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### Registration of 'Foster' Barley

'Foster' six-rowed spring barley (*Hordeum vulgare* L.) (Reg. no. CV-268, PI 592758) was developed by the North Dakota Agricultural Experiment Station and released in March 1995. Foster was named for A. Earl Foster, former six-rowed barley breeder and department chair of the Department of Crop and Weed Sciences at North Dakota State University. Foster, whose experimental designation was ND11055, has the pedigree 'Robust'/ND8310. ND8310 has the pedigree ND5570/ND5424. ND5570 is a sib of 'Hazen' and has the pedigree ND1884/'Azure'. ND1884 has the pedigree 'Nordic'/NDB142, and NDB142 has the pedigree 'Dickson'/'Trophy'. ND5424 has the pedigree 'Glenn'/'Karl'. The low grain protein character in Foster presumably was derived from Karl. Foster is best adapted to the Upper Midwest malting barley growing region of the USA. The lower grain protein content of Foster may allow growers in the western malting barley growing region of North Dakota to produce barley with acceptable grain protein more consistently.

The cross that led to Foster was made in 1985. Foster originated from a single plant taken at random from a selected F<sub>3</sub> line. Selection of the F<sub>3</sub> line was based on maturity, plant height, straw strength, kernel color, and awn type. Replicated agronomic and disease testing began in North Dakota in 1987 and regional testing began in 1990. Malt quality evaluation began in 1987 and industry malting and brewing evaluation began in 1990.

Foster has semismooth awns, and its covered kernels have long rachilla hairs and a white aleurone. The spike is medium lax, medium long, and semierect. Based on spike and kernel morphology, it is very difficult to distinguish between Foster, Hazen, and 'Excel'. DNA analysis using polymerase chain reaction-random amplified polymorphic DNA techniques (PCR-RAPD) (1) can easily differentiate Foster from Hazen and Excel. Using Operon Technologies (Alameda, CA) primer OP-AB07, a 700-kilobase band is produced in Foster, but not Hazen or Excel.

In 20 trials grown in North Dakota (1993-1995), Foster yielded 4697 kg ha<sup>-1</sup>. This yield was intermediate between Robust (4460 kg ha<sup>-1</sup>) and Excel (4826 kg ha<sup>-1</sup>). Based on data from North Dakota and regional trials, Foster is similar in height to Excel (85 cm), is 4 cm shorter than Robust, and heads about 1 d later than Robust. Straw strength of Foster and Excel are similar, and both cultivars have better straw strength than Robust and 'Morex'. In 13 trials (1992-1995) of the Mississippi Valley Uniform Regional Barley Nursery (MVBN) where lodging occurred, percent lodging of Foster, Morex, Robust, and Excel was 26, 45, 31, and 27%, respectively. In 12 trials of the MVBN (1992-1995) in which kernel plumpness data were collected, Foster had a greater amount

of plump kernels (860 g kg<sup>-1</sup>) than Robust (820 g kg<sup>-1</sup>), Morex (760 g kg<sup>-1</sup>), and Excel (760 g kg<sup>-1</sup>), based on kernels retained on a sieve with 0.24- by 1.9-cm slotted openings, according to the American Society of Brewing Chemists (2).

Like most midwestern barley cultivars, Foster possesses the NDB112 resistance to spot blotch [caused by *Cochliobolus sativus* (Ito & Kuribayashi) Drechs. ex Dastur] and the *Rpg1* (T) gene for resistance to the prevalent pathotypes of *Puccinia graminis* f. sp. *tritici* Eriks. & E. Henn., except Pgt-QCC. Foster is moderately susceptible to pathotype Pgt-QCC, net blotch (caused by *Pyrenophora teres* Drechs.), and barley yellow dwarf virus (BYDV). Foster has better resistance to net blotch than Morex, but is more susceptible than Robust and Excel. Foster is susceptible to loose smut [caused by *Ustilago tritici* (Pers.) Rostr.] and leaf scald [caused by *Rhynchosporium secalis* (Oudem.) J.J. Davis], and to several species of *Septoria* and *Fusarium* that attack barley in the midwestern USA.

Results from pilot malt quality evaluations conducted by the USDA-ARS Cereal Crops Research Unit at Madison, WI, and the American Malting Barley Association, Inc. (AMBA) show that Foster has more plump kernels and has similar malt extract and enzymatic activity as the six-rowed industry standard Morex. The fine-coarse extract difference and wort protein values of Foster were slightly lower than those of Morex. In 24 trials grown in North Dakota (1992-1995), grain protein of Foster was 15 g kg<sup>-1</sup> lower than that of Morex. Foster passed plant-scale malting and brewing quality tests conducted by members of AMBA and was added to the list of recommended malting barley cultivars.

U.S. plant variety protection for Foster is pending (no. 9600154). Breeder seed is maintained by the Seedstocks Project, Dep. of Plant Sciences, North Dakota State Univ., Fargo, ND 58105-5051.

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#### References and Notes

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3. R.D. Horsley and J.D. Franckowiak, Dep. of Plant Sciences, P.B. Schwarz, Dep. of Cereal Science, and B.J. Steffenson, Dep. of Plant Pathology, North Dakota State Univ., Fargo, ND 58105-5051. Accepted 30 Sept. 1996. \*Corresponding author (horsley@badlands.nodak.edu).

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