Registration of ‘Howard’ Wheat

‘Howard’ (Reg. no. CV-998, PI 642367) is a hard red spring wheat (HRSW) (Triticum aestivum L.) cultivar developed at North Dakota State University (NDSU) and released by the North Dakota Agricultural Experiment Station (NDAES) in January 2006. Howard was released because it combines a good level of Fusarium head blight (FHB) [caused by Fusarium graminearum Schwabe (telomorph Gibberella zeae (Schwein.) Petch)] resistance derived from the tetraploid wheat relative Triticum dicoecoides, high grain yield, and high end-use quality for the domestic and export wheat markets.

Howard was selected from the cross ‘Parshall’ (PI 613587)/5/‘Grandin’ (PI 531005)/3/IAS20*4/H567.71/‘Amidon’ (PI 527682)/4/ND 674 that was made in 1996 by Dr R.C. Frohberg. Parshall, Grandin, and Amidon are HRSW cultivars released by the NDAES in 1999, 1998, and 1988, respectively. IAS20*4/H567.71 is a breeding line introduced from the International Wheat and Maize Improvement Center (CIMMYT), Mexico; for its high resistance to leaf rust (caused by Puccinia triticina Eriks.). ND 674 (Grandin*2/ND ‘Glupro’ (PI 592759)), is a high quality HRSW experimental line developed by NDSU.

The F1 was grown in the greenhouse and F2 grown in the field at Casselton, ND in spring and summer of 1997, respectively. Two hundred spikes were selected from F2 and advanced to F3 in the greenhouse in fall of 1997 using single seed descent. Selection of spikes in the F2 generation was based on agronomic appearance and reactions to FHB and foliar diseases. One spike from each F3 plant was selected, harvested, threshed, and planted in a F3:4 plot in 1998 at Casselton, ND. The selected F3:4 plot of Howard was harvested, threshed in bulk, and included in the Preliminary Yield trial (PYT) as an F3:5 at two locations (Prosper and Casselton, ND) in 1999. Ten F3:5 spikes were selected from the Casselton, ND PYT, harvested, threshed in bulk, and sent to Christchurch, New Zealand (NZ) in 1999–2000 for seed increase and generation advancement (F3:6) in a 4-row 5-m long plot. The F3:7 seed from the NZ increase was used to establish the Advanced Yield Trial in ND in 2000. Subsequently, Howard was tested as ND 741 ‘S’ (F3:8) in the Elite and ND Variety Trials (NDVT) in 2001 and 2002, respectively; and as ND 800 in the NDVT from 2003 to 2005. Howard was also tested in the HRSW Uniform Regional Nursery (URN) and Uniform Regional Scab Nursery (URSN) from 2004 to 2005 in North Dakota, Minnesota, South Dakota, Nebraska, Montana, Wyoming, Washington, and Manitoba, Canada.

The first seed purification of Howard was in 2002 at Prosper, ND when tall, early, and awnless variants were rouged before harvest. Further seed purifications of Howard were done before harvest in 2004 and 2005 by discarding variants from the seed increase fields at Arizona and North Dakota, respectively.

Howard is an awned cultivar with mid-dense, inclined, and tapering spikes. The culms are white and the peduncle is shattering, comparable to Steele-ND, and has strength that is similar to Daps.

In 41 site-years of testing in the NDVT, Howard (4260 kg ha⁻¹) was similar to Steele-ND (4298 kg ha⁻¹), Glenn (4152 kg ha⁻¹), and Parshall (4120 kg ha⁻¹) and significantly (p < 0.05) higher than Alsen (3917 kg ha⁻¹). In 19 site-years of trials conducted in 2003, Howard yielded 4266, 3950, 4058, and 3077 kg ha⁻¹, similar to ‘Alsen’ (PI 615543), 2 and 4 cm shorter than ‘Steele-ND’ (PI634981) (Mergoum et al., 2005a) and ‘Glenn’ (PI639273) (Mergoum et al., 2005b). Howard has good resistance to grain scab (caused by Venturia graminea (Berk.) Castellani & E.G. Eriks. & E. Herter) and fusarium head blight (FHB) [caused by Fusarium graminearum Schwabe (telomorph Gibberella zeae (Schwein.) Petch)] in 41 site-years of testing in the NDVT, grain yield of Howard was 4186 kg ha⁻¹, significantly (p < 0.01) higher than Chris (741 kg m⁻³) and Verde (940 kg m⁻³) but similar to Steele-ND (770 kg m⁻³) and Keene (979 kg m⁻³). Grain protein of Howard was 157 g kg⁻¹, significantly (p < 0.01) higher than ‘Reeder’ (PI 613586) (158 g kg⁻¹), Alsen (159 g kg⁻¹), Glenn (160 g kg⁻¹), and Parshall (162 g kg⁻¹), but lower (p < 0.05) than Daps (162 g kg⁻¹) but significantly (p < 0.05) less than Alsen (15.1 min) and Glenn (18.8 min). Loaf volume of Howard was 1031 mL, superior (p < 0.05) to 694, 696, and 685 g kg⁻¹ for Alsen and Glenn, respectively. Water absorption was significantly (p < 0.05) higher than Alsen (65.2%) (64.3%), but not different from Glenn (65.8%). Flour yield for Howard from 20 trials averaged 697 g kg⁻¹, similar (P < 0.05) to 694, 696, and 685 g kg⁻¹ for Parshall and Glenn, respectively.

Mean grain volume weight of Howard (1001 mL) was similar to Steele-ND (1001 mL), and lower but lower (p < 0.05) than Parshall (1075 mL), Alsen (1074 mL), and Glenn (1095 mL).