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Published May, 2002

REGISTRATIONS OF CULTIVARS

Registration of 'Odyssey' Kentucky Bluegrass

'Odyssey' Kentucky bluegrass (*Poa pratensis* L.) (Reg. no. CV-64, PI 599226) is a turf-type cultivar released in August 1996 by Simplot/Jacklin Seed, Post Falls, ID. The experimental designations for Odyssey were 91-1561 and J-1561.

Odyssey originated as a highly apomictic, single-plant selection from hybrid cross number 89-1037, made in the field at Post Falls in July 1989. Pollen from 'Midnight' (Meyer et al., 1984) was used to pollinate plants of 'Limousine' (Alderson and Sharp, 1994). Seed harvested from the Limousine mother plants were individually sown into cells of greenhouse flats during the spring of 1990 and later transplanted to a spaced-plant field nursery of 33 500 plants. Offspring with characteristics dissimilar to Limousine were flagged during maturation in the spring of 1991. Plant number 91-1561 was identified as being different from Limousine by its panicle shape and color. It produced 30 g of seed from a single spaced plant, which is twice the seed typical for a bluegrass spaced plant in North Idaho. Seed harvested from this plant was used to establish a turf trial in September 1991, a replicated seed yield trial in August 1992, and a U.S. Plant Variety Protection (PVP) trial in June 1994, near Post Falls.

Odyssey is most similar to 'Impact' (PI 599225), which was developed from the same cross. However, it can be differentiated from Impact on the basis of eight botanical traits, as recorded in Odyssey's PVP application. These traits include a greater culm length, greater length of the lowest internode in the panicle, and more branches at the lowest panicle node.

Progeny evaluated in a 1994-1995 spaced-plant nursery had a level of apomixis sufficient for commercial seed production. A survey of 1928 plants of Odyssey showed that 1.74% of plants were variants in the vegetative (pre-flowering) stage, 0.39% were heading maturity variants, 0.95% seedhead variants, 0.21% miniature plants, and 0% were headless plants. Some variants exhibit high susceptibility to powdery mildew (caused by *Erysiphe graminis* DC. ex Merat); these plants tend to have wider leaves and dissimilar seedheads, but culm lengths comparable to the majority plant form. Approximately 1 to 2% of plants are variants with a very short culm and very late maturity. Approximately 1 in 1000 plants are a taller-growing, "common-type" variant with light-colored seedheads extending approximately 10 cm above the majority culm length. Aberrant progeny are rogued from seedstock fields to ensure continued uniformity and stability, but they will continue to occur in every generation. The mean spaced-plant apomixis rate of Odyssey is 95%, but varies ±5% depending upon year, location, and weather.

Odyssey ranked eleventh out of 103 entries for turf quality in the 1995 National Turfgrass Evaluation Program (NTEP) trials for Kentucky bluegrass (Morris, 2000). Odyssey ranked among the top 10 entries in spring, summer, and fall shoot density; dark-green genetic color; fall ground coverage; tolerance to low mowing heights (13–25 mm); and turf quality at seven locations mowing above 53 mm. Odyssey showed improved resistance to drought (dormancy), leafspot, and melting out [caused by *Drechslera poae* (Baudys) Shoem], necrotic ring spot (caused by *Leptosphaeria korrae* J. Walker and A.M. Smith), and summer patch (caused by *Magnaporthe poae* Landschoot and Jackson) disease. In 5 yr of commercial seed production, Odyssey has demonstrated the potential for high yields of quality seed, relative freedom from ergot [caused by *Claviceps purpurea* (Fr.) Tul.], and no adverse reactions to labeled Kentucky bluegrass pesticides.

Odyssey is recommended for golf course tees, fairways, and roughs, and for lawns, parks, and sports turf, in full sun or some shade, in areas where Kentucky bluegrass is well adapted for turf. It is compatible in blends and mixtures with other cool-season turfgrasses.

Breeder seed, first harvested in 1995, is maintained by Simplot/Jacklin Seed. Seed propagation is limited to one generation of increase for Foundation, Registered, and Certified seed. U.S. PVP application no. 9700386 has been filed for Odyssey.

A. Douglas Brede*

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Simplot/Jacklin Seed, West 5300 Riverbend Ave., Post Falls, ID 83854-9499. Registration by CSSA. Accepted 30 Sept. 2001. *Corresponding author (dbrede@simplot.com).

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Registration of 'Scantic' Broadleaf Tobacco

'Scantic', a Connecticut broadleaf cigar wrapper tobacco (*Nicotiana tabacum* L.) (Reg no. CV-122, PI 619163), was developed with resistance to Fusarium wilt [caused by *Fusarium oxysporum* Schlechtend.:Fr. f. sp. nicotianae (J. Johnson) W.C. Snyder & H.N. Hans.] by the Connecticut Agricultural Experiment Station and released in 2001. This cultivar is adapted to the Connecticut River Valley of Connecticut and Massachusetts, and allows broadleaf tobacco production in soils heavily infested with the Fusarium wilt pathogen. Yields and sorting quality of Scantic are equal to or better than the current standard wilt-resistant cultivar C9 or similar wilt-susceptible cultivars.

Scantic is an inbred derived from a bulk system of modified single seed descent. The F_2 generation of an equally represented composite of three crosses between wilt-susceptible Connecticut broadleaf tobacco lines and the tobacco mosaic virus (TMV)-resistant, wilt-resistant cultivar C2 (C2 × 'Winn'; C2 × 'Gogulski'; and C2 × 'Gradowski') was selected for resistance under greenhouse and field conditions. One thousand seedlings of the F_2 composite were each inoculated with 1.0×10^7 microconidia of *F. oxysporum* in greenhouse trays. Twenty-five of the most resistant and vigorous seedlings were selected and selfed. Following initial selection, F_3 to F_8 progeny were planted annually into field plots naturally infested with high levels of *F. oxysporum*. Twenty-five superior wilt-resistant plants of approximately 1200 individuals were selected and selfed, and the seed was bulked each generation. Plants were also selected for reduced sensitivity to weather fleck

caused by ozone. Twenty superior F_8 inbred lines were selfed in 1993 and evaluated as inbred lines in 1994 and thereafter.

Scantic (evaluated as line A-7 in commercial field trials) was selected as an advanced inbred. Scantic is susceptible to TMV. Agronomic characteristics and cured leaf quality were evaluated in both experimental plots and under commercial conditions. Yield and sorting characteristics of Scantic were compared to the wilt-resistant standard C9 on a commercial farm at South Windsor, CT, in 1995, 1997, and 1998. Plants were topped at approximately 1 m in height and stalk cut approximately 65 d after transplanting. Averages of 12 cured leaves per plant were commercially graded into one of six grades representing wrapper, binder, or filler quality. The percentage of the total yield in each grade was determined and value per hectare calculated. Cured leaf weight per hectare averaged 9.9% higher in each year and percent wrapper grades were higher for Scantic in two of the three years. As a result, economic return per hectare for Scantic was significantly higher (averaging more than 25% higher) than for C9 during the three years. In 1999, an additional commercial field trial in Whately, MA, determined that Scantic had 14.5% higher weight per hectare than C9 and that 64.6% of the cured leaves of Scantic were wrapper quality, while 25% were binder and 10.4% were filler.

Leaf yield, wilt incidence, and wilt severity were determined in field plots at the Connecticut Agricultural Experiment Station Valley Laboratory in 1996. Scantic, C9, and the wilt-susceptible cultivar Gogulski were compared in *F. oxysporum*-infested or noninfested soils. Each cultivar was transplanted to six replicate, two-row plots of 20 plants per plot in each *F. oxysporum*-infested or noninfested field. Plants were rated for disease incidence (number of 20 plants symptomatic) and severity (rated on a scale of 0–4 where 0 = healthy and 4 = dead) on 5 Aug. 1996. Ten plants per plot were harvested on 16 Aug. 1996 and cured. Wilt incidence and severity were low (less than 1%) for both Scantic and C9, and Gogulski was severely affected (17.0% incidence). Scantic resulted in over 20% yield increases in comparison to C9, regardless of whether soils were infested with the pathogen or not. Yield increases over the susceptible cultivar were approximately 5% in the absence of disease and more than 600% in *F. oxysporum*-infested soil.

Resistance to *F. oxysporum* is quantitatively inherited (Gritton et al., 1965). Wilt expression on wilt-resistant plants is often mild and plants often outgrow early symptoms (LaMondia and Taylor, 1987). Wilt severity was not significantly different for Scantic and C9, but was much greater for the wilt-susceptible Gogulski tobacco. Wilt-resistant tobacco, while not providing a means of eliminating the pathogen from soil, continues to allow the successful production of broadleaf tobacco in fields infested with *F. oxysporum* (LaMondia and Taylor, 1991). C9 has been widely grown in *F. oxysporum*-infested soils. Scantic is an additional Fusarium wilt-resistant cultivar available for commercial production with the advantage of increased cured weight yield per acre compared with C9.

Breeder seed of Scantic will be maintained and distributed by the Connecticut Agricultural Experiment Station Valley Laboratory, 153 Cook Hill Rd., Windsor, CT 06095. Limited quantities of seed are available to growers and scientists.

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Acknowledgments

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Connecticut Agric. Experiment Station, Valley Lab., P.O. Box 248, Windsor, CT 06095. Registration by CSSA. Accepted 31 Oct. 2001. *Corresponding author (lamondia@caes.state.ct.us)

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Registration of 'PA8649-95' Barley

'PA8649-95' winter barley (*Hordeum vulgare* L.) (Reg. no. CV-294, PI 613538) was developed by the Pennsylvania Agricultural Experiment Station and released in 1999 for brand labeling. PA8649-95 combines high grain yield with high test weight, midseason maturity, and medium plant height. PA8649-95 winter barley was derived from a bulk population provided in 1979 by T.M. Starling of the Virginia Agricultural Experiment Station. The pedigree of the bulk population was 'Harrison'/3/'Cebada Capa'/'Wong'//Awnleted 'Hudson' sel/4/'Hanover'/'Jefferson'//'Barsoy'. PA8649-95 traces to a single head selection made in the F_9 generation in 1985.

PA8649-95 was evaluated in state grain yield trials from 1994 to 1998 and in elite experimental line trials from 1990 to 1994 in Centre and Lancaster Counties, Pennsylvania. It was also evaluated in the USDA Uniform Winter Barley Yield Nursery at 16 locations in 1995 and 17 locations in 1996. PA8649-95 was evaluated in the USDA Uniform Barley Winterhardiness Nursery in 1995 and 1997.

In state trials in Centre County, average grain yield of PA8649-95 from 1994 to 1998 was 6289 kg ha^{-1}, which was 4% better than that of 'Pennco', 8% better than that of 'Pennbar 66', and 11% better than that of 'Nomini'. In Lancaster County, grain yield of PA8649-95 was 6773 kg ha^{-1}, which was 4% better than that of Pennco, 9% better than that of Pennbar 66, and 14% better than that of Nomini. Average bushel weight of PA8649-95 is 620 kg m^{-3}, which is comparable to that of Pennbar 66 and better than Pennco by about 3 and 6% in Centre and Lancaster Counties, respectively. Plant height and maturity are comparable to that of Pennbar 66 and Pennco. Over all locations in the USDA Uniform Winter Barley Yield Nursery, PA8649-95 ranked third for grain yield in both years and yielded 4225 kg ha^{-1} in 1995 and 4757 kg ha^{-1} in 1996, which was comparable to 'Wysor' in 1995, but 18% better than Wysor in 1996.

PA8649-95 is a winter, six-rowed, rough awned, hulled feed barley with medium height and medium maturity. The plants are semiprostrate and deep green in the fall. Spikes are semi-nodding at maturity; stem neck is straight and slightly curved at maturity. The distance from the flag leaf to spike averages 17 cm. The peduncle length ranges from 31 to 39 cm. The flag leaf is held predominantly upright and the penultimate leaf averages about 16 mm in width and 18 cm in length. Basal leaf sheaths are pubescent and anthocyanin is absent. The rachis is tough and covered with hair; the collar is closed. Basal rachis internode is short and straight. Kernel lemmas are slightly wrinkled; rachilla hairs are long. Lemmas are yellow at

maturity with few teeth on the lateral and marginal nerves. The basal marking of the kernel is a depression tending to crease. Glumes are one-half the length of the lemma and covered with hairs; glume awns are twice as long as the glumes. Both lemma and glume awns are rough.

Breeder seed of PA8649-95 will be maintained by the Pennsylvania Agricultural Experiment Station. Brand labeling arrangements and foundation seed of PA8649-95 will be available from the Northeast Foundation Seed Alliance, P.O. Box 218, Ithaca, NY 14851.

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Dep. of Crop and Soil Sciences, The Pennsylvania State Univ., University Park, PA 16802. Registration by CSSA. Accepted 31 Oct. 2001. *Corresponding author (mlr6@psu.edu)

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Registration of 'Barimash-2' Blackgram

'Barimash-2' blackgram [*Vigna mungo* (L.) Hepper] (Reg. no. CV-196, PI 619180) was developed at the Pulses Research Centre (PRC), Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur - 1701, Bangladesh. The cultivar was released in Bangladesh in 1996 for stable and high yield with combined resistance to *Bean yellow mosaic virus* (BYMV) and Cercospora leaf spot (CLS) [caused by *Cercospora cruenta* Sacc. or *Cercospora canescens* Ell. & Mart.].

Barimash-2 was developed from the cross between two advanced lines BMA-2141 and BMA-2140 acquired from India. Single plant selections were made in the F_3. Fifty-six F_4 families were developed from this particular cross and evaluated in plant progeny rows in 1988-1989, and 34 F_4 families were selected and tested as F_5 families the following year. Ten F_5 families were retained as promising and were evaluated as F_6 lines. Days to maturity, reaction to disease, growth habit, podding intensity, and seed yield were given priority during selection. The 10 F_6 lines were evaluated in a replicated trial in 1990 to 1991 and seed was bulked. The bulked line was assigned the station identification number BMAX-90233. This line was evaluated in preliminary, advanced and regional yield trials during the winter seasons of 1991-1992, 1992-1993, and 1993-1994 at four locations (BARI, 1994).

Yield trials over 3 yr in different blackgram growing areas in three cropping seasons in Bangladesh showed that Barimash-2 averaged 1800 kg ha^{-1}, compared with 1200 kg ha^{-1} for the 'Barimash-1' check (Afzal et al., 1999). Barimash-2 had a 30% yield advantage over Barimash-1 and a 60% advantage over the local check 'Nowabganj' and gave consistently higher yields throughout the trial (BARI, 1994). Because of its wide adaptability, the cultivar is recommended for three different mungbean growing seasons [Kharif - II (August–October), Kharif - I (February–May), and Late rabi (January–April)] and for all mungbean growing areas of Bangladesh.

Barimash-2 has an erect growth habit and attains a height of 33 to 35 cm. It flowers 35 to 40 d after emergence and reaches physiological maturity 70 to 75 d after emergence. Leaves are trifoliate, alternate, and green. Leaf pubescence is present. Petioles are short and purple-green. The corolla is yellowish-green. The raceme position is above the canopy. Mature pods are black and have hair. Seeds are drum-shaped and blackish. Barimash-2 has a 100-seed weight of about 4.2 g (Afzal et al., 1999).

Barimash-2 has resistance to BYMV and CLS. During initial evaluation, the families or lines were screened for combined resistance by the spreader row technique (Bakr, 1994). Highly susceptible lines for BYMV (BMN38) and CLS (B89) were planted after every five families or lines to create artificial disease pressure. Barimash-2 rated 0 on a rating scale of 0 to 5 for both diseases throughout its evaluation across locations (BARI, 1994).

Seeds of the Barimash-2 have 86.2% cotyledon content, and produce 71.8% head dhal (intact cotyledon after splitting) by the traditional method of dehulling. It takes about 33 min to cook and shows solid dispersion of 27.4%. Barimash-2 contains 22.9% protein and 47.0% carbohydrate (Afzal et al., 1999).

Breeder seed of Barimash-2 was distributed to the Bangladesh Agricultural Development Corporation (BADC) for production of Foundation and Certified seed. Breeder seed will be maintained by the Pulses Research Centre, Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur - 1701, Bangladesh. U.S. Plant Variety Protection for Barimash-2 will not be sought. 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.

M.A. Afzal,* Md. Abu Bakr, M.M. Rahman, and Nusrat Karim Luna

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Registration of 'Rojo Chiquito' Small Red Dry Bean

'Rojo Chiquito' small red dry bean (*Phaseolus vulgaris* L.) (Registration no. CV-197, PI 619085) was developed cooperatively by the Washington Agricultural Research Center and the USDA-ARS and released in 2001. Rojo Chiquito has an upright short vine growth habit (IIA), mid-season maturity, multiple disease resistance, and is adapted to the U.S. Pacific Northwest. Its most unique feature is retention of a bright red color after cooking.

Rojo Chiquito is an F_{12} bulk derived from a single F_7 plant from the cross 'K-42'/'Pompadour' made in 1988. K-42 is a light red kidney bush germplasm developed by Burke et al. (1995). It has dominant *I* gene resistance to bean common mosaic virus (BCMV) and complete resistance to curly top virus (CTV). Pompadour is a market class with distinct red mottled seeds that is popular in the Dominican Republic. The identity of the specific Pompadour landrace used in the cross is unknown, but it was likely of Middle American origin with small seed size and indeterminate growth habit. The presence of 'S' phaseolin, an evolutionary marker indicative of Middle American origin, in Rojo Chiquito, distinguishes the unknown parent from large seeded Pompadour landraces of Andean origin. Note that the kidney parent K-42 is of Andean origin. Although neither parent has a small red seed type, Rojo Chiquito is closer to a small red bean than any commercial dry bean class, but is very different in several respects. First, the

plant has a more upright plant habit (IIA) than typical commercial small reds. Pods are borne high enough (mid to top of plant) to be directly harvested. With the upright plant habit, a narrower row spacing may increase bean yield. Secondly, it has a much smaller seed size than typical small red cultivars. This smaller seed size is characteristic of the "Central America" small red market class. Thirdly, Rojo Chiquito will be the first small red cultivar release to possess dominant *I* gene resistance to seed borne BCMV.

Rojo Chiquito was tested as IS-4931 in the National Cooperative Dry Bean Nurseries in 1995 (Stewart-Williams and Myers, 1995). Average yield was 2296 kg ha^{-1} compared with 2416 and 2634 kg ha^{-1}, respectively, for 'LeBaron' (Hang et al., 2000) and 'NW-63' (Burke, 1982). Rojo Chiquito was also tested as USWA-6 in 1996 at the Othello Research Unit, its yield ranged from 2720 to 3100 kg ha^{-1}. Rojo Chiquito matured at 100 d after planting and was 11 and 5 d later than LeBaron and NW-63, respectively. Rojo Chiquito has a small shiny dark red seed when mature. Seed size of Rojo Chiquito is 19.3 to 21.4 g compared with 30.3 to 32.7 g 100 seeds^{-1} for NW-63. Rojo Chiquito yield ranged from 2720 to 3100 kg ha^{-1} when grown in Othello, WA, and was lower than LeBaron and NW-63, but with an upright plant habit, a narrower row spacing may be used to increase bean yield. Rojo Chiquito exhibits excellent quality in canning tests as it retains firmness and a very attractive bright red color after cooking.

Rojo Chiquito has been released as an exclusive variety with a research fee assessed on each unit of seed sold with the option that Rojo Chiquito may be sold for seed by name only under the Certified class. Breeder and Foundation seed will be maintained by Washington State Crop Improvement Association, Inc. 414 South 46th Avenue, Yakima, WA 98908-3232.

A.N. Hang,* P.N. Miklas, M.J. Silbernagel, and G.L. Hosfield

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Registration of 'Explorer' Wheat

'Explorer' (Reg. no. CV-915, PI 619086) is a hard white spring wheat (*Triticum aestivum* L.) developed and released in May 2001 by the Montana Agricultural Experiment Station. Explorer provides producers with a high protein hard white wheat with excellent baking quality to complement lower protein hard white wheats and the hard red spring wheat traditionally grown in the Great Plains of Montana.

Explorer was an F4 plant selection from the cross MT8182/'Fortuna')//'Pondera'/MT8182. MT8182 has hard white seed and was a selection from the cultivar Yding ('CIANO F67'/'Penjamo T62'//'Gallo'). Fortuna (Lebsock et al., 1967) is solid-stemmed hard red spring wheat, and Pondera (McNeal et al., 1980) is a hollow-stemmed hard red spring wheat. Single seed descent was used for advancement to the F_4 generation, where plants were selected primarily for height, head type, maturity, and seed color for advancement to F_5 rows. F_5 rows were evaluated for the same characteristics along with uniformity, apparent yield potential, and kernel protein. Selected rows were advanced to a single row yield nursery in Bozeman in 1996 and evaluated for yield, other agronomic characters, and milling and baking quality. A selection from this nursery was designated 'MTHW9710'.

MTHW9710 was tested at five Montana locations from 1997 to 1999, and at 10 Montana locations in 2000. Varieties used for comparison were 'Hi-Line' (PI 549275) hard red spring wheat (Lanning, 1992) and MTHW9420 (PI 612605) hard white spring wheat (Lanning et al., 2001). A head row–line row purification of MTHW9710, subsequently named Explorer, was commenced in 1998 by growing 400 head rows and discarding those that were nonuniform or differed from the modal type. Selected head rows were harvested separately, and grown as line rows in 1999. Aberrant line rows were discarded, and remaining line rows were harvested in bulk to form breeder seed of Explorer at the F_{10} generation.

Explorer has seedlings with green coleoptiles, yellow anthers, and a flat, mostly erect flag leaf. Explorer has awned, inclined, oblong heads with tan-white straw and chaff. The kernels are ovate, mid-long, with a mid-sized germ. Kernels have a medium V-shaped crease with angular cheeks and a mid-sized brush with collar.

Explorer had intermediate levels of stem-solidness over five locations, with an average score of 14.5 compared with hollow-stemmed Hi-Line with a score of 6.5, on the basis of a scale of 5 (hollow) to 25 (solid). However, Explorer was not resistant to the wheat stem sawfly (*Cephus cinctus* Nort.) in three nurseries with natural sawfly infestations. Explorer is resistant to stem rust (caused by *Puccinia graminis* Pers:Pers. F. sp. *tritici* Eriks. & E. Henn.) on the basis of adult-plant screening in the field at Bozeman with races previously collected in eastern Montana from 1980 to 1990. Explorer was resistant to stripe rust (caused by *Puccinia striiformis* Westend) during a natural infection at Bozeman in 1997. Virulences of the rust races are not known. Explorer is susceptible to the Russian wheat aphid (*Diuraphis noxia* Mordvilkio).

Explorer has early maturity with an average heading date of 21 June on the basis of 25 location–years in Montana, and is about 2 d earlier than Hi-Line and MTHW9420. Explorer is a semidwarf, with an average height of 73 cm. This is similar to MTHW9420 and Hi-Line. Explorer was not observed to lodge in any location tested from 1997-2000. Yield of Explorer averaged 4475 kg ha^{-1} versus 4501 kg ha^{-1} and 4556 kg ha^{-1} for Hi-Line and MTHW9420, respectively. Grain volume weight of Explorer averaged 799 kg m^{-3}, identical to Hi-Line and 5 kg m^{-3} higher than MTHW9420. Grain protein percentage of Explorer averaged 144 g kg^{-1} versus 145 g kg^{-1} and 135 g kg^{-1} for Hi-Line and MTHW9420, respectively.

Milling and baking quality of Explorer is excellent on the basis of tests by the Montana State University Cereal Quality Lab using grain collected from nine trials. Flour yield of Explorer averaged 642 g kg^{-1}, which is approximately 10 g kg^{-1} higher than Hi-Line and 20 g kg^{-1} lower than MTHW9420. Bake water absorption of Explorer was 694 g kg^{-1} versus 682 g kg^{-1} and 665 g kg^{-1} for Hi-Line and MTHW9420, respectively. Loaf volume of bread made from Explorer averaged 1193 cc,

while that of Hi-Line and MTHW9420 were 1192 cc and 1037 cc, respectively. Explorer has normal starch as opposed to partial waxy, and has the pinB mutation conferring hard seed texture.

Breeder seed of Explorer will be maintained by the Montana Foundation Seed Stocks Program, Plant Sciences and Plant Pathology Department, Montana Agricultural Experiment Station, Montana State University, Bozeman MT 59717. U.S. Plant Variety Protection will be applied for.

S.P. Lanning, D. Habernicht, W.E. Grey, G.R. Carlson, M.E. Giroux, J.L. Eckhoff, G.D. Kushnak, R.N. Stougaard, D.M. Wichman, K. Kephart, and L.E. Talbert*

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Registration of 'AC Ranger' Barley

'AC Ranger' (Reg. no. CV-295, PI 620640) is a six-rowed spring forage barley (*Hordeum vulgare* L.) developed at the Agriculture and Agri-Food Canada (AAFC) Research Centre, Brandon, MB, Canada. AC Ranger was registered on 12 April 2001, by the Canadian Food Inspection Agency, Ottawa, Canada. AC Ranger was tested at Brandon and in the Western Co-operative Forage Barley Registration Test (1997 and 1999) under the experimental number EX467-5. AC Ranger was selected from the cross 'AC Rosser'/PC 11. AC Rosser (Therrien, 1998) was developed at the AAFC Research Centre in Brandon, MB, Canada. Line PC 11 is a six-row barley from CIMMYT, selected for resistance to stem rust (caused by *Puccinia graminis* f. sp. *tritici* Eriks. & E. Henn).

The cross from which AC Ranger was selected (Brandon cross EX467) was made at the Brandon Research Centre, AAFC in 1991. Sixty-four F_1 seed were sown in the greenhouse and harvested in bulk. The F_2 population was sown in the field as a single 3-m-long row and bulk harvested. The procedure was repeated for the F_3 generation in two rows 3 m long. Five hundred spikes were chosen at random from the F_3 bulk sample and grown as F_4 head rows. Individual head rows were selected from the F_4 population on the basis of visual assessment for the stay green character, straw strength, vigor, and relative absence of disease. F_4 selections were grown as F_5 plots 3 m long and 1 m wide in a nearest-neighbor design with 'AC Lacombe' (Kibite, 1994) and 'Virden' (Therrien et al., 1988) as alternating check cultivars repeated every 20 plots. A single plot (EX467-5) was selected from this F_5 population on the basis of superior agronomic performance (grain yield, straw strength) relative to AC Lacombe and estimated forage yield relative to Virden. EX467-5 was tested in a replicated field trial in Brandon in 1993. EX467-5 also was tested in the laboratory for resistance to a wide variety of foliar, spike, and root pathogens. EX467-5 was then tested at two locations in 1994 (Brandon, MB and Hamiota, MB) and five locations in 1995 and 1996 (Brandon, Hamiota, Roblin, MB, Saskatoon and Outlook, SK). In all years, EX467-5 was advanced on the basis of merit for forage yield and quality, disease resistance, and straw strength. EX467-5 then was advanced to the Western Co-operative Forage Barley Registration Test (WCFBRT) in 1997 on the basis of merit for forage and grain yield and agronomic performance.

Over 2 yr of evaluation in the WCFBRT, AC Ranger had 4% higher grain yield than AC Lacombe (the high grain yielding check cultivar) in western Canada and 4.4% higher forage yield than Virden (the forage check cultivar). AC Ranger has superior forage quality to Virden, with lower Acid Detergent Fibre (ADF; 31.4 vs. 37.9%), lower neutral detergent fibre (NDF; 53.9 vs. 59.4%), and improved total digestible nutrients (TDN; 61.0 vs. 54.4%). AC Ranger also has better lodging resistance than AC Lacombe (2.0 vs. 3.9; on a scale of 1 to 9, where 1 = no lodging and 9 = completely lodged) and has similar height and test weight to AC Lacombe.

AC Ranger is similar in maturity (92 vs. 91 d) and height (91 vs. 94 cm) to AC Lacombe. The spike is compact (6.0–7.5 cm, excluding awns) and semierect. Kernels are long and wide with yellow (white) aleurone. Kernel feed quality is similar to AC Lacombe, the feed quality check cultivar. Lemma awns are semismooth and lemma awn tips are colorless (white).

AC Ranger is resistant to common root rot [caused by *Cochliobolus sativus* (Ito and Kuribayashi) Dreschs. ex Dastur], intermediate in reaction to net blotch (caused by *Pyrenophora teres* Dreschs), and is susceptible in reaction to scald [caused by *Rhynchosporium secalis* (Oudem) J.J. Davis], and septoria speckled leaf blotch (caused by *Septoria passerinii* Sacc.). AC Ranger is intermediate in reaction to stem rust, and is intermediate in reaction to all forms of smuts (caused by *Ustilago* spp.).

Seed from 300 uniform head rows at the F_{10} generation were bulked to constitute the Breeder seed of AC Ranger. Breeder seed is being maintained by AAFC at the Indian Head Research Farm, Indian Head, and SK, CANADA. The Canadian distributor for AC Ranger is Quality Assured Seeds (QAS) Ltd., 422 McDonald St. Regina, SK, Canada S4N 6E1.

M.C. Therrien*

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REGISTRATIONS OF GERMPLASM

Registration of Five Extra-Long Staple Cotton Germplasm Lines Possessing Superior Fiber Length and Strength

Five cotton germplasm lines (*Gossypium barbadense* L.), designated as 93252, 93260, 94217, 94218, and 94220 (Reg. no. GP-734 to GP-738, PI 619624 to PI 619628), were developed by the USDA-ARS in cooperation with the University of Arizona, Maricopa Agricultural Center and were released in 2001. All five lines produce significantly longer and stronger fiber than is currently available in commercial American Pima cultivars. The lines possess agronomically acceptable yield potentials, maturity intervals, and plant heights, and exhibit good levels of heat tolerance. Lines 93252, 93260, 94217, 94218, and 94220 provide public and private breeders with agronomically improved resources for concurrent improvement of fiber length and strength in Pima cotton.

Parentage of 93252, 93260, 94217, 94218, and 94220 appear in Table 1. The cultivar Sea Island St. Vincent that appears in the background of several parental lines is an obsolete, low-yielding, heat sensitive cultivar that possesses an exceptionally long and fine fiber. 'Giza 70', which occurs in the pedigree of 93252 and 93260, is an Egyptian extra-long staple cotton that displays little heat tolerance or adaptation to the arid southwestern USA. The experimental lines 8006 and 88-314 that appear in the parental backgrounds of 93252 and 94218, respectively, are sibs of experimental lines P71 and P76 (Percy and Turcotte, 1997). All germplasm lines were developed by pedigree breeding, with individual plant selections occurring in the F_2, F_3, and occasionally, F_4 generations. In each generation, plants were selected for agronomic properties at Maricopa, AZ, harvested, and reselected for fiber properties after fiber analysis. Progeny row selections were conducted in the F_4 or F_5 generations, and replicated evaluations conducted in the F_5 or F_6 generations. Lines 93252, 94218, and 94220 were tested under their current designations. Lines 93260 and 94217 were tested under the experimental designations 93260-5 and 94217-19, respectively. Fiber analyses for all selection and evaluation procedures were performed by Starlab, Inc. with individual instrumentation. Fiber strength was determined with a stelometer set at a gauge of 3.175 mm.

Agronomic and fiber properties of the five lines were evaluated in replicated tests at Mariposa and Safford, AZ, in 1999, and Shafter, CA, in 2000 (Percy, 2001). Averaged across tests, all lines except 93260 produced lint yields exceeding 90% of the yield of the commercial cultivar Pima S-7 (Turcotte et al., 1992). Plant heights of all lines were equivalent to plant height of Pima S-7. Fiber bundle strengths of 93252, 93260, 94217, 94218, and 94220 exceeded that of Pima S-7 (305 kN m kg^{-1}) and ranged from 340 to 384 kN m kg^{-1}. Fiber length (2.5% span length) of the lines ranged from 37.8 mm to 38.3 mm, as compared with 35.0 mm for Pima S-7. Fiber length uniformities of lines 93252, 94217, and 94220 were equivalent to that of Pima S-7, whereas lines 93260 and 94218 exhibited lower fiber length uniformities. Micronaire readings of the lines ranged from 4.3 to 3.7, compared with 4.5 for Pima S-7. The lower micronaire readings of 93260 (3.7) and 94220 (3.8) suggests that these lines might produce suboptimal micronaire readings and thus incur marketing system penalties under adverse environmental situations. Lint percentages of the five lines, determined from hand-picked samples, ranged from 34.0 to 36.3% and were lower than that of Pima S-7 (37.8%).

Small quantities of seed (25–50 g) are available for distribution to cotton breeders, geneticists, and other research personnel upon written request to the corresponding author. Appropriate recognition of the source is requested when these germplasm lines contribute to the development of a new breeding line, hybrid, or cultivar. All lines will be deposited in the National Plant Germplasm System, where they will be available for research purposes, including development and commercialization of new cultivars.

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Registration of Imidazolinone Herbicide-Resistant Sunflower Maintainer (HA 425) and Fertility Restorer (RHA 426 and RHA 427) Germplasms

One sunflower (*Helianthus annuus* L.) maintainer and two restorer germplasms were developed and released by the USDA-ARS, Fargo, ND, and the North Dakota Agricultural

Table 1. Parentage of germplasm lines possessing high fiber strength and long fiber length.

	Female parent		Male parent	
Germplasm line	Designation	Origin	Designation	Origin
93252	89591-9-2-1	P62† X Giza 70	8807-25-9-3	8006 X P73‡
93260	89590-7-8-4	P62 X S.I. St. Vincent	89591-34-3-2	P62 X Giza 70
94217	89590-7-8-7	P62 X S.I. St. Vincent	8810-51-4-1§	P72‡ X P73
94218	8915-13-7	P75‡ X 88-314	8810-51-4-1	P72 X P73
94220	89590-7-12-2	P62 X S.I. St. Vincent	8810-51-4-1	P72 X P73

† Turcotte et al. (1991).
‡ Percy and Turcotte (1997).
§ Percy and Turcotte (1998).

Experiment Station, Fargo, ND, in 2000; maintainer HA 425 (Reg. no. GP-254, PI 617098), restorer RHA 426 (Reg. no. GP-255, PI 617099), and restorer RHA 427 (Reg. no. GP-256, PI 617100). These germplasms are resistant to two imidazolinone herbicides, imazamox (Raptor, BASF Corporation, Mount Olive, NJ) [(±)-2[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-5-methoxymethyl-3-pyridinecarboxlic acid] and imazethapyr (Pursuit, BASF Corporation) [(±)-2[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-5-ethyl-3-pyridinecarboxlic acid] and are available for use by sunflower industry and public researchers to develop hybrids, parental lines, or improved germplasms with resistance to imidazolinone herbicides.

HA 425 is a BC_2F_6 maintainer germplasm selected from the cross HA 89*3/PUR *H. annuus*. PUR *H. annuus* was selected from a wild *H. annuus* L. population collected in Kansas. The wild *H. annuus* population was growing in a soybean [*Glycine max* (L) Merr.] field that had been repeatedly treated with imazethapyr. PUR H. annuus plants were resistant when treated with imazethapyr dispersed in water at the 15× (11.25 mL L^{-1}) labeled rate for soybean at the V6 plant stage (Schneiter and Miller, 1981). Pollen from the resistant plants was collected and crossed with HA 89 (PI 599773). HA 89 is an oilseed maintainer line released by the USDA and Texas Agricultural Experiment Station in 1971. Approximately 10 to 12 d after pollination, embryos were collected and cultured to obtain plants. When the F_1 plants reached the V6 stage, plants were treated with imazamox at a 1× (3.0 mL L^{-1}) rate. Resistant plants were identified and crossed to HA 89. Plants resistant to imazamox were also treated with imazethapyr at a 5× (3.75 mL L^{-1}) rate. All plants resistant to imazamox were resistant to the 5× rate of imazethapyr. Imazethapyr treatment was discontinued because of concerns regarding the long soil residual of imazethapyr. The same backcrossing procedure utilizing imazamox as the screening herbicide was continued to obtain BC_2F_1 plants which were self-pollinated to produce BC_2F_2 seed. The pedigree breeding method was used to develop the BC_2F_6 line utilizing imazamox at a 1× (3.0 mL L^{-1}) rate. HA 425 does not have an anthocyanin pigment in seed or plants, is single-headed, and has black seed with a grey stripe. The height of HA 425 is approximately 99 cm, and flowering date is approximately 62 d after planting.

RHA 426 and RHA 427 are F_6 restorer germplasms selected from the cross RHA 409//RHA 376*2/PUR *H. annuus*. PUR *H. annuus* was an imazethapyr-resistant selection from the same wild H. annuus population used to develop HA 425. RHA 376 was utilized in the initial cross and one backcross to obtain single-headed plants. RHA 376 is an oilseed restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 1990 (Miller, 1992). Single-headed plants that were resistant to a 1× (3.0 mL L^{-1}) rate of imazamox in the BC_1F_1 generation were crossed with RHA 409, a branched restorer line. RHA 409 is an oilseed restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 1995 (Miller and Gulya, 1999). The pedigree breeding method was used to develop RHA 426 and RHA 427 utilizing a 1× (3.0 mL L^{-1}) rate of imazamox for selection purposes. RHA 426 and RHA 427 do not have an anthocyanin pigment in seed or plants, are branched, and have black seed. The heights of RHA 426 and RHA 427 are approximately 104 and 116 cm, respectively, and the flowering dates are approximately 63 and 61 d after planting, respectively.

Hybrids were produced by crossing HA 425 with the two restorer lines, RHA 426 and RHA 427. The hybrids were planted at Prosper, North Dakota, and Hays, KS, during 1999, to evaluate their response to various rates of imidazolinone herbicides. Hybrids had no injury or chlorosis after treatment with a 1×, 2×, or 3× (0.75, 1.50, and 2.25 mL L^{-1}) rate of imazethapyr at Prosper, ND, or Hays, KS. Hybrids were chlorotic 1 wk after treatment with imazamox at the 1×, 2×, and 3× (3.0, 6.0, and 9.0 mL L^{-1}) rates at Prosper. However, after 3 wk, only the 3× (9.0 mL L^{-1}) rate caused slight chlorosis in hybrid plants. Treated hybrids at Hays had slight chlorosis 1 wk after treatment with the 1×, 2×, and 3× (3.0, 6.0, and 9.0 mL L^{-1}) imazamox rates, but no chlorosis of plants of any treatment was noted after 3 wk. There was no difference in yield between any treated plots and the untreated check.

Limited quantities of seed of each germplasm are available from the Seedstocks Project, Department of Plant Sciences, Loftsgard Hall, North Dakota State University, Fargo, ND 58105. We ask that appropriate recognition be made if these germplasms contribute to the development of a new breeding line, germplasm, or hybrid. U.S. Plant Variety Protection will not be requested for HA 425, RHA 426, or RHA 427.

J.F. Miller* and K. Al-Khatib

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Registration of Five Fertility Restorer Sunflower Germplasms

Five sunflower (*Helianthus annuus* L.) fertility restorer germplasm lines were released by the USDA-ARS, Fargo, ND, and the North Dakota Agricultural Experiment Station, Fargo, ND. RHA 417 (Reg. no. GP-257, PI 600000) and RHA 418 (Reg. no. GP-258, PI 607508) were released in 1998, RHA 419 (Reg. no. GP- 259, PI 619204) and RHA 420 (Reg. no. GP-260, PI 619205) were released in 1999, and RHA 428 (Reg. no. GP-261, PI 619206) was released in 2000. RHA 417, also known as "Sunburst," is characterized by hybrids which have shorter height, high yield, and high seed oil content, and RHA 418 provides tolerance to the sunflower midge (*Contarinia schulzi* Gagne). RHA 419, RHA 420, and RHA 428 are resistant to the prevalent North American races of downy mildew [caused by *Plasmopara halstedii* (Farl.) Berl. & De Toni in Sacc.] and to downy mildew races resistant to metalxyl (methyl *N*-(2-methoxyacetyl)-*N*-(2,6-xylyl)-DL-alaninate). The germplasm lines are available for use by sunflower industry and public researchers to create hybrids, parental lines, or improved germplasms.

RHA 417 is an F_6-derived F_8 fertility restorer line advanced by pedigree selection from the cross RHA 801/NS-RF POP 3. RHA 801 is a restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 1980 (Roath et al., 1981). NS-RF POP 3 was obtained by the USDA through an Office of International Cooperation and Development (OICD) germplasm exchange with the Institute of Field and Vegetable Crops, Novi Sad, Yugoslavia, in 1987. RHA 417

has a medium-size main head with profuse branching controlled by a recessive gene. The height of RHA 417 is approximately 91 cm, and flowering date is approximately 62 d after planting. RHA 417 has genes for fertility restoration of the PET1 (Serieys, 1996) cytoplasmic male sterility, and is resistant to race Pla 300 (Tourvieille de Labrouhe et al., 2000) of downy mildew.

RHA 418 is an F_5-derived F7 fertility restorer line advanced by pedigree selection from the cross RHA 801/RHA 274// Mahyco H-9. RHA 274 is a restorer line released by the USDA and the Texas and North Dakota Agricultural Experiment Stations in 1973 (Fick et al., 1975). RHA 801 is a restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 1980 (Roath et al., 1981). Mahyco H-9 was derived from a hybrid obtained through a Food and Agricultural Organization (FAO) Sunflower Subnetwork Trial in 1988. RHA 418 has a predominant main head with upper stem branching controlled by a recessive gene. RHA 418 is approximately 145 cm in height, has genes for fertility restoration of the PET1 cytoplasmic male sterility, and is resistant to race Pla 300 of downy mildew. RHA 418 had better tolerance to the sunflower midge in field tests at Fargo, ND, in 1996, and Mapleton, ND, in 1997, relative to the check inbred lines RHA 373 and RHA 274. A pedigree selection method was used on F_5 and F_6 lines to select for tolerance to the sunflower midge.

Hybrids with RHA 417 and RHA 418 were produced by crossing with three cytoplasmic male sterile (CMS) lines, CMS HA 89, CMS HA 821, and CMS HA 372. These hybrids were compared with the checks, Hybrid 894 and hybrid CMS HA 821/RHA 274, in trials planted in 1995, 1996, and 1997 at Casselton, ND, and in a Phomopsis (caused by *Phomopsis helianthi* Munt.-Cvet., et al.) screening nursery in 1996 and 1997. Hybrids with the two restorer lines had 14 and 16% higher yields, respectively, than the hybrid checks averaged over the 3 years of testing. Plant height of hybrids with RHA 417 and RHA 418 was 174 and 186 cm, respectively, compared with 178 cm for Hybrid 894 and 181 cm for hybrid CMS HA 821/RHA 274. Days from planting to flowering of hybrids were 71 and 70 d, respectively, compared with 72 and 74 d for Hybrid 894 and hybrid CMS HA821/RHA 274. Oil content of hybrid seed (dry weight basis) was 469 and 442 g kg^{-1}, respectively, compared with 417 and 451 g kg^{-1} for Hybrid 894 and hybrid CMS HA 821/RHA 274. Hybrids with RHA 417 and RHA 418 had significantly lower Phomopsis infection than the two check hybrids, with hybrids having 27.6 and 18.7% of the plants infected, respectively, compared with 54.9 and 38.7% for Hybrid 894 and hybrid CMS HA 821/RHA 274 in Phomopsis screening trials in 1996 and 1997.

RHA 419 and RHA 420 are F_4-derived F_6 fertility restorer lines advanced by pedigree selection from the cross RHA 373/ ARG 1575-2. RHA 373 is a restorer line released by the USDA and the North Dakota Agricultural Experiment Station in 1990 (Miller, 1992). ARG 1575-2 is a bulk of 41 self-pollinated F_5 plants derived from the cross CMS HA 89/accession *Helianthus argophyllus* Raf.-1575 (PI 468651) and was released by the USDA and the North Dakota Agricultural Experiment Station in 1989 (Seiler, 1991). Plants comprising PI 468651 were collected along a sandy beach near Daytona, FL, in 1980. The cross between RHA 373 and ARG 1575-2 was made in 1992 and a pedigree selection method was used. Downy mildew race Pla 730 was used to screen F_3, F_4, and F_5 lines during the initial selection phase. Released plants of RHA 419 and RHA 420 are homozygous resistant to races Pla 300, Pla 700, Pla 730, and Pla 770 of downy mildew, and thus would provide protection against metalxyl resistant strains of these races. RHA 419 and RHA 420 have upper stem branching conditioned by a recessive gene and are homozygous for fertility restoration of the PET1 cytoplasmic male sterility. RHA 419 is approximately 137 cm in height and RHA 420 is approximately 145 cm in height.

Hybrids with RHA 419 and RHA 420 were produced by crossing with CMS HA 821. These hybrids were compared with the checks, Pioneer 6451, Cargill 187, Mycogen 658, and Dekalb 3790 in trials planted in 1997 and 1998 at Casselton, ND. Hybrids with the two restorer lines yielded 3350 and 3175 kg ha^{-1}, respectively, compared with an average of 3280 kg ha^{-1} for the four checks. Oil content of hybrids using the two restorer lines averaged 493 and 498 g kg^{-1}, respectively, compared with a 504 g kg^{-1} average for the four checks. Hybrids with the two restorer lines flowered 75 and 77 d after planting, respectively, compared with a 74-d average for the four checks.

RHA 428 is an F7-derived F8 fertility restorer oilseed germplasm line advanced by pedigree selection from the cross RHA 801//RHA 365/PI 413157. PI 413157 is a wild *H. annuus* accession collected in New Mexico with approximately 65% of plants resistant to race Pla 730 of downy mildew as determined by Tan et al. (1990) at Fargo, ND. Pollen from resistant plants of PI 413157 was collected and crossed to RHA 365. RHA 365 is a single-headed restorer line released by USDA-ARS in 1988 (Miller and Gulya, 1990). F_1 plants of the cross RHA 365/PI 413157 were tested for resistance to race Pla 730 of downy mildew and resistant plants were self-pollinated. The F_2 generation of this cross was grown in the field at Fargo, ND, in 1992 and plants with the single-headed characteristic and no anthocyanin in seed or plants were identified and self-pollinated. The F_3 seed derived from F_2 heads was planted in the greenhouse in the spring of 1993 and tested for resistance to race Pla 730 downy mildew. Pollen was collected from resistant plants and crossed to RHA 801. RHA 801 is a recessive branched fertility restorer line released by USDA-ARS in 1980 (Roath et al., 1981). F7 plants were resistant to races Pla 300, Pla 700, Pla 730, and Pla 770 of downy mildew and provide protection against metalxyl resistant strains of these races. Resistant plants were increased by self-pollination and bulked to form RHA 428.

Limited quantities of seed of each germplasm are available from the Seedstocks Project, Department of Plant Sciences, Loftsgard Hall, North Dakota State University, Fargo, ND 58105. We ask that appropriate recognition be made if these germplasm lines contribute to the development of a new breeding line, germplasm, or hybrid. U.S. Plant Variety Protection will not be requested for RHA 417, RHA 418, RHA 419, RHA 420, or RHA 428.

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Registration of Maize Germplasm Oh1VI

The maize (*Zea mays* L.) germplasm Oh1VI (Reg. no. GP-369, PI 614734) was developed by the USDA-ARS and the Ohio Agricultural Research and Development Center as a source of resistance for maize chlorotic dwarf waikavirus (MCDV). Oh1VI was selected from the Virgin Island population PI 504148. In 1992 at Wooster, OH, a collection of 167 maize accessions obtained from the North Central Regional Plant Introduction Station, Ames, IA, was evaluated for resistance to MCDV. Twelve plants of each accession were screened by multiple inoculations with the disease vector *Graminella nigrifrons* (Forbes)(Louie and Anderson, 1993). One symptomless plant in the Virgin Island population was identified and self-pollinated in the greenhouse. Progenies from this plant were subjected to two additional cycles of disease screening and ear-to-row self-pollination of symptomless plants. The line was then advanced by seven generations of ear-to-row self-pollination without selection. The end result of the screening and advancement process was a S_9-derived S_{10} line.

A comparative test (1995 Wooster, OH) of Oh1VI with the MCDV resistant inbred line Mp705 (Pratt et al., 1994) and the susceptible inbred line Va35 was conducted by the multiple inoculation procedure. Inoculated and uninoculated plants were transplanted to the field for disease and agronomic trait assessment. Five plant plots were replicated four times and veinbanding symptoms were scored three times over a 14-d period by a disease severity scale of one (no symptoms) to five (severe symptoms). Area under the disease progress curve (AUDPC) scores were used to evaluate resistance. The mean AUDPC scores were 14.4 (Oh1VI), 25.4 (Mp705), and 53.2 (Va35). The AUDPC score for Oh1VI reflected limited veinbanding symptoms that were difficult to detect and slow to develop. Leaf tearing and chlorosis were not observed. Mean ear lengths of healthy (16.7 cm) and infected Oh1VI (15.2 cm) were not significantly different ($P = 0.73$). The plant height at the base of the flag leaf was also not significantly different ($P = 0.64$) for healthy (141.5 cm) and virus infected (133.6) plants. Plants had pink silks and the mean days to midsilk was 98 d. Ears averaged 16 to 18 rows of orange flinty seeds, had a white cob and were prone to ear molds. Plants were also highly susceptible to smut [caused by *Ustilago maydis* (DC.) Cda.] infection.

The Department of Plant Pathology (Ohio Agricultural Research and Development Center, The Ohio State University, Wooster, OH 44691) will maintain seed of Oh1VI for at least 5 yr. Packets of 30 seeds will be distributed upon written request. Recipients of seed are asked to make appropriate recognition of the original seed source if it is used to develop a new population, parental line, or hybrid.

R. Louie, M.W. Jones,* R.J. Anderson, and M.G. Redinbaugh

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Registration of OK 206 and OK 207 Alfalfa Germplasms

OK 206 and OK 207 alfalfa (*Medicago sativa* L.) germplasms (Reg. no. GP-344, PI 619164 and GP-345, PI 619165) were developed by the Oklahoma Agricultural Experiment Station and released in 2000. These are broad genetic base populations that provide resistance to the blue alfalfa aphid (*Acyrthosiphon kondoi* Shinji), biotype BAOK90, and the spotted alfalfa aphid [*Therioaphis herioaphis maculata* (Buckton)]. OK 206 and OK 207 have demonstrated good adaptation to Oklahoma and are intended as source populations for use in alfalfa breeding programs where multiple-pest resistance should include resistance to the biotype of blue alfalfa aphid first discovered in 1990 in Oklahoma (Zarrabi et al., 1994).

OK 206 and OK 207 were developed by recurrent phenotypic selection for resistance to blue alfalfa aphids collected in Oklahoma. Parents of OK 206 and OK 207 included 7 to 16% each of the cultivars 5472 (Woodward et al., 1993), Aggressor (North American Alfalfa Improvement Conference, 2000), Apollo Supreme, Cimarron (PVP 7900062), Garst 630, Magnum III, and WL 320 (Hanson et al., 1987), and the germplasm OK 51 (Caddel et al., 1992). Parental cultivars of OK 206 also included Good As Gold (4%) and CUF 101 (17%) (Lehman et al., 1983). These cultivars and the germplasm are well adapted to Oklahoma and the southern Great Plains, with the exception of CUF 101. OK 51 and CUF 101 were the only parental sources that possessed high resistance to the original biotype of blue alfalfa aphid. Two cycles of selection for resistance to the blue alfalfa aphid BAOK90 biotype were conducted. In cycle 1, approximately 1000 plants of each source cultivar were screened using standard procedures (North American Alfalfa Improvement Conference, 1999), resulting in 81 and 61 resistant phenotypes recovered for OK 206 and OK 207, respectively. Each strain was intercrossed in the greenhouse by hand. In cycle 2, several hundred syn 1 plants each were screened, resulting in 115 and 127 resistant plants, respectively, for OK 206 and OK 207. These were also intercrossed in the greenhouse by hand to produce the syn 1 generation of OK 206 and OK 207. Syn 2 and syn 3 seed was produced in isolated field plantings, with honey bees (*Apis mellifera* L.) for pollination.

Seedling tests to evaluate resistance to blue alfalfa aphid were conducted at Stillwater, OK, and Johnston, IA. The percentages of seedlings exhibiting resistance to aphids collected in Oklahoma were blue alfalfa aphid—tested at Stillwater OK 206 = 45, OK 207 = 35, CUF 101 (R) = 25, and 'Arc' (S) = 6, and tested at Johnston OK 206 = 32, OK 207 = 22, CUF 101 (R) = 14, and Arc (S) = 3; spotted alfalfa aphid—tested at Stillwater OK 206 = 53, OK 207 = 47, 'Baker' (R) = 50, and 'Caliverde' (S) = 2 [(R) = Resistant; (S) = Susceptible].

Although specific tests for resistance were not conducted, on the basis of their parentage, OK 206 and OK 207 probably

possess resistance to bacterial wilt [caused by *Clavibacter michiganensis* subsp. *insidiosus* (McCulloch)], Fusarium wilt [caused by *Fusarium oxysporum* Schlechtend.:Fr. f. sp. *medicaginis* (Weimer) W.C. Snyder & H.N. Hans], pea aphid [*A. pisum* (Harris)], anthracnose (caused by *Colletotrichum trifolii* Bain & Essary), Phytophthora root rot (caused by *Phytophthora megasperma* Drechs. f. sp. *medicaginis* T. Kuan & D.C. Erwin.), and Verticillium wilt (caused by *Verticillium albo-atrum* Reinke & Berthier).

Forage yield for OK 206 and OK 207 has been tested since 1997 in several Oklahoma sites. Each trial included the best cultivars developed by public and private breeding programs. Detailed results of each forage evaluation have been distributed in Central Alfalfa Improvement Conference Variety Test Reports and are online at www.agr.okstate.edu/alfalfa/var-test/alf-var.html; verified 10 Dec. 2001. Yields of OK 206 and OK 207 have been good, but not as consistently highly productive as the best cultivars for the area.

Flower color of OK 206 and OK 207 is approximately 82% purple and 18% variegated. Both germplasms are less fall dormant than all their parents, except CUF 101. Winter hardiness has been sufficient for the germplasms to survive four winters in Oklahoma with minimal plant loss.

Fifty grams of syn 3 seed will be provided upon written request to the corresponding author and agreement to make appropriate recognition of its source when this germplasm contributes to the development of a new germplasm, cultivar, hybrid, or strain cross. Request for seed from outside the USA should be accompanied by the appropriate customs and control documents.

J.L. Caddel,* A.A. Zarrabi, and R.C. Berberet

Acknowledgments

The authors gratefully acknowledge the assistance of Gary Hoard, Pioneer Hi-Bred International, Inc., Johnston, IA, for evaluation of this germplasm.

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Registration of OK 190 Alfalfa Germplasm

OK 190 alfalfa (*Medicago sativa* L.) germplasm (Reg. no. GP-346, PI 619203), was released by the Oklahoma Agricultural Experiment Station in 2000. OK 190 provides a unique combination of a broad genetic base, pest resistance, and production potential needed in alfalfa for the southern Great Plains. This germplasm is the result of the interpollination of 579 plants derived from the convergence of three lines of pest resistance breeding, that is, resistance to the blue alfalfa aphid (*Acyrthosiphon kondoi* Shinji), spotted alfalfa aphid [*Therioaphis maculata* (Buckton)], and Phytophthora root rot (caused by *Phytophthora megasperma* Drechs. f. sp. *medicaginis* T. Kuan & D.C. Erwin.). Source populations screened in the greenhouse for resistance to the blue alfalfa aphid, collected in Oklahoma prior to 1990 (Zarrabi et al., 1994), included 'Aggressor' (North American Alfalfa Improvement Conference, 2000), 'Apollo Supreme', 'Arrow', 'Cimarron' (Plant Variety Protection No. 7900092), 'Cimarron VR', 'CUF 101' (Lehman et al., 1983), 'Garst 630', 'OK 169' (Caddel et al., 2002), 'WL 317' (Kugler et al., 1991), 'WL 320' (Hanson et al., 1987), 'WL 322 HQ' (Huset et al., 1991), '555' (Woodward and Miller, 1989), '5472' (Woodward et al., 1993), and three experimental populations. Source material screened in the greenhouse for resistance to the spotted alfalfa aphid included Aggressor, Apollo Supreme, Arrow, 'Baker' (Kehr et al., 1978), Cimarron VR, CUF 101, 'Good As Gold', OK 169, WL 317, WL 320, WL 322 HQ, 555, and three experimental populations. Material screened in the field for resistance to Phytophthora root rot included Cimarron, WL 320, WAPH-1 (Grau, 1992) germplasm, and two experimental populations. From these three breeding lines, a total of 579 plants were transplanted to an isolated field and interpollinated with honey bees (*Apis mellifera* L.) to produce syn 1 seed. The plants traced to approximately 25% 555, 18% experimental populations, 8% each Cimarron and WL 320, 7% CUF 101, and 5% each Arrow and OK 169. Other cultivars contributed less than 4% each to the population.

Seedling tests to evaluate resistance (North American Alfalfa Improvement Conference, 1999) to blue alfalfa aphid and spotted alfalfa aphid were conducted at Stillwater, OK. The percentages of seedlings exhibiting resistance after infestation with aphids collected in Oklahoma were blue alfalfa aphid—OK 190 = 13, CUF 101 (R) = 25, and 'Arc' (S) = 6; spotted alfalfa aphid—OK 190 = 55, Baker (R) = 50, and 'Caliverde' (S) = 2 [(R) = Resistant; (S) = Susceptible].

On the basis of its parental sources, OK 190 also should provide resistance to bacterial wilt [caused by *Clavibacter michiganensis* subsp. *insidiosus* (McCulloch)]; Verticillium wilt, (caused by *Verticillium albo-atrum* Reinke & Berthier), Fusarium wilt [caused by *Fusarium oxysporum* Schlechtend.: Fr. f. sp. *medicaginis* (Weimer) W.C. Snyder & H.N. Hans], anthracnose (caused by *Colletotrichum trifolii* Bain & Essary), Phytophthora root rot, and pea aphid [*A. pisum* (Harris)]; and a low or moderate level of resistance to alfalfa stem nematode [*Ditylenchus dipsaci* (Khn) Filipjev] and Aphanomyces root rot [caused by *Aphanomyces euteiches* Drechs].

Flower color of OK 190 is predominately purple (>95%) with some variegated flowers and a trace of white and yellow flowers. Fall dormancy of OK 190 is similar to 'Legend', approximately 4 (1–9 scale, where 9 is very non dormant). Winter hardiness has been sufficient for the germplasm to survive several winters in Oklahoma. Forage yield potential for OK 190 has been tested since 1995 in several Oklahoma sites. Each trial included the best cultivars developed by public and private breeding programs. Detailed results of each forage evaluation have been distributed in Central Alfalfa Improvement Conference Variety Test Reports and are available online at www.agr.okstate.edu/alfalfa/var-test/alf-var.html; verified

10 Dec. 2001. Yields of OK 190 have been good, but not as consistently highly productive as the best cultivars for the area.

Twenty grams of syn 3 seed will be provided upon written request to the corresponding author and agreement to make appropriate recognition of its source when this germplasm contributes to the development of a new germplasm, cultivar, hybrid, or strain cross. Request for seed from outside the USA should be accompanied by the appropriate customs and control documents.

J.L. Caddel, A.A. Zarrabi, and R.C. Berberet

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Registration of PD 97100 Germplasm Line of Upland Cotton

PD 97100 cotton (*Gossypium hirsutum* L.) (Reg. no. GP-739, PI 612481) germplasm line that combines high yield potential with acceptable fiber quality was developed at the Pee Dee Research and Education Center, Florence, SC. This line was released in 2000 by the USDA-ARS.

PD 97100 was derived from a cross of PD 5256/'SureGrow 501' made in 1993. The pedigree of PD 5256 is 'McNair 220'/AC 241 (Green et al., 1991), while that of SureGrow 501 is 'DES 119'/DES 237-7 (Calhoun et al., 1997). The F_1 of the cross of PD 5256/SureGrow 501 was self-pollinated at the 1993-1994 USDA-ARS cotton winter nursery in Mexico and the F_2 seed bulked from 10 to 15 F_1 plants. On the basis of its 1994 yield performance, the F_2 bulk was advanced to the F_3 in 1995 for single plant selection. The F_3 plants were selected for plant type, fiber properties, and lint fraction, and advanced to F_4 progeny rows in 1996. PD 97100 was derived from seed bulked from a $F_{3:4}$ progeny row visually selected for yield potential compared with adjacent plots of SureGrow 501 (May, 2001).

PD 97100 combines high yield potential and acceptable fiber quality. Lint yield of PD 97100 averaged 8% greater than that of SureGrow 501 in four on-station breeding trials conducted between 1997 and 1999 at Florence, SC (May, 2001). Averaged over three locations of the 2000 University of Georgia Later-Maturity Strains Trials lint yield of PD 97100 was 5% greater than that of the cv. FiberMax 989 (Day et al., 2001). The lint fraction of PD 97100 (40%) was similar to that of SureGrow 501 (41%) in on-station trials, but less (38%) than that of FiberMax 989 (40%) in the Georgia Strains Trials. Fiber strength, 2.5% fiber span length, and micronaire readings (by single-instrument tests) of PD 97100 were similar to SureGrow 501 in on-station trials conducted between 1997 and 1999. Upper half mean length, uniformity index, fiber strength, and micronaire readings (by high volume instrument analysis) of PD 97100 were similar to those of FiberMax 989 in the Georgia Strains Trials. Relative trichome density of leaf petioles, veins, interveinal regions, and leaf margins of PD 97100 is intermediate between that of the hirsute cv. PSC 355 and relatively glabrous cv. FiberMax 966.

Data from the 2000 National Cotton Fusarium Wilt Test reported by Glass et al. (2000) indicates PD 97100 is moderately susceptible to Fusarium wilt [caused by *Fusarium oxysporum* Schlechtend.:Fr. f. sp. *vasinfectum* (Atk.) W.C. Snyder & H.N. Hans.].

PD 97100 should be useful to breeders and geneticists as a source of high yield potential. Seed (25 g) of this germplasm line may be obtained from the corresponding author. Requests for seed of PD 97100 from outside the U.S. must be accompanied by an import permit that will allow the seed to enter the requestor's country. The University of Georgia may not be able to certify the seed free of pests or pathogens specified on some import permits, and thus may not be able to supply seed of PD 97100. Recipients of seed are asked to acknowledge appropriately the source of the germplasm if it is used in the development of new germplasm, cultivars, or hybrids.

O.L. May*

Acknowledgments

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REGISTRATIONS OF GENETIC STOCKS

Registration of Four Mid-Range Oleic Acid Sunflower Genetic Stocks

Four sunflower (*Helianthus annuus* L.) maintainer genetic stocks were developed and released by the USDA-ARS, Fargo, ND, and the North Dakota Agricultural Experiment Station, Fargo, ND. HA 421 (Reg. no. GS-22, PI 618725), HA 422 (Reg. no. GS-23, PI 618726), HA 423 (Reg. no. GS-24, PI 618727), and HA 424 (Reg. no. GS-25, PI 618728) are maintainer genetic stocks released in 1999. These genetic stocks range from 637 to 670 g kg^{-1} in oleic acid concentration and possess genes which limit oleic acid to the mid-range level. These genetic stocks are available for use by sunflower industry and public researchers to develop mid-oleic hybrids (so called NuSun hybrids) with oleic concentrations between 550 and 700 g kg^{-1} in seed oil.

HA 421, HA 422, and HA 423 are bulked F_{10} genetic stocks selected from the cross HA 341/HA 821. HA 341 (PI 509051) and HA 821 (PI 599984) are germplasm lines released by the USDA-ARS and the North Dakota Agricultural Experiment Station in 1986 and 1983, respectively (Miller et al., 1987; Roath et al., 1986). Oleic acid concentration of HA 421 ranged from 549 to 713 g kg^{-1} and averaged 637 g kg^{-1} in seed oil of plants grown in the 1995 to 1998 USDA-ARS breeding nurseries planted at Fargo, ND. Oleic acid concentration of HA 422 ranged from 609 to 727 g kg^{-1} and averaged 669 g kg^{-1}, and HA 423 ranged from 580 to 724 g kg^{-1} and averaged 670 g kg^{-1} in seed oil of plants grown from 1995 to 1998, respectively, in the USDA-ARS breeding nurseries planted at Fargo, ND. For comparison, oleic acid concentration of HA 341 and HA 821 averaged 825 and 181 g kg^{-1} in seed oil, respectively.

HA 424 is a bulk F_{10} genetic stock selected from the cross HA 383/HA 341. HA 383 (PI 578872) is a germplasm line released by the USDA-ARS and the North Dakota Agricultural Experiment Station in 1992 (Miller and Gulya, 1994). Oleic acid concentration of HA 424 ranged from 603 to 692 g kg^{-1} and averaged 641 g kg^{-1} in seed oil of plants grown from 1995 to 1998 in the USDA-ARS breeding nurseries at Fargo, ND. For comparison, oleic acid concentration of HA 383 averaged 202 g kg^{-1} in seed oil.

HA 421, HA 422, HA 423, and HA 424 were approximately 98, 112, 110, and 100 cm in height, respectively, in field tests grown from 1995 to 1998. Days from planting to flowering were 68, 67, 69, and 68 d, respectively. A pedigree selection method was used to advance generations to the F_{10}, with selection for oleic concentration starting at the F_3 generation.

Hybrids were produced by crossing the four maintainer lines with two restorer lines, RHA 409 (PI 603990) and RHA 274 (LP-1) (PI 603920). They were planted and evaluated in a field nursery at Fargo, ND in 1998. RHA 409 and RHA 274 (LP-1) were released by the USDA-ARS and the North Dakota Agricultural Experiment Station in 1995 and 1997, respectively, and have traditional oleic acid concentration levels of 160 to 180 g kg^{-1} (Miller and Gulya, 1999; Miller and Vick, 1999). Oleic concentration was determined by averaging values from four heads for each hybrid. Hybrids of HA 421 crossed with the two restorers had an oleic acid concentration of 637 and 696 g kg^{-1}, respectively. Hybrids of HA 422 crossed with the two restorers had an oleic concentration of 564 and 655 g kg^{-1}, respectively. Hybrids of HA 423 crossed with the two restorers had an oleic concentration of 510 and 628 g kg^{-1}, respectively. Hybrids of HA 424 crossed with the two restorers had an oleic concentration of 542 and 649 g kg^{-1}, respectively. It appeared that RHA 409 and RHA 274 (LP-1) possess different modifier genes affecting oleic acid concentration, or differ in their interaction with the genetic factors influencing the oleic level in HA 421 to HA 424.

Limited quantities of seed of each genetic stock are available from the Seedstocks Project, Department of Plant Sciences, Loftsgard Hall, North Dakota State University, Fargo, ND 58105. It is requested that appropriate recognition be made if these genetic stocks contribute to the development of new breeding lines, germplasms, or hybrids. U.S. Plant Variety Protection will not be requested for HA 421, HA 422, HA 423, or HA 424.

J.F. Miller* and B.A. Vick

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Registration of MD 17 Fiberless Upland Cotton as a Genetic Stock

MD 17 (Reg. no. GS-2, PI 616493) upland cotton, *Gossypium hirsutum* L, was produced by the Crop Genetics and Production Research Unit, Stoneville, MS, as part of an ongoing multidisciplinary approach to understand the complex genetics of lint percentage and to identify specific genes involved in the expression of this important yield component. MD 17 originated from a single plant selection made from the F_2 progeny of a cross between two accessions, 143 and 243, of the Mississippi Obsolete Variety Collection (MOVC) (Percival, 1987). Accession 243 expresses the dominant naked seed allele N_1N_1 and accession 143 expresses the recessive naked seed allele n_2n_2. Progeny of the selected double mutant ($N_1N_1n_2n_2$) F_2 individuals were reselected on an individual plant basis. Seed from uniformly expressing F_4 and F_5 populations were bulk harvested. The F_5 population had completely fiberless cottonseed, was uniform in plant height, flowering and boll opening, and was homozygous for the expression of petal spot (R_2R_2) (Percy and Kohel, 1999).

Expression of the naked seed alleles in the accessions 143 and 243 is characterized by ovules which initiate lint fiber, but lack fuzz fiber (Endrizzi et al., 1985). The same biochemical mechanism which prevents fuzz fiber initiation also may inhibit lint fiber initiation. Lint production appears to be influenced negatively by the N_1 and n_2 alleles with lint percentage of 25.6% for accession 143 (National Genetics Resources Program, 2001a) and 11.4% for accession 243 (National Genetics Resources Program, 2001b). However, MD 17, presumably

containing $N_1N_1n_2n_2$ alleles, is completely devoid of fuzz and lint fibers. Other fiberless lines which have been reported in the literature are SL 1-7-1 (Ruan and Chory, 1998; Ruan et al., 2000; Turley and Ferguson, 1996), MU 5 fiberless (Nadarajan and Rangasamy, 1988, 1997), and 9SO × HG (Joshi et al., 1985, 1988). Mu 5 reportedly does not contain N_1N_1 thus its fiberless trait is conditioned by at least one gene not found in MD 17 (Nadarajan and Rangasamy, 1988, 1997). No information was found in the literature on the development or genotypes of 9SO × HG or SL 1-7-1. Two advantages of MD 17 compared with other fiberless lines are that the genotype of MD 17 is known and the parental accessions can be obtained easily from the USDA National Plant Germplasm System [National Collection of *Gossypium* Germplasm. USDA-ARS, 2765 F and B Rd., Southern Crop Research Laboratory, Crop Germplasm Research Unit, College Station, TX. (percival@tamu.edu)]. MD 17 should interest geneticists, plant physiologists, biochemists, molecular biologists, and other scientists with research interest in the development of lint percentage, trichome development, or fiber initiation.

Seed will be maintained by the author. Small quantities of seed are available upon request.

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