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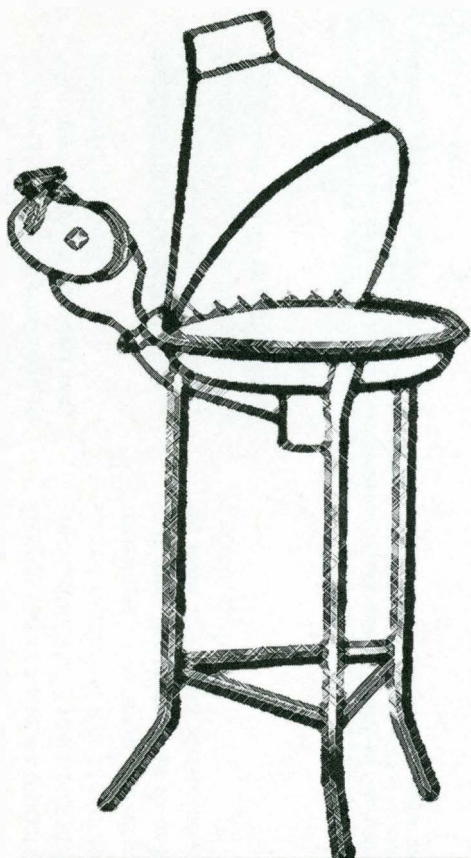
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**November 1998**

# **FORGE**

## **Hard Red Spring Wheat**



**Agricultural Experiment Station  
South Dakota State University  
U.S. Department of Agriculture**

# FORGE

## A New Hard Red Spring Wheat

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Just as pieces of iron can be heated and hammered into something new and different, plant breeders can forge new varieties by recombining the DNA of existing plants. Forge hard red spring wheat is an example of this powerful technique.

Parents of Forge are Butte 86, Guard, and Sharp. Although Forge shares characteristics with each of its parents, it is a unique cultivar.

The South Dakota Agricultural Experimental Station released Foundation seed of Forge in the spring of 1997. Certified seed is available for the 1999 season. Application for Plant Variety Protection has been made, and Forge will be sold only as a class of certified seed (Foundation, Registered, or Certified).

### Origin

Forge was derived from the cross 'Butte 86/SD8061' made at Brookings, S.D., in 1988. The pedigree of SD8061 is Sharp/Guard. F<sub>1</sub> plants were grown at Weslaco, Texas, during the winter of 1988-1989. Individual F<sub>2</sub> plant selections were made at Brookings in 1989 and were grown at Yuma, Ariz., the following winter as plant rows. Plant rows at Yuma were harvested as rows and used to plant F<sub>2,4</sub> yield trials and a

space planted Brookings nursery in 1990.

Based on data collected from the yield trials, individual plants were selected within selected populations. Populations were selected for grain yield, grain bushel weight, and bread-making characteristics. Individual plants were visually selected for resistance to prevalent foliar pathogens (leaf rust and stem rust).

Plant rows were grown in Yuma during the winter and F<sub>4,6</sub> yield trials and a space planted nursery were planted at Brookings in 1991. As in 1990, yield trial data were used to identify high yielding populations and individual plants were selected within the selected populations in the space planted nursery. The F<sub>6</sub> plant rows were grown in Yuma, and a single row was harvested and given the designation SD3156.

The South Dakota Spring Wheat Breeding Program increased the seed from 1992 through 1994. Breeders' seed was produced in 1995 and Foundation seed was produced in 1996.

### Agronomic Characteristics

Forge has been tested in South Dakota crop performance trials since 1993, in the Uniform

Regional Nursery in 1994 and 1995, and in the Wheat Quality Council trials in 1995 and 1996.

Forge looks like Butte 86 and Sharp but is higher yielding, 1 day earlier to head, and slightly shorter. Three years of South Dakota data indicate that Forge yields 4 bushels per acre more than Butte 86 and Sharp. It is similar to Russ and Oxen in yield.

Forge heads are semi-compact and may be harder to thresh than many current varieties. Forge straw strength is similar to other standard-height varieties. Lodging can sometimes occur, particularly on soils high in nitrogen.

Forge has good bushel weight, similar to Sharp, and is medium in protein. Protein content is greater than Prospect but lower than Butte 86. Wheat Quality Council trials indicated that Forge milling and bread-making properties are acceptable but not as good as the quality check cultivar, Grandin.

Forge is resistant to the prevalent races of stem rust in South Dakota but has shown moderately susceptible (MS) reactions in inoculated nurseries. It is moderately resistant to the prevalent races of leaf rust. Forge is equal to or better than 2375 and Sharp for tolerance to scab.



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Table 1. Origin, disease resistance, and traits of Forge compared to other popular spring wheat varieties.

Variety	origin (year)	Stand-ability	Disease reaction			1996 baking rating
			Leaf rust	Stem rust	Head blight tolerance	
<b>FORGE*</b>	<b>SD-97</b>	<b>GOOD</b>	<b>MR++</b>	<b>MR++</b>	<b>FAIR++</b>	<b>G-F#</b>
Butte 86	ND-86	FAIR	MR	R	FAIR	F-P
Sharp	SD-90	GOOD	R	R	FAIR	F-P
Oxen*	SD-96	GOOD	R	R	FAIR	VG-G
Russ*	SD-95	GOOD	R	R	FAIR	VG-G
2375*	NDSURF-88	GOOD	MS	MR	FAIR	G-F

\* Plant Variety Protection - sold by variety name only as a class of certified seed.  
 ++ MS=Moderately Susceptible; MR=Moderately Resistant, R=Resistant.  
 # VG=Very Good, G=Good, F=Fair, P=Poor.

Table 2. Agronomic performance averages (1995-96, 98) of Forge compared to other popular spring wheat varieties.

Variety	Relative heading		3-yr Bushel		Yield, bu/a		Top yield percentage	
	day	Protein pct	weight lb	Height inch	'98	3-yr@	'98	3-yr
<b>FORGE</b>	<b>-1</b>	<b>14.4</b>	<b>60</b>	<b>30</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>100+</b>
Butte 86	0	14.7	59	31	45	45	13	33
Sharp	0	14.9	60	31	45	45	25	67
Oxen	2	14.6	59	28	47	48	25	83
Russ	2	14.9	59	32	50	49	75	100
2375	3	14.4	60	28	43	44	0	33

@ Includes years 1995, 1996, and 1998.  
 + Percentage of time a variety appeared in the top-yield group.

Table 3. Yield comparisons of Forge to other popular HRS wheat varieties at various locations in South Dakota.

Variety	Brookings		Watertown		Highmore		Selby		Groton		Wall		Bison		Ralph	
	'98	3-yr@	'98	3-yr@	'98	3-yr@	'98	3-yr@	'98	3-yr@	98	3-yr@	98	3-yr@	'98	3-yr@
<b>FORGE</b>	<b>46</b>	<b>54</b>	<b>46</b>	<b>46</b>	<b>48</b>	<b>.</b>	<b>53</b>	<b>53</b>	<b>42</b>	<b>54</b>	<b>40+</b>	<b>.</b>	<b>61+</b>	<b>45+</b>	<b>61+</b>	<b>49+</b>
Butte 86	44	52	45	44	45	.	43	45	39	45	36	.	48	41+	57	43
Sharp	45	51	48	46	43	.	43	44	44	49	32	.	49	42+	53	42
Oxen	41	52	43	45	43	.	52	53	41	51	35	.	56	46+	61+	49+
Russ	49	52	55	51	46	.	47	49	46	55	39+	.	55	44+	62+	47+
2375	42	49	41	43	42	.	43	47	39	47	35	.	49	41+	55	42

@ Includes years 1995, 1996, and 1998.