ASA, CSSA, and SSSA Virtual Issue Call for Papers:

Advancing Resilient Agricultural Systems: Adapting to and Mitigating Climate Change

Content will focus on resilience to climate change in agricultural systems, exploring the latest research investigating strategies to adapt to and mitigate climate change. Innovation and imagination backed by good science, as well as diverse voices and perspectives are encouraged. Where are we now and how can we address those challenges? Abstracts must reflect original research, reviews and analyses, datasets, or issues and perspectives related to objectives in the topics below. Authors are expected to review papers in their subject area that are submitted to this virtual issue.

Topic Areas

- Emissions and Sequestration
  - » Strategies for reducing greenhouse gas emissions, sequestering carbon
- Water Management
  - » Evaporation, transpiration, and surface energy balance
- Cropping Systems Modeling
  - » Prediction of climate change impacts
  - » Physiological changes
- Soil Sustainability
  - » Threats to soil sustainability (salinization, contamination, degradation, etc.)
  - » Strategies for preventing erosion
- Strategies for Water and Nutrient Management
  - » Improved cropping systems
- Plant and Animal Stress
  - » Protecting germplasm and crop wild relatives
  - » Breeding for climate adaptations
  - » Increasing resilience
- Waste Management
  - » Reducing or repurposing waste
- Other
  - » Agroforestry
  - » Perennial crops
  - » Specialty crops
  - » Wetlands and forest soils

Climate Change Virtual Issue

Submit Now!

Deadlines

Abstract/Proposal Deadline: Ongoing
Submission deadline: 31 Dec. 2022

How to submit

Submit your proposal to manuscripts@sciencesocieties.org

Please contact Jerry Hatfield at jerryhatfield67@gmail.com with any questions.

American Society of Agronomy | Crop Science Society of America | Soil Science Society of America

Published January, 2001

REGISTRATION OF CULTIVARS

Registration of 'Fowler' Soybean

'Fowler' soybean [*Glycine max* (L.) Merr.] (Reg. no. CV-421, PI 613195) was developed by the USDA-ARS, in cooperation with the University of Tennessee Agricultural Experiment Station and the North Carolina Agricultural Research Service. It was released in 1999 to provide a cultivar of Group V maturity with high yield potential and resistance to soybean cyst nematode (SCN) (*Heterodera glycines* Ichinohe), Races 2, 3, 5, and 14 (6). Fowler is best adapted to production areas between 34° and 37° N lat.

Fowler is an F_7 bulk of a single-plant selection made in the F_5 from the cross 'Hartwig' × 'Holladay' (1, 2). The F_2 plants of the cross were challenged with a mixture of SCN Races 2, 3, 5, and 14 in the greenhouse during the spring of 1992. Resistant plants were transplanted to the field for seed production. The transplants were progeny tested in each succeeding generation for resistance to the four SCN races in separate tests. A single plant was chosen from a progeny row in each of the F_3, F_4 , and F_5 generations, and the remainder of the row was bulked for yield evaluation during the next year. One hundred and twenty $F_{5:6}$ plants were selected from the border rows of yield plots, tested for resistance to each of the four SCN races, and grown in progeny rows in the field for selection for uniformity of flower, pubescence, pod wall color, plant growth, and maturity. Selected rows were bulked in the $F_{5:7}$ generation.

Fowler matures ≈1 d later than 'Hutcheson' (3). It has determinate plant type, white flower, tawny pubescence, and tan pod wall. Seeds are shiny yellow with black hila. Fowler has been confirmed to be resistant to SCN Races 2, 3, 5, and 14 by greenhouse tests. It may have resistance to other SCN races because the resistant parent, Hartwig, is resistant to most races of the nematode. Fowler is susceptible to stem canker [caused by *Diaporthe phaseolorum* (Cook & Ellis) Sacc. var. *meridionalis* F.A. Fernandez] and root-knot nematodes [*Meloidogyne arenaria* (Neal) Chitwood and *M. incognita* (Kofoid & White) Chitwood]. Fowler, tested as J94-7, averaged two bushels per acre less than Hutcheson in the Tennessee variety trials in 1997 (4), one bushel per acre less in 1998 (5), and two bushels per acre less than Hutcheson in the Uniform Soybean Tests Southern Sates Maturity Group V tests in 1997 and 1998 (7, 8). In four fields infested with either SCN Race 2 or 5, Fowler averaged four bushels per acre more than Hutcheson and had only 17% of the nematodes occurring in Hutcheson plots at harvest. Fowler averaged 8 to 16 bushels per acre more than Hartwig in 1994 to 1995 and in 1997 in tests in western Tennessee.

Breeder seed will be maintained by USDA-ARS, Crop Genetics and Production Research Unit, P.O. Box 345, Stoneville, MS 38776-0345. One hundred seed of Fowler can be obtained for research purposes from the corresponding author for at least five years. U.S. plant variety protection for Fowler will not be applied for.

LAWRENCE D. YOUNG* (9)

References and Notes

1. Anand, S.C. 1992. Registration of 'Hartwig' soybean. Crop Sci. 32:1069–1070.
2. Burton, J.W., T.E. Carter, Jr., and E.B. Huie. 1996. Registration of 'Holladay' soybean. Crop Sci. 36:467.
3. Buss, G.R., H.M. Camper, Jr., and C.W. Roane. 1988. Registration of 'Hutcheson' soybean. Crop Sci. 28:1024–1025.
4. Graves, C.R., B.N. Duck, F.L. Allen, T.C. Mueller, R. Thompson, G. Percell, M. Smith, J. McClure, B. Pitt, and J. Williams. 1997. Performance of soybean varieties in 1997. Dep. of Plant and Soil Sci., Univ. of TN, Knoxville.
5. Graves, C.R., V.R. Pantalone, B.N. Duck, F.L. Ellis, D. Kincer, R. Thompson, G. Percell, C.L. Click, J. McClure, W.D. Pitt, and M. Smith. 1998. Performance of soybean varieties in 1998. Dep. of Plant and Soil Sci., Univ. of TN, Knoxville.
6. Riggs, R.D., and D.P. Schmitt. 1988. Complete characterization of the race scheme for *Heterodera glycines*. J. Nematol. 20:392–395.
7. Tyler, J.M., and P. Bell (ed.). The uniform soybean tests, southern states: 1997. USDA-ARS, Stoneville, MS.
8. Tyler, J.M., and P. Bell (ed.). The uniform soybean tests, southern states: 1998. USDA-ARS, Stoneville, MS.
9. L.D. Young, USDA-ARS, P.O. Box 345, Stoneville, MS 38776-0345. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (ldyoung@ars.usda.gov).

Published in Crop Sci. 41:257 (2001).

Registration of 'Maravilla-TCL99' Triticale

'Maravilla-TCL99' spring triticale (X *triticosecale* Wittmack L.) (Reg. no. CV-21, PI 613160) was developed by the International Maize and Wheat Improvement Center (CIMMYT), Mexico D.F., Mexico, and released in Mexico by the University of Mexico State, Universidad Autonoma del Estado de Mexico, UAEM, in 1999 (Reg. no. 1229-TCL-010-300799/C).

Maravilla-TCL99 is a widely adapted and high yielding complete hexaploid triticale cultivar. It was developed using a modified pedigree selection method known as the *shuttle breeding method* established by N.E. Borlaug in the mid-1940s (1) and adopted by the CIMMYT wheat and triticale breeding program (3). Shuttling germplasm between Obregon (40 m alt and 27.5° N lat) and Toluca (2640 m alt and 18° N lat) enables CIMMYT breeders to select cultivars adapted to a wide range of abiotic and biotic stresses with no photoperiod sensitivity. Maravilla-TCL99 was selected from the progeny of the cross 'DAGRO'/'IBEX'//'CIVET#2' (SWT87.246-1B-3Y-2B-4RES-0B-1Y-0PAP-3Y-0B-0UAEM). The F_1 of Maravilla-TCL99 was evaluated in Toluca, Mexico State and the F_3, F_5, F_7, and F_9 generations were grown at Obregon, Sonora. The F_2, F_4, F_6, and F_{10} were evaluated at El Batan. The F_8 and F_{11} generations of Maravilla-TCL99 were grown at Papalotla and the University UAEM campus, respectively. Two hundred individual plants were selected from the F_7 in Obregon and planted as head rows in Papalotla. The agronomically desirable and homogenous F_7-derived head rows were bulked and evaluated in yield trials in Obregon. Seed purification was continued in the F_9 and subsequent generations by planting 200 head rows in each generation, discarding the off–types and bulking the similar rows.

In Obregon, an arid region, Maravilla-TCL99 was selected under three types of mega-environments (ME) with ME1 as a high input environment with full irrigation, ME4 an arid environment with one irrigation before planting only, and ME5 a heat stress environment during grain filling. Early generation selection in Obregon was based primarily on agronomic type and resistance to leaf rust (caused by *Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) and stem rust (caused by *Puccinia graminis* Pers. f. sp. *tritici* Eriks. & Henn). Grain yield and test weight were additional selection criteria in the advanced generations. At El Batan, Papalotla (ME4), and Toluca, a high rainfall area (ME2), selection traits in early generations were resistance to yellow rust [caused by *Puccinia*

striiformis West. syn. *P. glumarum* (Schmidt) Eriks. & Henn.], fusarium head blight (scab) (caused by *Fusarium* spp.), septoria (caused by *Septoria* spp.), tolerance to low pH soils, harvest time sprouting, and agronomic traits.

In Obregon, from 1993 to 1997, Maravilla-TCL99 yielded equal to the checks 'Fahad-5,' 'Jilotepec,' and 'Huamantla' under both ME1 and ME4 conditions. The average yield of Maravilla-TCL99 under ME5 was lower than the checks. In Mexico State during 1998 and 1999, Maravilla-TCL99 substantially out performed the triticale as well as wheat checks in all environments. Under ME4 conditions, Maravilla-TCL99 averaged 20 and 22% higher grain yield than Jilotepec and Huamantla, respectively. Under ME2 and acid soils conditions (ME3), Maravilla-TCL9 produced 12 and 17% higher grain yield than the same two triticale checks.

In Mexico State, the test weight of Maravilla-TCL99 was 640 kg m^{-3} under ME4 and 580 kg m^{-3} in ME2 environments. These test weight levels are significantly higher than that of Jilotepec (610 kg m^{-3}) under ME4 conditions, but lower than that of Huamantla (610 kg m^{-3}) under ME2 conditions. Test weight of the bread wheat 'Romoga F94' averaged 670 and 720 kg m^{-3} under ME2 and ME4 conditions, respectively. In Obregon, Maravilla-TCL99 had a test weight similar to the two checks under all environments, except under ME5 conditions, where it had superior test weight.

In Mexico State, Maravilla-TCL99 was 5 and 10 cm taller than Jilotepec, and similar to that of Huamantla under ME1 and ME4 conditions, respectively. In Obregon, Maravilla-TCL99 was taller than both Jilotepec and Huamantla by 6 and 11 cm under ME1 and 7 and 9 cm in ME4 conditions, respectively. Maravilla-TCL99 is also a medium late maturing genotype. At El Batan, Mexico State, Maravilla-TCL99 matured 5 and 9 d later than Jilotepec and Huamantla, respectively. In Obregon, Maravilla-TCL99 matured 3 to 4 d later than Jilotepec and 6 d later than Huamantla under ME1 conditions.

Maravilla-TCL99, is moderately resistant to the new race of yellow rust that has virulence on the Yr9 gene in wheat and triticale in Mexico (2) and many other countries. All previously released triticale cultivars in Mexico State are susceptible to this new race. Maravilla-TCL99 is resistant to leaf rust, septoria, and stem rust. Maravilla-TCL99, is moderately susceptible to fusarium head blight and harvest time sprouting. Maravilla-TCL99 has medium dark kernel color with long, lax, white, and fully awned spikes. The grain quality of Maravilla-TCL99 is suitable for animal feeding, making unleavened breads (tortilla, chapatti, etc.), and in mixtures with bread wheat flour.

Breeder seed of Maravilla-TCL99 is maintained by the UAEM. Certified seed can be obtained from UAEM, Centro Universitario Km. 15, Col. San Rafael, Carret. Toluca-Ixtlahuaca, Apdo. Postal 435, Toluca, Edo. Mexico.

G. Estrada Campuzano, M. Mergoum,* W.H. Pfeiffer, S. Rajaram, A. Hede, A. Balbuena Melgarejo, C.G. Martinez Rueda, O. Abdalla, and G. Varughese (4)

References and Notes

1. Borlaug, N.E. 1968. Wheat breeding and its impact on world food supply. p. 1–36. *In* K.W. Finley and K.W. Shephard (ed.) Proc. 3rd. Int. Wheat Genet. Symp., Canberra, Australia.
2. Mergoum, M., W.H. Pfeiffer, S. Rajaram, and R.J. Peña. 1998. Triticale at CIMMYT: Improvement and adaptation. p. 58–64. Proc. 4th Int. Triticale Symp., Vol. 1. ISBN 0-9585592-0-1 Red Deer, Canada, 26–31 Jul.
3. Rajaram, S. 1995. Wheat Germplasm Improvement: Historical perspectives, philosophy, objectives and Missions. *In* S. Rajaram & G.P. Hettel (ed.) Wheat breeding at CIMMYT: Commemorating 50 years of research in Mexico for global wheat improvement. Wheat Spec. Rep. no. 29, Mexico, and D.F.: CIMMYT, p. 1–9.
4. M. Mergoum, W.H. Pfeiffer, S. Rajaram, O. Abdalla, A. Hede, G. Varughese, Int. Maize and Wheat Improv. Cent., CIMMYT Int., Lisboa 27, Apdo. Postal 6-641, 06600 Mexico, D.F., Mexico; G. Estrada Campuzano, A. Balbuena Melgarejo, C.G. Martinez Rueda. Facultad de Ciencias Agricolas, UAEM, Apdo. Postal 435, Toluca, Edo. De Mexico, Mexico. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (m.mergoum@cgiar.org).

Published in Crop Sci. 41:257–258 (2001).

Registration of 'Cerrillo-TCL99' Triticale

'Cerrillo-TCL99' spring triticale (X *triticosecale* Wittmack L.) (Reg. no. CV-22, PI 613156) was developed by the International Maize and Wheat Improvement Center (CIMMYT), Mexico D.F., Mexico, and released in Mexico by the University of Mexico State, Universidad Autonoma del Estado de Mexico, UAEM in 1999 (Reg. no. 1230-TCL-011-300799/C).

Cerrillo-TCL99 is a complete hexaploid spring triticale developed using a modified pedigree selection method known as the *shuttle breeding method* established by N.E. Borlaug in the mid-1940s (1), and adopted by the CIMMYT wheat and triticale breeding program (3). Shuttling germplasm between Obregon (40 m alt and 27.5° N lat) and Toluca (2640 m alt and 18° N lat) enables CIMMYT breeders to select cultivars adapted to a wide range of abiotic and biotic stresses with no photoperiod sensitivity. Cerrillo-TCL99 was selected from the progeny of the cross 'FAHAD 4'/'FARAS 1' (CTM89.179-5Y-0M-2Y-0M-6Y-0M-2B-0Y-0UAEM). The F_1, F_3, F_5, and F_7 generations of Cerrillo-TCL99 were grown as bulks at Toluca, Mexico State. The F_2, F_4, F_6, and F_9 generations were evaluated in Obregon, Sonora. The F_8 was grown in El Batan and the F_{10} at the UAEM in Mexico State. In the F_6 generation, 200 individual plants were selected and planted as head rows. The agronomically desirable and homogenous F_6-derived lines were bulked and evaluated in preliminary yield trials at Obregon. Further seed purification of Cerrillo-TCL99 was conducted in the F_9 and subsequent generations by planting 200 head rows selected from previous generations, discarding the off–types and bulking the similar and homogenous rows.

Cerrillo-TCL99 was selected under three types of mega environments (ME) in Obregon, an arid region with ME1 as a high input environment with full irrigation, ME4 an arid environment with one irrigation before planting, and ME5 a heat stress environment during grain filling. Early generation selection in Obregon is based primarily on agronomic type and resistance to leaf rust (caused by *Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) and stem rust (caused by *Puccinia graminis* Pers. f. sp. *tritici* Eriks. & Henn). Grain yield and test weight were additional selection criteria in the advanced generations. At El Batan and Toluca, a high rainfall area (ME2), selection traits in early generations were resistance to yellow rust [caused by *Puccinia striiformis* West. syn. *P. glumarum* (Schmidt) Eriks. & Henn.], fusarium head blight (scab) (caused by *Fusarium* spp.), septoria (caused by *Septoria* spp.), tolerance to low pH soils, harvest time sprouting, and agronomic traits. Cerrillo-TCL99 was evaluated in advanced yield trials under the three Obregon environments from 1994 to1998 and under adverse environments and disease severity in the highlands of Mexico State including Toluca, during the 1998 and 1999 crop seasons. During the 1994 to 1998 period at Obregon, Cerrillo-TCL99 out yielded the check 'Fahad-5' by 13%, 'Jilotepec' by 14%, and 'Huamantla' by 7% under the ME1 environment. Under the ME4 environment, grain yield of all cultivars was similar. Under the ME5 environment, Cerrillo-TCL99 produced 7 to 8% less than all other cultivars. In Mexico State, Cerrillo-TCL99 yielded on average higher

than all ME4 test sites in 1998 to 1999, by 11 and 13% more grain than Jilotepec and Huamantla, respectively. Under the ME2 environment of the Mexico State, Cerrillo-TCL99 produced 6% more grain than Huamantla, but was similar in yield to Jilotepec.

Under the harsh environments of Mexico State, Cerrillo-TCL99 exhibited a test weight (680 kg m^{-3}) which was significantly higher than Jilotepec (610 kg m^{-3}), and Huamantla (630 kg m^{-3}), but significantly less than the bread wheat 'Romoga F94' (720 kg m^{-3}). Under ME2 environments, the test weight of Cerrillo-TCL99 (610 kg m^{-3}) was equal to Huamantla but significantly higher than that of Jilotepec (580 kg m^{-3}). At Obregon, Cerrillo-TCL99 exhibited significantly higher test weight than Jilotepec and Huamantla under both ME1 and ME5 conditions. Under ME4 conditions, all three cultivars had comparable test weight.

Cerrillo-TCL99 is in general, a tall and medium late cultivar, except under ME2 conditions of Mexico State where it had similar height to Humantla. In all other environments the new cultivar was taller than the two checks by 5 to 16 cm. The maturity of Cerrillo-TCL99 is within the range of the check cultivars Jilotepec and Huamantla.

Cerrillo-TCL99 is resistant to the new race of yellow rust that has virulence to the Yr9 gene in wheat and triticale in Mexico (2) and many other countries. All previously released triticale cultivars in Mexico State are susceptible to this new race. Cerrillo-TCL99 is resistant to leaf rust, septoria, stem rust, and is moderately susceptible to fusarium head blight as well as harvest time sprouting. Cerrillo-TCL99 kernel color is medium dark and at maturity it has white, awned, medium long, and lax spikes. Cerrillo-TCL99 grain quality is suitable for animal feeding and making unleavened breads (tortilla, chapatti, etc.) as well as for blends with bread wheat flour.

Breeder seed of Cerrillo-TCL99 is maintained by UAEM. Certified seed can be obtained from UAEM, Centro Universitario Km. 15, Col. San Rafael, Carret. Toluca-Ixtlahuaca, Apdo. Postal 435, Toluca, Edo. Mexico

M. Mergoum,* G. Estrada Campuzano, W.H. Pfeiffer, S. Rajaram, A. Hede, A. Balbuena Melgarejo, and C.G. Martinez Rueda (4)

References and Notes

1. Borlaug, N.E. 1968. Wheat breeding and its impact on world food supply. p. 1–36. *In* K.W. Finley and K.W. Shephard (ed.) Proc. 3rd. Int. Wheat Genet. Symp., Canberra, Australia.
2. Mergoum, M., W.H. Pfeiffer, S. Rajaram, and R.J. Peña. 1998. Triticale at CIMMYT: Improvement and adaptation. p. 58–64. Proc. 4th Int. Triticale Symp., Vol. 1. ISBN 0-9585592-0-1. Red Deer, Canada, 26–31 Jul.
3. Rajaram, S. 1995. Wheat Germplasm Improvement: Historical perspectives, philosophy, objectives and Missions. *In* S. Rajaram & G.P. Hettel (ed.) Wheat breeding at CIMMYT: Commemorating 50 years of research in Mexico for global wheat improvement. Wheat Special Report no. 29, Mexico, and D.F.: CIMMYT, p. 1–9.
4. M. Mergoum, W.H. Pfeiffer, S. Rajaram, A. Hede, Int. Maize and Wheat Improv. Cent., CIMMYT Int., Lisboa 27, Apdo. Postal 6-641, 06600 Mexico, D.F., Mexico; G. Estrada Campuzano, A. Balbuena Melgarejo, C.G. Martinez Rueda. Facultad de Ciencias Agricolas, UAEM, Apdo. Postal 435, Toluca, Edo. De Mexico, Mexico. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (m.mergoum@cgiar.org).

Published in Crop Sci. 41:258–259 (2001).

Registration of 'Supremo TCL-2000' Triticale

'Supremo TCL-2000,' spring triticale (X *triticosecale* Wittmack L.) (Reg. no. CV-23, PI 613157) was developed by the International Maize and Wheat Improvement Center (CIMMYT), Mexico D.F., Mexico, and released in Mexico by the research institute ICAMEX (Instituto de Investigacion y Capacitacion Agropecuaria, Agricola y Forestal del Estado de Mexico) in 1999 (Reg. no. 1128-TCL-008-280599/C).

Supremo TCL-2000 is a high yielding triticale cultivar, widely adapted, and resistant to the race of yellow rust that is virulent on the Yr9 source of resistance. Supremo TCL-2000 was developed using a modified pedigree selection method known as the *shuttle breeding method* established by N.E. Borlaug in the mid-1940s (1) and adopted by the CIMMYT wheat and triticale breeding program (3). Shuttling germplasm between Obregon (40 m alt and 27.5° N lat) and Toluca (2640 m alt and 18° N lat) enables CIMMYT breeders to select cultivars adapted to a wide range of abiotic and biotic stresses with no photoperiod sensitivity. Supremo TCL-2000 is a complete hexaploid triticale that is derived from the progeny of the cross 'BULL−10'/ 'MANATI−1' (CTY90.169-25Y-0M-8Y-0M-2B-0Y). The F_2, F_2, F_4 and F_7 generations of Supremo TCL-2000 were grown in Obregon, Sonora. The F_1 was grown in El Batan, Mexico State and the F_3 and F_5 in Toluca. In the F_6 generation, 200 individual plants were selected and planted as head rows. The agronomically desirable and homogenous F_6-derived lines were bulked in the F_7 and evaluated in preliminary yield trials in Obregon. Further seed purification of Supremo TCL-2000 was conducted in the F_9 by planting 150 head rows selected from the F_8, discarding the off types, and bulking the similar rows.

In Obregon, an arid region, Supremo TCL-2000 was selected under three types of mega-environments (ME) with ME 1 as a high input environment with full irrigation, ME 4 an arid environment with one irrigation before planting only, and ME 5 a heat stress environment during grain filling. Early generations selection in Obregon was based primarily on agronomic type and resistance to leaf rust (caused by *Puccinia recondita* Rob. ex Desm. f. sp. *tritici*) and stem rust (caused by *Puccinia graminis* Pers. f. sp. *tritici* Eriks. & Henn.). Grain yield and test weight were additional selection criteria in advanced generations. At El Batan and Toluca, selection in the early generations improved resistance to yellow rust [caused by *Puccinia striiformis* West. syn. *P. glumarum* (Schmidt) Eriks. & Henn.], fusarium head blight (scab) (caused by *Fusarium* spp.), septoria (caused by *Septoria* spp.), tolerance to low pH soils, harvest time sprouting and agronomic traits. Supremo TCL-2000 was evaluated in advanced yield trials under the three Obregon environments from 1995 to 1998 and under adverse environments and disease severity in the highlands of Mexico State including Toluca, a high rainfall site (ME2), during the 1998 and 1999 crop seasons. In Obregon, Supremo TCL-2000 yielded 18 and 8% more than 'Fahad-5' under ME1 and ME4 conditions, respectively. Under similar conditions, Supremo TCL-2000 produced 7 and 11% more grain than 'Jilotepec.' In Mexico State, Supremo TCL-2000 produced on average 120, 53, and 71% more grain than Jilotepec, 'Huamantla' and 'Secano,' respectively.

Supremo TCL-2000 is resistant to the new yellow rust race that is virulent to the genE Yr9 in wheat and triticale in Mexico (2) and many other countries. All previously released triticale cultivars are susceptible to this new race of yellow rust. Supremo TCL-2000 is resistant to leaf rust, septoria, and stem rust. Supremo TCL-2000, is moderately tolerant to fusarium head blight and harvest time sprouting.

In Mexico State, the test weight of Supremo TCL-2000 (611 kg m^{-3}) was equal to that of Huamantla (612 kg m^{-3}), but significantly higher than that of Jilotepec (584 kg m^{-3}) and Secano (572 kg m^{-3}). Compared with the test weight of the bread wheat 'Romoga F94' (671 kg m^{-3}) and durum wheat

'Aculco C96' (640 kg m^{-3}), TCL-2000 had significantly lower test weight. In Obregon, the test weight of Supremo TCL-2000 (770 kg m^{-3}) was significantly higher and equal to that of Jilotepec (740 kg m^{-3}) under ME1 and ME4 conditions, respectively. In Mexico State, Supremo TCL-2000 was taller than Jiloptepec and Huamantla, but shorter than Secano. In Obregon, Supremo TCL-2000 was taller than Jilotepec. In Mexico State, Supremo TCL-2000 matured 4, 2, and 7 d later than Jilotepec, Huamantla and Secano, respectively. In Obregon, Supremo TCL-2000, matured later than Jilotepec by 8 and 3 d under ME1 and ME4 conditions, respectively. Supremo TCL-2000 has long, white, awned, and lax type of spikes and large, dark color grains with good attributes for animal feeding, making unleavened breads (tortilla, chapatti, etc.), and in mixtures with bread wheat flour.

Breeder seed of Supremo TCL-2000 is maintained by ICAMEX. Certified seed, may be obtained from ICAMEX, Conjunto SEDAGRO, Metepec, Edo. Mexico, C.P. 52140, Apdo. Postal 28.

A. Hernandez Sierra, M. Mergoum,* W.H. Pfeiffer, S. Rajaram, and A. Zuloaga Albarran (4)

References and Notes

1. Borlaug, N.E. 1968. Wheat breeding and its impact on world food supply. p. 1–36. *In* K.W. Finley and K.W. Shephard (ed.) Proc. 3rd Int. Wheat Genet. Symp., Canberra, Australia.
2. Mergoum, M., W.H. Pfeiffer, S. Rajaram, and R.J. Peña. 1998. Triticale at CIMMYT: Improvement and adaptation. p. 58–64. Proc. 4th Int. Triticale Symp., Vol. 1. ISBN 0-9585592-0-1. Red Deer, Canada, 26–31 Jul.
3. Rajaram, S. 1995. Wheat Germplasm Improvement: Historical perspectives, philosophy, objectives and Missions. *In* S. Rajaram & G.P. Hettel (ed.) Wheat breeding at CIMMYT: Commemorating 50 years of research in Mexico for global wheat improvement. Wheat Spec. Rep. no. 29, Mexico, and D.F.: CIMMYT, p. 1–9.
4. M. Mergoum, W.H. Pfeiffer, S. Rajaram, Int. Maize and Wheat Improv. Cent., CIMMYT Int., Lisboa 27, Apdo. Postal 6-641, 06600 Mexico, D.F., Mexico; A. Hernandez Sierra, A. Zuloaga Albarran, ICAMEX, Conjunto SEDAGRO, Metepec, Edo. Mexico, C.P. 52140, Apdo. Postal 28. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (m.mergoum@cgiar.org).

Published in Crop Sci. 41:259–260 (2001).

Registration of 'Montrose' Pinto Bean

'Montrose' pinto bean (*Phaseolus vulgaris* L.) (Reg. no. CV-178, PI 612595) was developed by the Colorado Agriculture Experiment Station and released 15 Mar. 1999. Montrose, tested as CO 51715, was derived from the cross, BelNeb RR2/GH-196 made in 1991. BelNeb RR2 is a medium size, white seeded line with resistance to rust, [caused by *Uromyces appendiculatus* Pers.:Pers.) Unger] (3). GH-196 is a high yielding pinto line with resistance to fusarium root rot [caused by *Fusarium solani* (Mart.) Sacc. f. sp. *phaseoli* (Burkholder) Snyder & Hans.], curly top virus, and bean common mosaic virus (1). GH-196 was released in 1990 jointly by the University of Idaho and USDA-ARS as the cultivar 'UI-196.' Montrose was developed by pedigree selection in the F_2 through the F_4 at Fort Collins, CO, for high yield potential, medium maturity, pinto seed quality, and resistance to rust and common bacterial blight [caused by *Xanthomonas campestris* pv. *phaseoli* (Smith) Dye]. Montrose was initially bulked for testing as an $F_{4:5}$ line in 1995. Breeder seed of Montrose was produced by bulking 25 $F_{4:6}$ plant rows grown at Fruita, CO.

Montrose was tested for 3 yr in Colorado and Nebraska. It combines mid-season maturity (92–95 d in Colorado), high yield potential, resistance to the prevalent races of rust in Colorado, and resistance to bean common mosaic virus (BCMV). The genes conferring resistance to rust are *Ur-5* from BelNeb RR2, and either *Ur-7* from the cultivar GN1140 or unnamed genes from the cultivar 'Olathe,' both of which appear in the pedigree of BelNeb RR2. Montrose carries the recessive allele $bc1^2$ which confers resistance to pathogroups I, II, III, and V of bean common mosaic virus. It is susceptible to the white mold pathogen [*Sclerotinia sclerotiorum* (Lib.) de Bary] based on field observations and greenhouse evaluation with the straw test (2). It has a prostrate Type III (CIAT classification) growth habit similar to most commercial pinto bean cultivars grown in the USA. Seed of Montrose has traditional pinto size, shape, and bright cream background coloration. Seed weight averaged 36.7 g 100 $seed^{-1}$ in tests conducted during 12 location–years in Colorado.

Cultivar protection has been filed under the U.S. plant variety protection act, Public Law 91-577, (PVP Certificate no. 200000128) with the option that Montrose may be sold for seed by name only as a class of Certified seed. Breeder and Foundation seed will be maintained by the Colorado State University Dry Bean Foundation Seed Project, Fruita, CO. 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.

M.A. Brick,* H.F. Schwartz, J.B. Ogg, J.J. Johnson, and F. Judson (4)

References and Notes

1. Burke, D.W., J.P. Meiners, M.J. Silbernagel, J.M. Kraft, and H.H. Koehler. 1995. Registration of pinto GH-196 and JM-126, pink UNS-117 and 6R-42, and great northern JM-24 dry bean germplasm. Crop Sci. 35:945.
2. Petzoldt R., and M.H. Dickson. 1996. Straw test for resistance to white mold in beans. Annu. Rep. Bean Improv. Coop. 39:142.
3. Stavely, J.R., J. Steinkle, R.T. McMillan, K.F. Grafton, J.R. Steadman, J.D. Kelly, D.P. 4. Coyne, D.T. Lindgren, and M.J. Silbernagel. 1992. Rust resistant bean germplasm releases. Annu. Rep. Bean Improv. Coop. 35:228–29.
4. M.A. Brick, J.B. Ogg, and J.J. Johnson, Dep. of Soil and Crop Sci., H.F. Schwartz, Dep. of Bioagricultural Sci. and Pest Manage., Colorado State Univ., Ft. Collins, CO 80523; and F. Judson, Fruita Res. Stn., 1910 L Road, Fruita, CO 81521. Research supported by the Colorado Agric. Exp. Stn., Colorado Dry Bean Administrative Committee, and Colorado Seed Growers Assoc. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (mbrick@lamar.colostate.edu).

Published in Crop Sci. 41:260 (2001).

Registration of 'Wesley' Wheat

'Wesley' (Reg. no. CV-890, PI 605742) is a hard red winter wheat (*Triticum aestivum* L.) developed cooperatively by the USDA-ARS and Nebraska Agricultural Experiment Station and released in August, 1998, in cooperation with the Agricultural Experiment Stations of South Dakota and Wyoming. Wesley was released for its superior breadmaking quality and high yield potential in the north central Great Plains. The name Wesley recognizes the many contributions to wheat breeding and wheat improvement made by Dr. John Wesley Schmidt during his career as University of Nebraska wheat breeder from 1954 to 1985.

Wesley was derived from the cross KS831936-3/NE86501 made in 1988. KS831936-3 is a sib of Sumner with the pedigree 'Plainsman V/Odesskaya 51'. NE86501 is a selection from the cross Colt/Cody. Wesley is an F_5-derived line from a single head reselection of an experimental line that resulted from a single F_3 plant selected in 1991. Wesley was identified in 1994

as an F_6 headrow and designated as experimental number N95L158 in 1995.

Wesley is a semidwarf cultivar with straw strength superior to 'Arapahoe'. Plant height (81 cm) of Wesley has averaged 3 cm less than '2137,' 10 cm less than Arapahoe, and similar to 'TAM 107.' It has a medium length coleoptile (82 mm; 70% of 'Scout 66' and 90% of TAM 107). Winterhardiness of Wesley is acceptable for Nebraska growing conditions, superior to that of Scout 66 and TAM 107. Wesley is a medium maturing cultivar, similar in heading date to Scout 66 (134 d) and 5 d later than TAM 107 based on regional nursery trials, and ≈1 to 2 d earlier than Arapahoe in Nebraska and South Dakota trials.

Juvenile growth habit of Wesley is semi-erect. Plant color at boot stage is dark green. Auricle anthocyanin and auricle hairs are absent. Flag leaf at boot stage is recurved and not twisted. Waxy bloom is present on the head, stem and leaf sheath. Leaves are glabrous. The spike is awned, middense and tapering to elliptical in shape with light brown (tan) glumes and awns. The glumes are glabrous, midlong, and midwide to wide, with glume shoulders square to elevated. The beak is moderately long and acuminate. The spike is nodding to inclined at maturity. Kernels are red colored, hard textured, and elliptical to ovate in shape. The kernel has no collar, a medium sized brush with short hairs, rounded cheeks, midsize to large germ, and a shallow and narrow crease.

Wesley has exhibited adult-plant and seedling resistance to stem rust (caused by *Puccinia graminis* Pers.:Pers.). It has been postulated to carry *Sr6, Sr17,* and other unidentified genes based on tests conducted by the USDA Cereal Disease Laboratory, St. Paul, MN. Wesley is resistant to soilborne mosaic virus, moderately resistant to wheat spindle streak virus, and has exhibited tolerance to acid soils. It is susceptible to leaf rust (caused by *Puccinia triticina* Eriks.), wheat streak mosaic virus, the Great Plains biotype of Hessian fly [*Mayetiola destructor* (Say)], and the Russian wheat aphid [*Diuraphia noxia* (Mordvilko)].

Wesley has been tested in Nebraska nurseries since 1995 and in the Southern Regional Performance Nursery in 1997 and 1998. It was tested in the Nebraska Fall Sown Cereal Variety Trials statewide in 1999 and 1998, and at select sites in 1997. In 39 site-years of testing, Wesley averaged 4620 kg ha^{-1}, similar to 2137, and 370 kg ha^{-1} greater than Arapahoe. It has slightly lower test weight, averaging 766 kg m^{-3} compared with 779 kg m^{-3} for 2137 and 773 kg m^{-3} for Arapahoe. Wesley appears to be best suited for dryland production areas in southeast, south central, and west central Nebraska and for irrigated production systems statewide and similar production areas in adjacent states.

The milling and baking properties of Wesley were determined by the Nebraska Wheat Quality Laboratory and USDA-GMRPL at Manhattan, KS. Grain protein content of Wesley averaged 117 g kg^{-1} in the Nebraska variety trials; higher than for Alliance (111 g kg^{-1}) and slightly lower than Arapahoe (119 g kg^{-1}). Wesley has strong dough mixing properties with good mixing tolerance. Mixing time and tolerance ratings were similar to those for 'Karl 92.' Bake absorption and loaf volume of Wesley has been comparable to Arapahoe. It has shown good external and internal loaf appearance suggesting acceptable quality characteristics. Wesley was evaluated by milling and baking companies through the Wheat Quality Council in 1998 and 1999. It was found to have acceptable end-use quality for commercial bread applications and was rated as similar in overall baking quality to Scout 66, but with stronger dough mixing properties.

The Breeder seed class of Wesley will be maintained by the Nebraska Foundation Seed Division, Department of Agronomy, University of Nebraska-Lincoln, Lincoln, NE 68583. Other recognized seed classes are Foundation, Registered, and Certified as per AOSCA standards. The Registered seed class will be non-saleable. Wesley will not be submitted for U.S. plant variety protection with the certification (Title V) option. Seed of Wesley also has been deposited in the USDA National Small Grains Collection, Aberdeen, Idaho, and the National Seed Storage Laboratory, Fort Collins, Colorado. It is requested that the source of this material be acknowledged in future usage by wheat breeding and genetics programs.

C.J. Peterson,* D.R. Shelton, P.S. Baenziger, D.D. Baltensperger, R.A. Graybosch, W.D. Worrall, L.A. Nelson, D.V. McVey, J.E. Watkins, and J. Krall (1)

References and Notes

1. C.J. Peterson, Dep. of Crop and Soil Science, Oregon State Univ., Corvallis, OR 97331; D.R. Shelton, Wheat Marketing Center, Inc., 1200 Naito Parkway, Suite 230, Portland, OR 97209-2800; P.S. Baenziger, and L.A. Nelson, Dep. Of Agronomy, Univ. of Nebraska, Lincoln, NE 68583; D.D. Baltensperger, Univ. of Nebraska, Panhandle Research and Extension Center, Scottsbluff, NE 69361; R.A. Graybosch, USDA-ARS, 344 Keim Hall, Univ. of Nebraska, Lincoln, NE 68583; W.D. Worrall, Agripro Wheat, P.O. Box 1739, Vernon, TX 76385; D.V. McVey, USDA-ARS, Cereal Disease Laboratory, 1551 Lindig Ave, St. Paul, MN 55108; J.E. Watkins, Dep. of Plant Pathology, Univ. of Nebraska, Lincoln, NE 68583; and J. Krall, Univ. of Wyoming, Torrington Exp. Stat., Torrington, WY 82240. Joint contribution from the USDA-ARS, Univ. of Nebraska Agric. Exp. Stat., and Oregon State Univ. Agric. Exper. Stat. Contribution no. 12956 from the Nebraska Agric. Res. Div., Univ. of Nebraska. Technical paper no. 11622 of the Agric. Exp. Stn., Oregon State Univ. Wesley was developed with partial financial support from the Nebraska Wheat Development, Utilization, and Marketing Board. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (cjp@orst.edu).

Published in Crop Sci. 41:260–261 (2001).

Registration of 'Negro Otomí' Shiny Black Bean

'Negro Otomí' shiny black bean (*Phaseolus vulgaris* L.) (Reg. no. CV-179, PI 607834) was developed and released by the 'Valle de México' Experiment Station of the National Research Institute for Agriculture, Forestry and Livestock (INIFAP) of Mexico as a high-yielding, disease-resistant, shiny black seeded cultivar for rainfed conditions in the highlands of Mexico.

Negro Otomí, tested as NG 94060, was derived from the multiple interracial cross, 'Michoacán' 91-A/3/BAT304/G811//XAN122/AB136, made in 1989. The cross was the product of a collaborative project between the bean program of INIFAP and that of the International Center for Tropical Agriculture (CIAT), and was designed to incorporate disease resistance into the Mexican landrace used as the last maternal parent in the cross. Michoacán 91-A is a mid-season cultivar with indeterminate growth habit (Type III) and adapted to the highlands of Mexico. BAT 304, XAN 112, and AB 136 are germplasm sources with resistance to rust [caused by *Uromyces appendiculatus* (Pers.: Pers.) Unger], common bacterial blight [caused by *Xanthomonas campestris* pv. *phaseoli* (Smith) Dye], and anthracnose [caused by *Colletotrichum lindemuthianum* (Sacc. & Magnus) Lambs.-Scrib.]. BAT 304 and XAN 112 are upright indeterminate (Type II), developed at CIAT and AB 136 is an indeterminate climbing growth habit (Type IV) developed in France. G811 or 'Higuerillo' is a landrace from the subhumid highlands of Mexico of indeterminate climbing growth habit (Type IV). The F_1 plants were advanced in the greenhouse and the F_2 and F_3 were bulk

advanced at Palmira, Colombia. The F_4 populations were planted at four locations in the highlands of Mexico and individual plants selected on the basis of plant vigor, pod load and disease resistance. F_5 families were advanced in a winter nursery at Los Mochis, Sinaloa on the west coast of Mexico. F_6 and F_8 families were planted in rows at the Valle de Mexico Experiment Station in Central Mexico and individual plant selections were made based on disease reaction and plant vigor. The F_7 and F_9 lines were grown in an irrigated winter nursery at the lowlands of the Gulf of Mexico in Cotaxtla, Veracruz. The F_{10} breeding line coded NG 94060 entered replicated trials in 1994.

Negro Otomí was tested extensively in the subhumid and semiarid highlands of Mexico (trials conducted at locations above 1900 masl) for yield and agronomic traits at varied locations from 1994 to 1998. In the subhumid highlands, Negro Otomí averaged 1940 kg ha^{-1} and outyielded 'Negro Perla 90' by 39%. At all locations, Negro Otomí outyielded checks 'Negro Queretaro' and 'Negro 8025' by 9 to 21%, respectively. At the locations in the semiarid highlands, Negro Otomí averaged 960 kg ha^{-1} and was superior to 'Negro San Luis' and Negro Querétaro, the main landraces in the region, by 25 and 17%, respectively.

Negro Otomí averaged 45 cm tall and exhibits a short vine Type III indeterminate growth habit, with excellent pod distribution in the canopy. Negro Otomí has purple flowers and blooms 48 d after planting, although blooming can be delayed at higher elevations in the subhumid highlands (i.e., above 2300 masl). Negro Otomí is a mid-season cultivar, maturing 105 d after planting and with a range in maturity from 98 to 115 d depending on season and altitude. Negro Otomí matures 10 d later than Negro Perla 90 and earlier than most landraces in its commercial seed class.

Negro Otomí carries the single dominant hypersensitive *I* gene for resistance to Bean Common Mosaic Virus (BCMV), and it is sensitive to necrosis inducing strains of Bean Common Mosaic Necrosis Virus (BCMNV), which induces a black root reaction. Strains of BCMNV are relatively infrequent in the highlands of Mexico. In Central Mexico, Negro Otomí has not shown symptoms of anthracnose and rust in the field in spite of the large number of physiological races detected in the region (1, 2, and 3). Negro Otomí is resistant to highland isolates of halo blight [caused by *Pseudomonas syringae* pv. *phaseolicola* (Burkholder) Young et al.] and tolerant to common blight [caused by *Xanthomonas campestris* pv. *phaseoli* (Smith) Dye] and root rots [primarily caused by *Fusarium solani* (Mart.) Sacc. f. sp. *phaseoli* (Burkholder) W.C. Snyder & H.M. Hans. and *Rhizoctonia solani* Kühn].

Negro Otomí has medium sized black seeds which average 31 g 100 seed^{-1}. The seed is similar in shape but larger than most highland landraces in the shiny black class and larger than Negro Perla 90. Breeder and Foundation seed of Negro Otomí is maintained at the Valle de Mexico Experiment Station and small samples for research purposes can be obtained from the corresponding author. Application for Mexico and U.S. plant variety protection will be made for Negro Otomí, which will permit Registered and Certified seed classes beyond Foundation seed.

Jorge A. Acosta-Gallegos*, Rigoberto Rosales-Serna, Samuel Nuñez-González, Roberto Ochoa-Márquez, Simón Alvarado-Mendoza, and S.P. Singh (4)

References and Notes

1. Araya, C.M., J.R. Steadman, and J.A. Acosta-Gallegos. 1996. Pathogenic variability of *Uromyces appendiculatus* on dry edible beans in Mexico. Annu. Rept. Bean Improv. Coop. 39:150–151.
2. Balardín, R.S., A.M. Jarosz, and J.D. Kelly. 1997. Virulence and molecular diversity in *Colletotrichum lindemuthianum* from South, Central and North America. Phytopathology 87:1184–1191.
3. González, M., R. Rodríguez, M.E. Zavala, J.J. Jacobo, F. Hernández, J.A. Acosta-Gallegos, O. Mártínez, and J.P. Simpson. 1998. Characterization of Mexican isolates of *Colletotrichum lindemuthianum* by using differential cultivars and molecular markers. Phytopathology. 88:292–299.
4. Jorge A. Acosta-Gallegos, Rigoberto Rosales-Serna, Samuel Nuñez-González, Roberto Ochoa-Márquez, and Simón Alvarado-Mendoza, Bean Program of INIFAP, Apartado Postal no. 10, Chapingo. Estado de Mexico C.P.56230, MEXICO, and S.P. Singh, Dep. of Plant, Soil and Entomological Sciences, Univ. of Idaho, 3793 North 3600 East, Kimberly, ID 83341-5076, USA. Registration by CSSA Accepted 30 Jun. 2000. *Corresponding author (jamk@mpsnet.com.mx).

The authors thank MSc Adán Castillo-Rosales, Eng. Román Zandate, MSc Pablo Fernández-Hernández, Dr. Benito Cázares-Enriquez, and Dr. Francisco Ibarra-Pérez for their help with field trials. We are also indebted to the Bean/Cowpea-CRSP, USAID Grant no. DAN-G-SS-86-00008-00.

Published in Crop Sci. 41:261–262 (2001).

Registration of 'AU Grazer' Sericea Lespedeza

'AU Grazer' sericea lespedeza [*Lespedeza cuneata* (Dumont de Courset) G. Don.] (Reg. no. CV-15, PI 613537) was developed and released in 1997 by Auburn University and the Alabama Agricultural Experiment Station. This cultivar is a synthetic made up of six populations that showed superior survival ability under grazing. Development of this cultivar started in 1986 when 81 populations of sericea lespedeza were established at Tallassee and at Winfield, AL, where they were selected under regimes of clipping and grazing, respectively. Some populations selected for frequent clipping in Tallassee were planted in Winfield and subjected to further selection under grazing. Recurrent restricted phenotypic selection was used to improve the populations that make up this cultivar. The main selection criterion during the selection process was survival under grazing. Additional traits considered during selection were survival under frequent clipping, longevity, vigor, and overall plant health.

Performance of the populations that make up this cultivar and of other cultivars and experimental populations was tested in small plots at Belle Mina, AL. The small plots were surrounded by 'Serala' planted in the remainder of a 0.81-ha (two-acre) field and subjected to mob grazing (i.e., about 80 head of beef cattle were placed in the field for 3–5 d). Results showed that the populations that make up this cultivar had 50% more stems on average (an indication of survival ability) than the leading cultivar Serala in 1997, the year following mob grazing. Also the populations showed an average of about 40% higher forage yield than Serala in the spring of 1997 after grazing pressure was released (indication of recovery). AU Grazer plants have fine and pliable stems with abundant secondary and tertiary branching.

Foundation and Certified seed classes will be recognized. Breeder seed of AU Grazer will be produced and maintained by Auburn Univ., Alabama Agric. Exp. Stn. U.S. plant variety protection will not be applied for.

J.A. Mosjidis* (1)

References and Notes

1. J.A. Mosjidis, Dep. of Agronomy and Soils and Alabama Agric. Expt. Stn., Auburn Univ., Auburn, AL. Registration by CSSA. Accepted 31 Jul. 2000. *Corresponding author (jmosjidi@acesag.auburn.edu).

Published in Crop Sci. 41:262 (2001).

Registration of 'Chapman' Oat

'Chapman' winter oat (*Avena sativa* L.) (Reg. no. CV- 364, PI 599220) which was jointly developed and released in 1996 by the Florida and Georgia Agricultural Experiment Stations, has an excellent combination of grain and forage yield, disease resistance, and straw strength. It was derived from a single cross, 'Florida 502'/'Coker 84-15,' made in 1987 at the University of Georgia Coastal Plain Experiment Station. Florida 502 is early maturing and high yielding with moderate lodging resistance. At the time of its release in 1983, Florida 502 exhibited excellent resistance to prevalent races of crown rust (*Puccinia coronata aveneae* Eriks. & Henn.) and was moderately resistant to Helminthosporium leafspot (*Helminthosporium sativum* Pam., King & Bakke). Coker 84-15, which is an unreleased advanced line with *Avena sterilis* L. in its pedigree, was the crown rust resistance source.

Chapman was developed using the bulk method of breeding. Generations were advanced from F_1 to F_5 in bulk with natural selection for winterhardiness, resistance to crown rust, and Helminthosporium leafspot. Single plants were selected in the F_5 generation in 1991, and Chapman originated from a single F_6 plant row grown in Tifton, Georgia, in 1992. It was evaluated for agronomic performance as either FL874-E55 or Tifton 92R1729 in Florida and Georgia, respectively. Juvenile plants of Chapman are erect to semi-prostrate with the culms mid-size and glabrous (1). The flag leaves are mid-size and drooping. The panicles are erect, moderately dense, equilateral, dark green in color, with semi-erect spikelets, and florets without awns. Seeds of Chapman are short, moderately plump, and have the white color of Florida 502. Chapman has a winter growth habit, with a low vernalization requirement. Chapman is relatively short in height, with good winter survival, moderate straw strength, and excellent crown rust resistance. It is similar in appearance to 'GA-Mitchell,' but matures about 5 d earlier. Chapman is susceptible to prevalent races of stem rust (*Puccinia graminis* Pers.:Pers. f. sp. *tritici* Eriks. & E. Henn) and to barley yellow dwarf virus. It has been stable and uniform throughout the multiplication process with less than 0.1% tall plants with open panicles.

The mean grain yields of Chapman have generally exceeded or equaled other oat cultivars in multiple location-year trials (1). In the USDA-ARS Uniform Winter Oat Yield Trials conducted at a number of diverse locations in the southeastern USA, Chapman was among the highest in grain yield of the experimental lines and exceeded all the commercial varieties included in 1994 and 1995. Across 17 locations in 1994, it had an average yield of 3412 kg ha^{-1} and ranked second in the trials. Chapman averaged 2666 kg ha^{-1} across 18 locations and ranked sixth in 1995. A severe crown rust epidermic in 1995 greatly reduced yields of most commercial varieties in the trial, but Chapman exhibited excellent field resistance. It was one of the shortest lines, exhibited the least amount of lodging, had good winter survival, and excellent crown rust resistance. Among the entries, Chapman had the highest grain yield in Florida, Georgia and Alabama with average grain production outside these states. In forage trials conducted in Florida, Georgia and Alabama, it had a mean yield of 4366 kg ha^{-1}, considerably above the overall test means of 3978 kg ha^{-1}.

Breeder seed of Chapman was distributed to the Florida and Georgia foundation seed organizations in 1996 and can be sold as a class of Certified seed by variety name only. The Florida and Georgia Agricultural Experiment Stations will be responsible for maintenance of Breeder seed. Limited quantities of seed of Chapman are available for research upon request from the author. Recipients of the seed are asked to make appropriate recognition of the source of Chapman if it is used in the development of a new cultivar, germplasm, parental line, or genetic stock.

A.R. Blount*, R.D. Barnett, J.W. Johnson, P.L. Pfahler, P.L. Bruckner, B.M. Cunfer, and G.D. Buntin (2)

References and Notes

1. Barnett, R.D., P.L. Bruckner, J.W. Johnson, A.R. Soffes Blount, P.L. Pfahler, and R.J. Martens. 1996. Chapman: A new disease resistant winter oat for the southern United States. North Florida Res. Educ. Ctr., Univ. of Florida Res. Report 96-11.
2. A.R. Blount, R.D. Barnett, North Florida Res. Educ. Ctr., Quincy FL 32351; P.L. Pfahler, Dep. of Agronomy, Univ. of Florida, Gainesville, FL 32611; J.W. Johnson, Dep. of Crop and Soil Sciences, Univ. of Georgia, Georgia Station, Griffin, GA 30223; P.L. Bruckner, Dep. of Plant and Soil Sciences, Montana State Univ., Bozeman, MT 59717; B.M. Cunfer, Dep. of Plant Pathology, Univ. of Georgia, Georgia Station, Griffin, GA 30233; and G.D. Buntin, Dep. of Entomology, Univ. of Georgia, Georgia Station, Griffin, GA 30223. Contribution from the Florida Agric. Exp. Stn., Journal Paper no. R-07189. This research was supported by state and Hatch funds allocated to the Florida and Georgia Agric. Exp. Stn. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (ablount@gnv.ifas.ufl.edu).

Published in Crop Sci. 41:263 (2001).

Registration of 'Wichita' Rapeseed

'Wichita' winter rapeseed [*Brassica napus* L. subsp. *oleifera* (Metzg.) Sinsk. f. *biennis*] (Reg. no. CV-19, PI 612846) was developed by the Kansas Agricultural Experiment Station and released in 1999. Wichita has edible quality oil (canola) and improved winter survival compared with other rapeseed cultivars tested under Great Plains conditions. Wichita was selected from the cross 'Indore'/'Sipal'//'Liraglu'/3/ 'Jet Neuf.' The final cross was made in 1987 at the Idaho Agricultural Experiment Station at Moscow, ID.

An F_3 bulk population was received from the Idaho Agricultural Experiment Station by the Agricultural Research Center at Hays, KS, in 1990. Single plant selections were advanced by open pollination in the vicinity of sister lines for 2 yr at Hays and 1 yr at Manhattan, KS. During yr 1, 134 selections were advanced from the F_3 bulk population. Twenty-nine single plant selections were advanced from 15 of these plant plots in yr 2. Thirty-four plants were selected from 12 populations in yr 3. Selection criteria in the field included yield potential and reduced winter injury. Plants were evaluated visually and compared with other plants in the nursery. Selected plants were screened for low glucosinolate content by the Tes-tape method (1). Seed from a 10-m^2 isolated increase plot of plants in the F_6 generation (derived from a single plant selection made in year three) was bulked to ensure a sufficient quantity for subsequent yield trials. Over 53 single plants from seed of this bulk were grown in the greenhouse and screened to ensure low glucosinolate content using the Tes-tape method. Plants with seed containing high glucosinolate content were discarded. Over 200 single plants from the low glucosinolate F_7 selections were grown in the greenhouse and again screened to identify low glucosinolate plants. Seed from the low glucosinolate plants was tested to isolate plants with low erucic acid in the oil. Breeder seed of Wichita was increased from 45 single plants selected on the basis of oil and meal quality in the F_8 generation and was increased in isolation under field conditions near Manhattan, KS, in 1997 to 1998.

Seed of Wichita is low in erucic acid (an average of 1 g kg^{-1} in the oil) and glucosinolates (an average of 13.4 mmol

g^{-1} in the oil-free meal). Wichita has shown a significant improvement in winterhardiness for Great Plains conditions compared with cultivars developed outside of the region. During the five seasons from 1994 to 1995 through 1998 to 1999, Wichita averaged 81.7% winter survival at 94 environments (location-year combinations) compared with 70.6% for 'Ceres' (3, 4, 5, 6, 7). These means include 31 environments where all entries had 100% survival and eight environments where all entries had less than 2% survival. The difference in winter survival is more pronounced in adverse conditions. In the 37 environments where mean winter survival was <80%, Wichita averaged 52.6% survival, compared with 37.0% for Ceres. In eight environments, Wichita survived with harvestable stands (62.5%) when Ceres did not (16.5%). Wichita's yields were not different from those of Ceres in the Midwest and Great Plains and were better than those of Ceres in the Southeast (Table 1).

Wichita is 1.5 d earlier than Ceres for 50% bloom date (106 d after 1 January) and reaches maturity about the same time as Ceres (168 d after 1 January). Wichita is 112-cm tall (1 cm taller than Ceres on average) and has total oil content of 370 g kg^{-1} (the same as Ceres). Wichita has better than average resistance to shattering (4.4%) and average tolerance to lodging (8.5%) when compared with other lines tested at the same environments. Test weights were 598 kg m^{-3} (the same as Ceres). Limited evaluation for tolerance to white mold [caused by *Sclerotinia sclerotiorum* (Lib.) de Bary] indicates that Wichita has tolerance equal to that of the least susceptible cultivars (7). Wichita's response to virulent blackleg [caused by *Leptosphaeria maculans* (Desmaz.) Ces. and De Not.] is similar to that of 'Falcon', which is considered tolerant (2).

Seed increases will be limited to Foundation and Certified seed classes. Breeder and Foundation seed of Wichita will be maintained and distributed by the Kansas Agricultural Experiment Station. A small sample of seed may be obtained from the corresponding author for research purposes. Application for U.S. plant variety protection of Wichita has been applied for.

C.L. Rife,* D.L. Auld, H.D. Sunderman, W.F. Heer, D.D. Baltensperger, L.A. Nelson, D.L. Johnson, D. Bordovsky, and H.C. Minor (8)

References and Notes

1. Lein, K.A., 1970. Methods for quantitative determination of seed glucosinolates of *Brassica* spp. and their application in plant breeding of rape low in glucosinolate content. Z. Pflanzenzuecht. 63:137–154.
2. Raymer, P.L., J.L. Day, and A.E. Coy. 1997. 1996–1997 Canola Performance Tests. Georgia Agric. Exp. Stn. Res. Rep. 645. p. 17. Griffin, GA.
3. Rife, C., et al. 1996. 1995 Great Plains canola research. Kansas Agric. Exp. Stn. Rep. of Prog. 763. Coop. Ext. Serv., Manhattan, KS.
4. Rife, C., et al. 1997. 1996 Great Plains Canola Research. Kansas Agric. Exp. Stn. Rep. of Prog. 782. Coop. Ext. Serv., Manhattan, KS.
5. Rife, C., et al. 1998. 1997 Great Plains Canola Research: Including some Midwestern and Southern States. Kansas Agric. Exp. Stn. Rep. of Prog. 803. Coop. Ext. Serv., Manhattan, KS.
6. Rife, C., et al. 1998. 1998 Great Plains Canola Research, Results from the National Canola Variety Trial. Kansas Agric. Exp. Stn. Rep. of Prog. 823. Coop. Ext. Serv., Manhattan, KS.
7. Rife, C., et al. 2000. 1999 National Winter Canola Variety Trial. Dep. Rep., Agronomy Dep., Kansas State Univ.
8. C.L. Rife, Dep. of Agronomy, Kansas State Univ., Manhattan, KS 66506; D.L. Auld, Dep. of Plant and Soil Science, Texas Tech Univ., Lubbock, TX 79409; H.D. Sunderman, Northwest Res.-Ext. Ctr., Kansas State Univ., Colby, KS 67701; W.F. Heer, South Central Exp. Field, Kansas State Univ., Hutchinson, KS 67501; D.D. Baltensperger, Dep. of Agronomy, Univ. of Nebraska, Panhandle Res.-Ext. Ctr., Scottsbluff, NE 69361; L.A. Nelson, Dep. of Agronomy, Univ. of Nebraska-Lincoln, Lincoln, NE 68583; D.L. Johnson, Dep. of Agronomy, Colorado State Univ., Fort Collins, CO 80523; D. Bordovsky, Texas A&M Univ., Ag. Res.-Ext. Ctr., Vernon, TX 76384; and H.C. Minor, Dep. of Agronomy, Univ. of Missouri, Columbia, MO 65211. Registration by CSSA.. Accepted 30 June 2000. *Corresponding author, (crife@oz.oznet.ksu.edu).

Published in Crop Sci. 41:263–264 (2001).

Table 1. Seed yield (kg ha^{-1}) of Wichita and two other common rapeseed cultivars in different regions of the United States, 1994 to 1995 through 1998 to 1999.

	Region†			
Cultivar	Southeast	Midwest	Great Plains	U.S. means
	kg ha^{-1}			
Wichita	1995a‡	2140a	1631a	1857a
Ceres	1865b	2042a	1673a	1842a
Bridger	1525c	1873b	1039b	1435b

† Southeast means include data from locations in Alabama, Arkansas, Georgia, and Mississippi (17 location years). Midwest means include data from locations in Illinois, Indiana, Missouri, and Virginia (22 location years). Great Plains means include data from location in Colorado, Kansas, Nebraska, and Texas (29 location years).

‡ Cultivar yields within rows followed by a different letter are significantly different at $P \leq 0.05$ according to Fisher's protected least significant difference.

Registration of 'Shaw' Alfalfa

'Shaw' alfalfa (*Medicago sativa* L.)(Reg. no. CV-199, PI 613164) was developed for increased forage yield under dryland conditions by the Montana Agricultural Experiment Station (MAES). Shaw was tested experimentally as MT9305 and released jointly by MAES and the USDA/NRCS Plant Materials Center, Bridger, MT, in 2000. Shaw was named in honor of Mr. Art Shaw, long time Extension Service Agronomist who was instrumental in Montana's alfalfa seed industry and the formation of the Montana Alfalfa Seed Growers Association.

Shaw is a synthetic cultivar with 115 parent plants selected from MAES breeding populations tracing to 'Blazer XL' selected for color, vigor, and seed yield in a spaced-planted nursery. Phenotypic recurrent selection was used to select plants for resistance to Phytophthora root rot (caused by *Phytophthora medicaginis* E.M. Hans. & Maxwell). Approximate germplasm source (1) contributions are *M.falcata*, 8%; Ladak, 7%; *M. varia*, 20%; Turkistan, 9%; Flemish, 54%; and Chilean, 2%.

Fall dormancy of Shaw is similar to '5246.' Shaw has high resistance to Aphanomyces root rot (caused by *Aphanomyces euteiches* Drechs), and northern root–knot nematode (*Meloidogyne hapla* Chitwood), resistance to Phytophthora root rot, pea aphid (*Acyrthosiphon pisum* Harris), spotted aphid (*Therioaphis maculata* Buckton) and has moderate resistance to Verticillium wilt (*Verticillium albo-atrum* Reinke &Berthier), anthracnose (*Colletotrichum trifolii* Bain and Essary) Race 1, and stem nematode [*Ditylenchus dipsaci* (Kuhn) Filipjev]. Pest tests were conducted by Crop Characteristics, Inc., 21130 Eaton Avenue, Farmington, MN 55024 using the standard test procedures approved by the North American Alfalfa Improvement Conference (3). Forage yield in Montana is equal to the check cultivars under irrigated condition where verticillium wilt is not a serious problem. It has produced significantly more forage under dryland conditions than 'Ladak 65' (2), which is the standard dryland cultivar grown in the harsh environs of eastern Montana. Flower color is 62% purple and 28% variegated with a trace of white, cream, and yellow.

Seed increase is on a limited generation basis with one generation of Breeder and two generations of Foundation and Certified seed classes. Breeder (Syn. 1), Foundation (Syn. 2 or 3), and Certified (Syn. 3 or Syn. 4) classes will be recognized. Breeder seed was produced under open-pollinated field conditions at Manhattan, MT. Sufficient Breeder seed was produced for the expected life of the cultivar. Application will be made for U.S. plant variety protection with title V option.

R.L. Ditterline,* R.L. Dunn, S.D. Cash, D.M. Wichman, L.E. Welty, J.L. Bergman, J.L.A. Eckhoff, M.E. Majerus, J.G. Scheetz, L.K. Holzworth, K.R. Blunt, L.S. Strang, and J. Vavrovsky (4)

References and Notes

1. Barnes, D.K., E.T. Bingham, R.P. Murphy, O.J. Hunt, D.F. Beard, W.J. Skrdla, and L.R. Tueber. 1977. Alfalfa germplasm in the United States: Genetic vulnerability, use, improvement, and maintenance. USDA Tech. Bull. 1521. U.S. Print. Office, Washington, DC.
2. Blunt, K., R. Ditterline, D. Cash, L. Welty, L. Strang, D. Wichman, K. Neill, K. Kephart, J. Bergman, J. Eckhoff, and G. Harper. 2000. 1999 Summary of the Montana uniform intrastate alfalfa yield trials. p. 25–46. *In* D. Cash (ed.) 1999 Alfalfa variety trial results – Western Alfalfa Improvement Conference. WAIC-15.
3. Standard Tests to Characterize Alfalfa Cultivars – third edition. 1998. North American Alfalfa Improvement Conference. Available at http://www.naaic.org/stdtests/index.html (verified 7 Sept. 2000)
4. R.L. Ditterline, Dep. of Plant Science, Montana State Univ., Bozeman, MT 59717; R.L. Dunn, Blue Moon Bulbs, Bozeman, MT 59715; S.D. Cash and K.R. Blunt, Dep. of Animal and Range Science, Montana State Univ., Bozeman, MT 59717; D.M. Wichman and J. Vavrovsky, Central Agr. Res. Cntr., HC90 Box 20, Moccasin Montana; L.E. Welty and L.S. Strang, Northwestern Agr. Res. Cntr., 4370 Montana 35, Kalispell MT 59901; J.L. Bergman, J.L.A. Eckhoff, Eastern Agr. Res. Cntr., 1501 North Central Ave, Sidney, MT 59270; M.E. Majerus and J.G. Scheetz, USDA/NRCS, Bridger Plant Materials Center, Rt 1, Box 1189, Bridger, MT 59014; L.K. Holzworth, USDA/NRCS, 10 East Babcock Street, Bozeman, MT 59715. Contribution from the Montana Agric. Exp. Stn. Journal Series no. 2000-38. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (rld@montana.edu).

Published in Crop Sci. 41:264–265 (2001).

Registration of 'Bancroft' Barley

'Bancroft' two-rowed spring feed barley (*Hordeum vulgare* subsp. *vulgare*) (Reg. no. CV-283, PI 605474) was developed cooperatively by the USDA-ARS and the Idaho, Colorado, and Oregon Agricultural Experiment Stations. It was formally released by these agencies in February 2000. The primary reason for release is its consistent and high level of resistance to barley stripe rust (caused by *Puccinia striiformis* f. sp. *hordei*), a relatively new disease in the western USA. Bancroft is named after a small town in southeastern Idaho.

Bancroft was selected from a cross of 'Hector'/60Ab1810-53 made in 1975. The parent Hector, a two-rowed spring feed barley, was developed by Agriculture Canada at Lethbridge, Alberta from the cross of 'Betzes'/'Palliser' (1). The parent 60Ab1810-53 is one of the 35 component lines of the two-rowed spring malting barley 'Klages,' developed by ARS at Aberdeen, Idaho, from the cross Betzes/'Domen' (2). Bancroft originated at Aberdeen as an F_4 spike selection, subsequently harvested as an F_5 row in 1978, and designated as 78Ab10274. Bancroft was developed in a pedigree breeding program, with selection for agronomic traits, malting quality characteristics, and disease resistance. Breeder seed of Bancroft originated as an advanced generation bulk seed increase, derived without further selection from the original F_5 head row, grown at the Aberdeen Research and Extension Center. Bancroft is midseason in maturity with lax spikes and rough awns. Kernels are covered and have white aleurone, rachilla hairs are long, barbs on lateral veins are few to none, lemmas are typically wrinkled, glumes are covered with long hairs, and rachis edges have numerous hairs.

Bancroft was first tested in a replicated trial in Idaho in 1979, and was tested in the regional Western Dryland Spring Barley Nursery from 1986 to 1988. It has been widely tested in both irrigated and dryland trials in Idaho and other western states since 1986. In 11 station-years of testing in irrigated trials at Aberdeen, Idaho, from 1985 to 1990, 1993 to 1994, and 1996 to 1998, Bancroft's grain yield averaged 7106 kg ha^{-1} or 101% of 'Crystal,' 105% of 'Harrington,' and 110% of Klages. In these same trials, Bancroft, Crystal, and Harrington were similar in test weight, kernel plumpness, and height, but Crystal and Harrington were both superior to Bancroft for straw strength. Bancroft is 3 d earlier than Crystal and 2 d earlier than Harrington in heading date in trials at Aberdeen. Bancroft was not tested in this series of trials in 1991 and 1992, but was reinstated in trials in 1993 after barley stripe rust became important in the western USA. No data were obtained in this series of trials at Aberdeen in 1995. In 9 station–yr of testing in irrigated trials at Tetonia, Idaho, from 1985 to 1987 and 1993 to 1998, Bancroft averaged 5284 kg ha^{-1} or 102% of Crystal, 109% of Harrington, and 108% of Klages. In 19 station–yr of testing in dryland trials at Tetonia, Idaho, from 1985 to 1989 and 1994 to 1998 and at Soda Springs, from 1985 to 1988, Bancroft averaged 3806 kg ha^{-1} or 100% of Hector and 107% of 'Clark.' In these dryland trials, Bancroft was superior to the parent Hector for straw strength. Again, Bancroft was not tested in this series of trials in 1990 to 1993, but was reinstated in trials at Tetonia in 1994 after barley stripe rust became important in the western USA. Trials were not conducted at Soda Springs after 1988. In 16 station-years of testing in dryland trials at Bonners Ferry, Craigmont, Potlatch, and Tammany in northern Idaho, from 1995 to 1998, Bancroft averaged 4547 kg ha^{-1} or 89% of 'Baronesse,' 95% of 'Chinook,' 107% of 'Crest,' 98% of Crystal, and 102% of Harrington. In 18 station-yr of testing in dryland and irrigated trials in Oregon at Corvallis, Hermiston, Klamath Falls, LaGrande, Madras, Moro, Morrow County, North Valley, Ontario, and Pendleton, from 1997 to 1998, Bancroft averaged 4472 kg ha^{-1} or 92% of Baronesse and 105% of 'Steptoe.' In the Oregon trials, Bancroft performed best in trials at LaGrande where it averaged 6004 kg ha^{-1} or 109% of Baronesse and 102% of Steptoe. Bancroft also performed well at Corvallis, Klamath Falls, North Valley, and Pendleton where its yield averaged, 97%, 98%, 98%, and 103% of Baronesse, respectively. In three years of testing (1986–1988) in the regional Western Dryland Barley Nursery, Bancroft averaged 104% of 'Bowman,' 106% of Clark, and 103% of Hector in yield. It was similar to Clark and Hector in test weight, kernel plumpness, and heading date, but inferior to Bowman in test weight and kernel plumpness and 5 d later than Bowman in heading date.

Bancroft first exhibited resistance to prevalent races of barley stripe rust in the initial cooperative barley stripe rust trials at Cochabamba, Bolivia, in 1990 to 1991. It has exhibited resistant reactions or a lower incidence of barley stripe rust relative to most other barley varieties over several years of testing in trials at Cochabamba. In recent trials in the San Luis Valley of Colorado and at Toluca, Mexico, a similar reaction to barley stripe rust has been observed. In 2 yr trials at Toluca, 26 barley stripe rust readings for Bancroft have ranged from 0 (15 readings) to 20MS (1 reading) whereas 'Russell' plots have ranged from 90/S to 100/S, with 13 of 16 Russell readings being 100S. Bancroft expresses resistance to the prevalent races of stripe rust in the Pacific Northwest, but

the nature of the resistance has not been confirmed by the authors. In Washington state, with variable incidences of barley stripe rust, Bancroft had percent infection/reaction type readings of 0/0 for 6 location–yr, while Baronesse and Harrington both had ranges of 10/S to 95/S.

Bancroft is expected to compete favorably with existing two-rowed spring barley varieties in dryland environments in Idaho and other western states, especially in environments where significant barley stripe rust is present. Although straw strength of Bancroft is probably too weak for most irrigated growers, it has produced excellent yields in short season environments such as Tetonia, ID under moderate irrigation. Breeder and Foundation seed of Bancroft will be maintained by the Idaho Agricultural Experiment Station, Foundation Seed Program. Requests for seed should be directed to the Coordinator, Foundation Seed Program, College of Agriculture, Kimberly Research and Extension Center, 3793 N 3600 E, Kimberly, Idaho 83341. Seed is available in small quantities for research purposes from the corresponding author.

D.M. Wesenberg,* D.E. Burrup, W.M. Brown, Jr., V.R. Velasco, J.P. Hill, J.C. Whitmore, R.S. Karow, P.M. Hayes, S.E. Ullrich, and C.T. Liu. (3)

References and Notes

1. Wells, S.A. 1973. Hector barley. Can. J. Plant Sci. 53:497.
2. Wesenberg, D.M., R.M. Hayes, H.C. McKay, N.N. Standridge, E.D. Goplin, and F.C. Petr. 1974. Registration of Klages barley. Crop Sci. 14:337.
3. D.M. Wesenberg, and D.E. Burrup, USDA-ARS, Univ. of Idaho Aberdeen Res. & Ext. Ctr., USDA-ARS Natl. Small Grains Germplasm Res. Facility, P.O. Box 307, Aberdeen, ID 83210; W.M. Brown, Jr., V.R. Velasco, and J.P. Hill, Dep. of Plant Pathology & Weed Sci., Colorado State Univ., Fort Collins, CO 80523; J.C. Whitmore, Univ. of Idaho Tetonia Res. & Ext. Ctr., 888 West Highway 33, Newdale, ID 83436; R.S. Karow and P.M. Hayes, Dep. of Crop and Soil Sci., Oregon State Univ., Corvallis, OR 97331; S.E. Ullrich, Dep. of Crop and Soil Sci., Washington State Univ., Pullman, WA 99164; and C.T. Liu, Dep. of Plant, Soil, and Entomological Sciences, Univ. of Idaho, Moscow, Idaho 83843. Cooperative investigations of the USDA-ARS and the Idaho, Colorado, Oregon, and Washington Agric. Exp. Stn. Idaho Agric. Exp. Res. Paper no. 00732. Registration by CSSA. Accepted 21 Jul. 2000. *Corresponding author (dwesenb@uidaho.edu).

Published in Crop Sci. 41:265–266 (2001).

Registration of 'Karma' Oat

'Karma' (Reg. no. CV-365,PI612393) spring oat (*Avena sativa* L.) was developed by the National Institute for Forestry, Agriculture, and Animal Research (INIFAP) at the Valle de México Experimental Station, and released in 1998. The name was chosen to honor Mr. Carlos Márquez, research technician of the National Oat Breeding Program for 35 years.

Karma was released because of its improved grain yield and disease resistance. It was developed by the pedigree method from the cross CI9291-CROSS/COLLI. The line CI9291-CROSS is late maturing and stem rust (caused by *Puccinia graminis* Pers.:Pers. f. sp. *avenae* Eriks. and E. Henn.) resistant, and was introduced to Mexico via the International Oat Rust Nursery. COLLI is any early maturing, tall, and stem rust resistant line developed from the cross 3034-TIPPE-CANOE-CURT/OPALO-CURT by the Oat Breeding Program of INIFAP. The F_2 generation was grown in the field in 1984, and individual plants were selected based on reaction to natural infections of stem rust and crown rust (caused by *Puccinia coronata* Corda var. *avenae* W.P. Fraser & Ledingham). The F_3, F_4, and F_5 were advanced in the field and individual plants were selected based on the criteria used for the F_2 and for lodging resistance. Karma resulted from seed harvested from an F_5 derived F_6 row.

Karma has been evaluated for yield since 1992 in the states of Mexico, Tlaxcala, and Jalisco. Based on evaluations in 21 environments of the National Oat Yield Trial, Karma is high yielding, and similar in maturity to 'Papigochi', 'Juchitepec', and 'Babícora'. Under low yielding environments the average grain yield of Karma was 40% higher than the average grain yield of Papigochi, Babícora, Juchitepec, 'Rarámuri', and 'Páramo'. Under high yielding environments, Karma outyielded the control cultivars by 30% and showed higher test volume weight than Papigochi and Páramo. Karma (115 cm) is shorter than Babícora and Papigochi, but similar in height to Juchitepec and Páramo. Karma is lodging resistant compared to the control cultivars.

Juvenile plants of Karma are erect and have medium green to dark green leaves. The upper culm nodes and internodes are hairy. Ligules are present. Panicles are ovate, medium wide, medium long, and equilateral. The panicle branches are short, and semi-erect, with intermediate density. There are three to four whorls of branches per panicle. The spikelets are nodding and have two to three florets. Spikelet separation is by fracture, and floret separation is by heterofracture. The medium wide and medium long lemma is hairy. The palea is about the same size as the lemma. The few lemma awns present are twisted at the base and subgeniculate. The kernels are medium wide, medium long, and cream colored. The caryopsis is pubescent with medium long brush hairs.

Based on races of oat crown rust prevalent in México, Karma is moderately resistant and is similar to Babícora, and Papigochi in reaction. It is moderately resistant to races NA5 and NA27 of oat stem rust, and resistant to speckled leaf blotch (caused by *Septoria avenae* f. sp. *avenariae* A.B. Frank) and leaf blotch [caused by *Helminthosporium avenae* (syn. *Pyrenophora avenae*) Eidam].

Karma was registered (Reg no. AVE-011-1920298/C) by the Mexican Seeds Inspection and Certification Service (SNICS) on February 1998. Breeder seed of Karma will be maintained by the INIFAP Oat Breeding Program. Limited quantities of seed for research are available upon request from the authors.

E. Espitia-Rangel,* H.E. Villaseñor-Mir, and C. Márquez-Gutiérrez (1)

References and Notes

1. E. Espitia-Rangel, H.E. Villaseñor-Mir, and C. Márquez-Gutiérrez, National Oat Breeding Progrm, Valle de Mexico Experimental Station CIRCE-INIFAP, Apartado Postal #10 Chapingo, Mex. 56230 Mexico. Accepted 31 Aug. 2000. *Corresponding author (eespitia@mpsnet.com.mx).

The authors wish to acknowledge the financial contributions of the Quaker Oats Co. to the development of this cultivar. The USDA-ARS Cereal Disease Laboratory, St. Paul, MN, and Deon Stuthman, Univ. of Minnesota, Department of Agronomy and Plant Genetics provided technical support on rust evaluation and advice on breeding procedures.

Published in Crop Sci. 41:266 (2001).

Registration of 'Cevamex' Oat

'Cevamex' (Reg. no. CV-366, PI 612394) spring oat (*Avena sativa* L.) was developed by the National Institute for Forestry, Agriculture, and Animal Research (INIFAP) at the Valle de México Experimental Station (Cevamex), and released in 1998. The name was chosen to honor the experimental station where the cultivar was developed.

Cevamex was developed by the mass gravimetric method

(1) from a composite population including the F_2 of 54 single crosses. The parental lines of the crosses were chosen based on grain yield, stem rust (caused by *Puccinia graminis* Pers.:Pers. f. sp. *avenae* Eriks. and E. Henn.) resistance, crown rust (caused by *Puccinia coronata* Corda var. *avenae* W.P. Fraser & Ledingham) resistance, earliness, and standability. The F_2, F_3, F_4, and F_5 were planted as spaced plants at Chapingo, Mexico. Individual plants were selected based on standability, earliness, stem and crown rust resistance. Selected plants were bulk harvested, and the seeds were fanned to eliminate lighter seeds. Remaining seed was floated on a 20% water–sugar solution (w/v) to select seeds with the highest density. Light or low-density seed from susceptible plants was eliminated, and thus the frequency of resistance genes in the remnant population is assumed to increase (1, 2). The F_6 was planted in the field at Zoapila Tlaxcala, under natural infections of both stem and crown rusts. The line that became Cevamex was an F_6 derived line harvested in bulk in an F_7 row.

Cevamex has been evaluated for grain yield since 1992 in the states of México, Tlaxcala, and Jalisco. Based on evaluations in 21 environments of the National Oat Yield Trial, Cevamex is a high yielding cultivar with late maturity, similar to 'Papigochi', and 'Babícora'. Under low yielding environments, the average grain yield of Cevamex was 35% higher than the average grain yield of Papigochi, Babícora, Juchitepec, 'Rarámuri', and 'Páramo'. Under high yielding environments, Cevamex outyielded the control cultivars by 18% and showed higher test volume weight than Papigochi and Páramo. Cevamex is similar in height to Babícora, but taller than Papigochi, Juchitepec, Páramo, and Raramuri. Cevamex is moderately resistant to lodging.

Cevamex has been evaluated for forage production, and mean forage yield of Cevamex (11 253 kg ha^{-1} of dry matter) exceeded the average of Raramuri and Papigochi by 1921 and 2395 kg ha^{-1} of dry matter, respectively. Cevamex is becoming the preferred cultivar for oat forage production in Mexico.

Cevamex has erect juvenile plants and medium green to dark green leaves. The upper culm nodes and internodes are hairy. Ligules are present. Panicles are ovate, broad, long, and equilateral. The panicle branches are short, and semi-erect with intermediate density. There are three to five whorls of branches per panicle. The spikelets are nodding and have two to three florets. Spikelet separation is by fracture, and floret separation is by heterofracture. The lemma is wide, long, and hairy. The palea is about the same size as the lemma. Awns are twisted at the base and subgeniculate. The kernels are broad, long, and cream colored. The caryopsis is pubescent with long brush hairs.

Based on races of oat crown rust prevalent in México, Cevamex is moderately resistant and is similar to Babícora and Papigochi in reaction. It is moderately resistant to stem rust (races NA5 and NA27) and resistant to speckled leaf blotch (caused by *Septoria avenae* f. sp. *avenae*) and leaf blotch [caused by *Helminthosporium avenae* (syn. *Pyrenophora avenae*) Eidam].

Cevamex was registered (Reg no. AVE-010-190298/C) on February 1998 by the Mexican Seeds Inspection and Certification Service (SNICS). Breeder seed of Cevamex will be maintained by the INIFAP Oat Breeding Program. Limited quantities of seed for research are available upon request from the authors.

H.E. Villaseñor-Mir, E. Espitia-Rangel,* and C. Márquez-Gutiérrez (3)

References and Notes

1. Maldonado, U., C. Jiménez, and D.D. Stuthman. 1986. Mass (Gravimetric) selection in diseased nurseries. p. 121–126. *In* D.A. Lowes and H. Thomas (ed.) World Crops: Production Utilization, Description. Proceedings of the Second International Oat Conference. 15–18 Jul. 1985. Aberystwyht, U.K.
2. Tiyawalee, D. and K.J. Frey. 1970. Mass selection for crown rust resistance in an oat population. Iowa State J. Sci. 45(2):217–231.
3. H.E. Villaseñor-Mir, E. Espitia-Rangel, and C. Márquez-Gutiérrez, National Oat Breeding Program, Valle de Mexico Experimental Station CIRCE-INIFAP, Apartado Postal #10 Chapingo, Mex. 56230 Mexico. Accepted 31 Aug. 2000. *Corresponding author (eespitia@mpsnet.com.mx).

The authors wish to acknowledge the financial contributions of the Quaker Oats Co. to the development of this cultivar. The USDA-ARS Cereal Disease Laboratory, St. Paul, MN, and Deon Stuthman, Univ. of Minnesota, Department of Agronomy and Plant Genetics provided technical support on rust evaluation and advice on breeding procedures.

Published in Crop Sci. 41:266–267 (2001).

Registration of 'Loetta' Arizona Cottontop

'Loetta' Arizona cottontop [*Digitaria californica* (Benth.) Henr.] (Reg. no. CV-116, PI 610665) was cooperatively released by the USDA-NRCS, USDA-ARS, and the University of Arizona Agricultural Experiment Station on 30 Apr. 2000. The experimental designation for Loetta was A-18679. This cultivar will be used as an erosion control plant in southcentral and southeastern Arizona, and southwestern New Mexico.

Arizona cottontop is a perennial, warm-season bunchgrass that is native to the southwestern USA. Loetta Arizona cottontop is both self- and cross-compatible, with more than half of the florets of a plant normally being self-pollinated (2).

Loetta is the product of a testing program at the Tucson Plant Materials Center (TPMC) to develop a cultivar of Arizona cottontop. The initial study began in 1976 and consisted of 22 accessions of Arizona cottontop. Loetta was the best performing accession and was selected for advanced evaluation (1). Seed harvested from the original plants in the initial observation block provided the material for the establishment of a Breeder seed block on the TPMC farm. No other Arizona cottontop accessions contributed pollen to this breeder seed block.

In 1993, Loetta was included in an evaluation planting along with four other grass species in Avra Valley, AZ, to evaluate seedling emergence and establishment from planting depths of 0.6, 1.3, and 2.5 cm. Loetta exhibited significantly higher ($P < 0.05$) germination and establishment from the 0.6- and 1.3-cm planting depths as compared with the 2.5-cm depth. In 1997, Loetta was seeded into a severely denuded range site in southeastern Arizona. Despite below average summer precipitation, Loetta had adequate emergence and establishment. In 1998, Loetta was evaluated along with nine other Arizona cottontop accessions using a line-source gradient irrigation system. Loetta required 10 mm of water in the first 3 d after planting for 50% emergence by the eighth day (3). Loetta was originally collected from a site with relatively high summer precipitation (225 mm) and soils with low water holding capacity.

Loetta Arizona cottontop is best adapted to Major Land Resource Areas 40-1, 40-2, 40-3, 41-2, and 41-3 in southern Arizona and southwestern New Mexico (4). Arizona cottontop can grow on a variety of soils including clayey loam, sandy loam, loose gravelly soils, as well as limestone ledges and porphyritic hills; however, it is more abundant and productive on clay, sand, or sandy-loam subsoils than on shallow, stony, or cobbly soils (2).

Loetta was selected primarily for use in revegetation of eroded rangelands, retired croplands, critical areas (e.g., high-

way construction areas), and to provide forage for wildlife and livestock. It is recommended that Loetta be utilized as part of a seeding mixture comprising ≈20 to 30% of the total mix; however, the percent composition may vary depending on the seeding objective. Site characteristics and condition influence the components of a seeding mixture. Compatible species for seedings with Arizona cottontop may include sideoats grama [*Bouteloua curtipendula* (Michx.) Torr.], cane bluestem [*Bothriochloa barbinodis* (Lag.) Herter], purple threeawn (*Aristida purpurea* Nutt.), desert globemallow (*Sphaeralcea ambigua* Gray), and fourwing saltbush [*Atriplex canescens* (Pursh) Nutt.].

Seed propagation of Loetta is restricted to two generations of increase from Breeder seed, one each of Foundation and Certified. Breeder and Foundation seed will be maintained by the USDA-NRCS, Tucson Plant Materials Center. Limited quantities of foundation seed will be available for commercial production in 2000. U.S. plant variety protection for Loetta will not be applied for.

Mark J. Pater* (5)

References and Notes

1. Briggs, J.A. 1980. 1976 Arid land grass IEP. Final summary. p. 9–29. Tucson Plant Materials Center. Annual Technical Report. USDA Soil Conservation Service, Tucson, AZ.
2. Cable, D.R. 1979. Ecology of Arizona cottontop. Res. Paper, RM-209, 21p. USDA Forest Service, Rocky Mtn. Forest and Range Exp. Stn., Fort Collins, CO.
3. Smith, S.E., E. Riley, J.L. Tiss, and D. Fendenheim. 2000. Geographical Variation in Predictive Seedling Emergence in a Perennial Desert Grass. J. Ecol. 88:139–149.
4. USDA Natural Resources Conservation Service. 1998. Arizona Field Office Tech. Guide, Sect. I, Gen. Ref., Part G. Phoenix, AZ.
5. M.J. Pater, USDA-NRCS, Tucson Plant Materials Center, 3241 N. Romero Road, Tucson, AZ 85705. Registration by CSSA. Accepted 31 Aug. 2000. *Corresponding author (mark.pater@az.usda.gov).

Published in Crop Sci. 41:267–268 (2001).

Registration of 'Calypso II' Perennial Ryegrass

'Calypso II' perennial ryegrass (*Lolium perenne* L.) (Reg. no. CV- 202, PI 592530) was developed by The Scotts Company, Marysville, OH, using germplasm obtained from the New Jersey Agricultural Experiment Station. It was released by Roberts Seed Company in 1995. AGWAY PR-92 was the experimental designation of Calypso II. The first Certified seed was produced in 1995.

Calypso II is an advanced generation synthetic cultivar selected from breeding populations involved in or related to populations used in the development of 'Calypso' perennial ryegrass. Over 90% of the parental germplasm used in the development of these breeding populations traces its origin to plants selected from old turfs throughout the mid-Atlantic region of the USA during the period from 1962 to 1977. Additional germplasm originated from plants collected in Europe. Intercrosses of selected plants were subjected to varying numbers of cycles of phenotypic and genotypic recurrent selection in mowed clonal evaluation tests, spaced-plant nurseries, greenhouse trials, and single-plant progeny tests conducted under turf maintenance conditions.

During the late summer of 1991, tillers from 38 of the best performing plots were selected from turf trials at the Rutgers Plant Science Research and Extension farm at Adelphia, NJ, and transferred to greenhouse flats. A total of 3 500 selected tillers were subsequently transplanted in a spaced-plant nursery at Adelphia. Two hundred-fourteen plants were selected from this nursery and moved to an isolated crossing block just prior to anthesis during the late spring of 1992. Selection was based on attractiveness; leafyness; moderately low-growth habit; medium-early reproductive maturity; a rich, bright dark-green color; and freedom from disease and symptoms of environmental stress. Seed was subsequently harvested from 70 plants showing the best floret fertility. This seed was used to establish single-plant progeny plots in a turf trial planted September 1992 at North Brunswick, NJ. Remnant seed from each selected plant was also sent to The Scotts Company Research Farm at Jervis, OR, for evaluation and production of Breeder seed. Each of these 70 plants contained a *Neotyphodium* endophyte. Foundation seed harvested in 1994 was used for NTEP tests and for the establishment of a Certified seed field.

Calypso II is an attractive, persistent, medium-low-growing, turf-type perennial ryegrass with a medium-dark green color. It showed excellent performance in the National Perennial Ryegrass Test seeded in 1994 and evaluated for 4 yr at 30 locations in the USA and Canada (2). Calypso II did not differ significantly from the top rated cultivar in mean turf quality. It rated among the best of the 96 entries for early spring greenup; fine leaf texture; wear tolerance; seedling vigor; winter color; turf density during spring, winter, and fall; and resistance to dollar spot (caused by a pathogen in the genus *Lanzia* Sacc. or *Moellerodiscus* Henn.); and the large brown patch disease (caused by *Rhizoctonia solani* Kühn).

Calypso II performs well on lawns, school grounds, parks, golf courses, and sports fields in temperate regions where turf-type perennial ryegrasses are adapted. It is often mixed with a blend of Kentucky bluegrasses (*Poa pratensis* L.) for these uses. Calypso II is recommended for the winter overseeding of dormant, warm-season turfs in the southern USA and similar regions.

Breeder seed of Calypso II is maintained by The Scotts Company. Seed increase is limited to three generations of increase from breeder seed: namely Foundation, Registered, and Certified. U.S. plant variety protection of Calypso II has been applied for (Certificate no. 9600045).

Jay Burr, Walter Bryant, Virgil D. Meier, W.A. Meyer, Dirk A. Smith, Ronald F. Bara, and C.R. Funk* (3)

References and Notes

1. Funk, C. Reed, and James F. White, Jr. 1997. Use of natural and transformed endophytes for turf improvement. p. 229–239. *In* C.W. Bacon and N.S. Hill (ed.) Neotyphodium/Grass Interactions. Plenum Press, New York.
2. Morris, K.N., and R. Shearman. 1999. National Perennial Ryegrass Test-1994, Final Report 1995–98, NTEP No. 99-11, National Turfgrass Evaluation Program, USDA-ARS, Beltsville, MD 20705.
3. Jay Burr, The Scotts Company, 7644 Keene Road NE, Gervais, OR 97026; Walter Bryant, Roberts Seed Company, Tangent, OR 97389; Virgil D. Meier, The Scotts Company, Marysville, OH 43041; and W.A. Meyer, Dirk A. Smith, Ronald F. Bara, and C.R. Funk, Plant Science Dep., Foran Hall, Cook College, Rutgers Univ., New Brunswick, NJ 08901. Publication D-12155-3-99. Some of this work was conducted as part of New Jersey Agric. Exp. Stn. (NJAES) Project no. 12155, and supported by NJAES funds, other grants, and gifts. Additional support was received from the U.S. Golf Association, Golf Course Superintendents Association of America Research Fund, and the New Jersey Turfgrass Association. Registration by CSSA. Accepted 30 Apr. 2000. *Corresponding author (basmith@aesop.rutgers.edu).

Appreciation is expressed to William K. Dickson, Raymond Schaaf, George Ziemienski, Michael Reynolds, Barbara Smith, and all participants in the National Turfgrass Evaluation Program.

Published in Crop Sci. 41:268 (2001).

Registration of 'SR 4200' Perennial Ryegrass

'SR 4200' perennial ryegrass (*Lolium perenne* L.) (Reg. no. CV-203, PI 543833) is an advanced generation synthetic cultivar selected from the half-sib progenies of 90 clones. It was developed and subsequently released in August 1990 by Seed Research of Oregon, Inc., Corvallis, OR. SRDR was the experimental designation of SR 4200. Germplasm obtained from the New Jersey Agricultural Experiment Station of Rutgers University was used in the development of SR 4200.

The parental germplasm of SR 4200 traces most of its lineage to a few outstanding plants collected from old turfs located in Maryland, New Jersey, New York, and Pennsylvania between 1962 and 1977. Over 5000 h were spent examining old turfs, which resulted in the discovery and collection of a few dozen superior plants. Selected plants were evaluated in both clonal plots maintained as turf and in spaced-plant nurseries. Intercrosses of the best ryegrasses were subsequently used to initiate population improvement programs that involved varying numbers of cycles of phenotypic and genotypic recurrent selection in spaced-plant nurseries, disease screening under greenhouse conditions, and progeny evaluation in closely mowed turf trials. Plants surviving intense interplant competition in closely mowed turf trials were frequently selected as part of the population improvement process.

The 90 parental clones of SR 4200 were selected from a spaced-plant nursery established in 1986 at Adelphia, NJ, which contained over 8000 plants. Attractive, leafy, turf-type plants with reduced vertical growth rate, uniform medium-early maturity, high seed yield potential, and relative freedom from disease were moved to an isolated location at North Brunswick, NJ, for production of Syn 1 seed prior to anthesis in June 1987. Nearly all selected plants contained a *Neotyphodium* endophyte. This endophyte has been shown to enhance resistance to a number of harmful insects, including billbugs (*Sphenophorus* spp.) and many lepidopterous species of sod webworms (1, 2, 3). Progenies from each of the 90 clones were subsequently established in a nursery containing 4550 spaced-plants near Corvallis, OR, in 1987 for production of Syn 2 Breeder seed. Selection within this nursery was directed toward improving disease resistance, seed yield, and uniformity. Most plants which did not meet these objectives were removed before anthesis. Breeder seed was harvested in 1988 from 1 214 selected plants. Foundation seed increase was initiated in the fall of 1988. The first Certified seed was harvested in western Oregon in 1990.

SR 4200 is a leafy, turf-type perennial ryegrass of medium-early reproductive maturity that is capable of producing an attractive, persistent turf with improved mowing qualities (4). Its high tillering ability enables the production of a medium fine-textured, leafy, medium-dense turf. SR 4200 has a bright, medium-dark-green color, with early spring greenup and good tolerance of temperature extremes. SR 4200 has medium-high resistance to net blotch [caused by *Drechslera dictyoides* f. sp. *perenne* (Drechsler) Braverman and Graham] and improved resistance to brown patch disease (caused by *Rhizoctonia solani* Kühn). SR 4200 has excellent seedling vigor and the ability to establish rapidly and grow on a wide range of soils. It has excellent wear tolerance and recuperative ability, especially during favorable, cool growing conditions.

SR 4200 has shown excellent performance on home lawns, institutional grounds, school play areas, parks, sports fields, and golf course tees, fairways, and cart paths in regions where turf-type perennial ryegrasses are well adapted. It can be used in full sun or in light to moderate shade. It should normally be mixed with a blend of adapted Kentucky bluegrass (*Poa pratensis* L.) and/or strong creeping red fescue (*Festuca rubra* L. subsp. *rubra*) for many of the above uses. SR 4200 is also used for fall and winter overseeding of dormant warm-season turfs throughout the southern USA and in similar regions throughout the world. Its lower growth profile, which is especially evident during short daylengths, makes SR 4200 especially useful in such regions.

Breeder seed of SR 4200 is produced and maintained by Seed Research of Oregon, Inc. Seed increase is restricted to three generations of increase from Breeder seed: one each of Foundation, Registered, and Certified. U.S. plant variety protection of SR 4200 has been granted (PVP Certificate no. 9000237).

M.F. Robinson, Leah A. Brilman, B.A. Adams, and C.R. Funk* (5)

References and Notes

1. Ahmad, S., J.M. Johnson-Cicalese, W.K. Dickson, and C.R. Funk. 1986. Endophyte-enhanced resistance in perennial ryegrass to the bluegrass billbug, *Sphenophorus parvulus*. Entomol. Exp. Appl. 41:3–10.
2. Funk, C.R., P.M. Halisky, S. Ahmad, and R.H. Hurley. 1985. How endophytes modify turfgrass performance and response to insect pests in turfgrass breeding and evaluation trials. p. 127–145. *In* F. Lemaire (ed.) Proc. 5th Int. Turfgrass Res. Conf., Avignon, France. 1–5 July 1985. INRA Publ., Versailles.
3. Funk, C.R., P.M. Halisky, M.C. Johnson, M.R. Siegel, A.V. Stewart, S. Ahmad, R.H. Hurley, and I.C. Harvey. 1983. An endophytic fungus and resistance to sod webworms: Association in *Lolium perenne* L. BioTechnology 1:189–191.
4. Morris, K.N. and R. Shearman. 1999. National Perennial Ryegrass Test - 1994, Final Report 1995–1998. NTEP No. 99-11, National Turfgrass Evaluation Program, USDA-ARS, Beltsville, MD 20705.
5. M.F. Robinson and Leah A. Brilman, Seed Research of Oregon, Inc., 27630 Llewellyn Road, Corvallis, OR 97333; B.A. Adams and C.R. Funk, Plant Science Dep., New Jersey Agric. Exp. Sta., Cook College, Rutgers Univ., New Brunswick, NJ 08901-8525. Publication no. D-12155-3-99, New Jersey Agric. Exp. Sta. Some of this work was conducted as part of new Jersey Agric. Exp. Sta. project no. 12155, supported by New Jersey Agric. Exp. Sta. funds, other grants, and gifts. Additional support was obtained from the U.S. Golf Assoc. - Golf Course Superintendents Association of America Res. Fund, and the New Jersey Turfgrass Association. Registration by CSSA. Accepted 30 Apr. 2000. *Corresponding author (basmith @aesop.rutgers.edu).

Appreciation is expressed to Kevin Morris, Robert Shearman, and all other participants in the National Turfgrass Evaluation Program for their participation in the evaluation of SR 4200. We also thank William K. Dickson, Ronald F. Bara, and Barbara A. Smith for their many contributions.

Published in Crop Sci. 41:269 (2001).

Registration of 'AC Pathfinder' Durum Wheat

'AC Pathfinder' durum wheat (*Triticum turgidum* L. var. durum) (Reg. no. CV-888, PI 610667) was developed at the Semiarid Prairie Agricultural Research Centre, Agriculture and Agri-Food Canada, Swift Current, SK, and received 1 yr interim registration, No. I-245, from the Canadian Food Inspection Agency on 20 Aug. 1998, which was extended for a further 3 yr on 20 Aug. 1999. It was released because of its superior-quality attributes, particularly gluten strength.

AC Pathfinder was selected from the cross 'DT367'/ 'Westbred 881'. DT367 (1) is a breeding line from our program, and Westbred 881 (PI 483458) was developed by Western Plant Breeders Ltd., Phoenix, AZ. AC Pathfinder was developed using a modified pedigree technique. The F_2 generation was grown in 1990 as individual plants in a nursery inoculated with leaf rust (caused by *Puccinia triticina* Eriks.) and stem rust (caused by *P. graminis* Pers.: Pers.). The rust races were

representative of those found in western Canada (2). Stem rust races used for one or more years were QTH (C25), RTH (C57), RRQ (C63), TMR (C10), TMR (C95), and TPM (C53). Leaf rust races used for one or more years were Race 1, Race 15, KBG, MBDS (12-3), MBR, (39-2), MBRJ (10-2), MCDS (1-2),MCR, MFM (56-1), MJB (10-3), TBD (U3-1), TDG (36-3), TDT, TGBJ (82-1), and TJB (77-2). The F_3, F_5, and F_7 generations were grown as head rows in a winter nursery near Brawley, CA, to produce seed for yield tests. Two replicate F_4, F_6, and F_8 yield trials were grown near Swift Current and Regina from 1991 to 1993, and selected for agronomic performance, disease resistance, and quality (protein, pigment, and gluten strength). An $F_{6:9}$ line was evaluated in pre-registration trials in 1994 (five locations) and 1995 (six locations), and under the designation DT671 in the Durum Cooperative Test from 1996 to 1998 (10–12 locations per year).

AC Pathfinder yield (4060 kg ha^{-1}) was similar to 'AC Morse' (4080 kg ha^{-1}) and less than 'Kyle' (4170 kg ha^{-1}) in the main durum production area of western Canada (3). Time to maturity of AC Pathfinder (97 d) was similar to that of Kyle (99 d) and AC Morse (98 d). AC Pathfinder has shorter (9 cm) and stronger straw than Kyle. Test weight of AC Pathfinder (79.6 kg hL-$^{-1}$) was similar to Kyle and 'Plenty', and greater than AC Morse (78.6 kg hL^{-1}). Average grain protein concentration of AC Pathfinder (153 g kg^{-1}, dry matter basis) was less than Kyle (156 g kg^{-1}) and 'AC Avonlea' (162 g kg^{-1}) in 3 yr in the Durum Cooperative Test. AC Pathfinder is resistant to prevalent leaf and stem rust races (above), and common bunt races L1, L16, T1, T6, T13, and T19 [caused by *Tilletia laevis* Kühn in Rabenh., and *T. caries* (DC.) Tul. & C. Tul.]. It is resistant to loose smut race T26 [caused by *Ustilago tritici* (Pers.) Rostr.], but susceptible to races T32 and T33 prevalent in western Canada. AC Pathfinder is photoperiod sensitive.

Spikes of AC Pathfinder are fusiform to oblong, dense, midlong, erect, and awned. Glumes are midwide, midlong, glabrous, and white in color. Glume shoulders are oblique to square, some slightly elevated. Glume beaks are short to midlong and acute. Kernels are medium amber in color, mid size, midwide, and elliptical; cheeks are rounded angular; crease midwide, middeep; brush is midsize, midlong; embryo is midsize.

AC Pathfinder is eligible for grades of the Canada Western Amber Durum wheat class. It has higher grain yellow pigment concentration (8.7 vs. 7.8 mg kg^{-1}) and stronger gluten as measured by SDS-sedimentation volume (74 vs. 42 mL) than the predominant Canadian cultivar Kyle.

Breeder seed, originating from 126 $F_{6:11}$ lines, will be maintained by the Seed Increase Unit of the Indian Head Research Farm, Indian Head, SK, S0G 2K0. Distribution and multiplication of pedigreed seed stocks will be handled by Saskatchewan Wheat Pool, 2625 Victoria Ave., Regina, SK, S4T 7T9. Small quantities of seed for research purposes are available from the corresponding author. AC Pathfinder was granted Plant Breeder's Rights by the Canadian Food Inspection Agency, Certificate no. 0644, on 14 June 1999.

J.M. Clarke,* J.G. Mcleod, R.M. DePauw, B.A. Marchylo, T.N. McCaig, R.E. Knox, M.R. Fernandez, and N. Ames (4)

References and Notes

1. McLeod, J.G., T.F. Townley-Smith, R.M. DePauw, J.M. Clarke, C.W.B. Lendrum, and G.E. McCrystal. 1991. Registration of DT367 high-yielding durum wheat germplasm. Crop Sci. 31:1394.
2. Kolmer, J.A. and J.Q. Liu. 1997. Physiologic specialization of *Puccinia recondita* f. sp. *tritici* in Canada in 1995. Can. J. Plant Pathol. 19:166–170.
3. Clarke, J.M., J.G. McLeod, T.N. McCaig, R.M. DePauw, R.E. Knox, and M.R. Fernandez. 2000. AC Pathfinder durum wheat. Can. J. Plant Sci. 80:(in press).
4. J.M. Clarke, J.M., R.M. DePauw, M.R. Fernandez, R.E. Knox, J.G. McLeod, and T.N. McCaig. Semiarid Prairie Agricultural Research Centre, Research Branch, Agriculture and Agri-Food Canada, Box 1030, Swift Current, SK. S9H 3X2; B.A.Marchylo, Grain Research Laboratory, Canadian Grain Commission, 1404-303 Main St., Winnipeg, MB, R3C 3G8; N. Ames, Agriculture and Agri-Food Canada, Research Branch, Cereal Research Centre, 195 Dafoe Rd., Winnipeg, MB, R3T 2M9. Registration by CSSA. Accepted 31 May 2000. *Corresponding author (clarkej@em.agr.ca).

Published in Crop Sci. 41:269–270 (2001).

Registration of 'AC Navigator' Durum Wheat

'AC Navigator' durum wheat (*Triticum turgidum* L. *var. durum*) (Reg. no. CV-889, PI 610666) was developed at the Semiarid Prairie Agricultural Research Centre, Agriculture and Agri-Food Canada, Swift Current, SK, and received 1 yr interim registration, No. I-243, from the Canadian Food Inspection Agency on 30 July 1998, extended for a further 3 yr on 1 Aug. 1999. It was released because of its superior quality attributes, particularly gluten strength.

AC Navigator was selected from the cross 'Kyle'/'Westbred 881'. Kyle (1) is currently the predominant Canadian cultivar, and Westbred 881 (PI483458) was developed by Western Plant Breeders Ltd., Phoenix, AZ. AC Navigator was developed using a modified pedigree technique. The F_2 generation was grown in 1990 as individual plants in a nursery inoculated with leaf rust (caused by *Puccinia triticina* Eriks.) and stem rust (caused by *P. graminis* Pers.: Pers.). The rust races were representative of those found in western Canada (2). Stem rust races used for one or more years were QTH (C25), RTH (C57), RRQ (C63), TMR (C10), TMR (C95), and TPM (C53). Leaf rust races used for one or more years were Race 1, Race 15, KBG, MBDS (12-3), MBR, (39-2), MBRJ (10-2), MCDS (1-2), MCR, MFM (56-1), MJB (10-3), TBD (U3-1), TDG (36-3), TDT, TGBJ (82-1), and TJB (77-2). The F_3, F_5, and F_7 generations were grown as head rows in a winter nursery near Brawley, CA, to produce seed for yield tests. Two replicate F_4, F_6, and F_8 yield trials were grown near Swift Current and Regina from 1991 to 1993 and selected for agronomic performance, disease resistance, and quality (protein, pigment, gluten strength). An $F_{6:9}$ line, designated 8980-AG2E, was evaluated in pre-registration trials in 1994 (five locations), and 1995 (six locations), and under the designation DT673 in the Durum Cooperative Test from 1996 to 1998 (10–12 locations per year).

AC Navigator yield (4 150 kg ha^{-1}) was similar to the checks 'Kyle' (4 170 kg ha^{-1}) and 'AC Morse' (4080 kg ha^{-1}) in the main durum production area of western Canada (3). Time to maturity of AC Navigator (98 d) was similar to that of Kyle (99 d) and AC Morse (98 d). AC Navigator is a semidwarf with 25 cm shorter and stronger straw than Kyle. Test weight of AC Navigator (79.9 kg hL^{-1}) was similar to Kyle and 'Plenty', and greater than AC Morse (78.6 kg hL^{-1}). Average grain protein concentration of AC Navigator (156 g kg^{-1}, dry matter basis) was similar to Kyle and less than 'AC Avonlea' (162 g kg-$^{-1}$) in 3 yr in the Durum Cooperative Test. AC Navigator is resistant to prevalent leaf and stem rust races (above), and common bunt races L1, L16, T1, T6, T13, and T19 [caused by *Tilletia laevis* Kuhn in Rabenh., and *T. caries* (DC.) Tul. & C. Tul.]. It is susceptible to loose smut [caused by *Ustilago tritici* (Pers.) Rostr.] races T26, T32, and T33 prevalent in western Canada. AC Navigator is photoperiod insensitive.

Spikes of AC Navigator are fusiform to oblong, dense,

mid long, erect, and awned. Glumes are narrow to midwide, midlong, glabrous, and white in color. Glume shoulders are oblique to square, some slightly elevated. Glume beaks are medium length and acuminate. Kernels are medium amber in color, midlong, midwide, and elliptical; cheeks are rounded slightly angular; brush is midsize, short; embryo is midsize.

AC Navigator is eligible for grades of the Canada Western Amber Durum wheat class. It has higher grain yellow pigment concentration (10.1 vs. 7.8 mg kg^{-1}) and stronger gluten as measured by SDS-sedimentation volume (59 vs. 42 mL) than the predominant Canadian cultivar Kyle.

Breeder seed, originating from 117 $F_{6:11}$ lines, will be maintained by the Seed Increase Unit of the Indian Head Research Farm, Indian Head, SK, S0G 2K0. Distribution and multiplication of pedigreed seed stocks will be handled by Saskatchewan Wheat Pool, 2625 Victoria Ave., Regina, SK, S4T 7T9. Small quantities of seed for research purposes are available from the corresponding author. AC Navigator was granted Plant Breeder's Rights by the Canadian Food Inspection Agency, Certificate no. 0645, on 14 June 1999. AC Navigator was granted Plant Breeder's Rights by the Canadian Food Inspection Agency, Certificate no. 0645, on 14 June 1999.

J.M. Clarke,* J.G. Mcleod, R.M. DePauw, B.A. Marchylo, T.N. McCaig, R.E. Knox, M.R. Fernandez, and N. Ames (4)

References and Notes

1. McLeod, J.G., T.F. Townley-Smith, R.M. DePauw, J.M. Clarke, C.W.B. Lendrum, and G.E. McCrystal. 1991. Registration of 'Kyle' durum wheat. Crop Sci. 31:236–237.
2. Kolmer, J.A., and J.Q. Liu. 1997. Physiologic specialization of *Puccinia recondita* f. sp. *tritici* in Canada in 1995. Can. J. Plant Pathol. 19:166–170.
3. Clarke, J.M., J.G. McLeod, T.N. McCaig, R.M. DePauw, R.E. Knox, and M.R. Fernandez. 2000. AC Navigator durum wheat. Can. J. Plant Sci. 80:(in press).
4. J.M. Clarke, R.M. DePauw, M.R. Fernandez, R.E. Knox, J.G. McLeod, and T.N. McCaig, Semiarid Prairie Agricultural Research Centre, Research Branch, Agriculture and Agri-Food Canada, Box 1030, Swift Current, SK, S9H 3X2; B.A. Marchylo, Grain Research Laboratory, Canadian Grain Commission, 1404-303 Main St., Winnipeg, MB, R3C 3G8; N. Ames, Agriculture and Agri-Food Canada, Research Branch, Cereal Research Centre, 195 Dafoe Rd., Winnipeg, MB, R3T 2M9. Registration by CSSA. Accepted 31 May 2000. *Corresponding author (clarkej@em.agr.ca).

Published in Crop Sci. 41:270–271 (2001).

Registration of 'Quebrantahuesos-TCL99' Triticale

'Quebrantahuesos-TCL99', spring triticale (X *triticosecale* Wittmack L.) (Reg. no. CV-18, PI 613159) was developed by the International Maize and Wheat Improvement Center (CIMMYT), Mexico D.F., Mexico, and released in Mexico by the University of Mexico State, Universidad Autonoma del Estado de Mexico, UAEM, in 1999 (Reg. no. 1228-TCL-009-300799/C).

Quebrantahuesos-TCL99 is a complete hexaploid triticale genotype. It was developed using a modified pedigree selection method known as the "Shuttle breeding method" established by N.E. Borlaug in the mid-1940s (1) and adopted by the CIMMYT wheat and triticale breeding program (3). Shuttling germplasm between Obregon (40 m altitude and latitude 27.5°N) and Toluca (2640 m altitude and 18°N latitude) enables CIMMYT breeders to select cultivars adapted to a wide range of abiotic and biotic stresses with no photoperiod sensitivity. Quebrantahuesos-TCL99 was selected from progeny of the cross 'ZEBRA79'/'LYNX*2'//'FAHAD1' (CTY90.1406-1M-1Y-0M-4Y-0M-2B-0Y-0UAEM). The F_1, F_2, F_4, and F_6 generations of Quebrantahuesos-TCL99 were planted in Toluca, State of Mexico. The F_7 was grown in El Batan, Mexico State and the F_3, F_5, and F_8 were grown in Obregon, Sonora. The F_9 generation was grown at the UAEM, Mexico State. Two hundred F_5 individual plants of Quebrantahuesos-TCL99 were selected and grown as head rows in the F_6 generation. The agronomically desirable and homogenous F_6-derived lines were bulked and evaluated in yield trials in Obregon. Further seed purification of Quebrantahuesos-TCL99 was done in the F_9 and subsequent generations by planting 200 head rows selected from previous generations, discarding the off-types and then bulking the similar rows.

Quebrantahuesos-TCL99 was selected under three types of 'mega-environments' (ME) in Obregon with ME 1 as a high input environment with full irrigation, ME 4 an arid environment with one irrigation before planting only, and ME 5 a heat stress envirnoment during grain filling. Early generation selection in Obregon was based primarily on agronomic type and resistance to leaf rust [caused by *Puccinia recondita* (Rob. ex Desmaz.) f. sp. *tritici* (Eriks. & E. Henn.) D.M.]. Grain yield and test weight were additional selection criteria in the advanced generations. At El Batan and Toluca, a high rainfall area (ME2), selection traits in early generations were resistance to yellow rust [caused by *Puccinia striiformis* West. (syn. *P. glumarum* Eriks. & Henn.)], Fusarium head blight (scab) (caused by *Fusarium* spp.), septoria (caused by *Septoria* spp.), tolerance to low pH soils, harvest time sprouting, and agronomic traits.

Quebrantahuesos-TCL99 was evaluated in advanced yield trials under the Obregon environments from 1994 to 1998. During the 1998 and 1999 crop cycles, Quebrantahuesos-TCL99 was tested under the highland environments of Mexico State. In Obregon, Quebrantahuesos-TCL99 yielded 14, 7, and 12% more grain than the check 'Fahad-5'; 14, 7, and 14% more grain than 'Jilotepec'; and 7, 9, and 12% more grain than 'Huamantla' under ME1, ME4, and ME5 conditions, respectively. In Mexico State, Quebrantahuesos-TCL99 produced 3 and 22% more grain than Jilotepec, and 25% more than Huamantla under ME2 and ME4 environments, respectively.

In Mexico State, Quebrantahuesos-TCL99 test weight (650 kg m^{-3}) under the ME4 conditions was significantly greater than that of Jilotepec (610 kg m^{-3}) and Huamantla (630 kg m^{-3}). Under ME2 conditions, the test weight of Quebrantahuesos-TCL99 (595 kg m^{-3}) was slightly higher than that of Jilotepec (580 kg m^{-3}) and significantly less than that of Huamantla (610 kg m^{-3}). The test weight of the bread wheat 'Romoga F94' was 710 and 675 kg m^{-3} under ME4 and ME2 environments, respectively. In Obregon, Quebrantahuesos-TCL99 had test weights of 750 and 730 kg m^{-3}, a 10 kg m^{-3} improvement over Jilotepec (740 and 720 kg m^{-1}) and 20 kg m^{-3} more than that of Huamantla (730 and 710 kg m^{-3}) under ME1 and ME4 conditions, respectively. Under ME5 conditions, Quebrantahuesos-TCL99 and Huamantla had a similar test weight (610 kg m^{-3}), which was significantly higher than that of Jilotepec (590 kg m^{-3}). The plant height of Quebrantahuesos-TCL99 was 12 to 24 cm greater than Jilotepec and 3 to 25 cm greater than Huamantla depending on the environments.

In the ME2 environments of Central Mexico, time to maturity for Quebrantahuesos-TCL99 was 123 d compared to Jilotepec at 121 d and Huamantla at 120 d. Under ME4 conditions, it matured similar to Huamantla and later than Jilotepec by 4 to 5 d.. In Obregon, Quebrantahuesos-TCL99 matured later than Jilotepec by 4 to 5 d under all conditions.

Quebrantahuesos-TCL99 is medium in resistance to the new race of yellow rust that is virulent on the *Yr9* gene in wheat and triticale in Mexico (2) and other countries. All previously released triticale cultivars in Mexico State are susceptible to this new race. Quebrantahuesos-TCL99 is resistant to leaf rust,

septoria, and stem rust, but is moderately susceptible to fusarium head blight disease and sprouting. Quebrantahuesos-TCL99 has white awns and medium lax spikes with medium dark colored kernels. It is good for animal feeding, making unleavened breads (e.g., tortilla, chapatti), and in mixtures with bread wheat flour.

Breeder seed is maintained by UAEM. Certified seed can be obtained from: UAEM, Centro Universitario Km. 15, Col. San Rafael, Carret. Toluca-Ixtlahuaca, Apdo. Postal 435, Toluca, Edo. Mexico.

M. Mergoum,* G. Estrada Campuzano, W.H. Pfeiffer, S. Rajaram, A. Hede, A. Balbuena Melgarejo, and C.G. Martinez Rueda (4)

References and Notes

1. Borlaug, N.E. 1968. Wheat breeding and its impact on world food supply. p. 1–36. *In* K.W. Finley and K.W. Shephard (ed.) Proceedings 3rd Int. Wheat Genetic Symp., Canberra, Australia.
2. Mergoum, M., W.H. Pfeiffer, S. Rajaram, and R.J. Peña. 1998. Triticale at CIMMYT: Improvement and adaptation. p. 58–64. *In* Proc. of the 4th Int. Triticale Symp., Vol. 1. ISBN 0-9585592-0-1. Red Deer, Canada, July 26–31.
3. Rajaram, S. 1995. Wheat Germplasm Improvement: Historical perspectives, philosophy, objectives and missions. *In* S. Rajaram & G.P. Hettel (ed.) Wheat breeding at CIMMYT: Commemorating 50 years of research in Mexico for global wheat improvement. *Wheat Special Report* No. 29, Mexico, and D.F.: CIMMYT, p. 1–9.
4. M. Mergoum, W.H. Pfeiffer, S. Rajaram, A. Hede, International Maize and Wheat Improvement Center, CIMMYT Int., Lisboa 27, Apdo. Postal 6-641, 06600 Mexico, D.F., Mexico; G. Estrada Campuzano, A. Balbuena Melgarejo, C.G. Martinez Rueda. Facultad de Ciencias Agricolas, UAEM, Apdo. Postal 435, Toluca, Edo. De Mexico, Mexico. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (m.mergoum@cgiar.org).

Published in Crop Sci. 41:271–272 (2001).

Registration of 'Milenio TCL-3' Triticale

'Milenio TCL-3', spring triticale (X *triticosecale* Wittmack L.) (Reg. no. CV-19, PI 613158) was developed by the International Maize and Wheat Improvement Center (CIMMYT), Mexico D.F., Mexico, and released in Mexico by the research institute ICAMEX (Instituto de Investigacion y Capacitacion Agropecuaria, Agricola y Forestal del Estado de Mexico) in 1999 (Reg. no. 1127-TCL-007-280599/C).

Milenio TCL-3 is a widely adapted, high-yielding cultivar, resistant to the race of yellow rust that is virulent to the *Yr9* source of resistance. Milenio TCL-3 is a complete hexaploid triticale that is derived from the progeny of the cross 'RHINO_3'/ 'BULL_1-1' (CTB88.1317-25B-0Y-3M-1Y-0M-1B-0Y). Milenio TCL-3 was developed using a modified pedigree selection method known as the "Shuttle breeding method" established by N.E. Borlaug in the mid-1940s (1) and adopted by the CIMMYT wheat and triticale breeding program (3). Shuttling germplasm between Obregon (40 m altitude and 27.5°N latitude) and Toluca (2640 m altitude and 18°N latitude) enables CIMMYT breeders to select cultivars adapted to a wide range of abiotic and biotic stresses with no photoperiod sensitivity. The F_1, F_3, F_5, and F_8 generations of Milenio TCL-3 were grown in Obregon, Sonora. The F_2 and F_7 generations were grown in El Batan and the F_4 and F_6 in Toluca, Mexico State. In the F_5 individual plants were selected and planted as head rows. The resulting agronomically desirable and homogenous F_5-derived lines were bulked in the F_6 and evaluated in preliminary yield trials at Obregon. Further seed purification of Milenio TCL-3 was conducted in the F_8 by planting one hundred head rows, discarding the off-types, and bulking the similar rows. In Obregon, an arid region, Milenio TCL-3 was selected under three types of 'mega-environments' (ME) with ME 1 as a high input environment with full irrigation, ME 4 an arid environment with one irrigation before planting only, and ME 5 a heat stress environment during grain filling. Milenio TCL-3 was evaluated in advanced yield trials under the three Obregon environments from 1995 to 1998 and under adverse environments and disease severity in the highlands of Mexico State including Toluca, a high rainfall site (ME2), during the 1998 to 1999 crop seasons. During the 1995 to 1998 period in Obregon, Milenio TCL-3 produced 28 and 12% more grain than 'Fahad-5' under ME1 and ME4 environments, respectively. In the same environments, Milenio TCL-3 produce 16 and 14% more grain than the recently released triticale cultivar, 'Jilotepec'. In Mexico State, Milenio TCL-3 and previously released wheat and triticale checks were evaluated in 1998 to 1999 crop season over five sites representing the ME3 and ME4 predominant mega environments. The overall average yield of Milenio TCL-3 was 3.12 Mg ha^{-1}, a grain yield advantage of 91, 32, and 49% over the previously released cultivars Jilotepec, 'Huamantla', and 'Secano', respectively.

Milenio TCL-3 is resistant to the new race of yellow rust [caused by *Puccinia striiformis* (West.) syn. *P. glumarum* Eriks. & Henn.] that has virulence to the *Yr9* gene in wheat and triticale in Mexico (2) and many other countries. All previously released triticale cultivars are susceptible to this new race. Milenio TCL-3 is resistant to leaf rust [caused by *Puccinia recondita* (Rob. Ex Desm.) f. sp. *Tritici*], septoria (caused by *Septoria* spp.), and stem rust [caused by *Puccinia graminis* (Pers.) f. sp. *Tritici* Eriks. & Henn.] Milenio TCL-3, is moderately susceptible to fusarium head blight (scab) (caused by *Fusarium* spp.), and harvest time sprouting.

In Mexico State, the test weight of Milenio TCL-3 was 588 kg m^{-3}, which is equal to that of Jilotepec (584 kg m^{-3}), significantly higher than that of Secano (572 kg m^{-3}) and significantly lower than Huamantla (612 kg m^{-3}). The test weight of the bread wheat 'Romoga F94' and the durum wheat 'Aculco C96', the most widely grown wheat cultivars in the region, averaged 671 and 640 kg m^{-3}, respectively. Under the Mexico State environments, Milenio TCL-3 was 5 cm taller than Jilotepec and 3 and 10 cm shorter than Huamantla and Secano, respectively. Under ME1 conditions in Obregon, Milenio TCL-3 was 3 cm shorter than Jilotepec. In drier conditions, Milenio TCL-3 was 4 cm taller than Jilotepec. In Mexico State, Milenio TCL-3 matured 4, 3 and 7 d later than Jilotepec, Huamantla and Secano, respectively. In Obregon, Milenio TCL-3 matured 1 to 2 d later than Jilotepec in the ME1 and ME4 environments. Milenio TCL-3 has white awned and very long lax spikes with large dark colored kernels. This cultivar is suitable for use as an animal feed as well as for making unleavened breads (e.g., tortilla, chapatti) and blends with bread wheat flour.

Breeder seed of Milenio TCL-3 is maintained by ICAMEX. Certified seeds may be obtained from ICAMEX, Conjunto SEDAGRO, Metepec, Edo. Mexico, C.P. 52140, Apdo. Postal 28.

M. Mergoum,* A. Hernandez Sierra, W.H. Pfeiffer, S. Rajaram, A. Zuloaga Albarran, O. Abdalla, and G. Varughese (4)

References and Notes

1. Borlaug, N.E. 1968. Wheat breeding and its impact on world food supply. p. 1–36. *In* K.W. Finley and K.W. Shephard (ed.) Proceedings 3rd Int. Wheat Genetic Symp., Canberra, Australia.
2. Mergoum, M., W.H. Pfeiffer, S. Rajaram, and R.J. Peña. 1998. Triticale at CIMMYT: Improvement and adaptation. p. 58–64. *In* Proc. of the 4th Int. Triticale Symp., Vol. 1. ISBN 0-9585592-0-1. Red Deer, Canada, July 26–31.

3. Rajaram, S. 1995. Wheat germplasm improvement: Historical perspectives, philosophy, objectives and missions. *In* S. Rajaram & Hettel, G.P. (ed.) Wheat breeding at CIMMYT: Commemorating 50 years of research in Mexico for global wheat improvement. *Wheat Special Report* No. 29, Mexico, D.F.: CIMMYT, p. 1–9.
4. M. Mergoum, W.H. Pfeiffer, S. Rajaram, O. Abdalla, G. Varughese, International Maize and Wheat Improvement Center, CIMMYT Int., Lisboa 27, Apdo. Postal 6-641, 06600 Mexico, D.F., Mexico; A. Hernandez Sierra, A. Zuloaga Albarran, ICAMEX, Conjunto SEDAGRO, Metepec, Edo. Mexico, C.P. 52140, Apdo. Postal 28. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (m.mergoum@cgiar.org).

Published in Crop Sci. 41:272–273 (2001).

Registration of 'Siglo TCL-21' Triticale

'Siglo TCL-21', spring triticale (X *triticosecale* Wittmack L.) (Reg. no. CV- 20, PI 613161) was developed by the International Maize and Wheat Improvement Center, (CIMMYT), Mexico D. F., Mexico, and released in Mexico by the Research Institute ICAMEX (Instituto de Investigacion y Capacitacion Agropecuaria, Agricola y Forestal del Estado de Mexico) in 1999 (Reg. no. 1126-TCL-006-280599/C).

Siglo TCL-21 21 is a complete hexaploid triticale known at CIMMYT under the name of 'CARACAL' (CTM87.1801-2Y-0M-11RES-7M-1Y-0PAP-4Y-0B), and derived from the progeny of the cross 'STIL/YAV79// CENT.MAROC54/3/ ARDI_1/4/TAPIR/YOGUI_1//2*MUSX'. Siglo TCL-21 was developed using a modified pedigree selection method known as the "Shuttle breeding method" established by N.E. Borlaug in the mid-1940's (1) and adopted by the CIMMYT wheat and triticale breeding program (3). Shuttling germplasm between Obregon (40 m altitude and 27.5°N latitude) and Toluca (2 640 m altitude and 18°N latitude) enables CIMMYT breeders to select cultivars adapted to a wide range of abiotic and biotic stresses with no photoperiod sensitivity. The F_1, F_2, F_4, F_6 and F_8 generations of Siglo TCL-21 were grown at Obregon in Sonora. The F_3 and F_5, and F_9 generations were grown at Toluca and El Batan, Mexico State. The F_7 was grown at Papalotla, Mexico State. In the F_6 generation, 200 individual plants were selected and planted as head rows. The agronomically desirable and homogenous F_6-derived lines were bulked in the F_7 and evaluated in preliminary yield trials at Obregon. Further seed purification of Siglo TCL-21 was done in the F_9 by planting 100 head rows from the F_8, discarding the off-types and bulking the similar rows.

In Obregon, an arid region, Siglo TCL-21 was selected under three types of 'mega-environments' (ME) with ME 1 as a high input environment with full irrigation, ME 4 an arid envirnoment with one irrigation before planting only, and ME 5 a heat stress environment during grain filling. Early generation selection in Obregon and Papalotla was based primarily on agronomic type and resistance to leaf rust [caused by *Puccinia recondita* (Rob. Ex Desm.) f. sp. *tritici*] and stem rust [caused by *Puccinia graminis* (Pers.) f. sp. *tritici* Eriks. & Henn.]. Grain yield and test weight were additional selection criteria in the advanced generations. At El Batan and Toluca, a high rainfall site (ME2), selection traits in early generations improved resistance to yellow rust [caused by *Puccinia striiformis* West. (syn. *P. glumarum* Eriks. & Henn.)], Fursarium head blight (scab) (caused by *Fusarium* spp.), septoria (caused by *Septoria* spp.), tolerance to low pH soils, harvest time sprouting resistance and agronomic traits.

Siglo TCL-21 was evaluated under the three Obregon environments from 1995 to 1999 and under adverse environments and severe disease pressure in Mexico State, as well as Toluca, in the 1998 and 1999 crop seasons. At Obregon, Siglo TCL-21 produced 15 and 22% more grain than 'Fahad-5' under ME1 and ME4 conditions, respectively. Under the same conditions, Siglo TCL-21 produced 4 and 25% more grain than 'Jilotepec'. In Mexico State, Siglo TCL-21 produced on average 138, 65, and 84% more grain than the recently released cultivars Jilotepec, Huamantla, and Secano, respectively.

Siglo TCL-21 is resistant to the new race of yellow rust that is virulent on the gene *Yr9* in wheat and triticale in Mexico (2) and other countries. All previously released triticale cultivars are susceptible to this new race. Siglo TCL-21 is resistant to leaf rust, septoria, and stem rust. Siglo TCL-21 is moderately susceptible to Fusarium head blight and harvest time sprouting.

In Mexico State, the test weight of Siglo TCL-21 (650 kg m^{-3}) was significantly greater than that of Jilotepec (584 kg m^{-3}), Secano (572 kg m^{-3}), and Huamantla (612 kg m^{-3}). However, it was significantly less than that of the bread wheat 'Romoga F94' (671 kg m^{-3}) and similar to that of 'Aculco C96' durum wheat (640 kg m^{-3}). In Obregon, the test weight of Siglo TCL-21 (770 and 730 kg m^{-3}) was greater than or equal to that of Jilotepec (740 and 720 kg m^{-3}) under both ME1 and ME4 conditions, respectively. The height of Siglo TCL-21 in Mexico State and Obregon was equal to that of Jiloptepec. It was significantly shorter than Humantla and Secano in Mexico State. In the same environments, the maturity of Siglo TCL-21 was equal to Huamantla, and 1 and 4 d later than Jilotepec and Secano, respectively. In Obregon, Siglo TCL-21 matured 4 and 9 d earlier than Jilotepec under ME1 and ME4 conditions, respectively. Siglo TCL-21 has medium long, awned, white, and medium up right spikes. Its kernels are medium large and dark in color with good animal feeding quality. Siglo TCL-21 is suitable for making unleavened breads (e.g., tortilla, chapatti) as well as in mixtures with bread wheat flour.

Breeder seed of Siglo TCL-21 is maintained by ICAMEX. Certified seed may be obtained from ICAMEX, Conjunto SEDAGRO, Metepec, Edo. Mexico, C.P. 52140, Apdo. Postal 28.

M. Mergoum,* A. Hernandez Sierra, W.H. Pfeiffer, S. Rajaram, A. Zuloaga Albarran, O. Abdalla, and G. Varughese (4)

References and Notes

1. Borlaug, N.E. 1968. Wheat breeding and its impact on world food supply. p. 1–36. *In* K.W. Finley and K.W. Shephard (ed.) Proceedings 3rd Int. Wheat Genetic Symp., Canberra, Australia.
2. Mergoum, M., W.H. Pfeiffer, S. Rajaram, and R.J. Peña. 1998. Triticale at CIMMYT: Improvement and adaptation. p. 58–64. *In* Proc. of the 4th Int. Triticale Symp., Vol. 1. ISBN 0-9585592-0-1. Red Deer, Canada, July 26–31.
3. Rajaram, S. 1995. Wheat Germplasm Improvement: Historical perspectives, philosophy, objectives and missions. *In* S. Rajaram and G.P. Hettel (ed.) Wheat breeding at CIMMYT: Commemorating 50 years of research in Mexico for global wheat improvement. *Wheat Special Report* No. 29, Mexico, and D.F.: CIMMYT, p. 1–9.
4. M. Mergoum, W.H. Pfeiffer, S. Rajaram, O. Abdalla, G. Varughese, International Maize and Wheat Improvement Center, CIMMYT Int., Lisboa 27, Apdo. Postal 6-641, 06600 Mexico, D.F., Mexico; A. Hernandez Sierra, A. Zuloaga Albarran, ICAMEX, Conjunto SEDAGRO, Metepec, Edo. Mexico, C.P. 52140, Apdo. Postal 28. Registration by CSSA. Accepted 30 Jun. 2000. *Corresponding author (m.mergoum@cgiar.org).

Published in Crop Sci. 41:273 (2001).