Registration of ‘Ada’ Wheat

‘Ada’ is a hard red spring wheat (Triticum aestivum L.) (Reg. no. CV-1004, PI 642856) cultivar developed and released by the Minnesota Agricultural Experiment Station in cooperation with USDA-ARS in January 2006. Ada was released on the basis of its high grain yield, high grain protein content, leaf rust (caused by Puccinia triticina Eriks.) resistance, and straw strength. Ada was named after a town in its region of adaptation in northwest Minnesota.

Ada was derived from the cross SBY189H/2375™, made by the former Pioneer Hi-Bred spring wheat breeding program in the U.S. The cultivar 2375, (PI 601477, syn. Pioneer 2375) has the pedigree ‘Ola’/‘Era’/Suqamuxi 68/73/‘Chris’/ND487/‘Lark’ and was widely grown in Minnesota during the mid-1990s due to its moderate resistance to Fusarium head blight (caused primarily by Fusarium graminearum Schwabe). SBY189H is an unreleased spring wheat line from Pioneer Hi-Bred whose pedigree is ‘Butte’/3/TZP/‘Sonora’ 64/‘Crim’ (B. Laskar, personal communication).

The F2 population producing Ada was selected for leaf rust and stem rust (caused by Puccinia graminis Pers. Pers. f. sp. tritici Eriks. & E. Hen.) resistance in a field planting at St. Paul in 1993. The F3 generation was advanced by seed descent in a greenhouse. The selection resulting in Ada was selected from a single plant in an F2 headrow in 1994 and this seed was increased in a winter nursery in Arizona during 1994–1995. This selection was tested under the experimental designation MN95229 in trials from 1995 through 2001 and following purification as MN95229-A in 2002 through 2005. The purification process was initiated in 1999 when 100 heads from F10 plants of MN95229 were harvested and grown as individual headrows in a winter increase in Arizona. Sixty two of these rows were selected based on uniformity of height among and within rows. All selections were similar for other morphological and seed characteristics. The 62 selections were evaluated for agronomic characteristics, and reaction to Fusarium head blight, leaf rust, and stem rust at St. Paul in 2000. No significant differences in disease reaction were observed among the 62 lines. There was variation for heading date among the 62 lines and they were grouped into early, medium, and late categories. The medium category consisted of 14 of the 62 lines. Equal amounts of seed from the 14 lines were bulked to form MN95229-A. Off-type plants that are approximately 10 cm taller occur in MN95229-A at a frequency of about 3 in 10,000, but could be as frequent as 2 in 1000 in some environments. Approximately 250 kg of breeder seed of MN95229-A was produced in 2004 and further increased in California and Minnesota in 2005. MN95229-A was released as Ada in 2006.

Ada has erect juvenile plant growth, a recurved flag leaf, white glumes with an oblique shoulder and an acuminate beak. The spike is awned, mid-dense, and tapering. The kernel is red and ovate in shape with angular cheeks and a narrow, mid-deep crease. The brush on the kernel has a collar and is medium in length.

Ada has medium maturity and produces spikes an average of 0.8 d later than ‘Alsen’ (PI 615543), and 1.4 d later than ‘Oxen’ (PI 596770), the most widely grown cultivar in Minnesota since the late 1990s. Ada is a semidwarf cultivar and averages 83 cm, 4 cm shorter than Alsen and 3 cm shorter than Oxen in Minnesota trials. In 34 trials conducted from 2002 through 2005 at seven Minnesota sites, Ada yielded 4451 kg ha⁻¹, higher (P < 0.05) than Alsen (3986 kg ha⁻¹) and similar (P > 0.05) to Oxen (4265 kg ha⁻¹). Ada (tested as MN95229) was evaluated in 22 environments in Minnesota, North Dakota, and South Dakota in the Uniform Regional Hard Red Spring Wheat Nursery in 1999 and 2000 and yielded an average of 3328 kg ha⁻¹ compared to an average of 3093 and 3395 kg ha⁻¹ produced by the check cultivars, 2375 and ‘Verde’ (PI 592561, Busch et al., 1996), respectively. Ada has a moderate reaction to Fusarium head blight in inoculated, mist-irrigated field nurseries. In eight Fusarium head blight nurseries from 2002 through 2004, Ada averaged 29% visually diseased spikelets, 17% visually scabby kernels (VSK), and 14.9 mg kg⁻¹ of the mycotoxin deoxynivalenol (DON). Alsen (moderately resistant) and Oxen (moderately susceptible) had 23 and 52% visually diseased spikelets, 11 and 29% VSK, and 9.4 and 14.2 mg kg⁻¹ DON, respectively. In the same trials, the resistant check ‘BacUp’ (PI 596533, Busch et al., 1998) and the susceptible check ‘Wheaton’ (PI 469271, Busch et al., 1984) averaged 15 and 65% visually diseased spikelets, 10 and 64% VSK, and 9.3 and 29.7 mg kg⁻¹ DON, respectively. On the basis of cooperative evaluations through the USDA Regional Testing program, Ada is highly resistant to prevalent races (OFC5, OTH1, RCRS, TPMK, and TTTT) of stem rust at the seedling and adult plant stages. Since the beginning of field evaluations in 1995, natural infection by stem rust on Ada has not been observed. Based on seedling resistance to leaf rust races SBDG, MCDS, and TLGF, Ada is postulated to have leaf rust seedling resistance genes Lr10 and Lr23. Seedling plants of Ada are susceptible to common races such as THBI, TDBI, and MBRI. However, Ada has good resistance in field plots to a mixture of common races over different locations, which indicates that it has effective adult plant resistance genes. Ada has a resistant reaction at the adult plant stage to the foliar disease tan spot [caused by Pyrenophora tritici-repentis (Died.) Drechs.].

The USDA Spring Wheat Quality Laboratory, Fargo, ND evaluated bread-making properties of Ada grown in a total of 13 environments from 2002 through 2004. Ada had an average grain volume weight of 803 kg m⁻³, grain protein of 147 g kg⁻¹, and loaf volume of 203 cm³ when using a baking recipe including 100 g of flour. Compared to Alsen, Ada is 4 kg m⁻³ higher (P < 0.05) in grain volume weight, 2 g kg⁻¹ lower (P > 0.05) in grain protein and 4% lower (P > 0.05) in loaf volume. Compared to Oxen, Ada is 13 kg m⁻³ higher (P < 0.01) in grain volume weight, 8 g kg⁻¹ higher (P < 0.01) in grain protein and similar (P > 0.05) in loaf volume. Ada is rated as resistant to preharvest sprouting in tests using intact spikes harvested at physiological maturity and scored for preharvest sprouting on a scale of 1 (no visible sprouting) to 10 (extensive sprouting over entire spike) after 7 d in a dew chamber at 22°C. In eight tests conducted from 2003–2005, Ada had a preharvest sprouting rating of 1.1, which was not different (P > 0.05) than Alsen and Oxen that had ratings of 1.1 and 1.4, respectively. Most of the other hard red spring wheat cultivars in the region have resistant ratings (< 2.0) to preharvest sprouting.

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