Biggar red spring wheat

DePauw, R. M., Preston, K. R., Townley-Smith, T. F., Hurd, E. A., McCrystal, G. E. and Lendrum, C. W. B. 1991. **Biggar red spring wheat.** Can. J. Plant Sci. **71**: 519–522. Biggar red spring wheat (*Triticum aestivum* L.) combines high grain yield potential with semidwarf stature and wide adaptation. Biggar has improved end-use suitability relative to HY320 such as harder kernels, better flour milling properties, greater water absorption, and stronger gluten properties. It received registration No. 3089 and is eligible for grades of Canada Prairie Spring (red).

Key words: *Triticum aestivum*, wheat (spring), high yield, cultivar description

DePauw, R. M., Preston, K. R., Townley-Smith, T. F., Hurd, E. A., McCrystal, G. E. et Lendrum, C. W. B. 1991. **Blé roux de printemps Biggar.** Can. J. Plant Sci. **71**: 519–522. Le blé roux de printemps (*Triticum aestivum* L.) allie un rendement grainier élevé à un port demi-nain et à une large adaptation. Il possède des qualités technologiques améliorées Pr rapport à HY320, comme des grains plus durs, de meilleures aptitudes meunières, une plus grande absorption d'eau et une meilleure résistance du gluten. Il a reçu le numéro d'homologation 3089 et est admissible aux catégories de blé roux de printemps Canada Prairies.

Mots clés: *Triticum aestivum*, blé de printemps, rendement élevé, description de cultivar

Biggar red spring wheat (*Triticum aestivum* L.) was developed at the Agriculture Canada Research Station, Swift Current, Saskatchewan, by the South Saskatchewan Wheat Breeding Program. On 11 Apr. 1989 the Food Production and Inspection Branch of Agriculture Canada issued registration No. 3089 for Biggar.

Pedigree and Breeding Method

Biggar is a reselection of HY320 for hard kernels (DePauw et al. 1987). The 122 breeder lines of HY320 were evaluated for kernel hardness in 1984 using a burr mill (Kosmolak 1978) and in 1985 using near-infrared spectroscopy (Williams and Sobering 1986). The frequency distribution for grinding time of the breeder lines exhibited a biomodel distribution with 48 lines being about as hard as Neepawa and 68 lines being about as soft as Pitic 62. Six lines appeared to be of intermediate hardness and may have been segregating for a kernel hardness allele. In 1986, the harder-kernelled breeder lines were grown out and evaluated for morphological uniformity and kernel hardness. Seed from 43 breeder lines were composited and designated HY368. It was subsequently evaluated in the High Yield Wheat Cooperative tests in 1987 and 1988 for agronomic performance, reaction to diseases, and end-use suitability.

Performance

In 1987 and 1988 Biggar yielded similar to HY320 in each of the agroclimatic zones of the Prairies (Table 1). Biggar has tended to yield more grain than the other checks except Genesis, a white-seeded Canada Prairie Spring (CPS) wheat cultivar. Biggar also yielded well under irrigated conditions (Table 2).

Biggar appeared to be slightly earlier maturing than HY320 and to have significantly higher test weight than it; otherwise they are very similar for both agronomic performance and reaction to diseases (Tables 3 and 4).

Biggar has harder kernels than HY320 as measured by particle size index (PSI) and starch damage (Table 5). Associated with the harder kernels are other improvements such as increased flour yield, lower flour ash, and increased farinograph water absorption.

Table 1. Means and least significant differences for grain yield (kg ha^{-1}) of Biggar and check cultivars, High Yielding Wheat Cooperative tests, 1987 and 1988

Year	Cultivar	Zone 1[z]	Zone 2	Zone 3	Mean[y]	LSD	No. of tests
1987	Biggar	3281	3463	3892	3442	180	16
	HY320	3290	3443	4022	3442		
	Genesis	3403	3910	3129	3641		
	Oslo	3140	2932	2871	3011		
	Glenlea	3252	3163	3990	3251		
1988	Biggar	3001	2152	5243	2952	290	13
	HY320	3070	2073	5411	2971		
	Genesis	3153	2150	4919	2961		
	Oslo	2749	1611	4972	2571		
	Glenlea	3022	1873	4508	2721		
Mean	Biggar	3162	2913	4789	3201		29
	HY320	3189	2853	4938	3211		
	Genesis	3290	3152	4321	3330		
	Oslo	2971	2363	4270	2812		
	Glenlea	3153	2602	4328	3010		
LSD ($P \leq 0.05$)		330	210	520	220		
No. of tests		12	14	3	29		

[z]Zone 1 = locations in Manitoba and southeastern Saskatchewan;
Zone 2 = locations in southern Alberta and southwestern Saskatchewan; and
Zone 3 = locations in Peace River and Parkland regions.
[y]All means are weighted by the number of tests within a zone.

Table 2. Grain yield and agronomic performance of Biggar and check cultivars in High Yielding Wheat Co-op Irrigated tests, 1987 and 1988

	Yield (kg ha^{-1})			Agronomic data	
Cultivar	1987	1988	Mean	Maturity (d)	Height (cm)
Biggar	4533	4270	4401	105.4	74
HY320	4250	4101	4180	106.6	74
Genesis	4951	4732	4941	105.6	89
Oslo	3469	3090	3281	104.0	71
Glenlea	3330	3213	3271	106.4	90
LSD ($P \leq 0.05$)	449	404	376	1.3	2
No. Sta.	5	5	10	9	7

Table 3. Grain yield and agronomic performance of Biggar and check cultivars in High Yielding Wheat Cooperative tests, 1987 and 1988

		Agronomic data			
Cultivar	Maturity (d)	Height (cm)	Lodging (1–9)[z]	Test weight kg hL^{-1}	1000-kernel wt. (3)
Biggar	98.3	65	3.2	79.8	38.8
HY320	99.0	65	3.2	79.1	38.5
Genesis	98.3	80	4.9	78.9	36.0
Oslo	94.6	62	1.6	78.0	36.8
Glenlea	98.3	82	3.9	79.0	41.6
LSD ($P \leq 0.05$)	0.8	2	1.1	0.6	0.9
No. of tests	22	29	6	26	26

[z]1 = all plants standing vertically and 9 = all plants lying horizontally.

Table 4. Reaction of Biggar and check cultivars to leaf rust, stem rust, bunt, loose smut and root rot in High Yielding Wheat Cooperative tests, 1987 and 1988

	Leaf rust		Stem rust		Bunt	Loose smut	Common root rot	
Cultivar	87	88	87	88	87	87	87	88
Biggar	20R[z]	10R	20R MR	30R/MR	43.5 S	92 HS	27[y]	64
HY320	10R	10R	20R	30R/MR	42.0 S	97 HS	29	66
Genesis	30M	10MR	20R	20R/MR	45.2 S	88 HS	26	64
Oslo	10R/MR	10R	10R	10R	9.5 I	78 HS	28	76**
Glenlea	3VR	5M	5R	10R	13.0 S	0 R	16**	49*
Neepawa	40MR/MS	20MR	5R	20R	12.7 S	8 R	25	62

Biggar was not tested for bunt and loose smut in 1988 because it was rated as susceptible in 1987.
[z]Percent infection and type of reaction: VR = very resistant; R = resistant; MR = moderately resistant; I = intermediate resistant; M = intermediate to MR and MS; MS = moderately susceptible; S = susceptible; HS = highly susceptible.
[y]Percentage of the plants with moderate to large lesions on the subcrown internode.
*,**Values differ from those for Neepawa at the 5 and 1% probability levels respectively.

Biggar has also shown increased gluten strength and larger bread loaf volume compared to HY320.

Other Characteristics

SPIKES. Oblong to fusiform, middense, midlong, erect, awned; glumes wide, long, glabrous, white; glume shoulders oblique to rounded, narrow to midwide; glume beaks midwide, accuminate.

KERNEL. Color light red; shape long to midlong; midwide, elliptical; cheeks rounded to angular; brush midsize with midsize hairs; crease midwide to wide, middeep to deep frequently pitted; germ small to midsize, ovate.

MATURITY. Similar to HY320.

STRAW. Semidwarf stature equal to HY320.

LODGING TOLERANCE. Equal to HY320.

SHATTERING RESISTANCE. Good.

DROUGHT TOLERANCE. Comparable to HY320.

DISEASE REACTION. Resistant to prevalent races of stem rust caused by *Puccinia graminis* Pers. f. sp. *tritici* Eriks and E. Henn, and leaf rust caused by *P. recondita* Rob. ex. Desm. f. sp. *tritici*; moderately susceptible to common root rot caused primarily by *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem; susceptible to common bunt caused by *Tilletia foetida* (Wallr.) Liro and *T. caries* (DC.) Tul.; and highly susceptible to loose smut caused by *Ustilago tritici* (Pers.) Rostr. (Table 4).

PHOTOPERIOD RESPONSE. Insensitive.

END-USE SUITABILITY. Eligible for grades of Canada Prairie Spring (red).

Maintenance and Distribution of Pedigreed Seed

Breeder seed originating from 43 breeder lines will be maintained by the Seed Section of the Agriculture Canada Experimental Farm, Indian Head, SK. S0G 2K0, Canada. Distribution and multiplication of pedigreed seed stocks will be handled by SECAN Association, 512-885 Meadowlands Drive, Ottawa, ON K2C 3N2, Canada.

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Table 5. Measurements of kernel hardness, flour attributes, gluten strength, and bread loaf volume for Biggar and check cultivars in the High Yielding Wheat Cooperative tests, 1987 to 1988

	Hardness PSI		Flour yield (%)		Flour ash (%)		Starch damage (Farrand units)		Farinograph Absorption (%)		Farinograph Dough development (min)		Farinograph Stability (min)		Remix loaf volume (cm^3)		Flour protein (%)	
	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988
Biggar	60.9	62.3	76.1	75.0	0.49	0.47	19	21	61.6	62.1	4.50	5.75	7.50	8.00	800	870	12.5	12.7
HY320	62.5	67.1	75.2	74.2	0.53	0.49	13	12	58.3	58.8	3.75	5.25	4.50	7.50	725	725	12.6	12.7
Genesis	62.7	67.6	75.6	73.8	0.47	0.45	17	15	60.8	61.4	3.25	3.75	3.00	4.50	680	725	12.0	13.1
Oslo	63.0	62.8	75.6	75.6	0.40	0.43	17	17	60.0	61.1	6.00	6.25	9.50	9.50	860	930	13.4	13.8
Glenlea	53.7	51.9	77.3	75.6	0.50	0.49	35	37	61.7	63.9	7.50	13.50	30.00	28.00	945	1070	13.3	14.2

American Association of Cereal Chemists methods were followed for determining the various end-use suitability trait.

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