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BRICK

A *Fusarium* Head Blight-tolerant Spring Wheat for South Dakota

SDSU

SOUTH DAKOTA STATE UNIVERSITY
Agricultural Experiment Station
U. S. Department of Agriculture

BRICK

A *Fusarium* Head Blight-tolerant Spring Wheat for South Dakota

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"Brick" is an F_4-derived hard red spring wheat cultivar selected from within the 3-parent cross ND2897/SD3219//SD3414, which was created in spring 2000 at Brookings, S.D. Brick was developed and released by the South Dakota Agricultural Experiment Station and tested as SD3851.

Brick was released for its high level of resistance to *Fusarium* head blight compared to other cultivars developed by the SDSU-HRSW breeding program as well as for its yield potential, high test weight, grain protein content, and early heading date compared to most HRSW cultivars currently in production. The cultivar was given its name to honor Mr. Robert Essick, late grandfather of Dr. Glover, a bricklayer prior to retirement, and because of its typically high test weight and deep-red-colored kernels .

Origin and Breeding History

During winter 2000–2001, F_1 seeds of the 3-parent population were sown at an off-season nursery near Yuma, Ariz. In the spring of 2001, early yield testing was initiated with F_2 seeds that were returned from Arizona and sown in unreplicated trials at Aurora and South Shore, S.D. Spaced-planted nursery plots were simultaneously sown at Aurora to facilitate selection of individual plants from the F_2 population. Based on high grain yield of this F_2 population at both locations, single heads from 20 individual plants were selected from the spaced-planted nursery plot, threshed singly, and grown as independent $F_{2:3}$ head-rows in Arizona during winter 2001–2002.

Seed of a single selected $F_{2:4}$ head-row was returned from Arizona and again sown in unreplicated yield trials at Aurora and South Shore in spring 2002. Prior to the harvest of all $F_{2:4}$ yield trial plots at Aurora, 20 individual plant selections were collected from those plots chosen for advancement, based on yield and test weight measurements. Selections were then threshed singly and sown as $F_{4:5}$ head-rows in Arizona during winter 2002–2003. Two of these 20 sister lines were selected for continuation within the program, based on within-row uniformity, plant height, and minimal lodging.

The $F_{4:6}$ seed was harvested in Arizona and again sown at Aurora and South Shore during spring 2003 as 2-replication tests. Based on grain yield, test weight, plant height, heading date, and disease resistance, along with its flour extraction rates and mixograph tolerance scores in 2003, one of the two sister-lines was advanced and included in replicated multi-location Preliminary Yield Trials in 2004. At this point, the line was designated SD3851. Based on agronomic and disease resistance performance in 2004, SD3851 was promoted to and tested in the Advanced Yield Trial from 2005 through 2008. Likewise, SD3851 was tested both in SDSU Crop Performance Testing trials and in Uniform Regional Spring Wheat Nursery trials from 2005 through 2008. For large-scale testing of quality traits, Brick was included in the 2008 Wheat Quality Council trial.

Agronomic Characteristics

On a statewide basis, grain yield of Brick is generally similar to Briggs and Granger, although Brick's test weight and protein content are higher. Heading data of Brick is earlier than Briggs and Granger. Brick is approximately 2 inches shorter than Granger and Traverse, but similar to Briggs. Testing at the USDA Spring Wheat Quality Laboratory in Fargo, N.D., indicated that most milling and baking-quality traits of Brick are similar to those of Granger. During development, Brick was found to be moderately resistant to leaf rust and resistant to stem rust (tables 1, 2, and 3).

This publication is found on the web at: http://agbiopubs.sdstate.edu/articles/B757.pdf

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Table 1. Yield comparison of Brick with other popular spring wheat varieties at nine South Dakota locations, 2007-2009, sorted by relative heading.

Variety, Heading [1]	Location Yield Avg. -- Bu/a at 13% moisture																		State Yield Avg. Bu/a		State Top-Yield Freq. %	
	Brookings		South Shore		Miller		Spink Co.		Selby		Brown Co.		Wall		Bison		Ralph					
	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr	2009	3-Yr
Brick, 0	**56**	**48**	**72**	**69**	**44**	.	**66**	**59**	**51**	**42**	**64**	**61**	**45**	.	**30**	**32**	**46**	.	**53**	**52**	**33**	**50**
Briggs, 2	58	49	73	71	41	.	67	60	54	45	69	65	43	.	27	30	51	.	54	53	11	83
Granger, 2	62	50	69	68	46	.	53	55	50	45	73	64	49	.	31	30	52	.	54	52	33	33
Traverse, 2	66	52	84	72	49	.	66	66	57	50	82	70	49	.	32	31	52	.	60	57	78	100
Steele-ND, 3	59	49	77	74	43	.	59	60	55	49	72	68	42	.	30	29	47	.	54	55	11	100
Faller, 4	75	55	82	75	43	.	76	68	60	52	81	71	47	.	28	28	58	.	61	58	89	100
Howard, 4	64	50	78	76	42	.	62	63	58	47	72	69	43	.	27	29	48	.	55	56	11	100

[1] Heading – days later than Brick

Table 2. Comparison of Brick grain protein (Prt) and bushel weight (BW) averages with other popular spring wheat varieties at six South Dakota locations in 2009. (Table sorted high to low by grain protein average.)

Variety	Location Protein (Prt) & Bushel weight (BW) averages												All Locations Average	
	Brookings		South Shore		Miller		Spink Co.		Selby		Brown Co.			
	Prt %	BW lb	Prt %	BW lb	Prt %	BW lb	Prt %	BW lb	Prt %	BW lb	Prt %	BW lb	Prt %	BW lb
Brick	**14.8**	**58.1**	**15.5**	**59.5**	**14.8**	**57.7**	**14.8**	**59.5**	**14.7**	**60.2**	**15.1**	**59.7**	**14.9**	**59.1**
Granger	14.3	55.7	14.6	57.6	14.9	54.2	15.0	57.9	14.5	58.2	14.8	58.4	14.7	57.0
Steele-ND	14.3	55.1	14.2	59.0	14.7	53.9	14.7	60.1	14.7	60.0	15.0	59.2	14.6	57.9
Howard	13.9	57.0	14.5	59.3	14.8	53.0	14.6	59.9	14.9	59.7	14.7	59.5	14.5	58.1
Traverse	13.9	54.0	14.2	57.7	14.7	54.0	14.8	56.7	14.2	57.0	14.6	58.8	14.4	56.4
Faller	13.3	56.8	13.5	57.7	15.1	53.0	14.5	58.6	14.3	59.3	14.6	59.8	14.2	57.5

Table 3. Comparison of Brick lodging resistance and disease reaction with other popular spring wheat varieties.

Spring wheat varieties tested in 2009

Variety	Origin	Rel Hdg [1]	Ldg. Resis.	Rust [2]			Fusarium Head Blight [2]	PVP Status [3]
				Stripe	Stem	Leaf		
Brick	**SD-08**	**0**	**Good**	**-**	**MR**	**MR**	**MR+**	**Yes**
Briggs	SD-02	2	Good	MR	R	MR	M+	Yes
Granger	SD-04	2	Good	MR	R	MR	M+	Yes
Traverse	SD-06	2	Good	MR	R	MR	MR+	Yes
Steele-ND	ND-04	3	Good	MR	MR	R	MR+	Yes
Howard	ND-06	4	Good	-	R	R	MR+	Yes
Faller	ND-07	4	Good	-	R	R	MR+	Yes

[1] Heading – days later than Brick

[2] Disease reaction: R = resistant, MR = moderately resistant, M = mixture, resistant & susceptible

[3] Plant variety protection status