

Registration of 'Sundre' Barley

J.M. Nyachiro,* J.H. Helm, M. Oro, P.E. Juskiw, and D.F. Salmon

'Sundre' barley (*Hordeum vulgare* L.) (Reg. No. CV-332, PI 643445) is a six-rowed, hulled, smooth-awned, spring feed barley. It has medium-strong straw and is adapted to western Canada. Sundre was developed at the Field Crop Development Centre (FCDC) of Alberta Agriculture, Food and Rural Development (AAFRD). It was recommended by the Prairie Registration Recommending Committee for Grain-Barley and Oats Subcommittee for registration in February 2005. Sundre was registered in Canada (Reg. no. 6115) on 28 Apr. 2006. Sundre barley was named after the town of Sundre, Alberta, Canada.

Sundre barley is derived from the cross H92068 (BT 636/'Tukwa') made at the FCDC in 1992. The line BT 636 originated from the Lacombe Research Centre, Agriculture and Agri-Food Canada (AAFC). The pedigree of BT 636 is LA659-207/BT 324. LA659-207/BT 324 is a sister line of 'Diamond' (Kaufmann and Kibite, 1985), which originated from the cross of 'Galt'/'Unitan' (Harder and Legge, 2000; Martin et al., 1991). Galt (Wells, 1967) is a Canadian cultivar, and Unitan (Eslick and Hockett, 1965) is an introduced cultivar to Canada from the USA. Line BT 324 is from the cross of NDB 135/Br. 6355-14. Line NDB 135 is a North Dakota six-rowed feed barley developed in the 1960s that was noted then for its good leaf disease resistance. The pedigree of NDB 135 is Dickson/3/CIho 4738//Traill/UM 570 (Peterson et al., 1968; Lambert, 1958). The pedigree of UM 570 is 'Newal' (CIho 6088)/'Peatland' (CIho 2613)/'Montcalm' (CIho7149). Line Br. 6355-14 was developed in 1963 at the Brandon Research Centre, AAFC (likely a six-rowed malt cross), whose pedigree is not traceable.

Tukwa was released by the FCDC and registered in 1992 (Helm et al., 1996). Tukwa originated from the cross of I74161/'Hiproly'. Hiproly (PI 60693) is a two-rowed hullless cultivar

Alberta Agriculture, Food and Rural Development, Field Crop Development Centre, 5030-50 St., Lacombe, AB, T4L 1W8, Canada. Registration by CSSA. Received 6 Sept. 2006. *Corresponding author (joseph.nyachiro@gov.ab.ca).

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that originated from Ethiopia. The line I74161 (FCDC accession code number) was introduced as DL69 (PI383854) to the FCDC barley program from the International Centre for Agricultural Research in Dry Areas (ICARDA)/International Maize and Wheat Improvement Centre (CIMMYT) program in Mexico. The line I74161 is six-rowed, hulled, semi-dwarf barley originally developed in Punjab, India from the cross of BG1/Mexican-5-13.

Sundre was evaluated as line H92068001 in the FCDC-AAFRD barley yield trials and as BT 566 in the Western Cooperative Six-Rowed Barley trials. A modified pedigree-bulk breeding method was used to advance early generations of Sundre. The F₂ generation was grown as a bulk population at the FCDC near Lacombe, Alberta in 1993. The whole F₂ population was harvested in bulk and seed was screened for plumpness using a gravity table. About 5000 F₃ seeds of Sundre were grown for one season (1993-1994) in the California winter nursery near El Centro. The F₃ generation was derived from the seed of about 500 spikes selected at random from the California winter nursery. The selections from the California winter nursery were grown at Lacombe for subsequent bulking, and selection in F₄ and F₅ from 1994 to 1996. In 1996, 200 spikes were selected from the F₆ bulk population and grown in 1997 as individual F₇ single-spike-derived progeny rows. Sundre was selected from these single-spike-derived progeny rows in 1997 to enter into the first yield trials in 1998 that were conducted in single replicate plots of 3-m long by 1.25 m and 8 rows at one location, Lacombe.

Between 1998 and 2002, Sundre was evaluated in the FCDC-AAFRD barley field trials. These trials were conducted in multiple replicated plots and at multiple locations in Alberta and Saskatchewan. In 2003 and 2004, Sundre was evaluated in the Western Cooperative Six-Rowed Barley Test conducted in three replicates and multiple locations across western Canada. In both the FCDC-AAFRD barley field trials and Western Cooperative Six-Rowed Barley tests, selection and advancement of Sundre was based on grain yield, silage yield, test weight, 1000-kernel weight, kernel plumpness, maturity, lodging resistance, and resistance to scald [caused by *Rhynchosporium secalis* (Oud.) J.J. Davis] and smuts (caused by several *Ustilago* spp.). Purification of Sundre was accomplished by selecting 161 F₁₃ single-spike-derived progeny rows that were uniform in appearance and bulked to form the breeder's seed.

Sundre is a medium-height cultivar with medium lodging resistance of 2.7 (on 0-9 scale), where 0 = no lodging and 9 = severe lodging. The lodging resistance of Sundre is lower compared with 1.7 for 'Vivar'. Sundre has an intermediate-erect

juvenile growth habit with short green coleoptiles. It has a wide, long, and upright flag leaf with purplish auricles. It has medium-long spikes with long awns that have a slightly purplish tip. The kernels of Sundre are of medium length and medium width, with clasping lodicules and horseshoe-shaped basal markings.

In the 2003 and 2004, Western Cooperative Six-Rowed Barley Test, average grain yield for Sundre from 38 station years was 6319 kg ha⁻¹ compared with 5996 kg ha⁻¹ for 'AC Lacombe' (Kibite, 1994) and 6331 kg ha⁻¹ for 'AC Rosser' (Therrien, 1998). In FCDC yield data based on 43 station years, Sundre had an overall mean yield of 6124 kg ha⁻¹ compared with 5603 kg ha⁻¹ for AC Lacombe and 5698 kg ha⁻¹ for Vivar barley (Helm et al., 2003). Sundre outyielded the check cultivar AC Rosser by 1 to 8% in the Western Black Soil, Brown Soil and Gray Wooded Soil Zones in the 2003 and 2004 Western Cooperative Six-Rowed Barley Test.

Sundre matures in 95 d, compared with 93 d for AC Lacombe and 94 d for AC Rosser, based on 32 station years of Western Cooperative Six-Rowed Barley Tests. In FCDC tests, Sundre had an average 1000-kernel weight of 42.0 g compared with 41.3 g for AC Lacombe (40 station years), and a test weight of 63.7 kg hL⁻¹ (40 station years) compared with 61.1 kg hL⁻¹ for AC Lacombe. Sundre has a higher plump seed percentage of 70.8 compared with 42.6 for AC Lacombe. Biomass yield taken at the soft dough stage (for ensiling) of Sundre (9685 kg ha⁻¹) was higher compared with AC Lacombe (8554 kg ha⁻¹) and Vivar (8416 kg ha⁻¹) in four station years at FCDC. Sundre has good field resistance to scald, as determined in the Western Cooperative Six-Rowed Barley Tests and ICARDA/CIMMYT tests. In Mexico under high scald pressure, Sundre was rated as "TR" (trace resistant) in 2001 and "MR" (moderately resistant) in 2002. In inoculated tests for smut in 2003–2004 at FCDC, Sundre was shown to be moderately susceptible to loose smut [caused by *Ustilago nuda* (J.L. Jensen) Kellerman & Swingle]. In the Western Cooperative Six-Rowed Barley Tests, Sundre had good resistance to covered smut [caused by *U. hordei* (Pers.) Lagerh.]. Sundre has good resistance or tolerance to false loose smut (caused by *U. nigra* Tapke). Sundre shows moderate resistance and moderate susceptibility to the net-form of net blotch (caused by *Pyrenophora teres* Drechs. f. *teres* Smedeg) and stem rust (caused by *Puccinia graminis* Pers. f. sp. *tritici* Eriks & E. Henn.). Sundre is moderately susceptible to common root rot [caused by *Cochliobolus sativus* (Ito & Kurib) Drechsler ex Dastur] and speckled leaf blotch (caused by *Septoria passerinii* Sacc.). Sundre is moderately susceptible to Fusarium

head blight (scab) [mainly caused by *Fusarium graminearum* Schwabe [teleomorph *Gibberella zeae* (Schwein.) Petch]].

Breeders' seed of Sundre will be maintained by the Field Crop Development Centre, Lacombe, Alberta, Canada. Canada Plant Variety Protection for Sundre has been filed (PVP application no. 06-5416). All seed requests should be sent to the corresponding author during the period of protection by the Plant Variety Protection Certificate. Seed of this release is deposited in the National Plant Germplasm System, where it will be available after the expiry of the Plant Variety Protection for research purposes, including development and commercialization of new cultivars. It is requested that appropriate recognition be made if this germplasm contributes to the development of new germplasm or cultivars. Commercial seed distribution rights of Sundre were granted to Mastin Seeds, RR 1 Sundre, AB, Canada, TOM 1X0; Tel: (403) 556-2609; Fax: (403) 507-2609; email: mastinseeds@yahoo.com.

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