

# North Dakota

## Hard Red Spring Wheat

### Variety Trial Results for 2017 and Selection Guide

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Hard red spring (HRS) wheat was harvested from 5.07 million acres in 2017, down from 2016. The average yield of spring wheat was 41 bushels/acre (bu/a), down 11 percent from last year. Drought significantly reduced yield in much of the state, with 280,000 acres of drought-damaged crop not harvested; much of it was baled for hay prior to harvest. Disease pressure was very low in the drought-affected regions of the state.

SY Ingmar was the most popular HRS wheat variety in 2017, occupying 17.8 percent of the planted acreage, followed by SY Soren (10.8), Linkert (6.9), Barlow (6.8), Elgin-ND (5.6) and SY Valda (5). SY Ingmar, SY Soren and SY Valda were released by Syngenta/AgriPro and Linkert was released by the University of Minnesota. Barlow and Elgin-ND are NDSU releases.

Successful wheat production depends on numerous factors, including selecting the right variety for a particular area. The information included in this publication is meant to aid in selecting that variety or group of varieties. Characteristics to consider in selecting a variety may include yield potential, protein content when grown with proper fertility, straw strength, plant height, response to problematic pests (diseases, insects, etc.) and maturity. Every growing season differs; therefore, when selecting a variety, we recommend using data that summarize several years and locations. Choose the variety that, on average, performs the best at multiple locations near your farm during several years.

Selecting varieties with good milling and baking quality also is important to maintain market recognition and avoid discounts. Hard red spring wheat from the northern Great Plains is known around the world for its excellent end-use quality.

Millers and bakers consider many factors in determining the quality and value of wheat they purchase. Several key parameters are: high test weight (for optimum milling yield and flour color), high falling number (greater than 300 seconds indicates minimal sprout damage), high protein content (the majority of HRS wheat export markets want at least 14 percent protein) and excellent protein quality (for superior bread-making quality as indicated by traditional strong gluten proteins, high baking absorption and large bread loaf volume).

Gluten strength, and milling and baking quality ratings are provided for individual varieties based on the results from the NDSU field plot variety trials. These ratings are applied to varieties grown for multiple years at seven NDSU Research Extension Centers across the state to provide producers and end users with end-use performance data. The wheat protein data often are higher than obtained in actual production fields but can be used to compare differences among varieties.

The agronomic data presented in this publication are from replicated research plots using experimental designs that enable the use of statistical analysis. These analyses enable the reader to determine, at a predetermined level of confidence, if the differences observed among varieties are reliable or if they might be due to error inherent in the experimental process.

The LSD (least significant difference) values beneath the columns in the tables are derived from these statistical analyses and apply only to the numbers in the column in which they appear. If the difference between two varieties exceeds the LSD value, it means that with 95 or 90 percent confidence (LSD probability 0.05 or 0.10), the higher-yielding variety has a significant yield advantage. When the difference between two varieties is less than the LSD value, no significant difference was found between those two varieties under those growing conditions.

NS is used to indicate no significant difference for that trait among any of the varieties at the 95 or 90 percent level of confidence. The CV stands for coefficient of variation and is expressed as a percentage. The CV is a measure of variability in the trial. Large CVs mean a large amount of variation that could not be attributed to differences in the varieties. Yield is reported at 13.5 percent moisture, while protein content is reported at 12 percent moisture content.

Presentation of data for the entries tested does not imply approval or endorsement by the authors or agencies conducting the test. North Dakota State University approves the reproduction of any table in the publication only if no portion is deleted, appropriate footnotes are given and the order of the data is not rearranged. Additional data from county sites are available from each Research Extension Center at [www.ag.ndsu.edu/varietytrials/spring-wheat](http://www.ag.ndsu.edu/varietytrials/spring-wheat). Also consider using the online variety selection tool at [www.ag.ndsu.edu/varietyselectiontool/](http://www.ag.ndsu.edu/varietyselectiontool/), which allows you to generate tables of data from research locations nearest your farm and make head-to-head comparisons of varieties of interest.

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**Table 1. North Dakota hard red spring wheat variety descriptions, agronomic traits, 2017.**

Variety	Agent or Origin <sup>1</sup>	Year Released	Height (inches)	Straw Strength <sup>2</sup>	Days to Head <sup>3</sup>	Reaction to Disease <sup>4</sup>					
						Stem Rust <sup>5</sup>	Leaf Rust	Stripe Rust	Tan Spot	Bact. Leaf	Head Scab
AKF-Astro <sup>6</sup>	AFK	2016	28	NA	60	4	2	2	NA	7	8
Ambush	DynaGro	2016	27	5	57	1	4	3	NA	NA	5
Barlow	ND	2009	29	6	57	1	6	4	6	7	5
Bolles	MN	2015	28	4	61	2	3	5	4	8	5
Boost	SD	2016	29	5	61	1	4	3	NA	5	4
<b>Caliber</b>	<b>DynaGro</b>	<b>2016</b>	<b>23</b>	<b>2</b>	<b>61</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>NA</b>	<b>NA</b>	<b>8</b>
Elgin-ND	ND	2012	30	5	60	1	6	5	6	7	5
Faller	ND	2007	28	5	61	1	7	8	7	8	5
Glenn	ND	2005	29	4	56	1	6	4	6	7	3
<b>HRS 3100</b>	<b>Croplan</b>	<b>2016</b>	<b>26</b>	<b>4</b>	<b>60</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>NA</b>	<b>7</b>	<b>6</b>
HRS 3419	Croplan	2014	28	2	63	1	3	4	NA	6	5
HRS 3504	Croplan	2015	25	3	61	1	1	6	NA	6	7
HRS 3530	Croplan	2015	29	4	61	1	2	8	NA	7	5
HRS 3616	Croplan	2016	27	4	59	1	5	5	NA	8	7
<b>Lang-MN</b>	<b>MN</b>	<b>2017</b>	<b>28</b>	<b>3</b>	<b>61</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>NA</b>	<b>6</b>	<b>5</b>
LCS Anchor	Limagrain	2016	24	3	57	1	2	4	NA	7	6
LCS Breakaway	Limagrain	2011	25	5	57	1	3	6	4	7	5
LCS Nitro	Limagrain	2015	26	4	62	2	2	2	3	5	5
LCS Prime	Limagrain	2015	28	4	57	2	4	6	NA	8	4
<b>LCS Rebel</b>	<b>Limagrain</b>	<b>2017</b>	<b>29</b>	<b>5</b>	<b>57</b>	<b>1</b>	<b>7</b>	<b>4</b>	<b>NA</b>	<b>7</b>	<b>4</b>
<b>LCS Trigger</b>	<b>Limagrain</b>	<b>2016</b>	<b>28</b>	<b>5</b>	<b>65</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>NA</b>	<b>6</b>	<b>4</b>
Linkert	MN	2013	24	2	58	1	3	1	4	5	5
Mott <sup>7</sup>	ND	2009	30	3	62	1	6	6	6	7	6
<b>MS Camaro</b>	<b>Meridian</b>	<b>2016</b>	<b>25</b>	<b>5</b>	<b>59</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>NA</b>	<b>6</b>	<b>6</b>
MS Chevelle	Meridian	2014	26	5	57	1	4	3	6	6	5
<b>ND VitPro</b>	<b>ND</b>	<b>2016</b>	<b>27</b>	<b>3</b>	<b>58</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>NA</b>	<b>7</b>	<b>4</b>
Prevail	SD	2014	26	4	57	4	3	1	4	4	5
Prosper	ND	2011	28	5	61	1	6	8	6	7	5
Rollag	MN	2011	26	3	58	1	4	2	3	7	3
Shelly	MN	2016	25	5	62	2	6	5	NA	6	5
Surpass	SD	2016	26	5	55	1	4	6	NA	7	5
SY Ingmar	Syngenta/AgriPro	2014	26	3	60	1	3	6	6	6	5
SY Rowyn	Syngenta/AgriPro	2013	25	4	58	1	3	4	2	5	5
SY Soren	Syngenta/AgriPro	2011	25	3	59	1	2	7	2	6	5
SY Valda	Syngenta/AgriPro	2015	26	4	58	1	2	7	6	7	4
<b>TCG-Climax</b>	<b>21<sup>st</sup> Century Genetics</b>	<b>2017</b>	<b>28</b>	<b>2</b>	<b>64</b>	<b>1</b>	<b>6</b>	<b>3</b>	<b>NA</b>	<b>7</b>	<b>6</b>
TCG-Cornerstone	21 <sup>st</sup> Century Genetics	2015	27	4	59	1	4	6	NA	NA	6
TCG-Spitfire	21 <sup>st</sup> Century Genetics	2015	28	4	62	1	5	4	NA	6	6
<b>WB9479</b>	<b>WestBred</b>	<b>2017</b>	<b>24</b>	<b>4</b>	<b>58</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>NA</b>	<b>8</b>	<b>6</b>
<b>WB9590</b>	<b>WestBred</b>	<b>2017</b>	<b>24</b>	<b>NA</b>	<b>57</b>	<b>1</b>	<b>3</b>	<b>8</b>	<b>3</b>	<b>7</b>	<b>6</b>
WB9653	WestBred	2015	26	4	59	2	3	8	6	7	6
<b>WB9719</b>	<b>WestBred</b>	<b>2017</b>	<b>26</b>	<b>NA</b>	<b>59</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>NA</b>	<b>NA</b>	<b>6</b>
WB-Mayville	WestBred	2011	25	3	57	1	3	6	6	8	8

<sup>1</sup>Refers to agent or developer: MN = University of Minnesota; ND = North Dakota State University; SD = South Dakota State University; **Bold** varieties are those recently released, so data is limited and rating values may change.

<sup>2</sup>Straw Strength = 1 to 9 scale, with 1 the strongest and 9 the weakest. These values are based on recent data and may change as more data become available.

<sup>3</sup>Days to Head = the number of days from planting to head emergence from the boot averaged from several locations.

<sup>4</sup>Disease reactions scores from 1-9, with 1 = resistant and 9 = very susceptible, NA = not available.

<sup>5</sup>Fargo stem rust nursery inoculated with *Puccinia graminis* f. sp. *Triticis* races TPMK, TMLK, RTQQ, QFCQ and QTHJ.

<sup>6</sup>White wheat.

<sup>7</sup>Solid stemmed or semisolid stem, imparting resistance to sawfly.

**Table 2. Analytical milling and baking data from field plot variety trials at Carrington, Casselton, Dickinson, Hettinger, Langdon, Minot and Williston in 2015 and 2016 (unless otherwise noted)<sup>1</sup>.**

Variety	Planted 2017		Test	Protein	Vitreous	1,000	Falling	Farinograph	Farinograph	Qual. #	DO	Loaf Volume	
	ND	OBS <sup>2</sup>	Weight	12% MB	Kernels	Kwt	Number	Stability	Absorption				MTI
	(% area)		(lb/bu)	(%)	(%)	(gram)	(seconds)	(minutes)	(%)	(bu)	(mm)	(1-10)	(cc)
Barlow	6.8	10	62.3	14.4	89	32.1	389	12.1	64.3	29	153	9	993
Bolles	3.3	10	61.1	15.2	83	33.9	425	19.8	62.5	17	234	9	1,007
Boost	--	10	61.0	14.0	74	33.3	422	8.4	62.9	33	113	8	998
Duclair	--	8	59.5	13.7	50	32.7	384	15.3	59.1	24	188	9	978
Elgin-ND <sup>3</sup>	5.6	10	61.0	14.2	79	30.9	410	9.0	63.3	30	121	9	969
Faller <sup>3</sup>	3.8	10	60.8	13.3	69	35.1	400	9.0	61.8	30	105	9	942
Focus	--	9	62.1	14.0	73	32.1	415	8.6	59.8	32	118	9	963
Glenn <sup>3</sup>	4.9	10	64.1	14.8	92	32.8	387	14.9	63.3	21	178	9	1,001
HRS 3419	--	8	60.4	13.2	57	30.3	423	12.6	59.8	27	155	9	907
HRS 3530	--	8	61.3	14.0	68	34.6	405	8.0	63.2	32	102	8	981
Lang-MN	--	10	62.7	14.1	90	31.8	418	7.7	62.5	34	98	9	964
LCS Nitro	--	5	59.8	13.1	36	33.4	437	16.7	58.2	21	183	9	908
LCS Prime	--	7	62.9	12.8	59	35.4	383	12.2	61.4	27	130	9	936
Linkert <sup>3</sup>	6.9	10	61.4	14.7	70	35.3	428	25.0	61.9	15	270	9	991
Mott	1.1	8	61.5	14.2	71	29.3	386	10.2	61.0	30	125	9	959
ND VitPro	--	10	63.4	14.6	93	33.8	407	8.4	62.9	31	114	10	979
Prevail	--	10	60.9	13.4	51	33.3	390	9.9	59.3	32	112	9	934
Prosper <sup>3</sup>	4.5	10	60.7	13.5	64	35.0	398	10.0	60.8	30	111	9	968
Rollag	2.9	10	62.0	14.4	70	33.7	485	7.6	64.7	28	109	9	883
Shelly	--	10	62.4	13.1	69	33.6	425	10.9	59.3	26	118	9	905
Surpass	--	10	61.5	13.7	52	30.2	381	9.4	59.0	30	118	9	976
SY Ingmar	17.8	10	62.0	14.2	79	30.2	414	11.1	61.0	25	136	9	1,009
SY Rowyn	1.0	11	61.3	13.0	49	31.1	422	16.1	59.4	21	176	9	944
SY Soren	10.8	10	61.9	14.3	66	30.2	443	11.6	61.3	26	155	9	963
SY Valda	5.0	10	61.3	13.3	85	32.8	394	7.0	60.6	36	100	9	872
WB 9653	--	5	60.4	13.2	69	32.0	384	8.7	61.5	29	115	8	881
WB-Mayville	3.1	10	61.1	14.2	74	34.2	430	13.5	62.2	26	162	9	938
Average			61.5	13.9	70	32.7	410	11.6	61.4	27	141	9	954

Analyses conducted at the NDSU Hard Red Spring Wheat Quality Laboratory in Fargo, N.D.

<sup>1</sup>2016 Carrington and Dickinson data omitted.

<sup>2</sup>Observations (number of times tested).

<sup>3</sup>Lines used as checks.

**Table 3. Yield of hard red spring wheat varieties grown at five locations in eastern North Dakota, 2015-2017.**

Variety	<u>Colgate</u>			<u>Carrington</u>			<u>Casselton</u>			<u>Langdon</u>			<u>Prosper</u>			<u>Avg. eastern N.D.</u>	
	2017	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.
	------(bu/a)-----																
AKF-Astro	65.3	55.6	--	101.7	--	56.1	--	79.7	--	71.7	--						
Ambush	64.4	59.7	--	86.5	--	71.6	--	77.5	--	71.9	--						
Barlow	66.2	57.1	49.5	91.5	78.4	74.3	69.1	78.9	71.9	73.6	67.2						
Bolles	66.3	60.0	46.2	97.8	77.3	74.1	69.9	74.8	67.1	74.6	65.1						
Boost	68.4	58.4	49.6	88.2	--	78.9	70.5	79.4	--	74.7	--						
Caliber	65.7	54.7	--	84.6	--	63.1	--	74.4	--	68.5	--						
Elgin-ND	68.1	57.7	51.1	91.3	77.9	81.4	73.0	81.5	70.9	76.0	68.2						
Faller	64.1	58.6	48.3	94.6	75.7	82.2	78.4	92.0	74.2	78.3	69.2						
Glenn	65.8	56.5	48.6	88.4	71.4	71.1	70.1	70.6	67.5	70.5	64.4						
HRS 3100	65.3	59.3	--	100.3	--	75.3	--	88.6	--	77.8	--						
HRS 3419	59.6	58.7	48.6	103.8	--	92.4	84.7	73.7	--	77.6	--						
HRS 3504	59.5	61.2	--	100.0	--	76.8	75.1	90.1	--	77.5	--						
HRS 3530	66.2	57.9	48.2	97.1	--	78.9	78.0	85.6	--	77.1	--						
HRS 3616	63.3	61.1	--	97.3	--	75.6	--	74.2	--	74.3	--						
Lang-MN	67.3	58.8	50.6	93.0	--	77.6	--	81.5	--	75.6	--						
LCS Anchor	62.7	51.5	--	91.9	--	69.0	--	74.8	--	70.0	--						
LCS Breakaway	63.4	50.4	47.2	92.3	78.9	75.4	73.3	84.9	75.3	73.3	68.7						
LCS Nitro	65.6	57.2	47.2	95.9	79.0	92.4	81.7	65.6	69.4	75.3	69.3						
LCS Prime	65.7	60.8	--	100.5	--	87.5	78.1	91.3	--	81.2	--						
LCS Rebel	66.0	57.1	--	97.7	--	84.2	--	89.0	--	78.8	--						
LCS Trigger	64.1	63.6	--	115.2	--	98.3	--	98.8	--	88.0	--						
Linkert	61.4	57.0	49.5	88.0	76.3	63.8	67.6	76.5	72.9	69.3	66.6						
Mott	67.7	58.6	50.8	97.8	--	--	--	76.1	--	--	--						
MS Camaro	62.3	53.0	--	85.4	--	66.6	--	74.7	--	68.4	--						
MS Chevelle	66.0	60.5	50.6	98.2	78.5	86.2	78.0	85.6	76.9	79.3	71.0						
ND VitPro	66.7	56.4	48.9	88.8	73.1	71.6	69.3	68.5	68.9	70.4	--						
Prevail	67.1	62.4	52.5	93.8	83.5	76.0	71.8	87.7	82.8	77.4	72.7						
Prosper	66.6	63.1	49.3	97.5	78.4	82.5	77.0	88.4	72.1	79.6	69.2						
Rollag	61.0	58.6	50.6	89.6	81.3	75.7	74.0	82.8	74.1	73.5	70.0						
Shelly	66.7	66.3	51.5	101.1	--	81.4	77.4	93.6	--	81.8	--						
Surpass	57.3	60.6	51.4	99.8	--	80.2	72.4	93.5	--	78.3	--						
SY Ingmar	54.2	57.0	50.9	93.6	81.7	74.0	72.7	83.4	73.9	72.4	69.8						
SY Rowyn	61.0	55.7	50.6	87.3	79.0	85.6	76.8	81.0	75.4	74.1	70.5						
SY Soren	69.4	60.0	48.5	92.5	75.6	75.9	72.9	84.7	70.5	76.5	66.9						
SY Valda	55.3	66.9	52.4	100.3	86.1	84.5	80.7	99.1	85.4	81.2	76.2						
TCG-Climax	60.7	63.0	--	84.6	--	71.9	--	71.5	--	70.3	--						
TCG-Cornerstone	61.6	55.2	--	89.2	--	63.7	--	85.3	--	71.0	--						
TCG-Spitfire	61.3	66.3	--	96.7	--	76.2	--	85.6	--	77.2	--						
WB9479	63.6	57.5	--	98.6	--	75.4	--	80.5	--	75.1	--						
WB9590	59.3	63.4	--	94.2	--	72.1	--	83.2	--	74.4	--						
WB9653	66.7	64.9	56.6	103.8	--	82.7	77.5	90.8	--	81.8	--						
WB9719	65.5	58.6	--	89.6	--	69.5	--	91.5	--	74.9	--						
WB-Mayville	65.9	54.9	47.7	89.4	75.8	57.5	60.1	81.9	72.9	69.9	64.1						
Mean	64.0	58.5	49.9	93.5	78.5	76.2	74.2	81.5	73.7	74.7	68.8						
CV%	6.7	7.2	--	4.8	--	5.9	--	5.9	--	7.3	--						
LSD 0.05	4.9	5.8	--	6.1	--	6.3	--	6.6	--	6.9	--						
LSD 0.10	4.1	4.9	--	4.8	--	5.3	--	5.1	--	5.7	--						

**Table 4. Yield of hard red spring wheat varieties grown at four locations in western North Dakota, 2015-2017.**

Variety	<u>Dickinson</u>		<u>Hettinger</u>		<u>Minot</u>		<u>Williston</u>		<u>Avg. western N.D.</u>	
	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.	2017	3 Yr.
	------(bu/a)-----									
AKF-Astro	37.6	--	37.9	--	56.6	--	25.2	--	39.3	--
Ambush	34.1	--	36.3	--	48.1	--	26.6	--	36.3	--
Barlow	38.1	51.9	40.1	51.2	48.2	60.1	28.0	35.7	38.6	49.7
Bolles	34.4	50.2	32.8	49.1	48.6	62.5	25.7	34.9	35.4	49.2
Boost	34.7	51.2	31.2	50.8	49.3	61.5	29.2	36.9	36.1	50.1
Caliber	31.6	--	32.5	--	48.0	--	29.0	--	35.3	--
Elgin-ND	36.2	--	38.4	53.8	50.8	67.8	28.7	38.9	38.5	--
Faller	34.5	49.9	41.5	54.8	49.9	72.2	25.1	34.4	37.8	52.8
Glenn	34.9	51.3	32.1	48.1	50.6	65.0	29.3	36.8	36.7	50.3
HRS 3100	34.3	--	36.3	--	38.9	--	29.4	--	34.7	--
HRS 3419	30.7	55.9	41.2	60.9	53.4	73.1	24.9	--	37.6	--
HRS 3504	34.8	--	32.7	--	43.6	67.1	30.8	--	35.5	--
HRS 3530	33.1	54.8	35.9	53.1	51.3	71.7	27.7	--	37.0	--
HRS 3616	32.7	--	38.7	--	48.3	--	29.0	--	37.2	--
Lang-MN	35.7	--	36.3	--	46.9	--	27.5	--	36.6	--
LCS Anchor	34.3	--	35.7	--	34.6	--	31.9	--	34.1	--
LCS Breakaway	32.7	53.8	34.8	49.1	34.9	64.0	28.4	35.0	32.7	50.5
LCS Nitro	32.8	58.3	35.4	54.3	49.0	80.5	28.6	37.7	36.5	57.7
LCS Prime	36.2	--	39.2	56.2	44.7	64.9	28.6	43.4	37.2	--
LCS Rebel	33.3	--	36.8	--	46.8	--	27.6	--	36.1	--
LCS Trigger	34.0	--	44.5	--	49.2	--	21.3	--	37.3	--
Linkert	32.8	52.3	34.0	47.1	39.2	61.8	27.5	37.2	33.4	49.6
Mott	29.8	46.3	36.6	49.8	42.9	62.6	21.9	37.0	32.8	48.9
MS Camaro	33.5	--	31.4	--	46.9	--	30.3	--	35.5	--
MS Chevelle	35.3	56.3	37.5	53.8	45.2	66.9	29.4	40.8	36.9	54.5
ND VitPro	28.8	50.5	31.9	48.0	35.2	61.1	27.8	--	30.9	--
Prevail	38.4	49.8	38.3	54.3	48.9	63.2	30.3	41.2	39.0	52.1
Prosper	33.6	53.2	39.5	48.6	55.4	76.0	25.0	36.0	38.4	53.5
Rollag	37.1	55.0	31.6	50.2	53.6	70.0	31.4	38.1	38.4	53.3
Shelly	39.3	--	43.9	58.2	47.1	64.2	28.4	--	39.7	--
Surpass	35.6	56.6	36.7	54.1	40.7	62.7	30.1	40.5	35.8	53.5
SY Ingmar	37.0	56.5	39.9	51.7	47.7	71.2	28.0	37.4	38.2	54.2
SY Rowyn	29.1	53.4	33.3	52.1	46.6	65.8	28.8	36.7	34.5	52.0
SY Soren	32.4	51.0	36.5	52.8	50.8	64.5	30.1	38.3	37.5	51.7
SY Valda	38.7	60.2	35.1	52.1	43.7	69.7	29.3	40.7	36.7	--
TCG-Climax	33.9	--	34.5	--	48.8	--	25.5	--	35.7	--
TCG-Cornerstone	36.5	--	32.1	--	44.0	--	26.8	--	34.9	--
TCG-Spitfire	35.0	--	37.6	--	64.0	--	29.3	--	41.5	--
WB9479	28.4	--	34.4	--	54.2	--	29.1	--	36.5	--
WB9590	34.3	--	37.6	--	51.6	--	26.3	--	37.5	--
WB9653	37.3	56.2	39.4	54.4	47.7	69.4	31.6	42.1	39.0	55.5
WB9719	38.7	--	43.4	--	58.3	--	28.1	--	42.1	--
WB-Mayville	37.6	54.9	32.6	46.2	49.8	61.9	24.9	37.2	36.2	50.1
Mean	34.5	53.5	36.5	52.1	47.8	66.7	28.0	38.0	36.7	52.1
CV %	11.2	--	11.4	--	12.7	--	10.7	--	10.3	--
LSD 0.05	5.4	--	5.7	--	9.9	--	4.9	--	5.2	--
LSD 0.10	4.5	--	4.8	--	8.3	--	4.1	--	4.1	--

**Table 5. Protein at 12 percent moisture of hard red spring wheat varieties grown at nine locations in North Dakota, 2017.**

Variety	Colgate	Carrington	Casselton	Prosper	Dickinson	Hettinger	Langdon	Minot	Williston	State Avg.
------(%)-----										
AKF-Astro	13.7	13.8	12.3	12.8	14.8	11.5	12.3	14.3	17.4	13.7
Ambush	15.5	14.6	15.0	14.7	17.1	13.7	13.8	16.1	18.8	15.5
Barlow	15.4	14.7	14.6	14.7	17.3	13.6	13.8	16.0	18.6	15.4
Bolles	16.9	16.1	16.6	16.3	18.3	15.5	15.0	17.3	19.7	17.0
Boost	15.4	15.1	15.2	14.7	17.4	14.9	13.3	16.3	18.3	15.6
Caliber	15.7	15.6	15.4	15.4	16.8	14.1	14.7	16.1	17.7	15.7
Elgin-ND	15.0	14.8	14.9	14.9	17.0	13.8	13.5	15.8	18.9	15.4
Faller	14.9	13.6	13.2	13.0	16.4	13.8	11.7	15.7	18.2	14.5
Glenn	15.7	14.4	15.3	14.4	17.0	14.3	14.3	16.1	18.0	15.5
HRS 3100	15.1	14.7	14.5	14.0	17.1	14.1	13.0	16.8	18.3	15.3
HRS 3419	14.8	14.4	13.4	12.9	17.8	13.4	12.3	15.2	20.4	15.0
HRS 3504	14.7	15.0	14.1	14.1	16.5	14.7	12.8	16.3	17.4	15.1
HRS 3530	15.6	14.7	14.4	15.0	17.7	13.9	12.7	15.7	18.9	15.4
HRS 3616	15.8	15.6	15.0	15.7	17.3	13.9	14.3	16.5	18.3	15.8
Lang-MN	16.1	15.6	14.7	15.1	17.6	13.5	14.7	16.2	19.9	15.9
LCS Anchor	15.7	15.7	14.9	14.9	16.8	13.4	13.7	15.9	17.9	15.4
LCS Breakaway	16.2	16.7	14.6	14.9	17.2	13.0	13.2	16.8	17.8	15.6
LCS Nitro	14.0	13.4	13.1	13.1	16.3	13.1	11.2	14.6	17.7	14.1
LCS Prime	13.8	13.3	13.5	13.6	15.1	13.3	11.8	14.7	16.6	14.0
LCS Rebel	15.3	14.9	14.8	14.4	17.6	14.4	13.5	16.3	18.9	15.6
LCS Trigger	13.4	13.3	12.9	12.9	16.4	12.1	11.0	14.2	21.0	14.1
Linkert	16.0	16.0	14.9	15.2	18.0	13.9	14.7	16.4	18.4	15.9
Mott	15.4	15.5	14.9	14.3	17.2	14.0	--	16.2	19.7	--
MS Camaro	15.8	15.6	14.9	14.7	17.3	13.9	13.6	16.1	17.4	15.5
MS Chevelle	14.5	14.5	13.7	13.8	16.3	13.1	12.2	15.2	17.0	14.5
ND VitPro	16.0	15.3	15.6	15.5	17.5	14.8	14.2	16.6	18.0	15.9
Prevail	14.5	14.0	13.5	14.4	16.2	12.6	13.5	15.6	17.4	14.6
Prosper	14.9	13.6	14.0	13.6	15.9	12.8	11.9	15.6	18.1	14.5
Rollag	16.3	15.8	15.3	15.0	17.4	13.3	14.4	15.8	18.3	15.7
Shelly	14.7	14.5	13.7	14.0	16.5	13.0	13.0	15.2	18.4	14.8
Surpass	14.6	15.1	14.3	14.0	16.0	13.1	12.9	15.6	17.0	14.7
SY Ingmar	15.6	15.5	14.8	15.1	17.3	14.4	14.1	16.3	18.8	15.8
SY Rowyn	15.0	14.1	13.7	13.9	17.4	13.7	12.3	16.0	18.2	14.9
SY Soren	15.6	15.7	14.7	14.9	17.5	14.1	13.6	16.1	18.5	15.6
SY Valda	15.0	14.7	13.7	13.9	16.8	13.8	12.8	15.8	18.6	15.0
TCG-Climax	16.7	16.3	16.0	16.1	18.2	14.8	15.1	16.6	20.7	16.7
TCG-Cornerstone	15.3	14.9	15.0	15.1	17.0	14.3	13.6	15.8	18.6	15.5
TCG-Spitfire	14.7	14.3	14.3	14.0	17.5	13.7	13.2	14.7	18.8	15.0
WB9479	15.9	15.8	15.9	15.0	17.4	15.0	13.9	16.2	18.0	15.9
WB9590	15.5	15.0	14.8	15.1	17.4	14.6	13.3	16.0	17.7	15.5
WB9653	14.8	14.3	14.2	14.3	17.1	14.4	12.6	16.1	17.6	15.0
WB9719	15.2	14.5	15.0	14.7	16.4	13.5	13.1	15.3	18.2	15.1
WB-Mayville	15.7	14.9	15.5	15.2	16.5	14.2	13.9	15.7	17.4	15.4
Mean	15.3	14.9	14.7	14.7	17.1	13.8	13.4	16.0	18.4	15.3
CV%	1.7	4.8	--	--	2.1	4.1	2.9	2.1	3.2	3.6
LSD 0.05	0.4	1.0	--	--	0.7	0.8	0.5	0.5	1.0	0.4
LSD 0.10	0.3	0.8	--	--	0.6	0.7	0.5	0.5	0.8	0.3

**Table 6. Test weight of hard red spring wheat varieties grown at eight locations in North Dakota, 2017.**

Variety	Carrington	Casselton	Prosper	Dickinson	Hettinger	Langdon	Minot	Williston	State Avg.
	------(lb/bu)-----								
AKF-Astro	55.5	58.2	59.4	60.0	61.1	54.3	58.4	48.2	56.9
Ambush	60.0	61.9	62.2	60.3	61.6	61.5	60.5	49.5	59.7
Barlow	59.7	61.3	62.0	61.5	62.2	61.5	61.1	50.4	60.0
Bolles	58.7	60.2	60.4	57.8	59.3	61.2	58.8	50.9	58.4
Boost	58.7	61.2	60.9	59.0	59.0	60.7	59.4	49.6	58.6
Caliber	59.1	61.1	61.5	60.9	61.6	59.8	59.2	50.8	59.3
Elgin-ND	57.9	60.5	61.7	58.6	60.9	61.1	58.9	47.3	58.4
Faller	58.0	60.3	61.4	58.1	60.3	61.5	58.4	47.1	58.1
Glenn	61.2	63.1	63.4	61.9	60.8	63.8	60.8	52.7	61.0
HRS 3100	57.4	60.6	60.4	58.9	60.6	60.1	59.7	48.4	58.3
HRS 3419	55.6	59.7	60.6	56.9	59.7	61.6	58.7	48.9	57.7
HRS 3504	56.2	60.4	59.1	59.9	61.3	59.0	59.3	48.8	58.0
HRS 3530	57.4	60.5	61.4	56.9	59.8	61.3	57.7	48.1	57.9
HRS 3616	57.7	60.5	60.2	58.5	60.4	61.5	58.7	50.6	58.5
Lang-MN	59.2	62.1	61.8	59.4	61.1	63.3	59.1	50.1	59.5
LCS Anchor	59.2	61.0	59.8	60.8	61.9	61.8	61.0	51.5	59.6
LCS Breakaway	59.7	60.8	62.2	61.6	62.6	61.8	59.8	51.6	60.0
LCS Nitro	56.7	58.9	61.3	57.4	59.5	62.2	57.6	50.3	58.0
LCS Prime	60.0	61.7	62.9	61.4	63.2	61.4	60.7	51.7	60.4
LCS Rebel	59.7	61.7	63.0	60.5	61.9	62.4	55.7	51.4	59.5
LCS Trigger	57.7	61.8	61.9	56.3	61.8	62.3	57.3	45.8	58.1
Linkert	58.9	59.7	61.3	60.4	62.4	60.8	61.0	50.5	59.4
Mott	57.8	60.7	60.6	58.0	60.3	--	58.8	49.8	--
MS Camaro	59.5	61.3	61.0	60.3	60.8	61.6	59.6	52.2	59.5
MS Chevelle	58.6	60.8	61.0	59.9	60.9	61.3	60.2	51.1	59.2
ND VitPro	60.0	62.1	63.0	61.6	62.1	62.7	61.2	49.7	60.3
Prevail	58.9	59.8	61.6	59.1	62.3	61.4	60.6	49.2	59.1
Prosper	58.4	60.2	61.5	58.3	60.6	60.8	59.1	47.7	58.3
Rollag	59.1	61.2	62.3	60.1	61.1	62.4	60.2	50.0	59.6
Shelly	58.4	60.9	61.1	59.9	62.2	61.9	60.2	50.4	59.4
Surpass	58.0	59.3	60.4	60.8	61.2	60.9	60.6	49.9	58.9
SY Ingmar	59.6	61.8	62.0	58.3	62.0	61.1	60.5	49.2	59.3
SY Rowyn	58.2	59.8	61.3	58.4	61.6	62.0	59.0	50.3	58.8
SY Soren	59.3	61.2	61.7	60.5	61.4	61.3	61.0	49.8	59.5
SY Valda	58.6	60.7	62.1	59.6	61.1	60.3	58.9	49.9	58.9
TCG-Climax	61.0	62.4	63.2	60.1	59.9	62.8	60.6	52.5	60.3
TCG-Cornerstone	58.4	61.3	61.0	60.4	60.3	58.9	57.8	50.0	58.5
TCG-Spitfire	58.4	60.8	62.0	58.0	60.4	59.8	58.4	49.2	58.4
WB9479	58.5	61.8	61.8	60.6	62.3	61.0	57.7	49.9	59.2
WB9590	57.7	60.5	61.8	60.3	61.3	60.4	59.2	49.8	58.9
WB9653	56.3	60.0	59.5	59.5	61.7	58.8	58.9	47.9	57.8
WB9719	60.7	62.0	63.5	62.3	62.3	61.9	61.5	51.2	60.7
WB-Mayville	58.9	61.3	61.6	60.8	61.5	58.5	59.3	49.5	58.9
Mean	58.5	60.9	61.5	59.6	61.1	61.1	59.4	49.8	59.0
CV %	1.2	1.3	2.3	1.4	1.6	0.9	1.8	2.1	1.6
LSD 0.05	1.0	1.0	1.8	1.1	1.4	0.8	1.5	1.7	0.8
LSD 0.10	0.8	0.8	1.4	1.0	1.1	0.7	1.5	1.4	0.7

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