 99003; *A. hypogaea* × *A. cardenasii* for ICGV 99004; and *A. hypogaea* × [*A. batizocoi* × *A. duranensis*] for ICGV 99005. These wild *Arachis* species are immune or highly resistant to rust and/or LLS (Subrahmanyam et al., 1983; 1985). Cytologically stable tetraploid interspecific progenies were produced following triploid-hexaploid route of crossing in case of *A. villosa* and *A. cardenasii*, and amphidiploid route in case of *A. batizocoi*, *A. duranensis*, and *A. stenosperma* followed by intermitant backcrossing with recurrent *A. hypogaea* parent. These populations were evaluated under field conditions for rust and LLS following infector row screening technique (Subrahmanyam et al., 1995)

ICGV 99001 has decumbent two growth habit, sequential branching pattern, and medium-sized elliptic green leaves (IBPGR and ICRISAT, 1992). Its plant height averages 17 cm with a canopy breadth of 41 cm. It has six primary branches and one secondary branch. It has 1-2-3 seeded pods with no pod beak or pod ridges, slight pod reticulation, and slight to medium pod constriction. The seeds are round in shape. It has 720 mg g^{-1} meat content and a 100-seed weight of 44 g. The seeds contain 521 mg g^{-1} oil and 253 mg g^{-1} protein of dry seeds.

ICGV 99003 has decumbent three growth habit, alternate branching pattern, and small elliptic dark green leaves. Its plant height averages 18 cm with a canopy breadth of 44 cm. It has six primary branches and 17 secondary branches. It has 2-1-3 seeded pods with slight to moderate pod beak and pod constriction, and moderate pod reticulation and pod ridges. The seeds are elongated to round in shape. It has 740 mg g^{-1} meat content, and a 100-seed weight of 55 g. The seeds contain 531 mg g^{-1} oil and 181 mg g^{-1} protein of dry seeds.

ICGV 99004 has decumbent three growth habit, sequential branching pattern, and medium-sized elliptic green leaves. Its plant height averages 21 cm with a canopy breadth of 36 cm. It has 2-1 seeded pods with slight to moderate pod constriction. The pod beak, pod ridges, and pod reticulation are absent. The seeds are round in shape. It has 730 mg g^{-1} meat content and a 100-seed weight of 36 g. The seeds contain 496 mg g^{-1} oil and 250 mg g^{-1} protein of dry seeds.

ICGV 99005 has decumbent two growth habit, alternate branching pattern, and medium-sized elliptic green leaves. Its plant height averages 11 cm with a canopy breadth of 37 cm. It has six primary branches and eight secondary branches. It has 2-1-3 seeded pods with slight to moderate pod beak, moderate pod constriction and pod ridges, and moderate to slight pod reticulation. The seeds are elongated in shape. It has 690 mg g^{-1} meat content, and a 100-seed weight of 66 g. The seeds contain 517 mg g^{-1} oil and 252 mg g^{-1} protein of dry seeds.

The oil quality, as measured by oleic (O)/linoleic (L) fatty acid ratios, of ICGV 99003 (O/L ratio = 1.53) is relatively better than that of ICGV# 99001, 99004, and 99005 (O/L ratio = 1.16 to 1.21). The seeds of all the lines have dark red testa color. ICGV# 99001 and 99004 mature in 145 d and ICGV# 99003 and 99005 in 156 d during the postrainy season (October–November to April–May) at ICRISAT, Patancheru, India.

By means of infector row technique, these four germplasm were screened for resistance to rust and LLS under field conditions for 2 rainy seasons (June–July to October–November) at ICRISAT. They were evaluated on a 1-to-9 scale, where 1 = no disease and 9 = 81 to 100% foliage damaged, 1 wk before harvest. The average resistant disease score ranged from 3.0 to 4.0 for rust and 3.0 to 5.5 for LLS as compared with 9.0 on the susceptible control TMV 2. ICGV# 99001 and 99004 for LLS and ICGV# 99003 and 99005 for rust recorded the lowest score in both seasons. These lines were also evaluated for components of resistance to LLS and rust under greenhouse conditions. Resistance to LLS in ICGV# 99001 and 99004 is due to longer incubation (9.5–10.0 d as compared with 8 d in TMV 2) and longer latent (16–26 d as compared with 13 d in TMV 2) periods, reduced number of lesions per leaflet (83–116 as compared with 244 in TMV 2 at 20 d after inoculation (DAI)), smaller lesion diameter (2.5–2.8 mm as compared with 6.6 mm in TMV 2 at 35 DAI), reduced sporulation score (1.8–2.7 as compared with 8.0 in TMV 2 at 35 DAI), and lower leaf area damage (6.4–7.4% as compared with 39.0% in TMV 2 at 20 DAI). Resistance to rust in ICGV# 99003 and 99005 is due to longer incubation (10.7–13.0 d as compared with 7.0 d in TMV 2) and longer latent (14–25 d as compared with 9 d in TMV 2 when first pustule sporulated) periods, reduced number of pustules per leaflet (52–110 pustules as compared with 310 in TMV 2 at 50 DAI), smaller pustule diameter (0.6 mm as compared to 1.0 mm in TMV 2 at 50 DAI), reduced sporulation score (1.7–1.9 as compared with 9.0 in TMV 2 at 50 DAI), and lower leaf area damage (1.4–3.0% as compared with 59.5% in TMV 2 at 50 DAI).

The Genetic Resources and Enhancement Program, ICRISAT Center, Patancheru AP 502324, India, will maintain seeds of these elite germplasm. Limited quantities of seed without limitations on research uses will be made available upon request. The seeds of these germplasm are also deposited with U.S. National Seed Storage Laboratory, 1111 S. Manson, St. Fort Collins, CO 80521-4500.

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Registration of RN582 Sorghum Germplasm Line

RN582 sorghum [*Sorghum bicolor* (L.) Moench] germplasm line (Reg. no. GP-591, PI 628277) was developed jointly by the USDA-ARS and the Agricultural Research Division, Institute of Agriculture and Natural Resources, University of Nebraska, and was released in September 2001.

RN582 is an S_6 selection from the cross (RTx430 ms_3ms_3 × E 35-1) × E 35-1. RTx430 was developed and released by the Texas Agricultural Experiment Station (Miller, 1984) and was provided to this project containing the nuclear male sterility gene ms_3 by A.B. Maunder in 1988. E 35-1 is an Ethiopian land race with white seed, tan necrotic plant color, 2-dwarf in height, late maturing, and was obtained from A. Sotomayor-Rios in 1979. RN582 has tan necrotic plant color (*pp*__), white pericarp (__*yy*), thin mesocarp (*ZZ*), normal (*WxWx*) white endosperm, no testa (b_1b_1__), and juicy culms (*dd*). RN582 has demonstrated high heterotic potential for grain yield with 10% higher yields when crossed to AWheatland than the check hybrid AWheatland × RTx430 over the 3-yr period 1998 to 2000, and 20% higher yields when crossed to ATx631 than the white seed tan plant check hybrid ATx631 × RTx437 in 2001 (Table 1). RN582 is adapted to the northern portion of the U.S. grain sorghum producing region and will reach anthesis 5 d earlier than RTx430 in that environment. RN582 is a strong restorer of fertility in A1 cytoplasm. Fertility reaction in other cytoplasmic sterility systems is not known. Nuclear male sterility has not been observed in RN582. Performance data for RN582 and its hybrids collected in 1998, 1999, 2000, and 2001 at Ithaca, NE, are presented in Table 1.

RN582 is a source of tan necrotic plant color and white

Table 1. Descriptive data for RN582, AWheatland × RN582 and ATx631 × RN582 hybrids.

	Days to anthesis†	Height	Seed set‡	Test weight	Yield
Inbreds§		**cm**	**%**	**kg hL^{-1}**	**kg ha^{-1}**
RN582	**82**	**96**	**100**	**63**	**6020**
RTx430	**87**	**133**	**90**	**50**	**4076**
BWheatland (BTx399)	**71**	**104**	**80**	**59**	**5581**
LSD 0.05	**3**	**13**	**21**	**21**	**1693**
Hybrids 1998–2000¶					
AWheatland × RN582	**76**	**165**	**99**	**77**	**10 849**
AWheatland × RTx430	**74**	**139**	**84**	**76**	**9845**
LSD 0.05	**1**	**4**	**11**	**4**	**627**
Hybrids 2001# (tan plant white seed)					
ATx631 × RN582	**77**	**150**	**100**	**56**	**6707**
ATx631 × RTx437	**76**	**131**	**100**	**54**	**5576**
LSD0.05	**1**	**8**	**–**	**6**	**714**

† Days from planting to 50% anthesis.
‡ Percent self seed set under pollinating bag.
§ Data for inbreds are from a randomized complete block design experiment with n = 22 and four replications at 1999 at Ithaca, NE.
¶ Data for hybrids are means pooled over 3 yr from randomized complete block design experiments with four replications at Ithaca, NE, in 1998 (n = 44), 1999 (n = 44), and 2000 (n = 39).
 # Data for tan plant white seed hybrids are from a randomized complete block design experiment with four replications at Ithaca, NE, in 2001 (n = 30).

seed color with demonstrated high heterotic potential that is adapted to the northern portion of the U.S. sorghum production region. It is suited for the production of high quality grain for feed or food.

Seed of RN582 will be maintained and distributed by the USDA-ARS, Wheat, Sorghum, and Forage Research Unit, Department of Agronomy and Horticulture, University of Nebraska, Lincoln, Nebraska 68583-0937, and will be provided without cost to each applicant on written request. Requests from outside the USA must be accompanied by an import permit. 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 variety/cultivar. It is requested that appropriate recognition be made if this germplasm contributes to the development of a new breeding line or variety/cultivar.

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USDA-ARS, Dep. of Agronomy, Univ. of Nebraska-Lincoln, Lincoln, NE 68583-0937. Joint contribution of the USDA-ARS and the Dep. of Agronomy, Univ. Of Nebraska-Lincoln, as Journal Series Paper No. 13555. Registration by CSSA. Accepted 30 June 2002. *Corresponding author (jfp@unlserve.unl.edu).

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Registration of Tx2912 through Tx2920 Sorghum Germplasm Lines

Nine sorghum [*Sorghum bicolor* (L.) Moench] germplasm lines, designated Tx2912 through Tx2920 (Reg. no. GP-592–600, PI 629035–629043), were developed and released in 2002 by the Sorghum Improvement Program of the Texas Agricultural Experiment Station at College Station, TX. These lines are 3-dwarf ($dw_1Dw_2dw_3dw_4$) and possess unique combinations of several agronomic, grain quality, and disease resistance traits.

All of these lines were developed by the pedigree method of plant breeding (Table 1). Most of the parents in the pedigrees of these germplasms have been previously released with the following exceptions. SC326-6 is a partially converted version of SC326-14E (IS 3758C) (Rosenow et al., 1997). 77CS4 is an unreleased breeding line that was a selection from the partially converted version of SC120-14E (IS 2816C)(Rosenow et al., 1997). CS3541 is a breeding line with good disease resistance and green leaf retention.

F_2 progeny from these crosses were selected at College Station. Selections in the F_3 to the F_7 generation were made in one or more of the following locations: Corpus Christi or Beeville (B), TX, College Station (C), TX, and Isabela (T), Puerto Rico. In the final generation of selection, 20 individual panicles of each line were self-pollinated and bulked to create the experimental line. Since that time, these lines have been maintained by self-pollination of increase rows. From 1996 to 2000, these lines were included in numerous replicated tests as inbred lines and in testcross hybrids to determine the merits and weaknesses of each line for key agronomic traits.

All of these germplasms are restorers of the A1 cytoplasmic genetic male sterility system. Their reaction in other cytoplasmic genetic male sterility systems (A2 and A3) has not been tested. Seven of the nine germplasms have tan plant color (Table 1). In addition, two of these germplasms have a red pericarp and tan plant color that may prove particularly useful in the development of tan plant hybrids. None of the lines have a pigmented testa. Maturity ranges from 2 d earlier to 7 d later than RTx430 (Miller, 1984), and plant height

Table 1. Designation, epicarp color, plant color, glume color and pedigree of Tx2912 through Tx2920.

Designation	Epicarp color	Plant color	Glume color	Pedigree
Tx2912	Red	Purple	Purple	(SC326-6 × RTx434)
Tx2913	White	Tan	Straw	(Tx2817 × CS3541)-10-2-B1-B1
Tx2914	White	Tan	Straw	(Rio × CS3541)-5-3-B1-B1-B2-B1
Tx2915	Red	Purple	Purple	(((SC120-14E × Tx7000) × RTx430) × SC326-6)-B17-B1-B2-B5-B1
Tx2916	Red	Tan	Tan	((C.Shallu × Rio)-3-6-3-5-1 × RTx434)-C3-C5-C2-C1-C1-C2
Tx2917	Red	Tan	Tan	(Tx2894 × RTx433)-B13-B1-B1-B3
Tx2918	White	Tan	Tan to light brown	(((SC120-14E × Tx7000) × Tx7000)-10-4-6 × Tx2894)-C1-C2-C1-C1
Tx2919	White	Tan	Tan	((SC120-14E × Tx7000) × Tx7000)-C1-C3-C2-C4-C3-C2
Tx2920	White	Tan	Light brown	(77CS4 × RTx430)-B1-B2-B1-B1-B2

Table 2. General agronomic characteristics of Tx2912 through Tx2920 and standard checks in four Texas environments in 1999. The locations from which data were collected are Weslaco, Corpus Christi, College Station, and Lubbock, TX

Designation	Days to 50% anthesis	Plant height	LD rating†	LPD rating‡	Des. rating§	Anthracnose rating¶	Head smut infection	Grain mold rating¶
		cm					%	
Tx2912	80	104	1.8	4.0	2.8	1.9	0	3.2
Tx2913	79	121	3.0	4.5	2.4	4.0	0	2.7
Tx2914	76	128	2.4	4.5	2.6	4.5	0	3.1
Tx2915	79	118	1.7	3.5	2.8	1.4	2	2.7
Tx2916	78	115	2.1	3.7	2.7	4.8	7	3.0
Tx2917	72	116	2.5	1.8	2.4	1.6	1	2.9
Tx2918	71	110	3.2	3.3	2.9	2.5	0	3.3
Tx2919	72	121	3.0	3.2	2.4	2.7	0	3.7
Tx2920	72	107	3.2	3.5	2.6	3.0	0	3.8
RTx430 (check)	73	118	3.4	3.8	3.2	3.9	1	4.4
RTx436 (check)	73	119	2.5	4.0	2.3	1.7	0	3.7

† LD rating = Foliar disease rating taken at maturity with the scale of 1 (healthy) to 5 (dead). Diseases common in these evaluation were zonate leaf spot, caused by *Gloeocercospora sorghi* D. Bain & Edgerton ex Deighton, bacterial leaf stripe, caused by *Burkholderia andropogonis* (Smith) Gillis et al., and leaf blight, caused by *Exserohilum turcicum* (Pass.) K.J. Leonard & E.G. Suggs.

‡ LPD rating = Leaf and plant death rating that reflects post flowering drought tolerance with a scale of 1 (no stress, healthy) to 5 (dead). Ratings were under severe drought conditions in Lubbock, Texas.

§ Desirability rating = Visual rating of overall phenotypic appearance with a scale of 1 (excellent) to 5 (poor).

¶ Ratings for grain mold and anthracnose are on a scale of 1 (excellent resistance) to 5 (complete susceptibility).

ranges from 14 cm shorter to 10 cm taller than RTx430 (Table 2). In general, the grain quality of these lines is good and most lines, in combination with the correct females, will produce high quality grain sorghum in the hybrids. Hybrids of these lines as male parents with commercially available females are high yielding and agronomically desirable. In combination with food quality grain sorghum females, some of these germplasm lines produce hybrids with food quality sorghum grain.

These lines have been evaluated for reaction to several diseases. Tolerance to anthracnose [caused by *Colletotrichum graminicola* (Ces.) G.W. Wilson], head smut [caused by *Sporisorium reilianum* (Kühn) Langdon & Fullerton], and grain mold (caused by *Fusarium* spp. and *Alternaria* spp.) varies among the lines (Table 2). These lines have above average general foliar disease resistance (Table 2). These lines are resistant to insecticide phytotoxic reactions, and they have not been evaluated for their reaction to insect pests.

Seed of Tx2912 through Tx2920 will be maintained by the Dep. of Soil & Crop Sciences, Texas A&M University, College Station, TX 77843-2474. Small samples of these germplasms are available for distribution upon written request to the corresponding author. It is requested that appropriate recognition of the source be given if this germplasm contributes to the development of new germplasms or parental lines.

W.L. Rooney

Acknowledgments

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Rosenow, D.T., J.A. Dahlberg, J.C. Stephens, F.R. Miller, D.K. Barnes, G.C. Peterson, J.W. Johnson, and K.F. Schertz. 1997. Registration of 63 converted sorghum germplasm lines from the sorghum conversion program. Crop Sci. 37:1399–1400.

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Registration of Tx2921 through Tx2928 Sorghum Germplasm Lines

Eight germplasm lines of sorghum [*Sorghum bicolor* (L.) Moench] designated Tx2921 through Tx2928 (Reg. no. GP-601–608, PI 629044–PI 629059), were developed and released in 2002 by the Sorghum Improvement Program of the Texas Agricultural Experiment Station at College Station, TX. These lines are 3-dwarf ($dw_1Dw_2dw_3dw_4$) and possess unique combinations of several agronomic and grain quality, and disease resistance.

All of these lines were developed by the pedigree method of plant breeding (Table 1). Most of the parents in the pedigrees of these germplasms are publicly released with the following exceptions. 74C5462-1 was a breeding line selection (pedigree unknown) from the TAES sorghum breeding program at College Station. SC110-6 and SC110-9 were partially converted derivatives of SC110-14E (IS 12610C) (Rosenow et al., 1997). RS4906 was a breeding line selection (pedigree unknown) from the TAES sorghum breeding program at College Station.

F_2 progeny from these crosses were selected at College Station. Selections in the F_3 to the F_7 generation were made in one or more of the following locations: Corpus Christi or Beeville (B), TX, College Station (C), Tx, and Isabela (T), Puerto Rico. In the final generation of selection, 20 individual panicles of each line were self pollinated and bulked to create the experimental line. Male sterile (A-line) versions of these B-lines were then developed via backcrossing with ATx623 as the source of A1 cytoplasm. Since that time, the lines have been maintained by self-pollination (B-line) or hand pollinations (A-line) of increase rows. From 1996 to 2000, the lines were included in numerous replicated tests as inbred lines and in testcross hybrids to determine the merits and weaknesses of each line for key agronomic traits.

All of the germplasms are maintainers of the A1 cytoplasmic genetic male sterility system. Male sterile versions of each B-line were released concurrently. Their reactions in other cytoplasmic genetic male sterility systems (A2 and A3) have not been tested. Five of the eight germplasms have tan plant color and two have a red pericarp and tan-plant color that may prove particularly useful in the development of tan plant hybrids (Table 1). None of these lines have a pigmented testa. Maturity in these lines ranges from 5 d earlier to 4 d later than BTx2752 (Johnson et al., 1982), and plant height ranges from 15 cm shorter to 19 cm taller than BTx2752 (Table 2). Hybrids evaluated by means of these lines as female parents with commercially available males are high yielding and agronomically desirable. In combination with the correct R-lines, some of these germplasm lines produce hybrids with food quality sorghum grain.

These lines have been evaluated for reaction to several diseases. Tolerance to anthracnose [caused by *Colletotrichum graminicola* (Ces) G.W. Wilson], head smut [caused by *Sporisorium relianum* (Kuhn) Langdon & Fullerton], and grain mold (caused by *Fusarium* spp. and *Alternaria* spp.) varies among the lines (Table 2). The lines have variable levels of general foliar disease resistance (Table 2). The lines are resistant to insecticide phytotoxic reactions, and have not been evaluated for reaction to insect pests.

Seed of Tx2921 through Tx2928 will be maintained by the Dep. of Soil & Crop Sciences, Texas A&M University, College Station, TX 77843-2474. Small samples of these germplasms are available for distribution upon written request to the corresponding author. It is requested that appropriate recognition

Table 1. Designation, epicarp color, plant color, glume color, and pedigree of Tx2921 through Tx2928.

Designation	Pericarp color	Plant color	Glume color	Pedigree
Tx2921	White	Tan	Light brown	(74C5462-1 × BTx615)-23-3-C1-C2-C2
Tx2922	Red	Tan	Tan	((BTx378 × SC110-6) × ((BTx378 × SC110-9) × BTx615))-C1-C4-C2-C4
Tx2923	Red	Purple	Purple	((BTx378 × SC110-6) × BTx623)-B4-T2-C1-T2
Tx2924	Red	Purple	Purple	(BTx623 × (BTx378 × SC110-6))-B11-B1-B1-T2
Tx2925	White	Tan	Tan	(BTx630 × BTx629)-B3-B1-T1-C2
Tx2926	Red	Purple	Purple	(BTx623 × (BTx378 × SC110-9))-B4-B2-B2-B5
Tx2927	Red	Tan	Tan	(BTx378 × SC110-6) × BTx631)-C3-C4-C5-C4
Tx2928	White	Tan	Tan	(RS4906 × BTx399) × RS4906)-C4-T3-C1-C1

Table 2. General agronomic characteristics of Tx2912 through Tx2928 and standard checks in four Texas environments (Weslaco, Corpus Christi, College Station, and Lubbock) in 1999.

Entry	Days to 50% anthesis	Plant height	LD rating†	LPD rating‡	Des. rating§	Anthracnose rating¶	Head smut infection	Grain mold rating¶
		cm					%	
Tx2921	72	122	2.0	4.5	3.0	4.5	2	3.5
Tx2922	64	135	2.0	3.0	3.0	4.5	2	2.3
Tx2923	71	121	3.0	3.5	2.7	4.0	2	2.7
Tx2924	73	116	2.5	4.0	2.5	4.5	5	2.6
Tx2925	72	129	2.0	4.5	2.3	5.0	1	3.2
Tx2926	71	124	2.5	4.0	2.5	4.5	5	2.4
Tx2927	73	118	2.0	3.0	3.0	4.0	7	2.6
Tx2928	69	95	3.0	3.0	2.7	3.0	5	2.9
BTx2752 (check)	69	110	2.5	3.5	3.2	3.0	2	3.1
BTx631 (check)	76	130	2.5	4.5	3.0	2.5	6	3.3
BTx378 (check)	68	130	3.5	4.0	3.5	1.5	5	3.7

† LD rating = Foliar disease rating taken at maturity with the scale of 1 (healthy) to 5 (dead). Leaf disease ratings were made at Corpus Christi and College Station, TX. Diseases common in these evaluation were zonate leaf spot, caused by *Gloeocercospora sorghi* D. Bain & Edgerton, bacterial leaf stripe, caused by *Burkholderia andropogonis* (Smith) Gillis et al., and leaf blight, caused by *Exserohilum turcicum* (Pass.) K.J. Leonard & E.G. Suggs.
‡ LPD rating = Leaf and plant death rating that reflects post flowering drought tolerance with a scale of 1 (no stress, healthy) to 5 (dead). Rating is an average of LPD ratings taken at Corpus Christi and Lubbock, TX.
§ Desirability rating = Visual rating of overall phenotypic appearance with a scale of 1 (excellent) to 5 (poor).
¶ Ratings for grain mold and anthracnose are on a scale of 1 (excellent resistance) to 5 (complete susceptibility). Grain mold ratings are from Weslaco, Corpus Christi, and College Station, TX. Anthracnose ratings are from College Station.

of the source be given if this germplasm contributes to the development of new germplasms or parental lines.

W.L. Rooney

Acknowledgments

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Registration of the Maize Population Zapalote Chico 2451F

Zapalote Chico 2451F (ZC-2451F) (Reg. no. GP-370, PI 618810), a maize (*Zea mays* L.) germplasm population was released in April 2001 by the Florida Agricultural Experiment Station and the USDA-ARS Crop Genetics and Breeding Research Unit. This population was released as a source of improved resistance to silk and ear feeding by larvae of the corn silk fly [*Euxesta stigmatias* Loew. (Diptera: Otitidae)], the fall armyworm [*Spodoptera frugiperda* (J.E. Smith)], and the corn earworm [*Heliocoverpa zea* (Boddie) (Lepidoptera: Noctuidae)]. Zapalote Chico 2451F is distinct from Shrunken Zapalote Chico (ZC-*sh2*) (PI 612343), and the Zapalote Chico land race collected in the state of Oaxaca, Mexico, in the late 1940s, and first acceded to the National Seed Storage Laboratory as PI 217413 (Scully et al., 2000; Anderson, 1959; Straub and Fairchild, 1970). PI 217413 was one of the earliest Zapalote Chico populations identified as a source of natural compounds with insecticidal properties (Wais et al., 1979; Wilson and Wiseman, 1988). Resistance in Zapalote Chico 2451F is also due to elevated levels of the flavone glycoside maysin that is found in fresh silk (Ellinger et al., 1980; Snook et al., 1993, 1995). Maysin is synthesized in the flavonoid pathway and known to specifically confer antibiosis-based resistance to silk feeding (Byrne et al., 1996).

Zapalote Chico 2451F is one of several subpopulations derived from Oaxaca Gpo. 35, a Zapalote Chico population held at CIMMYT, Mexico (A. Ortega, 1968, personal communication). Zapalote Chico 2451F was developed from two phases of selection. In the first phase, three cycles of recurrent mass selection were conducted in Tifton, GA, on Oaxaca Gpo. 35, which resulted in a germplasm line coded as ZC 2451 (P)C3. Selection was practiced primarily for a plant with a purple phenotype; secondary selection criteria emphasized agronomic traits such as plant uniformity, seedling vigor, and tight husks. Subsequently, ZC 2451 (P)C3, along with an array of other Zapalote Chico accessions, were assessed for resistance to silk and ear feeding by lepidopteran larvae. After the identification of improved insect resistance, ZC 2451 (P)C3 underwent another three cycles of phenotypic recurrent mass selection in Florida from 1995 to 1997. In different generations, selection was practiced at variable intensities of 2.063 to 1.554 (5–15%) for resistance to ear and silk feeding by the corn silk fly and fall armyworm. This selection program resulted in the Zapalote Chico 2451F population.

In Florida, Zapalote Chico 2451F was compared with the sweet corn hybrid Primetime, the Bt test hybrid GSS 0966 with the *Cry 1A(b)* construct, and ZC-*sh2*. At silk emergence, corn silk fly larvae were infested on freshly emergent silk with ear damage rated at roasting stage (±21 DAP) on a 0 to 4 scale (Scully et al., 2002). Results from 1998 to 2000 indicated that Zapalote Chico 2451F and ZC-*sh2* sustained ear damage rated at 1.31 and 1.49, respectively, and were significantly more resistant than either GSS 0966 or Primetime, each rated at 2.45 and 2.56, respectively. Silk infestation with neonate and/or first instar fall armyworm during the same time period revealed that GSS 0966, ZC-*sh2*, and Zapalote Chico 2451F were comparable and rated at 1.83, 1.78, and 1.73, respectively, on a 0 to 3 damage scale. The susceptible check, Primetime, incurred an average damage rating of 2.58. Damage caused by corn earworm in Georgia on GSS 0966, Zapalote Chico 2451F, and ZC 2451 (P)C3 was not significantly different and rated at 2.35, 2.52, and 2.83, respectively. Corn earworm damage to Primetime averaged 7.00, while ZC-*sh2* sustained an average damage rating of 4.70.

Levels of silk maysin were assayed and compared for Primetime, GSS 0966, ZC-*sh2*, Zapalote Chico 2451F, along with

ZC 2451 (P)C3 on plants grown in Georgia. On the basis of fresh silk weights, ZC-*sh2*, Zapalote Chico 2451F, and ZC 2451 (P)C3 had 1.02, 0.52, and 0.49% maysin, respectively. All three were significantly different. As expected, the maysin assay in Primetime and GSS 0966 was near zero.

In Florida, the Zapalote Chico 2451F population averaged 180 cm in height with ears placed 53 cm above the ground, and reached midsilking in 62 d, 3 d earlier than Primetime. Mature plants had 8 to 11 leaves at silk expression with mostly five leaves above the top ear. Brace roots were present, but not prolific, on stalks with a basal diameter up to 2.0 cm. Tillers were absent. Internode width at the top ear ranged from 1.7 to 2.2 cm, with internode lengths of 14.0 to 20.0 cm. Leaves at the top ear of Zapalote Chico 2451F measured 63 to 76 cm in length with leaf widths of 7.0 to 8.0 cm. Leaves at the ear node angled 45° and were pendulant toward the tip, usually with five or more marginal waves and few longitudinal creases. Husk leaves on Zapalote Chico 2451F generally ranged from 13.0 to 15.0 cm, but occasionally up to 20 cm, with two to three of these husks wrapped completely around the ear. Husk leaves clasped tightly around the ear and at the tip. Flag leaves were mostly absent. Husk leaf lengths measured 17.0 to 20.0 cm and extended 1.0 to 2.0 cm beyond the ear tip. The Zapalote Chico 2451F population is suffused with deep purple and reddish pigmentation throughout most plant organs.

Ears measured 8.0 to 10.5 cm in length, and up to 4.0 cm in width on cobs that averaged 2.7 cm wide. Ears were held on the stalk at a 15° to 30° angle. Kernel formation on the ear was distinct, with dropped rows at the base of the ear. Majority row count was 14 and commonly ranged from 10 to 16. Shank length measured between 5.0 and 7.0 cm with 7 to 8 internodes. White floury kernels taken from the mid-ear region measured 0.80 cm in length, 0.40 cm in width, and had an average kernel height of nearly 0.99 cm. Zapalote Chico 2451F was susceptible to the common races of blight and rust diseases found in Florida.

This Zapalote Chico 2451F population is part of a series of high maysin populations that include ZC-*sh2*, the popcorn accession PI 340856, EPM6 (PI 614735) with a semipopcorn type purple kernel, and SIM6 (PI 614736) with a yellow dent kernel on a red cob. (Scully et al., 2000; Widstrom and Snook, 2001, 2002). Zapalote Chico 2451F is publicly released with the request that recipients of this seed acknowledge the source when using this germplasm in either research or crop improvement. In addition to storage at the National Seed Storage Laboratory, seed stock will be maintained and is available from N.W. Widstrom or B.T. Scully at their respective addresses.

N.W. Widstrom,* B.R. Wiseman, M.E. Snook,
G.S. Nuessly, and B.T. Scully

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PARENTAL LINE

Registration of RTx437 Sorghum Parental Line

RTx437, a sorghum [*Sorghum bicolor* (L.) Moench] parental line (Reg.no. 282, PI 629034), was developed and released by the Sorghum Improvement Program of the Texas Agricultural Experiment Station at College Station, TX. This line is suitable for use as a male parent in the production of hybrids with good grain quality and/or as germplasm for use in a breeding program that emphasizes agronomic and grain quality improvement. In hybrid combinations, this line has produced white-grain tan plant hybrids with consistently high yields. The hybrids also have good agronomic and grain quality characteristics.

RTx437 was developed using pedigree breeding methodology and has a pedigree of (77CS4 × RTx430)-B1-B2-B1-B1-B4-B1-CBK. 77CS4 is an unreleased line in the sorghum breeding program which was a selection from the partially converted version of SC120-14E (IS 2816C)(Rosenow et al., 1997). IS 2816C is a white, tan zerazera (Murty and Govil, 1967) from Sudan that was converted and released by the TAES/USDA in 1970 (Rosenow et al., 1997). RTx430 was developed and

Table 1. Agronomic characteristics of RTx437 and checks from a total of 16 environments across Texas and Kansas.

	Days to 50% anthesis		Plant height		Exsertion		Desirability†	
Genotype	Mean	Range	Mean	Range	Mean	Range	Mean	Range
			cm	cm	cm	cm		
RTx437	71	58–90	102	79–119	7	0–17	2.8	1.4–3.5
RTx436	73	57–90	106	86–125	7	0–17	2.8	1.3–3.7
Tx2783	77	64–99	106	84–117	1	0–3	3.0	1.3–4.4
RTx430	72	60–90	109	86–124	3	0–10	2.9	1.4–4.1

† Desirability ratings are a subjective rating based on a scale of 1 (best) to 10 (worst).

released in 1976 by the Texas Agricultural Experiment Station (Miller, 1984). The initial F_1 was made in a greenhouse in College Station by hand emasculation. F_2 progeny were selected at College Station, TX. Selections in the F_3 through F_8 generations were made at Beeville or Corpus Christi, TX. In most generations, selections were made in nurseries that were rainfed, and encountered significant disease pressure. Final selection and initial increases of RTx437 were made at College Station in 1990.

Grain from RTx437 has a white pericarp (*rrYY*), thick mesocarp (*zz*), and no testa ($b_1b_1B_2B_2$). The line has tan plant color (*ppqq*), light brown glume color, and is awnless (*AA*). The line has moderate resistance to insecticide phytotoxicity, but the reaction is difficult to detect because of the tan plant color. The panicles are semicompact, glumes cover approximately 20% of the seed, and the grain is easily threshed from the panicle. Seed and/or grain of RTx437 are medium in size. Thousand seed weight of RTx437 averaged 27.6 g over four environments. RTx437 fully restores fertility in the A1 cytolasmic sterility system, but it is does not restore fertility to the A2 and A3 cytoplasmic sterility system.

Days to 50% anthesis for RTx437 range from 58 to 90 d (Table 1). RTx437 is genetically a three dwarf inbred (dw_1Dw_2 dw_3dw_4) in plant height, and phenotypically, the plant height of RTx437 ranges from 79 to 115 cm (Table 1). Panicle exsertion of RTx437 ranged from 0 to 17 cm (Table 1). Leaf and plant death ratings for RTx437 are similar to those of RTx436 (Miller et al., 1992), RTx430 and Tx2783 (Peterson et al., 1984), but the line will express higher levels of stress susceptibility than the checks under extremely dry conditions. On average, desirability ratings for RTx437 were similar to ratings for RTx430, RTx436, and Tx2783 (Table 1).

RTx437 is resistant to systemic and local lesion downy mildew pathotype 1 infection [caused by *Peronosclerospora sorghi* (W.Weston & Uppal) C.G. Shaw]. RTx437 is resistant to head smut [caused by *Sporisorium reilianum* (Kühn) Langdon & Fullerton]. RTx437 shows moderate tolerance to *Maize dwarf mosaic virus* (MDMV) and it is susceptible to anthracnose [caused by *Colletotrichum graminicola* (Ces.) G.W. Wilson] when evaluated in College Station, TX. RTx437 is susceptible to grain mold, but has moderate levels of resistance to rust (caused by *Puccinia purpurea* Cooke), and zonate leaf spot (caused by *Gloeocercospora sorghi* D. Bain & Edgerton). The line has not been evaluted for reaction to any insect pests.

In hybrid combinations, RTx437 has good general combining ability. Hybrids of RTx437 with three different inbred lines in over 30 environments yielded 110% of RTx436 hybrids with the same females. Grain quality parameters for hybrids of RTx437 are similar to those of RTx436 hybrids. Performance of RTx437 hybrids was consistent across a wide range of environments, and there was no specific environment in which RTx437 hybrids performed consistently better or worse than the checks.

Seed of RTx437 will be maintained by the Dep. of Soil & Crop Sciences, Texas A&M University, College Station, TX 77843-2474. Small samples of RTx437 are available for distribution upon written request to the corresponding author. We request that appropriate recognition of the source be given if this germplasm contributes to the development of new germplasms or parental lines.

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