

## Snowstar hard white spring wheat

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Humphreys, D. G., Townley-Smith, T. F., Czarnecki, E., Lukow, O. M., McCallum, B., Fetch, T., Gilbert, J., Menzies, J., Brown, D. and Fox, S. L. 2013. **Snowstar hard white spring wheat**. *Can. J. Plant Sci.* **93**: 143–148. Snowstar is a hard white spring wheat (*Triticum aestivum* L.) that represents an improvement in end-use quality specifications of the Canada Western Hard White Spring wheat class compared with Snowbird. Snowstar was evaluated in the Central Bread Wheat Cooperative Test in 2003, and the Hard White Wheat Cooperative Test in 2004 and 2005. Snowstar appears best adapted to the longer season wheat-growing areas of the Canadian prairies. Snowstar was generally lower yielding than the check cultivars. However, in Zone 1 (Manitoba and eastern Saskatchewan), Snowstar had 2% higher grain yield than CDC Teal (2003–2005) and 1.5% more than Snowwhite475 (2004–2005). In 2003 and 2005 (Zone 1), Snowstar had grain yield approximately 3% more than Snowbird (data not shown). Snowstar was resistant or moderately resistant to the prevalent races of leaf rust and stem rust. Snowstar was susceptible to common bunt and loose smut. Snowstar was generally more resistant to Fusarium head blight than the check cultivars. Snowstar had higher test weight, flour yield and whiter flour as well as stronger dough compared with Snowbird.

**Key words:** *Triticum aestivum* L., Canada Western Hard White Spring, hard white spring wheat, cultivar description, yield, disease resistance

Humphreys, D. G., Townley-Smith, T. F., Czarnecki, E., Lukow, O. M., McCallum, B., Fetch, T., Gilbert, J., Menzies, J., Brown, D. et Fox, S. L. 2013. **Le blé dur blanc de printemps Snowstar**. *Can. J. Plant Sci.* **93**: 143–148. Snowstar est une variété de blé dur blanc de printemps (*Triticum aestivum* L.) de qualité supérieure à Snowbird pour ce qui est de l'utilisation finale, dans la catégorie « blé de force blanc de printemps de l'Ouest canadien ». Snowstar a été évalué dans le cadre des Central Bread Wheat Cooperative Test de 2003 et des Hard White Wheat Cooperative Test de 2004 et 2005. La variété semble particulièrement bien adaptée aux zones de culture du blé à plus longue période végétative des Prairies canadiennes. Snowstar donne un rendement généralement inférieur à celui des cultivars témoins. Néanmoins, dans la zone 1 (Manitoba et est de la Saskatchewan), la variété a produit 2 % de plus de grain que CDC Teal (2003–2005) et 1,5 % plus de grain que Snowwhite475 (2004–2005). En 2003 et en 2005 (zone 1), Snowstar a enregistré un rendement grainier supérieur d'environ 3 % à celui de Snowbird (données non citées). Snowstar est résistant à modérément résistant aux races communes de la rouille des feuilles et de la rouille de la tige. La variété est sensible à la carie et au charbon nu. Snowstar résiste généralement mieux que les cultivars témoins à la brûlure de l'épi causée par *Fusarium*. Snowstar se caractérise par un poids spécifique plus élevé et par un meilleur rendement en farine que Snowbird, et donne une farine plus blanche ainsi qu'une pâte plus robuste.

**Mots clés:** *Triticum aestivum* L., blé de force blanc de printemps de l'Ouest canadien, CWHWS, blé dur blanc de printemps, description de cultivar, rendement, résistance aux maladies

Snowstar, a hard white spring wheat (*Triticum aestivum* L.), was developed at the Cereal Research Centre (CRC), Agriculture and Agri-Food Canada (AAFC), Winnipeg, MB. It received registration No. 6603 from the Variety Registration Office of the Canadian Food Inspection Agency (CFIA) on 2009 May 15. Snowstar is adapted to the longer season wheat-growing areas of the prairie provinces, particularly Manitoba and eastern Saskatchewan. Snowstar meets the kernel colour and end-use quality characteristics of the Canada Western Hard White Spring (CWHWS) wheat class. Plant Breeder's Rights were granted for this variety on 2008 Aug. 18 under CFIA PBR certificate no. 3274.

### Pedigree and Breeding Method

Snowstar is derived from a cross between 94B46\*G22 and McKenzie, where 94B46\*G22 is a sister line of the CWHWS cultivars, Kanata (Humphreys et al. 2007) and Snowbird (Humphreys et al. 2007) and McKenzie is a Canada Western Red Spring wheat cultivar (Graf et al. 2003). The cross was made in 1997 at the Agriculture and Agri-Food Canada (AAFC), Cereal Research Centre (CRC) in Winnipeg, MB. The F<sub>1</sub> seed was transferred to the CRC doubled haploid lab where 733 doubled haploid lines were produced from this cross in 1998. Snowstar was increased in the DH<sub>1</sub> generation as 97B31\*B106 in the 1998–1999 CRC winter nursery in Palmerston North (PN), New Zealand. In the PN nursery, it was evaluated

for desirable maturity, straw strength, height, and disease resistance. In 1999, 97B31\*B106 was yield tested as a DH<sub>2</sub> line in the PDHW4 yield test at four locations: Glenlea, Morden, Brandon in Manitoba and Swift Current, SK. 97B31\*B106 was further evaluated in the CRC 2000 Hard White “B” test. In 2001, it was designated BW315 and advanced to the 2001 Central Bread Wheat “C” test, but was found to be contaminated with red wheat seeds. BW315 was purged of the red-seeded admixture and the line was re-designated BW315a, and entered in the 2003 Central Bread Wheat Cooperative test. In 2004, the Hard White Wheat cooperative test was created, and BW315a was evaluated in the 2004 and 2005 Hard White Wheat Cooperative tests. The variables measured and the protocols followed in the Central Bread Wheat and Hard White Wheat Cooperative tests have been described by Graf and Fox (2000). For the end-use quality evaluations, a composite sample was generated each year from the sites of the Central Bread Wheat and Hard White Wheat cooperative tests with the highest grades and suitable grain protein content.

### Area of Adaptation

Snowstar is adapted to the longer season wheat growing areas of the prairie provinces, particularly Manitoba and eastern Saskatchewan.

### Performance

Snowstar is an awnless, white-seeded, hollow-stemmed spring wheat cultivar. Over 3 yr of testing (2003–2005) across western Canada, Snowstar yielded 1% less than Snowbird and CDC Teal (Table 1). However, Snowstar had 2% higher grain yield than CDC Teal in Zone 1 (Manitoba and eastern Saskatchewan) and had grain yield approximately 3% more than Snowbird in both 2003 and 2005 (data not shown). Over 2 yr of testing (2004–2005) in the Hard White Wheat cooperative test, Snowstar was generally lower yielding than all check varieties. Although in Zone 1, Snowstar had grain yield similar to CDC Teal and was 1.5% higher yielding than Snowwhite475. Snowstar had maturity similar to Snowbird, but was 1 d later than CDC Teal over 3 yr of testing (Table 1). In the Hard White Wheat Cooperative test (2004–2005), Snowstar had maturity similar to Infinity, was 1 d later than CDC Teal and 1–2 d earlier than the other check cultivars. Snowstar had shorter and stronger straw than CDC Teal, Snowbird and Infinity. Snowstar was slightly taller but with similar lodging resistance compared with Snowwhite475. Snowstar had higher test weight and smaller seed mass than all check cultivars (Table 1).

### Other Characteristics

Spike: Parallel sided, medium density, erect attitude, medium to strong waxy bloom, white colour at maturity, short apical white awnlettes.

Table 1. Agronomic data for Snowstar and check cultivars based on data collected in the Central Bread Wheat Cooperative (2003) and Hard White Cooperative (2004–2005) tests

Cultivar	Yield (kg ha <sup>-1</sup> )					Maturity (d)					Overall mean	Height (cm)	Lodging <sup>z</sup> (1–9)	Test weight (kg hL <sup>-1</sup> )	Seed mass (mg)	
	Zone 1	Zone 2	Zone 3	Overall mean	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3						
<i>Three-year means (2003–2005)</i>																
CDC Teal	4555	4062	—	4266	98	104	—	101	92	2.7	78.1	33.0				
Snowbird	4694	3951	—	4259	100	105	—	102	96	2.9	78.9	32.6				
<b>Snowstar</b>	<b>4660</b>	<b>3951</b>	—	<b>4244</b>	<b>100</b>	<b>104</b>	—	<b>102</b>	<b>87</b>	<b>2.3</b>	<b>80.3</b>	<b>29.2</b>				
LSD ( <i>P</i> < 0.05) <sup>y</sup>	535	855	—	538	7	4	—	3	5	1	0.8	1.4				
Station Years	12	17	—	29	12	15	—	27	29	14	29	29				
<i>Two-year means (2004–2005)</i>																
CDC Teal	4854	4373	5182	4669	106	110	106	108	94	2.9	77.9	33.6				
Snowbird	5008	4190	5239	4628	109	112	108	110	98	3.4	78.6	33.3				
Infinity	4951	4491	4954	4712	107	110	108	109	96	3.5	78.4	32.1				
AC Vista	5405	5216	6002	5426	110	112	111	111	86	3.6	76.0	40.1				
Snowwhite475	4771	4829	5559	4958	110	110	109	110	84	2.5	77.1	39.9				
<b>Snowstar</b>	<b>4842</b>	<b>4166</b>	<b>4879</b>	<b>4498</b>	<b>108</b>	<b>111</b>	<b>105</b>	<b>109</b>	<b>87</b>	<b>2.5</b>	<b>80.1</b>	<b>29.4</b>				
LSD ( <i>P</i> < 0.05) <sup>y</sup>	783	971	611	552	10	11	18	5	5	1	1	2				
Station years	7	13	5	25	7	11	5	23	25	11	25	25				

<sup>z</sup>Lodging scale: 1 = vertical; 9 = flat.

<sup>y</sup>LSD of means was based on the checks and Snowstar, and calculated using SAS (SAS Institute, Inc.).

**Table 2. Disease reactions of Snowstar and check cultivars to leaf and stem rust in the Central Bread Wheat Cooperative (2003), Hard White Cooperative (2004–2005) and greenhouse seedling tests**

Cultivar	Leaf rust <sup>z</sup>							Stem rust <sup>y</sup>								
	Field test			12-3	128-1	74-2	77-2	Field test			C10	C63	C53	C57	C25	C20
	2003	2004	2005	MBDS	MBRJ	MGBJ	TJBJ	2003	2004	2005	TMRTK	RKQSR	TPMKR	RTHJT	QTHST	RHTSK
CDC Teal	16 MRMS	12 MR	37 I	1+3-	;1-2-	2+3-	;1-2-3-	1 RMR	tr R	5 MR	;1 =	0;	0;	12+	12+	0;
Snowbird	9 RMR	18 MR	42 MS	1-1 =	;1-1 =	33-	3-	3 MR	3 RMR	20 MRMS	0;	12+	;	12	12	0;
Infinity	–	17 MR	25 MR	11+	;1 =	11+	11-	–	2 RMR	7 RMR	;	;1 =	;1-	1-2	1-1	0;
AC Vista	–	5 R	50 MS	0	;1-2-	33-	;1 =	–	5 RMR	30 MR	;1 =	;1 =	0;	;1 =	1-	1 =
Snowwhite475	–	13 MRMS	65 S	1-1 =	;1-	33-	;1-1 =	–	5 R	15 RMR	1-	1-1	;1-	;1 =	;1 =	;1-
<b>Snowstar</b>	<b>2 RMR</b>	<b>2 R</b>	<b>17 MR</b>	<b>;1 =</b>	<b>;1 =</b>	<b>;1 =</b>	<b>;</b>	<b>3 R</b>	<b>3 RMR</b>	<b>7 RMR</b>	<b>0;</b>	<b>;1</b>	<b>0;</b>	<b>;1 =</b>	<b>;1-</b>	<b>0;</b>

<sup>z</sup>Caused by *Puccinia triticina* Eriks. Inoculum was a composite of all leaf rust races increased from collections made the previous year (McCallum and Seto-Goh 2005). Ratings indicate percent severity and pustule type, respectively.

<sup>y</sup>Caused by *Puccinia graminis* Pers. f. sp. *tritici* Eriks. & E. Henn. Races used include TPMKR, TMRTK, RKQSR, QFCSH, RTHJT, and QTHST (Roelfs and Martens 1988; Fetch 2003). Ratings indicate percent severity and pustule type, respectively.

**Table 3. Disease reactions of Snowstar and check cultivars in the Central Bread Wheat Cooperative (2003) and Hard White Cooperative (2004–2005) tests**

Cultivar	Common bunt <sup>z</sup>			Loose smut <sup>y</sup>			FHB VRI (%) <sup>x</sup>			Leaf spotting complex				
	2003		2004	2003		2004	2003		2004	2005	2003	2004		2005
												SK <sup>w</sup>	MB <sup>y</sup>	SK
CDC Teal	9 I	54 S	64 MS	30 MR	19 MR	25 MR	67 S	54 S	33	–	7	15 MS	8.2	21 MS
Snowbird	9 I	52 S-	42 I	13 R	22 MR	24 MR	27 I	40 S	40	–	7	13 MS	8.0	23 MS
Infinity	–	29 I	43 I	–	3 R	35 I	–	61 S	35	–	7	8 I	8.2	13 I
AC Vista	–	6 R	0 R	–	4 R	32 I	–	62 S	68	–	7	8 I	8.3	–
Snowwhite475	–	7 R	2 R	–	4 R	6 R	–	66 S	50	–	7	11 MS	8.8	29 1 rep
<b>Snowstar</b>	<b>30 S</b>	<b>85 S+</b>	<b>66 S</b>	<b>66 S</b>	<b>23 MR</b>	<b>43 I</b>	<b>23 I</b>	<b>36 MS</b>	<b>38</b>	<b>–</b>	<b>7</b>	<b>8 I</b>	<b>7.7</b>	<b>12 I</b>

<sup>z</sup>Caused by *Tilletia tritici* (Bjerk) Wint. and *T. laevis* Kühn. The inoculum used was a composite of races T1, T6, T13 and T19 of *T. tritici* and L1, L16 of *T. laevis* mixed (vol/vol) in a 1:1:1:1:2:2 ratio (Gaudet and Puchalski 1989a), and represents the virulence spectrum of bunt isolates in western Canada (Gaudet and Puchalski 1989b). Rating indicates percent infection and relative classification.

<sup>y</sup>Caused by *Ustilago tritici* (Pers.) Rostr. Races include T2, T9, T10 and T39 (Nielsen 1987; Menzies et al. 2003).

<sup>x</sup>Caused by *Fusarium graminearum* Schwabe. Visual Rating Index = (% severity × % incidence)/100.

<sup>w</sup> >10 = S, >8 = MS, ≥7 = I, 6 = MR, <5 = R.

<sup>v</sup>Composite rating of percent of disease lesion coverage on flag and middle canopy leaves. Weighted score = 60%\*(flag leaf coverage) + 40%\*(mid canopy coverage).

**Table 4. Wheat and flour analytical data for Snowstar and check cultivars based on data from the Central Bread Wheat Cooperative (2003) and Hard White Cooperative (2004–2005) tests. End-use quality testing was performed by the Grain Research lab of the Canadian Grain Commission on a composite from each year of the Cooperative tests**

Cultivar	Test weight (kg hL <sup>-1</sup> )	Kernel weight (mg)	Grain protein (%)	Flour protein (%)	Protein loss (%)	Falling number (s)	Amylo- graph (BU)	Flour yield (%)	Flour ash (%)	Agtron colour (%)	Starch damage (%)	Particle size index (%)																								
<i>Three-year means (2003–2005)</i>																																				
CDC Teal	80.3	35.1	14.6	14.1	0.5	413	610	75.5	0.41	82	6.8	58																								
Snowbird	81.7	34.0	13.8	13.4	0.5	440	1000	75.8	0.42	84	7.5	54																								
<b>Snowstar</b>	<b>83.2</b>	<b>30.7</b>	<b>13.3</b>	<b>12.6</b>	<b>0.7</b>	<b>433</b>	<b>693</b>	<b>76.7</b>	<b>0.39</b>	<b>90</b>	<b>7.3</b>	<b>54</b>																								
LSD ( <i>P</i> < 0.05) <sup>‡</sup>	0.9	1.1	0.2	0.3	0.2	20	69	0.3	0.02	3	0.2	2																								
Station years	3	3	3	3	3	3	3	3	3	3	3	3																								
<i>Two-year means (2004–2005)</i>																																				
CDC Teal	81.1	37.0	14.3	13.8	0.5	403	530	75.9	0.41	83	6.8	58																								
Snowbird	82.0	35.7	13.6	13.2	0.5	430	940	76.0	0.43	84	7.5	55																								
Infinity	82.1	35.1	13.7	12.9	0.8	395	538	76.7	0.40	89	7.1	55																								
AC Vista	80.1	43.5	12.1	11.3	0.8	395	595	74.5	0.45	83	8.7	51																								
Snowwhite475	81.2	43.4	12.3	11.5	0.9	378	488	75.1	0.43	89	7.6	56																								
<b>Snowstar</b>	<b>83.6</b>	<b>31.9</b>	<b>13.0</b>	<b>12.3</b>	<b>0.7</b>	<b>425</b>	<b>630</b>	<b>77.0</b>	<b>0.39</b>	<b>90</b>	<b>7.3</b>	<b>54</b>																								
LSD ( <i>P</i> < 0.05) <sup>‡</sup>	0.3	1.4	0.2	0.3	0.2	60	203	0.9	0.01	2	0.3	2																								
Station years	2	2	2	2	2	2	2	2	2	2	2	2																								
<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="6" style="text-align: center; border-top: 1px solid black;">Farinograph</td> <td colspan="6" style="text-align: center; border-top: 1px solid black;">Canadian short process (150 ppm ascorbic acid)</td> </tr> <tr> <td style="border-top: 1px solid black;">Cultivar</td> <td style="border-top: 1px solid black;">Absorption (%)</td> <td style="border-top: 1px solid black;">Dough development time (min)</td> <td style="border-top: 1px solid black;">Mixing tolerance index (BU)</td> <td style="border-top: 1px solid black;">Stability (min)</td> <td style="border-top: 1px solid black;">Loaf volume (cm<sup>3</sup>)</td> <td style="border-top: 1px solid black;">Loaf appearance</td> <td style="border-top: 1px solid black;">Crumb structure</td> <td style="border-top: 1px solid black;">Crumb colour</td> <td style="border-top: 1px solid black;">Absorption (%)</td> <td style="border-top: 1px solid black;">Mixing energy (Wh kg<sup>-1</sup>)</td> <td style="border-top: 1px solid black;">Mixing time (min)</td> </tr> </table>													Farinograph						Canadian short process (150 ppm ascorbic acid)						Cultivar	Absorption (%)	Dough development time (min)	Mixing tolerance index (BU)	Stability (min)	Loaf volume (cm <sup>3</sup> )	Loaf appearance	Crumb structure	Crumb colour	Absorption (%)	Mixing energy (Wh kg <sup>-1</sup> )	Mixing time (min)
Farinograph						Canadian short process (150 ppm ascorbic acid)																														
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<i>Three-year means (2003–2005)</i>																																				
CDC Teal	66.1	8.75	15	24.2	1177	7.8	6.1	7.8	70	8.2	4.7																									
Snowbird	67.1	6.83	27	9.6	1108	7.6	6.1	7.8	71	7.4	5.5																									
<b>Snowstar</b>	<b>65.4</b>	<b>6.83</b>	<b>17</b>	<b>16.2</b>	<b>1083</b>	<b>7.6</b>	<b>6.2</b>	<b>7.8</b>	<b>70</b>	<b>9.6</b>	<b>6.4</b>																									
LSD ( <i>P</i> < 0.05) <sup>‡</sup>	0.6	1.83	9	11.2	49	0.3	0.2	0.3	1	1.1	0.7																									
Station years	3	3	3	3	3	3	3	3	3	3	3																									
<i>Two-year means (2004–2005)</i>																																				
CDC Teal	66.7	8.75	18	20.3	1158	7.8	6.1	7.8	71	7.8	4.5																									
Snowbird	67.9	6.63	30	8.9	1070	7.5	6.0	7.6	71	6.4	5.3																									
Infinity	66.7	7.25	18	21.5	1125	7.5	6.1	7.9	71	7.1	4.3																									
AC Vista	68.8	5.38	40	7.5	960	7.2	6.1	7.3	71	7.3	4.2																									
Snowwhite475	67.0	5.75	30	7.6	1040	7.5	6.0	7.4	70	6.6	3.8																									
<b>Snowstar</b>	<b>66.1</b>	<b>7.00</b>	<b>15</b>	<b>17.8</b>	<b>1043</b>	<b>7.5</b>	<b>6.1</b>	<b>7.8</b>	<b>70</b>	<b>9.0</b>	<b>6.2</b>																									
LSD ( <i>P</i> < 0.05) <sup>‡</sup>	0.6	2.18	10	10.5	46	0.3	0.1	0.3	1	0.8	0.9																									
Station years	2	2	2	2	2	2	2	2	2	2	2																									

<sup>‡</sup>LSD of means was based on the checks and Snowstar, and calculated using the Agrobases 21 (Agronomix Software Inc.).

Kernel: white colour, medium size, midlong, midwide, ovate shape, rounded cheeks, short to midlong brush hairs, midsize oval shaped germ, midwide and mideep crease.

**Disease Reaction.** Stem and leaf rust reactions were evaluated as part of the registration testing in epiphytic nurseries and in greenhouse seedling tests. Snowstar was resistant to moderately resistant to both leaf and stem rust in the field and greenhouse tests (Table 2). Leaf rust scores were generally lower than all check cultivars. It has been shown that Snowstar carries the leaf rust resistance gene: *Lr21* (data not shown). Snowstar was susceptible to common bunt, and loose smut, intermediate to moderately susceptible to Fusarium head blight, and intermediate in reaction to leaf spotting complex (Table 3).

The leaf rust races used to inoculate cooperative tests were increased from collections made the previous year (McCallum and Seto-Goh 2005). The stem rust races included: TPMKR, TMRTK, RKQSR, QFCSH, RTHJT, and QTHST (Fetch 2003). The races of loose smut included: T2, T9, T10, and T39 (Menziez et al. 2003), and the races of common bunt included: L1, L16, T1, T6, T13, and T19 (Gaudet and Puchalski 1989a, b). Race designations are described by Roelfs and Martens (1988) for stem rust, Nielsen (1987) for loose smut, and Hoffman and Metzger (1976) for common bunt.

### End-use Suitability

End-use quality parameters measured are summarized in Table 4. Snowstar had significantly higher test weight and significantly lower seed mass compared with all check cultivars. Snowstar had significantly lower grain and flour protein content than CDC Teal, Snowbird and Infinity but was significantly higher than AC Vista and Snowwhite475. Snowstar had high Hagberg falling numbers suggesting that this white seeded cultivar has good preharvest sprouting resistance. Snowstar had significantly higher flour yields and lower flour ash content than all check cultivars except Infinity. Snowstar had significantly higher Agtron flour colour scores than CDC Teal, Snowbird and AC Vista, but was similar to Infinity and Snowwhite475. Snowstar had kernel hardness, measured as particle size index, similar to Snowbird, Infinity and Snowwhite475, but was harder than CDC Teal, although not as hard as AC Vista. Snowstar had farinograph absorption lower than all checks although farinograph absorption was not significantly different from Infinity and CDC Teal over 2 yr of testing (Table 4). Snowstar demonstrated strong dough mixing properties with intermediate farinograph mixing time and relatively long farinograph dough stability time. Snowstar had baking performance similar to Snowbird except that the Canadian short process mixing energy and mixing time were greater for Snowstar indicating improved dough strength compared with Snowbird. “Stronger” dough is a desirable attribute for new CWHWS wheat cultivars (N. Edwards, personal

communication). Snowstar is eligible for all grades of the CWHWS wheat class.

### Maintenance and Distribution of Pedigreed Seed

Spikes of Snowstar were gathered from the 2003 Central Bread Wheat Cooperative test seed increase plot in Indian Head, SK, and seed of 260 spikes were grown in isolation in short row plots at Portage la Prairie, MB, in 2004. Head rows were rogued for plant type, height, and maturity. Following harvest, 10 seeds per isolation row were tested for grain colour using the NaOH seed colour test (Chemelar and Mostovoj 1938). No isolation rows with only red seed were identified but two isolation rows were discarded because one red seed was detected among the ten seeds tested. Breeder’s lines were grown and rogued at the Indian Head Experimental Farm of Agriculture and Agri-Food Canada in Indian Head, SK, in 2005. Breeder seed will be maintained by the AAFC Seed Increase Unit, Indian Head, SK. Distribution and multiplication of pedigree seed stocks is the responsibility of SeCan, 501 – 300 March Road, Kanata, Ontario, Canada K2K 2E2.

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