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Published September, 2002

REGISTRATIONS OF CULTIVARS

Registration of 'Ein El Gazal' Cowpea

'Ein El Gazal' cowpea [*Vigna unguiculata* (L.) Walp.] (Reg. no. CV-199, PI 619432) was developed by the Agricultural Research Corporation (ARC) of the Sudan in collaboration with the University of California, Riverside (UCR), and was released by the National Release Committee of the Sudan in 2000. Ein El Gazal is adapted for grain production under rainfed conditions in the Sahelian Zone of the Sudan in northern Kordofan where annual rainfall in the last 33 yr (1968–2000) at El Obeid (13° 10′ N 30° 14′ E elevation 577 m) has averaged only 303 mm per growing season.

Ein El Gazal, tested as UCR 1-12-3, was derived from a cross in 1977 between a California cultivar, CB5 (Mackie, 1946), as the female parent and a breeding line from Senegal, 'Bambey 23' (Sène and N'Diaye, 1974), as the male parent. Crossing and initial selections were conducted at UCR. The main objective was to obtain an extra-early cowpea cultivar by crossing two early flowering lines with different genetic backgrounds to achieve transgressive segregation for earlier flowering. Emphasis was given to developing an extra-early cowpea cultivar due to the following circumstances. The long-term average rainfall in the Sahel from 1918 to 1968 (e.g., 388 mm at El Obeid, Sudan, and 447 mm at Louga, Senegal) had been sufficient to result in useful grain production in most years by available cowpea landraces that had cycle lengths of 90 to 100 d from sowing to harvest. However, from 1968 to 1998, there has been a near continuous drought in the Sahel (average rainfall of only 301 mm at El Obeid and only 276 mm at Louga) during which time only extra-early cowpea cultivars with cycle lengths of about 60 d have consistently produced useful quantities of grain. Both parents used in the cross are erect, which is associated with extreme earliness of flowering. Both parents have large cream seeds (individual seed weight of both CB5 and Bambey 23 is 210 mg under Sahelian conditions in Senegal) with black eyes and rough seed coats. These seed qualities are attractive to many Sahelian consumers.

An F_2-derived F_4 population of 585 families and parental lines were grown in a well-irrigated field at UCR in 1978. Twenty-three lines were selected that began flowering a few days earlier and had the same type of large high quality seed as the parents and were erect with synchronous flowering. Further selections were made on the basis of grain yield in tests conducted under well-irrigated field conditions at UCR in 1979 and well-irrigated and dry field conditions at UCR in 1980 and 1981. Selected lines were then tested under rainfed conditions with variable levels of drought in the Sahel at Bambey, Senegal, in 1980, 1981, and 1982 and at Louga, Senegal, in 1981 and 1982 (Hall and Patel, 1985). Ein El Gazal was extra early in that 50% of the plants produced their first flowers 37 d after sowing and plants reached physiological maturity in about 60 d under well-watered conditions and a few days sooner with terminal drought. In 1982 at Louga with only 181 mm of rainfall, Ein El Gazal produced 1091 kg ha^{-1} of grain in 55 d, whereas local landraces in an adjacent experiment had only just begun flowering at this time and produced virtually no grain because of a terminal drought. Ein El Gazal has substantial yield potential in that in 1982 at Bambey with 452 mm of rain, it produced 2406 kg ha^{-1} of grain. A subset of the UCR lines that gave high average grain yields in Senegal, including Ein El Gazal, was sent to the Sudan.

In the first yield trial at El Obeid, Experiment Station, Sudan, in 1983, which was a dry year with only 230 mm of rain, Ein El Gazal produced 500 kg ha^{-1} of grain while two local landraces, 'Garn Elkabish' and 'Gambaru', only produced 135 and 169 kg ha^{-1}, respectively (Hall and Patel, 1985). From 1985 through 1993, Ein El Gazal was evaluated in seven annual trials on the experiment station at El Obeid with an average rainfall of 285 mm and no pesticide applications, other than a seed dressing of Fernasan D (tetramethylthiuram disulfide). Ein El Gazal produced an average grain yield of 596 kg ha^{-1} and had greater yield stability than a local landrace that produced an average grain yield of only 215 kg ha^{-1}. Ein El Gazal also was evaluated in 60 on-farm trials over 5 yr at three locations in northern Kordofan, Sudan, with no pesticide applications (Agricultural Research Corporation, 1992–1997). Ein El Gazal produced an average grain yield of 363 kg ha^{-1} compared with the average yield of a local landrace, 'Baladi', of only 85 kg ha^{-1}. In 6 yr of trials at El Obeid Research Station, 50% of plants of Ein El Gazal produced their first flower 41 to 48 d after sowing and plants reached physiological maturity in 60 to 71 d. In contrast, 50% of plants of the local landrace used in the trials produced their first flowers 58 to 88 d after sowing and plants reached physiological maturity in 87 to 117 d, which accounts for their smaller grain yields than Ein El Gazal when the rainy season was short. Ein El Gazal is erect with synchronous flowering and has cream seed with a black eye, a rough seed coat, and an average individual seed weight when grown in northern Kordofan of 186 mg. By 2001, about 500 000 farmers in northern Sudan had been supplied with seed of Ein El Gazal, including farmers in the states of North Kordofan, South Kordofan, and South Darfur.

Breeders seed can be obtained from either the Agricultural Research Corporation at El Obeid Research Station, P.O. Box 429, El Obeid, Sudan, or the Botany & Plant Sciences Department, University of California, Riverside. U.S. Plant Variety Protection will not be applied for.

H.O.A. ELAWAD AND A.E. HALL*

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Registration of 'Iona' Wheat

'Iona' hard red spring wheat (*Triticum aestivum* L.) (Reg. no. CV-918, PI 618734) was released in April 1999 by the Idaho Agricultural Experiment Station in cooperation with the Oregon and Washington State Agricultural Experiment Stations. Iona is a tall, semidwarf wheat adapted to rainfed production at elevations above 1000 m in the intermountain West of the USA. Iona was released because of its excellent grain yield and end-use quality.

Iona was derived from the 1989 cross A89232S with the pedigree Idaho 367/'Klasic'. Klasic (PI 486139) is a privately developed hard white spring wheat adapted to the western USA. Idaho 367 was derived from the cross Idaho 270/Idaho 134, where Idaho 270 had the pedigree 'Sonora 64'/'Winalta'/7/'Moran'/3/III-58-1//'Frontana'/3*'Thatcher'/4/'Norteno'/'Anahuac B'//Winalta/3/Moran/'Atlas 50'/5/'Rex'/'Rio'//2*'Cheyenne'/3/'Turkey'/6/SM6/4/2*'Itana'/Utah 175a-53//'Burt'/3/CI 13438 and Idaho 134 had the pedigree 'Borah'/3/II-60-101//'Tezanos Pintos Precos'/Sonora 64. A89232S was advanced by the bulk method of breeding from the F_1 to F_3 generation in field plantings at Aberdeen. In the F_3 generation, heads were selected from short plants and planted as $F_{3:4}$ headrows in 1991. From these headrows, the single headrow selection A89232S-3 was bulked and advanced to rainfed and irrigated yield trials in southeastern Idaho for 3 yr. In 1995, A89232S-3 was designated IDO492 and F3:8 seed was entered into the Western Regional Spring Wheat Nursery for 3 yr of testing (1995–1997). In 1996, the milling and baking quality of IDO492 was evaluated by the Pacific Northwest Wheat Quality Council. In 1996, 100 F8:9 head selections were grown at Tetonia, ID, and selected for uniform plant type. Seed from headrows that were true to type were harvested and planted at Tetonia in 1998 to form breeder seed.

Iona is most similar in appearance to the cultivar Probrand 751 (PI 486144). Iona has a nonpigmented coleoptile and erect juvenile growth. Iona has a recurved flag leaf and an awned, curved, middense head that is white-chaffed at maturity. Iona is 90 cm tall, 10 cm taller than 'Westbred 926', and 10 cm shorter than 'Amidon' (PI 527682). Iona is midseason spring wheat, maturing in southeastern Idaho environments at Day of Year174 , approximately 1 d later in heading than Westbred 926 and 2 d earlier than Amidon. In irrigated trials, Iona is more prone to lodge than Westbred 926, yet less prone than Amidon. Seed of Iona is dark red, hard, ovate, and plump. The kernel shape is similar to Klasic, but has a seed weight of approximately 35 mg, 3 mg per kernel lighter than Klasic. On the basis of field evaluations in Washington and Idaho, Iona has adult plant resistance to stripe rust [caused by *Puccinia striiformis* (Westend.)], and moderate susceptiblility to leaf rust [caused by *P. triticina* (Eriks.)]. On the basis of field evaluations at Aberdeen, Iona is susceptible to the Russian wheat aphid [*Diuraphis noxia* (Mordvilko)]. In Moscow, ID, field trials, Iona is susceptible to northern Idaho populations of the Hessian fly [*Mayetiola destructor* (Say)] comprised of biotypes GP, E, F, G.

Iona's combination of grain yield, test weight, and protein concentration compares favorably with current hard red spring wheats, particularly in rainfed production. In 13 site-years of replicated, rainfed trials in southeastern Idaho from 1994 to 1998, Iona had a grain yield of 3.04 Mg ha^{-1} compared with 2.95 Mg ha^{-1} for Amidon, 2.98 Mg ha^{-1} for Westbred 926, 3.16 Mg ha^{-1} for 'Jefferson' (PI 603040), and 3.29 Mg ha^{-1} for Probrand 751. In the same trials, Iona had a test weight of 766 kg m^{-3} similar to Jefferson (769 kg m^{-3}) and significantly higher than Amidon, Westbred 926, and Probrand 751 (755, 759, and 751 kg m^{-3}, respectively). In 5 yr of southeastern Idaho trials, Iona had a high flour protein concentration of 126 g kg^{-1}, similar to Amidon, and Westbred, 926; Iona had 13 g kg^{-1} and 4 g kg^{-1} higher flour protein concentration than Probrand 751 and Jefferson, respectively. In 5 yr of baking evaluations by the University of Idaho Wheat Quality Laboratory, Iona had a high milling yield (720 g kg^{-1}), similar to Probrand 751 (720 g kg^{-1}) and Jefferson (71.6 g kg^{-1}), and significantly higher than Amidon (705 g kg^{-1}) and Westbred 926 (692 g kg^{-1}). In evaluations of the milled flour, Iona has strong dough mixing characteristics with 0.8 min longer time to mixograph peak time than Amidon and Probrand 751 and similar mixograph peak times as Jefferson and Westbred 926. Bread loaf volume of Iona (1008 mL) is similar to Amidon (948 mL), Probrand 751 (983 mL), Jefferson (989 mL), and Westbred 926 (1002 mL).

Seed of Iona will be maintained by the Idaho Agricultural Experiment Station. Foundation seed may be obtained by contacting the corresponding author.

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Registration of 'Tara 2000' Wheat

'Tara 2000' hard red spring wheat (*Triticum aestivum* L.) (Reg. no. CV-919, PI 617073) was developed by the Agricultural Research Center of Washington State University in cooperation with the Agricultural Experiment Stations (AESs) of the University of Idaho and Oregon State University and USDA-ARS. Tara 2000 was jointly released by the AESs of Washington, Idaho, and Oregon and the USDA-ARS in April 2002. Tara 2000 was released as a replacement for 'Westbred 926' in the intermediate to high rainfall (400 mm of average annual precipitation), nonirrigated wheat production regions of Washington State on the basis of its tolerance to the Hessian fly [*Mayetiola destructor* (Say)], high grain yield, and superior end-use quality.

Tara 2000 was tested under the experimental designations WA007824, K9300092, and K88437, which were assigned through progressive generations of advancement. Tara 2000 is a $F_{4:5}$ head row selection derived from the cross 'Kodiak' (PI 535008)/'Spillman' (PI 506350)//'Westbred 906R' (PI 483455), which was made in 1987. A modified pedigree-bulk breeding method was used to advance early generation progeny. Bulked seed from F_1 plants was used to establish an F_2 field plot. Seeds from approximately 100 randomly selected heads from individual F_2 plants were bulked together to establish a single F_3 plot that was bulk harvested to establish an F_4 field plot. Single heads from 150 F_4 plants were threshed individually to establish $F_{4:5}$ head row families. Following selection for general adaptation, plant height, and grain appearance, seeds from all plants (30–50) within each selected head row were bulk harvested to obtain $F_{4:6}$ seed for grain yield assessment. F_1, F_2, F_4, and F_5 progeny were advanced in field nurseries at Pullman, WA, whereas F_3 progeny were advanced at the Washington State University Dryland Experiment Station at Lind, WA. Breeder seed of Tara 2000 was produced as a reselection, on the basis of phenotypic uniformity, from 1900 F_{10} head rows grown with irrigation at Othello, WA, in 2000.

Tara 2000 is an intermediate height, semidwarf plant. It has lax, fusiform heads with white awns and medium length, white glumed spikes with elliptical kernels that are red, hard, and smooth texture. Seed of Tara 2000 has a round germ with a narrow, shallow crease, rounded cheeks, and a short, noncollared brush.

Among the major pests of spring wheat in the Pacific Northwest, USA, Tara 2000, has moderate nonrace-specific, high-temperature, adult plant resistance, similar to 'Jefferson' (Souza et al., 1999) and 'Scarlet' (Kidwell et al., 1999), to stripe rust (caused by *Puccinia striiformis* Westend.) races common in North America, including CDL-17, 37, 43, and 45, on the basis of results from noninoculated and inoculated field disease screening trials conducted at Mt. Vernon, WA, and Pullman, WA, for four crop years. Tara 2000 also has moderate adult-plant resistance to leaf rust (caused by *P. triticina* Eriks.) similar to 'Westbred 926', on the basis of 2 yr of noninoculated field disease ratings from Pullman, WA. On the basis of controlled environment insect screening trials conducted at Kansas State University and the University of Idaho, as well as field trials conducted in Walla Walla, WA, and Pullman, WA, Tara 2000 is tolerant to Hessian fly biotypes E, F, and GP. On the basis of pedigree and natural field infestation ratings from Pullman, WA, Tara 2000 is susceptible to the Russian wheat aphid [*Diuraphis noxia* (Mordvilko)].

Tara 2000 was evaluated in replicated field trials under fallow, nonirrigated, and irrigated conditions. Grain yields of Tara 2000 typically equaled or exceeded those of other hard red spring wheat entries in nonirrigated field production in Washington, Oregon, and Idaho from 1996 to 2000. In 41 tests conducted over 3 yr in nonirrigated production regions in Washington State, the grain yield averages of Tara 2000, Westbred 926, Jefferson, and Scarlet were 4166 kg ha^{-1}, 3910 kg ha^{-1}, 4240 kg ha^{-1}, and 4152 kg ha^{-1}, respectively. Tara 2000 produced 81 to 410 kg ha^{-1} more grain than Westbred 926, depending on location.

On the basis of nine site years of data in the intermediate to high rainfall zone, Tara 2000 (5644 kg ha^{-1}) produced significantly more grain than Westbred 926 (5234 kg ha^{-1}), Jefferson (5409 kg ha^{-1}), and Scarlet (5301 kg ha^{-1}). Grain volume weight of Tara 2000 averaged 782.5 g L^{-1}, which was significantly higher than that of Jefferson (776.1 g L^{-1}), Westbred 926 (764.5 g L^{-1}), and Scarlet (770.9 g L^{-1}). Thousand-kernel weight averages of Tara 2000, Westbred 926, Jefferson, and Scarlet were 46.4 g, 49.8 g, 37.5 g, and 39.2 g, respectively. The average plant height of Tara 2000 was 86 cm, 5 cm taller than Westbred 926, and approximately the same height as Jefferson and Scarlet. Lodging percentages of Tara 2000 (5%) were comparable with those of Westbred 926 and Jefferson, but lower than those of Scarlet (5–10%). Tara 2000 (Day of Year 167) headed 2, 3, and 4 d earlier, respectively, than Westbred 926, Jefferson, and Scarlet.

In tests conducted by the USDA-ARS Western Wheat Quality Laboratory at Pullman, WA, using grain produced in breeding and commercial variety testing trials in Washington State from 1996 through 2000, average grain protein concentration of Tara 2000 (134 g kg^{-1}) was significantly lower than Westbred 926 (138 g kg^{-1}) but significantly greater than that of Jefferson (132 g kg^{-1}) and Scarlet (131 g kg^{-1}). Flour yield of Tara 2000 (67.0%) was significantly greater than Westbred 926 (66.2%), but significantly less than those of Jefferson (67.7%) and Scarlet (67.6%). Flour ash content for Tara 2000 (0.38%) was significantly lower than that for Westbred 926 (0.42%), similar to that for Jefferson (0.39%) and significantly greater than that for Scarlet (0.37%). The mixing time for Tara 2000 (5.6 min) was significantly longer than that of Westbred 926 (4.2 min) and Scarlet (4.5 min) but shorter than that for Jefferson (6.0 min). Average pup loaf volume for Tara 2000 (988 cm^3) was larger than those for Westbred 926 (977 cm^3), Jefferson (886 cm^3), and Scarlet (945 cm^3).

Seed of Tara 2000 will be maintained by the Washington State Crop Improvement Association under supervision of the Department of Crop and Soil Sciences, Washington State University, Pullman, WA, and the Washington State Agricultural Research Center, and may be obtained by contacting the corresponding author or through the National Plant Germplasm System. U.S. Plant Variety Protection status for this cultivar is pending.

K.K. Kidwell,* G.B. Shelton, V.L. Demacon, J.W. Burns, B.P. Carter, C.F. Morris, X.M. Chen, and J.H. Hatchett

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Registration of 'H3860224' Barley

'H3860224', a two-rowed spring feed barley (*Hordeum vulgare* L.) (Reg. no. CV-300, PI 619102), was developed by the Montana Agricultural Experiment Station and released for commercial production in February 2002.

H3860224 was selected from a cross of 'Lewis'/'Apex' made at Bozeman, MT, in 1982. The parent Lewis (CIho 15856), a two-rowed barley, was developed by ARS and Montana State University from the cross 'Hector'/'Klages'. The parent Apex is a two-rowed barley cultivar developed by Cebeco Zaden B.V. in the Netherlands.

H3860224 originated at Bozeman from F_3 plants selected in 1985 that provided seed for two-rowed F_4 plots in 1986. One of these F_4 plots was selected for replicated yield trial evaluation and was named 'MT860224'. Following 4 yr of evaluation, 60 F_8 headrows were evaluated from the MT860224 population. The third entry in this group of lines became H3860224. H3860224 is midseason in maturity with midlax, midlong spikes with rough awns that are seminodding to erect before and after maturity, similar to Apex. Kernels have adhering, finely wrinkled hulls, white aleurone, and rachilla hairs are short. Glume awns are equal to the length of the moderately hairy glume. H3860224 flowers nearly 2 d later than its maternal parent, Lewis (Table 1). H3860224 is approximately 2 cm shorter than Lewis at maturity (Table 1). H3860224 has been found to be resistant to existing races of stripe rust (caused by *Puccinia striiformis* Westend. f. sp. *hordei*) in trials at Cochabamba, Bolivia (W.M. Brown, V. Velasco, and J.F. Hill, personal communication).

H3860224 has been widely tested in both dryland and irrigated trials in Montana since 1993. It was tested in trials in Idaho in 2001. In 72 location-years trials on dryland and under irrigation in Montana in 1993 to 1999, H3860224 out yielded all commonly grown cultivars ($P < 0.01$) except 'Baronesse', 'Stark', and 'Valier' (Table 1). H3860224 also produced a

Table 1. Agronomic performance of H3860224 and selected barley cultivars grown in dryland and irrigated trials in Montana, 1993 to 1999.

ID	Pedigree	Number of years	Yield	Number of years	Test weight	Number of years	Plump	Number of years	Heading date (days after 1 January)	Number of years	Plant height
			Mg/ha		kg/hL		%				m
P149153	Gallatin (Check)	72	4.880	72	66.54	69	75.6	69	177.3	70	81.3
CI 15856	Lewis	72	4.870	72	66.54	69	77.4	69	178.4	70	81.5
P159182	Chinook	72	4.854	72	66.50	69	74.3	69	178.4	70	80.3
ND 9866	Stark	72	5.058	72	67.18	69	87.0	69	175.1	70	84.1
P156824	Baronesse	72	5.445	72	65.64	69	78.8	69	179.9	70	73.9
CI 15514	Hector	50	4.598	50	65.51	47	73.4	49	178.4	49	82.8
SK 76333	Harrington	72	4.746	72	63.71	69	74.8	69	179.6	70	79.5
H38 X6022	H3860224	72	5.042	72	65.64	69	80.0	69	180.0	70	79.0
MTLB	Valier	30	4.897	30	66.02	30	75.7	28	180.6	29	80.0
SITEME	Site mean	72	4.897	72	56.25	69	77.5	69	177.7	70	78.2

higher proportion of plump kernels than other commonly grown cultivars, except Stark (Table 1).

Foundation and Breeders seed of H3860224 will be maintained by the Montana Foundation Seed Program. Foundation and Registered seed will be available to growers and seed dealers in the spring of 2002. Seed is available in small quantities for research purposes from the corresponding author.

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Registration of 'Valier' Barley

'Valier', a two-rowed spring feed barley (*Hordeum vulgare* L.) (Reg. no. CV-301, PI 610264), was developed by the Montana Agricultural Experiment Station and released for commercial production in May 1999.

Valier was selected from a cross of 'Lewis'/'Baronesse' made at Bozeman, MT, in 1991. The parent Lewis (CIho 15856), a two-rowed barley, was developed by ARS and Montana State University from the cross 'Hector'/'Klages'. Western Plant Breeders, Bozeman, Montana, introduced the parent Baronesse into the USA from Germany. Baronesse, an important two-rowed feed barley cultivar in the western USA, was formerly a prominent feed barley in Germany.

Valier originated at Bozeman from a series of 58 randomly isolated F_5 plants grown in 1994. These 58 lines were utilized in a series of linkage analysis and quantitative trait locus mapping experiments (Blake et al., 1998) that had the objectives of determining locations of genes from Baronesse that were responsible for its agronomic superiority and determining locations of genes that could possibly affect feedlot performance characteristics. Valier was derived from line number 30 of this 58 member population. Headrow-derived F_9 plots were bulked to form the cultivar Valier. It was designated as MTLB30 before naming and release. Valier is midseason in maturity with midlax, midlong spikes with rough awns that are seminodding to erect before and after maturity, similar to Baronesse. Kernels have adhering, finely wrinkled hulls, white aleurone, and rachilla hairs are long. Glume awns are equal to the length of the hair-covered glume. Unlike its parent, Baronesse, Valier retains sterile lateral florets. Valier, like Baronesse, flowers nearly 2 d later than its maternal parent, Lewis. Valier is approximately 2 cm shorter than Lewis and is superior to Lewis in lodging resistance. Valier frequently develops red-tipped awns, a distinctive and obvious character. Valier has been relatively free of disease when grown in Montana.

Valier has been widely tested in both dryland and irrigated trials in Montana since 1997. It was tested in the regional Western Spring Barley Nursery and the Western Dryland Spring Barley Nursery in 1999 and 2000. In 21 location-years trials on dryland and under irrigation in Montana in 1999 and 2000, Valier's grain yield was 5515 kg ha^{-1} or 103% of 'Gallatin' and 104% of 'Harrington'. Valier out yielded all commonly grown cultivars in the Montana trials except Baronesse. Valier also produced high test weight grain with good kernel plumpness.

Valier was developed specifically to combine excellent agronomic performance with improved cattle-feeding characteristics. In a 20 calf per treatment evaluation, Valier-fed calves gained weight more rapidly than their half-siblings fed either Lewis or Baronesse barley (Boss et al., 1999).

Foundation and Breeders seed of Valier will be maintained by the Montana Foundation Seed Program. Varietal protection under title V of the Plant Variety Protection Act is being sought. Foundation, Registered and Certified seed is now widely available throughout Montana. Seed is available in small quantities for research purposes from the corresponding author.

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Registration of 'Jumbo' Annual Ryegrass

'Jumbo' tetraploid annual ryegrass (*Lolium multiflorum* Lam.) (Reg. no. CV-220, PI 614099) resulted from doubling the chromosomes of an advanced breeders population of 'Surrey' (Prine et al., 1989; Prine, 1996) diploid annual ryegrass, a cultivar resistant to crown rust [caused by *Puccinia coronata* (Pers.) Cda.]. Surrey was selected from the crown-rust-susceptible 'Marshall' (Arnold et al., 1981.) annual ryegrass. Jumbo was released as a cultivar by the University of Florida, Institute of Food and Agricultural Sciences on 20 Sept. 1999. Jumbo was tested under the experimental designation, FL X1997 (G) LR.

In 1989–1991, three ramets from each of >300 crown rust resistant plants were selected each season in early April utilizing a 4-by-10 grid selection pattern over a 9000 spaced-plant crossing nursery at Gainesville, FL. More than 900 ramets from selected plants were sent to Reed Barker, USDA National Forage Seed Production Center, Corvallis, OR, in early May of 1989, 1990, and 1991. The ramets were established in a greenhouse and subsequently transplanted to a field to evaluate seed production and resistance to stem rust (caused by *P. graminis* Pers.:Pers.). Seed of selected plants was returned to Gainesville each fall to establish the 1990–1991 and 1991–1992 plantings. After selection of the 300 plants for shipment to Oregon, the Gainesville planting was further rogued for crown rust resistance, and the selected plants were allowed to produce seed at Gainesville. In 1990–1991 and 1991–1992, a row nursery was planted at Gainesville with seed produced in both Oregon and Florida. Every third row was derived from Florida seed with the rest of the nursery established with Oregon seed. Selected plants sent to Oregon were from the rows planted with Oregon seed. In the spring of 1993, 350 plants were selected in a 4-by-10 grid pattern over all rows from a 9000-plant Florida nursery. Equal quantities of seed were harvested from each selected plant, composited, and identified as FL X1993 LR select. A small sample of FL X1993 LR select seed was sent to Germany where the chromosomes were doubled by means of colchicine. Seed from 344 individual plants verified by flow cytometer as tetraploids were returned to Florida in the fall of 1995. In December 1995, equal quantities of seed from each tetraploid plant were composited and planted in a 6000-spaced-plant nursery at Gainesville and rogued for disease susceptibility and off-types. Seed was harvested from >400 selected plants in a 4-by-10 grid pattern in this nursery in the spring of 1996. Equal quantities of seed from each plant were composited and used to establish a selection nursery in the fall of 1996. This planting was similar to the 1995–1996 nursery, with equal quantities of seed from the selected plants composited and designated FL X1997 (G) LR. In the fall of 1997, this seed was planted in a prebreeder seed field near Halsey, OR, and rogued in the spring of 1998 for stem rust susceptibility, poor seed production, and off-types. This prebreeder seed was used for testing in the southeastern USA and to plant a Breeder seed field near Halsey, OR, in 1998-1999. After roguing for stem rust susceptibility, Breeder seed was harvested in the summer of 1999 and used for testing and for Foundation seed production.

During the three seasons, 1997–1998, 1998–1999, and 1999–2000, Jumbo was tested in ryegrass trials in Florida and other southeastern states as FL X1997(G) LR. Jumbo was higher or not different from the highest forage-yielding entries in most trials. Jumbo was later maturing and had higher resistance to crown rust and gray leaf spot [caused by *Pyricularia grisea* (Cooke) Sacc.] than Surrey. The crown rust index for Jumbo at Gainesville for 2000 was 1.55 (1–3 highly resistant, 3–5 resistant, 5–7 susceptible, and 7–10 highly susceptible), the highest crown rust resistance of all ryegrass genotypes evaluated (Prine, 2000). Seed producers in Oregon found Jumbo had high seed yields and resistance to race(s) of stem rust typically found in ryegrass seed production areas of the Willamette Valley. Jumbo had moderate resistance to Helminthosporium leaf spot disease (caused by *Dreschlera* spp.), and was considerably more resistant than Surrey.

Jumbo exhibited little cold damage during the winter of 2000-2001 in nurseries at Gainesville, FL, and Marianna, FL. Jumbo has larger stems, leaves, seed heads, and seed than the diploid, Surrey, from which it was derived. The protein content and in vitro organic matter digestibility (IVOMD) compares favorably with Surrey and other ryegrass cultivars. Because of its large plant size, Jumbo is expected to be primarily used for forage purposes. It is later maturing than Surrey. Jumbo is adapted to southeast ryegrass belt and Oregon ryegrass seed production area.

Florida Foundation Seed Producers, Inc., Greenwood, FL, has granted Barenbrug USA of Tangent, OR, exclusive rights for production and marketing of Jumbo seed. Seed classes of Jumbo will be one generation each of Breeder, Foundation and Registered and two generations of Certified. Application No. 200000196 has been made for United States Plant Variety Protection for Jumbo.

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Registration of 'Horizon 314' Oat

Horizon 314 winter oat (*Avena sativa* L.) (Reg. no. CV-368, PI 628345) was jointly developed and released in 2000 by the Florida and Georgia Agricultural Experiment Stations. It has an excellent combination of grain and forage yield, disease resistance, and straw strength.

The parentage of Horizon 314 is Coker 84-15/TX84AB2171. Coker 84-15 was an unreleased advanced line that was tested in the 1985 Uniform Winter Oat Nursery. Its pedigree is CK76-30/5/CK75-27/4/CK76-29/3/CK76-23//CK75-28/CI8335. CI8335 is an *Avena sterilis* L. line, used as a source of resistance to crown rust (caused by *Puccinia coronata* Corda f. sp. *avenae* Eriks.). CK76-30 was released as 'Southern States 7630'. All other parents of Coker 84-15 were unreleased advanced lines. Coker 84-15 appears in the pedigree of several other oat cultivars including 'Chapman' (Blount et al., 2001), 'Harrison', and 'Terral Secretariat LA495'. TX84Ab2131 is a Texas breeding line in which the crown rust resistance genes from 'TAM O-301', 'TAM O-312', 'Coker 227', and 'Coker 234' were combined with the stem rust (caused by *Puccinia graminis* Pers.: Pers. f. sp. *avenae* Eriks. & Henn.) resistance gene from 'Alpha' (CI9221).

Horizon 314 was tested experimentally as FL92OHR31,314 and as FLX499-1-B3-G6. It was selected from material donated by the Northrup-King Seed Company (Novartis Seeds, Syngenta Seeds) to the USDA-ARS when the Coker Pedigreed Seed Company oat breeding program (owned by Northrup-King) was discontinued in 1989. Twenty-five thousand single panicle selections that had been harvested from the 1988 Coker program nurseries were planted at Quincy, FL, for evaluation in 1992. Horizon 314 was a single row designated 31,314 selected from that material.

Horizon 314 is 3 to 6 d later maturing than Chapman. It is higher yielding, has a heavier test weight, and is about 10 cm taller than Chapman. At the time of its release in 2000, Horizon 314 exhibited excellent resistance to prevalent races of crown rust, and was moderately resistant to Helminthosporium leaf spot, (caused by *Helminthosporium sativum* Pam., King & Bakke). It has been rated as susceptible to crown rust in south Texas. It is susceptible to stem rust and Barley yellow dwarf virus.

Juvenile plants of Horizon 314 are semierect with the culms midsize and glabrous. The flag leaves are midsize and drooping. The panicles are erect, equilateral, dark green in color, and florets have occasional awns 2 to 3 cm in length. Horizon 314 has leaves that are more upright than most other oat cultivars grown in the southeastern USA. Horizon 314 has good winter survival and moderate straw strength. Seeds of Horizon 314 are long, moderately plump, tan in color, and similar to those of Chapman.

Horizon 314 was first included in a yield evaluation trial at Quincy, FL, in 1993. In 1995, it was entered in the Elite Oat Test and in the USDA Regional Uniform Winter Oat Yield Nursery, which was grown at 20 stations in 13 states. In the Elite Test, grown at four locations, Horizon 314 produced an average of 2688 kg ha^{-1}, which was higher than all the check cultivars except Chapman, which produced 2760 kg ha^{-1}. It headed 6 d later than Chapman at the Quincy location. In regional testing, Horizon 314 was the highest yielding entry at 3179 kg ha^{-1} averaged over 18 locations. In comparison to Chapman, Horizon 314 had a higher test weight, (398 kg m^{-3} compared to 377 kg m^{-3}) was 20 cm taller, and 5 d later in heading.

In the 1996 USDA Regional Uniform Winter Oat Yield Nursery, Horizon 314 was the highest yielding entry (3975 kg ha^{-1}). In comparison with Chapman, it had a slightly heavier test weight, was 3 d later in heading, and 10 cm taller. It had 11% lodging compared with a mean of 21% for the entire test. Horizon 314 had 53% survival compared with the test average of 50% for seven locations.

In 1998, Horizon 314 was included in both Florida and Georgia official state performance trials. Across the five locations in Georgia, Horizon 314 was the highest yielding entry at 2921 kg ha^{-1}. Average state variety test results, reported in the 2000–2001 Small Grains Performance Tests, Univ. of Georgia (Day et al., 2001), showed 3-yr (1999–2001) and 2-yr (2000–2001) grain yields of 3290 kg ha^{-1} and 3796 kg ha^{-1} for Horizon 314, respectively. Average 3-yr (1999–2001) and 2-yr (2000–2001) grain yields of all oat entries in the trials were 3136 kg ha-1 and 3505 kg ha^{-1}, respectively.

Horizon 314 is considered to be a good forage producer. Forage dry matter yields for Horizon 314, from the 1999–2000 Small Grains Performance Tests, Univ. of Georgia, averaged over Tifton, Griffin, and Plains locations, were 7.5 and 8.0 Mg ha^{-1} for 3-yr (1998–2000) and 2-yr (1999–2000) studies, respectively. In oat forage trials conducted at Quincy, FL, in 2000, Horizon 314 had a dry matter forage yield of 12 Mg ha^{-1}, compared with an 11.3 Mg ha^{-1} average for all entries in the trial.

U.S. Plant Variety Protection is pending. Horizon 314 has been licensed exclusively to Plantation Seed, Newton, GA, for marketing and promotion. Breeders seed of Horizon 314 is available from the Florida Agric. Exp. Stn. Recipients of the seed are asked to make appropriate recognition of the source of Horizon 314 if it is used in the development of a new cultivar, germplasm, parental line, or genetic stock.

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J.W. Johnson, B.M. Cunfer, and G.D. Buntin

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Registration of 'Georgia-01R' Peanut

'Georgia-01R' (Reg. no. CV-70, PI 629027) is a new multiple pest resistant runner market type peanut (*Arachis hypogaea* L. subsp. *hypogaea* var. *hypogaea*) cultivar that was released by the Georgia Agricultural Experiment Stations in 2001. It was developed at the University of Georgia, Coastal Plain Experiment Station.

Georgia-01R was derived from a cross made in 1989 between PI 203395 and Georgia Browne (Branch, 1994). Sequential selection method (Branch et al., 1991) was practiced within the early segregating (F_2, F_3, and F_4) populations, and individual resistant plants were sequentially selected each year under heavy soilborne disease pressure, heavy leafspot disease pressure, and heavy *Tomato spotted wilt virus* (TSWV) pressure without any fungicide and insecticide applications. Performance testing was begun in the $F_{4:6}$ generation with the advanced pure-line selection, GA 942511.

During three consecutive years 1997 through 1999 when grown without any pesticides (Branch and Fletcher, 2001), Georgia-01R was found to have comparable or better resistance to early and late leafspots [caused by *Cercospora arachidicola* Hori and *Cercosporidium personatum* (Berk. & Curt.) Deighton, respectively] and TSWV as 'Southern Runner' (Gorbet et al., 1987) and 'Florida MDR 98' (Gorbet and Shokes, 2002). Georgia-01R also produced significantly higher yields and dollar values without pesticides as compared to these other multiple resistant cultivars, and when grown with recommended pesticides, Georgia-01R was found to be comparable to 'Georgia Green' (Branch, 1996) in TSWV resistance, pod yield, total sound mature kernel grade, and dollar value return per hectare. Preliminary field trials also shows Georgia-01R to have moderate resistance to white mold or stem rot (caused by *Sclerotium rolfsii* Sacc.), Cylindrocladium black rot (caused by *Cylindrocladium parasiticum* Crous, Wingfield & Alfenas), leafhoppers (*Empoasca fabae* Harris), and/or leaf scorch (caused by *Leptosphaerulina crassiasca* Sachet).

Georgia-01R has a spreading runner growth habit, tan testa color, and late maturity similar to Southern Runner, Florida MDR 98, and 'C-99R' (Gorbet and Shokes, 2002). Maturity is approximately 2 to 3 wk later for Georgia-01R than for Georgia Green in southern Georgia.

Georgia-01R has dark green foliage, prominent mainstem, and alternate branching pattern. Georgia-01R also has a significantly greater pod bulk density (346 vs. 316 kg m^{-3}), more pronounced pod reticulation and constriction, approximately 10% more jumbo runner seed (riding a 8.33- by 19.05-mm slotted screen), significantly lower oil content (46 vs. 49%), and significantly higher oleic to linoleic fatty acid ratio (3.1 vs. 2.3) than C-99R. However, it is not significantly different from C-99R in number of sound mature seed count, blanchability, protein content, and roasted peanut flavor scores.

U.S. Plant Variety Protection is pending for Georgia-01R. Breeder seed of Georgia-01R will be maintained by the University of Georgia, Coastal Plain Experiment Station at Tifton. Foundation seed stock will be available from the Georgia Seed Development Commission, 2420 S. Milledge Avenue, Athens, GA 30605.

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Registration of 'AU Merit' Hairy Vetch

'AU Merit' hairy vetch (*Vicia villosa* Roth.) (Reg. no. CV-9, PI 619630) was developed and released in 1999 by Auburn University and the Alabama Agricultural Experiment Station. This cultivar was released because it has a consistently high forage yield and is early flowering.

AU Merit was derived from accession PI 206493 obtained from the Plant Genetic Resources Conservation Unit (S-9), National Plant Germplasm System. In the Fall of 1994, a breeding nursery consisting of 1500 plants was established in Tallassee, AL. One cycle of recurrent restricted phenotypic selection was utilized to improve the population. AU Merit is made up of about 300 plants that were selected on the basis of biomass yield, uniform maturity, and plant morphology. Additional traits considered during the selection process were earliness, vigor, and pest resistance.

AU Merit performs well in each of the main regions of the state of Alabama, thus has a wider area of adaptation than the common type and AU EarlyCover (Mosjidis et al., 1995) which performs well in northern and southern areas. When AU Merit is harvested or incorporated in the soil as a green manure about 1 April [time when many farmers get ready to plant corn (*Zea mays* L.)], it has a dry matter yield superior to common hairy vetch in southern Alabama, and about the same in central and northern Alabama. Compared with AU EarlyCover, AU Merit's yield is superior in the North and similar in the central and southern part of the state. On average, the forage yield of AU Merit was 12 and 4% higher than common hairy vetch in 1997 and 1998, respectively.

AU Merit flowers earlier than common hairy vetch. In 1997, it flowered five to 24 d earlier than common hairy vetch with an average of 13 d, and in 1998, 0 to 19 d earlier with an average of 7 d. Seed of AU Merit have mostly a dull seed coat but about 5% have a shiny seed coat. Its seedlings have most commonly reddish epicotyls with about 4% green, whereas about 18% of common hairy vetch seedlings have green epicotyls.

Foundation and Certified seed classes will be recognized. Breeder seed of AU Merit will be produced and maintained by Auburn University, Alabama Agricultural Experiment Station. U.S. Plant Variety Protection will not be applied for.

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Registration of 'Shiny Crow' Black Bean

'Shiny Crow' black bean (*Phaseolus vulgaris* L.) (Reg. no. CV-198, PI 617060) was developed by the Colorado Agricultural Experiment Station and released 15 Apr. 2000. Shiny Crow, tested as CO 96902, has a shiny black seed coat luster which is unique from traditional black bean cultivars grown in the USA that have an opaque seed coat luster. Black beans with shiny seed coat luster are more appealing in some commercial markets. Currently, black bean processors polish opaque black beans to produce a shiny seed coat luster for those markets. Shiny Crow will provide a black bean cultivar for U.S. processors that desire shiny seed coat luster without the need to polish them.

Shiny Crow is a semivine (CIAT Type III), disease resistant, black bean cultivar with excellent canning quality. Shiny Crow was derived from a single plant selection made in 1988 from a segregating experimental line obtained from Dr. Shree P. Singh at the International Center for Tropical Agriculture (CIAT), Cali, Colombia (currently at the University of Idaho, Kimberly, ID). The original line designation was lost, consequently, the pedigree of Shiny Crow is not known. The single plant selection was planted in a plant row in 1989 at Fruita, CO. The seed produced from this row was bulked and increased for initial yield testing. From the bulk, 40 single plants were selected and grown in plant-rows the following year. Among the 40 plant rows, 22 were selected on the basis of uniformity for growth habit, harvest maturity, pod load, and seed characteristics. The selected rows were harvested and bulked to form the initial Breeder seed and used for subsequent testing.

Shiny Crow was tested for 6 yr in Colorado and 3 yr in the Cooperative Dry Bean Nursery. Shiny Crow combines midseason maturity (95–98 d in Colorado, 98–101 d in the northern Great Plains), high yield potential, resistance to bean common mosaic, caused by *Beancommon mosaic virus*, and adaptation to the High Plains. Shiny Crow carries the dominant *I* gene which confers resistance to all pathogroups of bean common mosaic virus. It is susceptible to the white mold pathogen [caused by *Sclerotinia sclerotiorum* (Lib.) de Bary] based on the straw test (Petzoldt and Dickson, 1996) and to rust, caused by *Uromyces appendiculatus* (Pers.:Pers.) Unger on the basis of field observations and greenhouse evaluation. Mean seed weight was 20, 21, and 22 g 100^{-1} seed averaged across 6, 18, and 20 locations in Colorado in 1998 and the Cooperative Dry Bean Nurseries in 1998 and 1999, respectively. Seed shape is somewhat oval compared to traditional commercial opaque black bean cultivars that have round seed.

Canning qualities of Shiny Crow are equal to or superior to 'UI 911', 'UI 906', and 'Raven', three commercial opaque black bean cultivars. Seed of the three cultivars and Shiny Crow produced at Fort Collins and Fruita, CO, were submitted for canning evaluation to Dr. Mark Uebersax, Department of Food Science and Human Nutrition, Michigan State University, East Lansing, MI. The evaluation rates the cultivars on a visual scale from one to seven after soaking, with seven superior for canning characteristics. Mean ratings for bean breakdown, seed size, uniformity, and free starch clumps were 6.5, 6.0, 5.25, and 5.75 for Shiny Crow, compared with 5.4, 4.8, 5.5, and 5.5 for the opaque cultivars, respectively. Shiny Crow had a lower rating for brine clarity of the canned product and had less weight gain during water soaking compared with the other black bean cultivars. The overall quality description that incorporates all of the canning qualities, classified Shiny Crow as superior, while the other cultivars were classified as moderate or good.

Breeder and Foundation seed will be maintained by the Colorado Agricultural Experiment Station Dry Bean Foundation Seed Project at Fruita, CO. Plant variety protection has been filed under the U.S. Plant Variety Protection Act, Public Law 91-577 (PVP Certificate no. 200100133), with the option that Shiny Crow may be sold for seed by name only as a class of Certified seed. A Technology fee will be assessed on all Registered and Certified seed produced in the USA. Consult the Dry Bean Foundation Seed Project, Fruita, CO, for fee structure and details.

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Registration of 'Wahoo' Wheat

'Wahoo' (Reg. no. CV-920, PI 619098) is a hard red winter wheat (*Triticum aestivum* L.) cultivar developed cooperatively by the Nebraska Agricultural Experiment Station and the USDA-ARS and released in 2000 by the developing institutions and the Wyoming Agricultural Experiment Station. Wahoo was released primarily for its superior adaptation to rainfed (syn. nonirrigated) wheat production regions in eastern Nebraska and broad adaptation to rainfed wheat production regions in Wyoming and Nebraska. Where it is adapted, Wahoo should be a good replacement cultivar for 'Arapahoe' (Baenziger et al., 1989). Wahoo is genetically complementary to '2137', 'Alliance', 'Buckskin', 'Jagger', 'Pronghorn', and 'Windstar'. It is noncomplementary to 'Abilene' (PI 511307), Arapahoe, 'Culver', 'Millennium', 'Niobrara', and 'Vista'.

Wahoo was selected from the cross Arapahoe*2/Abilene, which was made in 1988. The F_1 was grown greenhouse and the F_2 and the to F3 generations were advanced by the bulk breeding method at Mead, NE. Wahoo is an $F_{3:4}$ line that was visually selected for its phenotypic uniformity and perceived agronomic merit, winter survival, maturity, and general resistance to diseases observed in the field. From the F_5 to release, the line was advanced with yearly rouging to remove phenotypic variants.

Wahoo was evaluated as NE94654 in Nebraska yield nurseries starting in 1995, in the Northern Regional Performance Nursery in 1998 and 1999, and in Nebraska cultivar performance trials in 1999 and 2000. In the Nebraska cultivar performance trials, it has performed well throughout most of Nebraska and Wyoming, yet is best adapted to eastern Nebraska. The average Nebraska rainfed yield of Wahoo of 3620 kg ha^{-1} (27 environments) was greater than the yields of Alliance (3550 kg ha^{-1}), Culver (3510 kg ha^{-1}), and Millennium (3580 kg ha^{-1}). In Wyoming, Wahoo yielded an average of 2590 kg ha^{-1} (9 environments), which was superior to Buckskin (2390 kg ha^{-1}) and Pronghorn (2380 kg ha^{-1}). Wahoo was tested in the Northern Regional Performance Nursery in 1998 and 1999. It ranked 16th of 28 entries in 1998 (17 environments) and 6th of 29 entries in 1999 (18 environments) and averaged 225 kg ha^{-1} more yield than Abilene. Wahoo has not performed well under irrigation and is not recommended for use in irrigated productions systems.

Other measurements of performance from comparison trials show that Wahoo is medium in maturity (140 d after 1 January, data from observations in Nebraska), about 0.5 d earlier flowering than Arapahoe and similar but, slightly later than 'Wesley'. However, Wahoo tends to be more variable in its flowering date than either Arapahoe or Wesley. Wahoo has a longer length coleoptile (53 mm) for a semidwarf wheat, longer than Arapahoe (50 mm) and Millennium (43 mm), but shorter than the semidwarf cultivar Cougar (76 mm), which is believed to have a different semidwarfing gene that does not affect coleoptile length (e.g., *Rht8*). The mature plant height of Wahoo (92 cm) is 5 cm shorter than Arapahoe and 5 cm taller than Wesley. Wahoo has moderate straw strength (29% lodged), similar to Arapahoe (30% lodged), but is weaker than Wesley (11% lodged). The winter hardiness of Wahoo is good to very good, similar to that of Abilene and comparable to that of other winter wheat cultivars adapted and commonly grown in Nebraska.

Wahoo is an awned, white-glumed cultivar. Its field appearance is most similar to Arapahoe. After heading, the canopy is moderately open and upright. The flag leaf is erect and twisted at the boot stage. The foliage is green with a waxy bloom at anthesis. The leaves are pubescent. The spike is oblong in shape, midlong, and middense. The glume is long and narrow, and the glume shoulder is narrow and square. The beak is medium to long in length with an acuminate tip. The spike is usually nodding at maturity. Kernels are red colored, hard textured, midlong, and ovate in shape. The kernel has no collar, a large brush of long length, rounded cheeks, midsize germ, and a midwide and shallow crease.

Wahoo is moderately resistant to stem rust (caused by *Puccinia graminis* Pers.: Pers. f. sp. *tritici* Eriks & E. Henn; most likely possessing *Sr6* and *Sr24*; data provided by D. McVey, USDA Cereal Disease Laboratory), leaf rust (caused by *P. triticina* Eriks.; most likely possesses *Lr16*, *Lr24*, and possibly other leaf rust resistance genes; data provided by D. McVey at the USDA Cereal Disease Laboratory), and Hessian fly [*Mayetiola destructor* Say, similar to Arapahoe, and most likely conferred by the Marquillo-Kawvale genes (*H18* and another unknown gene) for resistance; data provided by J. Hatchett, USDA and Kansas State University]. It is susceptible to *Wheat soilborne mosaic virus*, *Wheat streak mosaic virus*, and *Barley yellow dwarf virus* (data obtained from the Uniform Winter Wheat Northern Regional Performance Nursery, 1998-1999 and field observations in NE).

Wahoo is genetically low in grain volume weight (73.8 kg hL^{-1}) being similar to Arapahoe (74.1 kg hL^{-1}) and Wesley (74.3 kg hL^{-1}), but lower than Culver (74.9 kg hL^{-1}), Millennium (75.6 kg hL^{-1}), Alliance (75.6 kg hL^{-1}), and Pronghorn (76.6 kg hL^{-1}). The milling and baking properties of Wahoo were determined for 6 yr by the Nebraska Wheat Quality Laboratory. In these tests, Arapahoe and 'Scout 66' were used as check cultivars. The average wheat and flour protein content of Wahoo (126 and 114 g kg^{-1}) was similar to Scout 66 (126 and 117 g kg^{-1}) and lower than Arapahoe (131 and 118 g kg^{-1}). The average flour extraction on the Buhler Laboratory Mill for Wahoo (728 g kg^{-1}) was similar to Scout 66 (729 g kg^{-1}), and higher than Arapahoe (720 g kg^{-1}). The flour ash content (42 g kg^{-1}) was higher than Scout 66 and Arapahoe (37 g kg^{-1} and 39 g kg^{-1}, respectively). Dough mixing properties of Wahoo were similar to Arapahoe and stronger than Scout 66. Average baking water absorption was slightly less than the check varieties. The average loaf volume of Wahoo (888 cm^3) was similar to Scout 66 (888 cm^3), and less than Arapahoe (911 cm^3). The scores for the internal crumb grain and texture were good, and similar to Arapahoe, but less than Scout 66. The overall end-use quality characteristics for Wahoo should be acceptable to the milling and baking industries. In preliminary noodle quality tests, noodles made from Wahoo discolor less over time than noodles made from flour from Arapahoe, Scout 66, and most other hard red winter wheat varieties.

Wahoo has been uniform and stable since 1999. Less than 0.5% of the plants were rogued from the Breeder seed increase in 1999. The rogued variant plants were taller in height (10–15 cm) or were awnless with red chaff. Up to 1% (10:1000) variant plants may be encountered in subsequent generations.

The Nebraska Crop Improvement Association provided technical assistance in describing the cultivar characteristics and accomplishing technology transfer. The Nebraska Foundation Seed Division, Department of Agronomy and Horticulture, University of Nebraska-Lincoln, Lincoln, NE 68583 had Foundation seed available to qualified certified seed enterprises in 1999. 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. Wahoo will be submitted for registration and U.S. Plant Variety Protection under P. L. 10577 with the certification option. Small quantities of seed for research purposes may be obtained from the corresponding author and the Department of Agronomy and Horticulture, University of Nebraska-Lincoln for at least 5 yr from the date of this publication.

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REGISTRATIONS OF GERMPLASM

Registration of S96-2692 Soybean Germplasm Line Resistant to Three Soybean Nematodes

Soybean [*Glycine max* (L.) Merr.] germplasm line S96-2692 (Reg. no GP-277, PI 629013) was developed at the Delta Center of the University of Missouri, Portageville, MO. This line has value as a parent because of its competitive yield potential and broad resistance to populations of races of soybean cyst nematode (SCN) *Heterodera glycines* Ichnohe. In addition, it is resistant to southern root knot nematode [*Meloidogyne incognita* (Kofoid and White) Chitwood] and reniform nematode [*Rotylenchulus reniformis* (Linford and Oliveira)].

S96-2692 originated as an F_4 single plant selection from the cross 'Manokin' × S91-1839 (Kenworthy et al., 1996). S91-1839 is a selection from 'Hartwig' × Coker 485 (Anand, 1992). Coker 485 is a selection from 'Centennial' × [('Hampton 266' × 'Bragg') × 'Hutton'] (Hartwig and Epps, 1977; Hinson and Hartwig, 1964; Hinson, 1973). Hampton 266 is a selection from 'Hampton' (Webb and Hicks, 1965). The F1 generation was grown in Puerto Rico. The F_2 and F_3 generations were advanced by the bulk pod method in a race 5 SCN infested nursery at the University of Missouri Rhodes Farm and in Puerto Rico, respectively. The F_4 was grown again in the SCN nursery. Single plants were harvested and individually screened for SCN in the greenhouse to a mixture of races 3, 5, and 14. SCN resistant F_5 plant rows were grown in the field at Portageville and single rows uniform for agronomic traits were bulked for yield tests. S96-2692 was screened to individual SCN populations of races 1, 2, 3, 5, and 14 at Portageville and Columbia, MO as well as Jackson, TN. It was screened to southern root knot nematode in an infested field near Bertrand, MO, in 1999 and 2000.

S96-2692 is mid-group V maturity (RM5.5), about 3 d earlier than 'Hutcheson' (Buss et al., 1988). It was tested in Missouri from 1997 through 2000 and was evaluated in the Uniform Group V Soybean Tests - Southern States from 1998 through 2000 (Tyler, 1999; Paris and Shelton, 2000). Yield and plant height are similar to Hutcheson. S96-2692 has white flowers, tawny pubescence, and tan pods. Seeds are shiny yellow with black hila. Seed size has averaged 127 mg seed^{-1} versus 137 mg seed-1 for Hutcheson. Seed composition on a dry weight basis averages 417 g kg^{-1} protein and 197 g kg^{-1} oil compared to 410 g kg^{-1} protein and 211 g kg^{-1} oil for Hutcheson.

S96-2692 is resistant to populations of race 1, 2, 3, 5, and 14 of SCN, southern root knot nematode (Tyler, 1999; Paris and Shelton, 2000), and reniform nematode (R.T. Robbins, 2000, personal communication). S96-2692 has shown moderate resistance to sudden death syndrome [caused by *Fusarium solani* (Mort.) Sacc. f. sp. *glycines* Roy] as well as peanut root knot nematode [*Meloidogyne arenaria* (Neal) Chitwood] (Tyler, 1999; Paris and Shelton, 2000). It is susceptible to stem canker [caused by *Diaporthe phaseolorum* (Cooke and Ellis) Sacc. var. *meridionales* F.A. Fernandez] and *Soybean mosiac virus*.

Small quantities of seed can be obtained from the corresponding author for at least 5 yr.

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Registration of P-7 Bluebunch Wheatgrass Germplasm

P-7 bluebunch wheatgrass [*Pseudoroegneria spicata* (Pursh) A. Löve] germplasm (Reg. no. GP-7, PI 619629) was released 28 Feb. 2001 as a selected class of Certified seed (genetically manipulated track). This class of prevariety germplasm is eligible for seed certification under guidelines developed by the Association of Seed Certifying Agencies (2001). Participating in the release are USDA-ARS and the Utah Agricultural Experiment Station.

P-7 is a multiple-origin polycross generated by intermating 23 open-pollinated, native-site collections and two cultivars from Washington, Oregon, Nevada, Utah, Idaho, Montana, and British Columbia. Breeder seed of P-7 was bulked across the 25 populations in direct proportion to their seed yield in 1995 in a replicated test at the Utah State University Blue Creek Farm, Box Elder County, UT (Larson et al., 2000). Two of the populations are the cultivars Whitmar and Goldar (both originating in southeastern Washington), released by the USDA-SCS in 1946 and 1989, respectively (Hein, 1958; Gibbs et al., 1991). Whitmar is an awnless cultivar developed from a population collected near Colton, Whitman County, WA, and Goldar is an awned cultivar developed from a population collected near Anatone, Asotin County, WA. Nine of the remaining populations were collected by T.A. Jones (PI 537368, Pollock, ID; PI 537370, Riggins, ID; PI 598821, Wawawai Park, WA; PI 537374, Steptoe Butte, WA; PI 537375, Durkee, OR; PI 537378, Lone Mountain Junction, NV; PI 516185, Seneca, OR; PI 537388, Dayton, WA; PI 563870, Green Canyon, UT), seven by K.H. Asay (PI 563872, New Meadows, ID; PI 563867, Colton, WA; PI 563868, Wawawai Road, WA; PI 563874, Wawawai Park, WA; PI 562050, Wawawai Park, WA; PI 598816, Connell, WA; PI 562056, Lind, WA), and seven were obtained from miscellaneous sources (PI 595192, Wawawai Road, WA; PI 595193, Almota Road, WA; PI 595196, Darby, MT; PI 236670, Slocan, BC; P-3, Grande Ronde River, OR; P-5, unknown; KJ-10, Salina Canyon, UT). Twenty-four of the constituent populations are diploid ($2n = 2x = 14$) and one (PI 537374) is tetraploid ($2n = 4x = 28$). The inclusion of the tetraploid PI 537374 in the polycross was inadvertent. The representation of this tetraploid is expected to decline dramatically through generations of seed increase. Therefore, P-7 can be considered to be predominately diploid, the dominant ploidy level of bluebunch wheatgrass.

P-7 is intended to provide genetic diversity within a single germplasm for semiarid to mesic sites where bluebunch wheatgrass was an original component of the vegetation. Bluebunch wheatgrass is a cross-pollinated species widely distributed in the Intermountain West. The proportion of total nucleotide variation among the two cultivars of this species ($G_S = d_A/d_{XY}$) was 0.07 (Larson et al., 2000), an order of magnitude lower than reported among northern California populations of self-pollinating purple needlegrass [*Nassella pulchra* (Hitchc.) Barkworth] (Larson et al., 2001). P-7 was developed to reflect the large proportion of genetic variation packaged within natural bluebunch wheatgrass populations, e.g., 93% within Whitmar and Goldar, as well as the small proportion of genetic variation typically found between natural populations, e.g., 7% between Whitmar and Goldar (Larson et al., 2000). Sixteen of the P-7's 25 component populations are predominately awned and 9 are predominately awnless (Larson et al., 2000). Because the awnless state is dominant and the awned state is recessive in bluebunch wheatgrass and its relatives (Jones et al., 1991), P-7 individuals are predominately awnless.

More amplified fragment length polymorphic (AFLP) alleles (99) were found to be unique to P-7, i.e., present in P-7 but absent in Goldar and Whitmar, than were found to be unique to Whitmar (59) or Goldar (49) (Larson et al., 2000).

P-7 also had fewer fixed loci (233) than Whitmar (385) or Goldar (318). Overall nucleotide-sequence diversity [$\pi \pm$ SE(1000)], i.e., within-population variation, was greater for P-7 (38.7 $\pm$ 1.6) than for Whitmar (34.2 $\pm$ 1.5) or Goldar (33.9 $\pm$ 1.5). Average net nucleotide-sequence divergence (d_A), i.e., between-population variation, was 0.3 $\pm$ 0.2 between P-7 and Goldar, 1.3 $\pm$ 0.2 between P-7 and Whitmar, and 2.6 $\pm$ 0.3 between Goldar and Whitmar. Therefore, P-7 is genetically intermediate between the two cultivars but more similar to Goldar than to Whitmar.

G-0 (the separate 25 populations), G-1 (first intermating), and G-2 (second intermating) generations will be maintained by the USDA-ARS Forage and Range Research Laboratory, Logan, UT. G-2 seed will be made available to growers for production of G-3 and G-4 generations of seed (third and fourth intermating) by the Utah Crop Improvement Association. Sale of P-7 seed beyond generation G-4 is expressly prohibited to limit genetic shift. Small quantities of seed will be provided to researchers upon request to the corresponding author.

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Registration of 16 Day Length-Neutral Flowering Primitive Cotton Germplasm Lines

Sixteen day length-neutral (DN) flowering cotton (*Gossypium hirsutum* L.) germplasm lines (Reg. no. GP-746 through GP-761, PI 628762 through PI 628777) were released in 1998 by the USDA-ARS and the Mississippi Agricultural and Forestry Experiment Station. The germplasm release designation, registration number, and PI number of each line are given in Table 1. The last four digits of the release designation correspond to the Texas (T-) accession number, denoting the recurrent parent (Percival, 1987).

The procedure for developing day length-neutral flowering germplasm has been outlined by McCarty et al. (1979). Briefly, each primitive accession was crossed as the male parent to 'Deltapine 16' (PI 529251) and subsequently F_2 progenies with the DN flowering habit were selected. These progenies were then backcrossed four times to their respective primitive parent and selected for DN flowering habit in the F_2 generation following each backcross. Within each backcross cycle, all crosses were made and backcross seed were produced in a winter cotton nursery in Tecoman, Mexico, and F_2 plants were grown and selected for photoperiod response at Mississippi State, MS. The DN BC_4F_5 progenies were grown at Mississippi State, MS, and evaluated for agronomic and fiber traits in 1997 and 1999 (McCarty and Jenkins, 2001).

Table 1. Sixteen day-neutral flowering cotton germplasm lines derived from crosses with primitive accessions.

Release number†	Registration number	PI number
M-9644-0027	GP-746	628762
M-9644-0029	GP-747	628763
M-9644-0073	GP-748	628764
M-9644-0083	GP-749	628765
M-9644-0089	GP-750	628766
M-9644-0116	GP-751	628767
M-9644-0188	GP-752	628768
M-9644-0195	GP-753	628769
M-9644-0199	GP-754	628770
M-9644-0216	GP-755	628771
M-9644-0224	GP-756	628772
M-9644-0235	GP-757	628773
M-9644-0238	GP-758	628774
M-9644-0240	GP-759	628775
M-9644-0242	GP-760	628776
M-9644-0250	GP-761	628777

† The last four digits correspond to the Texas (T-) accession number, denoting the recurrent parent.

Descriptor data for the primitive (T-) accessions were reported previously (Percival, 1987) and are accessible through the USDA Germplasm Resources Information Network (http://www.ars-grin.gov; verified April 26, 2002). In general, the 16 DN lines produced bolls that tended to be smaller and seeds that were larger than the cultivar Deltapine 50. Lint percentage for most of the DN lines was in the low 30s and seed cotton yields were significantly lower than standard cultivars. As expected, lint yields were low for the DN lines becaue of their low lint percentages (McCarty and Jenkins, 2001).

Fiber analyses revealed that most of the DN lines produced short fibers. Fiber micronaire values tended to be higher, while fiber strength tended to be similar to commercial mid south cultivars. In contrast, M-9644-242 (T-242 DN) tended to produce fibers that were stronger than commercial cultivars (McCarty and Jenkins, 2001).

The converted primitive accessions are useful reservoirs of genetic diversity. Researchers in search of new traits can exploit these DN lines to expand the genetic base of cotton. Small quantities of seed of these germplasm lines may be obtained from the corresponding author. Recipients of seed are asked to make appropriate recognition of the source of the germplasm if it is used in the development of a new cultivar, germplasm, parental line, or genetic stock.

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Registration of ILC 10765 and ILC 10766 Chickpea Germplasm Lines Resistant to Cyst Nematode

Chickpea (*Cicer arietinum* L.) germplasm lines, ILC 10765 (Reg. no. GP-226, PI 629017) and ILC 10766 (Reg. no. GP-227, PI 629018), which are resistant to chickpea cyst nematode (*Heterodera ciceri* Vovlas, Greco and Divito), were jointly developed by the International Center for Agricultural Research in the Dry Areas (ICARDA), Syria, and the Istituto di Nematologia Agraria Applicata ai Vegetali, Consiglio Nazionale delle Ricerche (INIA-CNR), Italy. These lines were derived from a cross between a wild progenitor of chickpea belonging to the species *Cicer reticulatum* Ladiz. and a cultivated chickpea accession. This is the first report in chickpea where genes for cyst nematode resistance have been introgressed from wild *Cicer* spp. into a genetic stock and made available to chickpea researchers.

Cyst nematode is widely distributed and is an important pest in West Asia and North Africa, which often causes heavy yield losses in localized areas (Greco et al., 1988). Nematicides and soil solarization are very effective for the control of nematodes, but these control methods are uneconomical. Therefore, exploitation of host resistance is a desired alternative for controlling cyst nematode. In the past, the evaluation of a large number of chickpea germplasm accessions at ICARDA (Di Vito et al., 1988) failed to identify resistance to cyst nematode in cultivated material. However, the evaluation of 241 wild *Cicer* accessions belonging to eight annual species resulted in identification of resistance to cyst nematode in 14 accessions of *C. bijugum* Rech. f., seven accessions of *C. pinnatifidum* Jaub. & Spach., and one accession of *C. reticulatum* (Singh et al., 1989). Among these wild *Cicer* species, only *C. reticulatum* is easily crossable with the cultivated species. The accession ILWC 119 from *C. reticulatum*, which was reported as resistant to chickpea cyst nematode, was used in hybridization with FLIP 87-69C, a widely adapted and high-yielding kabuli-type cultivar. FLIP 87-69C is a kabuli type with white flowers and a semierect growth habit with nondehiscent pods. Accession ILWC 119 has a prostrate growth habit, purple flower color, and a purple tinge on leaves and stems, with dehiscent pods. The off-season nursery at Terbol, in the Beqaa valley in Lebanon, was used for rapid generation advancement. The pedigree method of breeding was followed to develop homozygous cyst nematode resistant lines. Individual plants in ILWC 119 were heterogeneous for reaction to *H. ciceri* and later a pure line with nematode resistance was developed from this accession and was registered as ILWC 292 (Singh et al., 1996).

Hybridization was made between ILWC 119 and FLIP 87-69C in 1990 at Tel Hadya, the main research station of ICARDA located at Aleppo, Syria (36° 01′ N and 36° 56′ E with 284 m above sea level). The crossed seeds were grown to advance the generation in the off-season nursery at Terbol in Lebanon. The F_2 seeds harvested from the off-season nursery were brought to Tel Hadya and grown in pots in the plastic house under controlled conditions in 1991. A nondestructive procedure was used to evaluate the chickpea plants for cyst nematode resistance (Caswell et al., 1985). The plants were evaluated on a 0-to-5 scale, where 0 = no visible females and/or cysts on the roots of individual plants, 1 = 1 to 2 females and/or cysts, 2 = 3 to 5 females and/or cysts, 3 = 6 to 20 females and/or cysts, 4 = 20 to 50 females and/or cysts, and 5 = >50 females and/or cysts. The pedigree method of selection was followed throughout and 19 plant progenies with 0 and 1 ratings were selected and bulked separately for progeny evaluation.

All 19 progenies exhibited 0 to 1 rating when evaluated against cyst nematodes in pots. These progenies along with their parents were grown under field conditions for seed increase and agronomic evaluation in 1998–1999 and 1999–2000 cropping season. All derived lines exhibited varying seed colors, seed size, plant height, and productivity. The two best lines with resistance to cyst nematode and desirable agronomic traits (larger seed size, nonshattering habit, semierect plant type, and high seed yield) were selected and assigned accession numbers ILC 10765 and ILC 10765. Both have purple flowers, with purple tinge on the leaves and stems, and are semierect with round and purple seeds and nondehiscent pods. The seed of these lines is maintained by the Genetic Resources Unit of ICARDA, and small quantities can be obtained on request.

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Registration of Sugarbeet Germplasm M1-3 Resistant to Root-Knot Nematode

Sugarbeet (*Beta vulgaris* L.) germplasm M1-3 (Reg. no. GP-221, PI 628749) was developed by the USDA-ARS, Salinas, CA, in cooperation with the California Beet Growers Association, Ltd., Stockton, CA, and released in March 2001. M1-3 provides a source of resistance to root-knot nematode, *Meloidogyne* spp., that may be useful in resistance breeding program.

The initial seed of M1-3 was produced by inter-pollinating more than 60 plants selected from the fourth backcross generation of hybrids between wild beet (*B. vulgaris* ssp. *maritima*) line M1-2 (PI 614899) (Yu, 2002) and recurrent sugarbeet parents, C37 (PI 590715), C69 (PI 599341), and C78 (PI 593671) (Lewellen et al., 1985; Lewellen, 1997, 2000). These selected plants all produced root-knot resistant progeny, when crossed to susceptible sugarbeet, as determined by J2 larval inoculation studies in the greenhouse. M1-3 is highly resistant, if not immune, to root-knot nematode. M1-3 is a multigerm, biennial, self-incompatible sugarbeet germplasm that is heterogenous for plant type and hypocotyl color. Approximately 80% of the seedlings have nongreen hypocotyls. Taproot size and conformation is not as uniform as its recurrent parents; however, the intensity of the sprangled root growth habit of M1-2 has been greatly decreased. The M1-3 germplasm is resistant to several species of root-knot nematode, including *M. incognita* (Kofoid and White) Chitwood, *M. javanica* (Treub) Chitwood, *M. arenaria* (Neal) Chitwood, *M. hapla* Chitwood, *M. chitwoodi* Golden et al., and *M. fallax* Karssen (Yu et al., 1999).

The strength of resistance to root-knot nematode in M1-3 is similar to that of M6-1 (PI 613165) (Yu, 2001), but the two germplasms can be differentiated by a phosphoglucomutase (PGM) isozyme stain on starch gels (Yu et al., 2001). F_1 progeny of M1-3 produce the PGM banding pattern associated with root-knot nematode resistance. However, a similar banding pattern has not been observed in M6-1 or its progeny. In addition, M6-1 is self-compatible, but M1-3 is self-incompatible.

Breeder seed will be maintained by the USDA-ARS and provided to sugarbeet breeders and researchers in small quantities upon written request. Recipients of seed are requested to make appropriate recognition of the source if M1-3 contributes to the development of a new population, parental line, cultivar, or hybrid. U.S. Plant Variety Protection for M1-3 will not be applied for.

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