

## Spring Wheat Breeding

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Four hard red spring wheat cultivars have been released by the South Dakota State University breeding program and made available to growers since 2009. 'Brick' was released to Registered Seed Producers prior to the 2009 production season and has acquired a good level of interest from growers primarily because of its high Fusarium head blight (FHB) resistance levels, functional protein, heavy test weight, and early maturity. 'Select' was released to Registered Seed Producers prior to the 2010 production season. Data reveals that Select is equal, or superior to, Briggs, Granger, Traverse, and Brick for most characters of comparison. In the coming years, it is anticipated that Select will prove to be a popular cultivar, especially under more typically warm and dry South Dakota production environments. Both 'Advance' and Forefront' were released in fall 2011 and made available to Registered Seed Producers prior to the 2012 planting season.

Deliverables produced by the Spring Wheat Breeding Program not only include released cultivars, but also germplasm made available to other breeding programs in the form of Uniform Regional and Uniform Regional Scab nursery entries. This typically amounts to approximately 10 accession requests each year.

Agronomic performance data collected from several regionally prominent cultivars, newly released cultivars, and experimental breeding lines are presented in Table 1.

### Cultivar Development

Three advanced experimental lines (SD4178, SD4189, and SD4215) are presently at various stages of increase. Each should be considered for release as a cultivar within the next two years.

#### **SD4178**

SD4178 is an F<sub>4</sub> line derivation from within the cross SD3720/MN98389-A. Its first year of testing in the AYT was 2009. Over years 2010-2011, grain production of SD4178 (43.8 bu/ac) was statistically similar to Traverse (42.2) and Faller (45.1). Test weight (56.3 lb/bu) was significantly less than Brick and Select, but significantly greater than Faller and Traverse. Protein concentration (15.3%) was similar to Brick and Traverse, but significantly less than Select. Loaf volume in 2010 (197.6 ml) was, however, significantly greater than Traverse and similar to both Brick and Select. Like Advance, SD4178 is relatively short in stature (~32 inches). Other characteristics associated with SD4178 seem within the range of acceptability. Information supporting continued increase of SD4178 will be presented to the Variety Review and Release Committee in Fall 2012. Breeder seed increase took place in winter 2011-2012.

#### **SD4189**

SD4189 is an F<sub>4</sub> line derivation from within the cross Briggs/FHBC02-5. Its first year of testing in the AYT was 2009. Over years 2010-2011, grain yield of SD4189 (41.2 bu/ac) was statistically similar to Select (39.7), Brick (39.9), Briggs (40.9), Granger (41.3), and Traverse (42.2). Test weight (55.4 lb/bu) has been statistically greater than Traverse (52.2), similar to Granger (56.0), and less than Briggs (56.1), Brick (57.6) and Select (57.6). Protein concentration of SD4189 (15.5%) was significantly less than Briggs (15.9) and Granger (15.9), similar to Traverse (15.4) and Select (15.7), yet higher than Brick (15.2). Loaf volume data collected from 2010, however, shows that its average loaf volume (206.2 ml) is significantly greater than Briggs (189.8), Select

(194.6), and Traverse (185.2), but similar to Brick (198.4) and Granger (196.4). The height of SD4189 (35.9 in) is slightly shorter than Granger, Select, and Traverse. Information supporting SD4189 has been presented to the Variety Review and Release Committee. In 2010 permission was granted for seed increase activities to begin with the intent of release as a cultivar that will be available to Registered Seed Producers in Spring 2013.

#### **SD4215**

SD4215 is an F<sub>4</sub> line derivation from within the cross Steele-ND/FN1704-317. Its first year of testing in the AYT was 2010. Over years 2010-2011, grain production of SD4215 (40.7 bu/ac) was statistically similar to Select (39.7), Brick (39.9), Briggs (40.9), Granger (41.3), and Traverse (42.2). Test weight (55.0 lb/bu) was statistically greater than Traverse (52.2), but less than Brick (57.6), Select (57.6), Briggs (56.1), and Granger (56.0). Protein concentration (15.5%) has been significantly higher than Brick (15.2). Other traits, including loaf volume, associated with SD4215 seem to be within the range of acceptability. Plant height (31.8 in) is shorter than both Oxen and Advance. Information supporting increase of SD4215 was presented to the Variety Review and Release Committee in Fall 2011. The first cycle of Breeder seed increase is taking place (2011-2012).

Table 1. - Performance data of 34 spring wheat entries tested over 2-years (16 environments 2010 – 2011) in Advanced Yield Trials.

LSD Grouping*				Entry	Grain	Test	Protein	Head	Plant	FHB	FDK														
				Yield	Weight	Conc.	Date	Height	Dis		Volume														
				(Bu/Ac)		(Lb/Bu)		(%)	(D>6/1)(in)		(%)														
											(%)														
A				FALLER	45.07	55.13	15.34	25.57	34.93	29.71	15.00	195.4													
A	B			KNUDSON	43.99	56.78	15.17	23.68	33.00	30.33	45.00	190.2													
A	B	C		SD4178	43.81	56.33	15.25	22.31	32.85	26.42	18.33	197.6													
	B	C	D	SD4218	43.10	57.08	15.26	22.08	35.60	29.75	50.00	188.0													
	B	C	D	E	STEELE-ND	42.24	56.35	15.99	23.57	35.04	21.67	207.8													
	B	C	D	E	TRAVERSE	42.20	52.22	15.38	22.47	36.11	26.20	53.33	185.2												
		C	D	E	ADVANCE	42.13	56.66	15.29	23.00	32.60	28.56	45.00	206.8												
			D	E	F	SD4243	41.97	54.07	15.11	20.58	32.75	25.16	61.67	181.2											
			D	E	F	G	GRANGER	41.34	56.02	15.87	23.06	36.40	29.81	55.00	196.4										
				E	F	G	H	FOREFRONT	41.25	57.22	15.95	21.56	36.88	24.21	35.00	209.2									
					E	F	G	H	SD4189	41.24	55.35	15.52	22.61	35.94	31.38	43.33	206.2								
					E	F	G	H	SD4265	41.05	54.55	15.22	22.14	35.93	28.39	36.67	196.0								
					E	F	G	H	BRIGGS	40.88	56.13	15.85	20.97	33.99	26.76	51.67	189.8								
					E	F	G	H	I	SD4215	40.73	55.00	15.50	22.71	31.82	25.26	33.33	195.2							
					E	F	G	H	I	SD4112	40.60	56.22	15.44	21.61	34.85	24.59	18.33	191.8							
						F	G	H	I	SD4199	40.32	55.51	15.06	20.17	33.55	28.70	19.33	204.8							
						F	G	H	I	OXEN	40.04	52.90	15.48	22.42	32.30	29.38	50.00	198.0							
						F	G	H	I	BRICK	39.93	57.58	15.16	20.14	34.88	18.14	21.00	198.4							
						F	G	H	I	J	SD4263	39.81	56.02	15.57	20.67	34.90	27.25	48.33	199.0						
						F	G	H	I	J	SELECT	39.69	57.54	15.66	21.89	36.89	25.42	21.67	194.6						
						F	G	H	I	J	SD4253	39.65	55.38	16.37	23.59	36.44	33.31	36.67	210.8						
							G	H	I	J	SD4250	39.64	53.16	15.69	22.14	34.45	36.32	30.00	193.0						
								H	I	J	K	SD4214	39.51	53.87	15.31	20.50	34.76	23.48	38.33	204.4					
									I	J	K	L	SD4213	39.06	54.48	15.77	23.97	37.42	27.13	26.67	205.8				
										I	J	K	L	SD4165	39.00	54.49	16.06	22.08	33.01	26.21	18.33	202.6			
											J	K	L	M	SD4264	38.06	55.93	15.42	22.69	34.08	27.35	43.33	186.0		
												K	L	M	KELBY	37.72	55.82	16.33	22.06	30.13	26.72	30.00	196.2		
													L	M	N	RUSS	37.33	53.09	15.60	23.50	35.41	37.43	38.33	192.2	
														L	M	N	REEDER	37.29	53.38	15.78	23.43	34.21	29.59	40.00	195.4

	M	N	SD4076	37.07	56.15	15.88	21.11	32.42	22.87	33.33	204.0
	M	N	SD4271	37.03	54.57	15.66	23.00	36.56	21.53	31.67	207.6
	M	N	SD4277	36.42	54.78	15.61	21.39	33.99	23.41	25.00	192.8
		N	SD4181	35.81	56.58	16.55	21.08	35.88	27.56	11.67	218.8
		N	ALSEN	35.73	55.80	16.34	23.27	33.77	22.61	11.67	214.4
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	AVERAGE			40.02	55.36	15.63	22.27	34.52	27.44	34.08	198.6
	LSD (0.05)			1.80	0.61	0.25	0.59	0.65	7.13	21.36	11.8
	CV			5.89	2.51	2.49	5.49	4.91	14.49	39.80	4.3
	STD DEV			2.36	1.39	0.39	1.22	1.69	3.97	13.56	8.7

□ = Entries demarcated with the same letter are statistically similar (in terms of yield).

□□ = Loaf volume data from 2010 growing season.