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Protein Content of Winter Wheat Varieties in Oklahoma — 2016–2017

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General Information

Protein is just one of many attributes that determines end-use quality and marketability of winter wheat. In fact, some millers and bakers would argue that functionality of wheat protein is more important than the quantity of protein. While varietal differences commonly exist, variability in protein among environments is generally much larger than variability among varieties. Factors such as N fertility and drought stress, for example, can sharply impact final protein wheat content.

To reflect these management and environmental impacts on wheat protein content, data are reported by variety and location in Table 1. Table 2 reports the wheat protein content by variety as a deviation from location mean, as this allows for easier comparison of wheat protein among varieties across locations. Doublestop CL Plus, for example, is a variety which showed positive deviation from the location mean in 90 percent of this year's trials, indicating it has a tendency for above-average wheat protein content. Iba, on the other hand, showed a negative deviation from location mean in 75 percent of the trials, indicating a tendency for lower than average wheat protein content. Varieties which showed a consistent, relatively high wheat protein content across the regional performance trial locations this year and have a history of acceptable or desirable dough quality (i.e., good protein quality) include Bob Dole, Doublestop CL Plus, Stardust, SY Drifter,and WB4458.

Adequate N fertility as recommended by a recent soil test or sensor-based nitrogen management program can help ensure that varieties such as Iba produce wheat or flour protein within the acceptable range for end-use customers. Iba is also a prime example of how protein data can sometimes be misused, as the functionality of the protein in Iba is above average, which can offset lower absolute protein content. More information on end-use quality is available in Current Report CR-2165, Wheat and Flour Quality for Varieties Tested in the 2016 OSU Variety Peformance Tests.

Procedures

Approximately 600-gram subsamples of wheat grain were collected from the OSU Wheat Variety Performance Test plots at harvest. These plots were well-fertilized and managed according to OSU Cooperative Extension recommendations. Additional information on test locations and management practices is available in Current Report CR-2143, 2016-2017 Oklahoma Small Grains Variety Performance Tests on the web at www.wheat.okstate.edu. Samples were stored in plastic containers for approximately one month following harvest. Samples were nondestructively analyzed for protein content on a 12 percent moisture basis using a Diode Array Near Infrared instrument (NIR) (model DA 7200, Perten Instruments, Sweden).

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Table 1. Wheat protein content (12% moisture basis) of varieties and experimental lines tested in the 2016-2017 Oklahoma Wheat Variety Performance Tests.

		Afton	*Altus*	*Alva*	*Apache*	*Apache Fungicide*	*Balko*	*Buffalo*	*Cherokee*	*Chickasha*	*Chickasha IWM*
Source	**Variety**	**%wheat protein**									
AGSECO	AG Icon	-	14.0	-	-	-	-	-	-	12.4	12.2
AGSECO	AG Robust	-	13.4	-	-	-	-	-	-	12.7	12.2
PlainsGold	Avery	-	-	11.1	-	-	13.0	8.9	10.3	-	-
OGI	Bentley	12.7	11.6	10.6	9.4	10.7	12.9	11.3	10.5	10.2	10.8
OGI	Billings	12.9	12.8	-	-	-	-	-	-	12.0	11.9
Syngenta	Bob Dole	-	11.9	-	-	-	-	-	-	11.8	12.4
PlainsGold	Brawl CL Plus	-	-	10.0	-	-	13.0	10.7	11.1	-	-
PlainsGold	Byrd	-	-	9.8	-	-	13.6	9.0	9.9	-	-
OGI	Doublestop CL Plus	13.6	12.7	10.3	12.3	11.6	13.6	12.5	11.1	11.8	12.0
OGI	Duster	12.7	12.2	10.3	11.2	10.7	13.8	11.0	10.7	11.7	11.8
OSU	Endurance	12.9	12.1	10.8	11.2	11.1	14.2	10.4	10.3	12.3	12.1
OGI	Gallagher	12.7	10.7	10.9	9.9	10.3	13.4	10.5	10.2	11.4	11.7
AGSECO	Hot Rod	-	12.3	-	-	-	-	-	-	10.9	11.7
OGI	Iba	11.7	11.6	10.9	10.1	9.9	13.9	10.2	10.6	10.9	11.0
KWA	Joe	13.2	11.4	11.0	-	-	13.1	10.7	10.0	11.9	11.9
PlainsGold	Langin	-	-	10.3	-	-	12.8	8.9	10.0	-	-
KWA	Larry	13.6	12.0	10.3	-	-	13.3	9.6	10.1	11.7	11.6
LCS	LCS Chrome	13.6	13.6	11.0	10.8	10.7	11.8	11.6	10.6	11.8	12.4
LCS	LCS Mint	12.0	10.6	11.0	10.1	9.9	13.1	9.5	10.0	11.7	12.0
LCS	LCS Pistol	12.8	11.4	11.4	10.1	9.9	14.1	10.1	10.8	11.3	11.7
LCS	LCS Wizard	-	11.6	-	-	-	-	-	-	11.3	11.4
OGI	Lonerider	13.2	-	9.9	-	-	13.0	9.9	-	-	-
Dyna-Gro	Long Branch	-	12.6	-	-	-	-	-	-	11.0	12.1
OGI	NF 101	-	12.0	-	-	-	-	-	-	11.4	11.8
OGI	Ruby Lee	13.4	11.4	11.4	10.5	10.7	13.8	11.2	10.8	12.0	12.2
OGI	Smith's Gold	-	10.7	12.4	9.8	10.1	13.1	-	10.4	11.0	11.4
OGI	Spirit Rider	-	-	-	-	-	13.0	-	10.2	-	-
OGI	Stardust	-	12.0	-	-	-	-	-	-	12.4	12.6
Syngenta	SY Achieve CL2	-	12.3	-	-	-	-	-	-	11.9	11.8
Syngenta	SY Benefit	12.6	11.1	-	-	-	-	-	-	10.6	11.3
Syngenta	SY Drifter	-	12.4	-	-	-	-	-	-	11.9	11.9
Syngenta	SY Flint	13.2	11.7	-	11.2	11.0	-	-	-	11.5	11.7
Syngenta	SY Grit	-	11.0	-	-	-	-	-	-	11.4	12.0
Syngenta	SY Llano	13.3	11.6	-	11.5	11.2	-	-	-	11.7	11.5
Syngenta	SY Monument	12.7	-	11.2	-	-	13.5	10.6	10.4	-	-
Syngenta	SY Razor	-	12.3	-	11.2	10.9	-	-	-	11.6	12.2
Syngenta	SY Rugged	-	12.2	-	-	-	-	-	-	12.3	11.2
LCS	T158	-	11.0	-	-	-	-	-	-	10.9	11.0
Watley Seed	TAM 112	-	-	10.8	-	-	13.5	9.6	10.3	-	-
AGSECO	TAM 114	-	11.9	-	-	-	-	-	-	10.1	11.4
Watley Seed	TAM 204	13.4	12.1	11.7	10.3	10.5	13.6	10.1	10.3	11.0	10.6
KWA	Tatanka	12.4	10.7	11.1	-	-	13.6	9.7	10.1	10.2	10.9
WestBred	WB4269	-	12.2	-	-	-	-	-	-	11.8	11.7
WestBred	WB4303	-	12.2	-	-	-	-	-	-	11.4	11.7
WestBred	WB4458	14.0	11.9	-	10.2	10.5	-	-	-	12.0	12.8
WestBred	WB4515	-	12.3	-	-	-	-	-	-	11.2	11.8
WestBred	WB4721	-	11.8	-	-	-	-	-	-	11.1	11.4
WestBred	WB-Cedar	13.6	12.1	11.7	-	-	14.4	10.8	9.9	11.4	11.8
WestBred	WB-Grainfield	12.5	12.6	12.2	9.2	9.3	14.0	10.0	9.8	9.9	10.9
WestBred	Winterhawk	-	11.2	12.5	9.6	10.0	13.8	10.7	10.1	10.8	12.0
KWA	Zenda	-	11.0	-	-	-	-	-	-	10.6	12.1
OSU Experimentals											
	OK11755W-9W	-	11.6	-	-	-	-	-	-	-	-
	OK11D25005	-	-	-	-	-	-	-	10.3	-	-
	OK12206-2	13.3	-	10.5	-	-	-	-	10.1	-	-
	OK12621	12.5	-	-	-	-	-	-	-	-	-
	OK12716R/W	12.6	12.3	11.0	10.8	11.8	12.6	9.9	10.2	11.6	11.6
	OK12912C-2	-	13.1	11.0	11.3	11.4	-	-	-	-	-
	OK12D22002-077	12.8	12.0	10.3	10.7	10.6	13.3	-	-	11.3	11.9
	OK12D22004-016	13.2	-	-	-	-	-	-	-	-	-
	OK13209	12.8	13.9	10.2	11.1	10.4	-	-	-	11.7	11.2
	OK13621	-	12.4	-	-	-	-	-	-	11.6	11.6
	OK14319	12.9	-	-	-	-	-	-	10.3	-	-
	Mean	**13.0**	**12.0**	**10.9**	**10.6**	**10.6**	**13.4**	**10.3**	**10.3**	**11.4**	**11.7**
	LSD (0.05)	**1.0**	**1.4**	**0.9**	**1.0**	**1.2**	**NS**	**0.9**	**NS**	**1.1**	**NS**

Notes: Shaded values are not statistically different from the highest value within a column (i.e., location). NS = not significant.

Table 1. Wheat protein content (12% moisture basis) of varieties and experimental lines tested in the 2016-2017 Oklahoma Wheat Variety Performance Tests. (cont'd).

Source	Variety	*Goodwell Irrigated*	*Homestead*	*Kildare*	*Lahoma*	*Lahoma Fungicide*	*Marshall Dual-Purpose*	*Marshall Grain-only*	*Thomas*	*Union City*	*Walters*
		---------- %wheat protein ----------									
AGSECO	AG Icon	16.9	-	-	12.0	11.7	-	-	-	-	-
AGSECO	AG Robust	17.1	-	-	11.0	11.2	-	-	-	-	-
PlainsGold	Avery	15.4	-	-	11.5	10.4	-	-	-	-	-
OGI	Bentley	16.0	10.3	10.1	10.8	10.5	12.4	11.6	9.0	10.0	8.1
OGI	Billings	17.3	11.5	10.5	11.5	11.2	12.6	11.8	10.5	12.3	-
Syngenta	Bob Dole	17.0	-	-	11.4	11.5	-	-	-	-	-
PlainsGold	Brawl CL Plus	16.5	-	-	12.4	12.5	-	-	-	-	-
PlainsGold	Byrd	15.7	-	-	11.0	10.6	-	-	-	-	-
OGI	Doublestop CL Plus	17.3	12.3	11.5	12.1	12.3	11.9	12.5	10.5	13.6	8.8
OGI	Duster	16.2	10.7	10.6	11.1	10.8	12.1	12.3	10.0	12.1	8.5
OSU	Endurance	16.6	11.2	10.2	11.9	11.8	12.3	11.8	10.3	13.0	9.1
OGI	Gallagher	16.7	10.9	10.1	10.7	11.0	11.3	11.8	9.9	12.1	8.4
AGSECO	Hot Rod	16.6	-	-	11.0	11.0	-	-	-	-	-
OGI	Iba	15.4	10.6	10.0	10.5	10.4	11.9	12.8	9.5	12.0	8.2
KWA	Joe	16.0	10.0	9.5	11.0	10.8	12.5	12.0	9.2	-	-
PlainsGold	Langin	17.0	-	-	10.9	10.8	-	-	-	-	-
KWA	Larry	16.1	10.3	10.7	11.0	10.5	11.9	13.0	9.2	-	-
LCS	LCS Chrome	16.4	10.8	10.9	12.5	12.5	12.5	12.2	10.0	12.9	8.4
LCS	LCS Mint	15.8	9.8	9.6	10.7	10.6	11.9	12.1	8.8	10.9	8.6
LCS	LCS Pistol	16.1	10.6	9.9	11.3	10.8	12.3	11.8	9.5	12.7	8.0
LCS	LCS Wizard	16.3	-	-	11.7	11.7	-	-	-	-	-
OGI	Lonerider	17.0	10.7	-	-	-	-	-	9.5	-	-
Dyna-Gro	Long Branch	15.4	-	-	11.6	11.5	-	-	-	-	-
OGI	NF 101	16.0	-	-	11.2	11.6	-	-	-	-	-
OGI	Ruby Lee	17.6	11.1	10.4	10.9	11.7	13.1	11.5	10.4	13.9	8.5
OGI	Smith's Gold	16.5	10.3	10.9	11.4	10.9	12.2	12.3	9.2	10.5	8.3
OGI	Spirit Rider	16.4	-	10.8	-	-	-	-	-	-	-
OGI	Stardust	17.1	11.5	-	12.5	12.1	12.9	12.5	-	-	-
Syngenta	SY Achieve CL2	17.9	-	-	11.5	11.4	-	-	-	-	-
Syngenta	SY Benefit	16.3	-	-	10.8	10.3	-	-	-	-	-
Syngenta	SY Drifter	16.9	-	-	11.7	11.8	-	-	-	-	-
Syngenta	SY Flint	16.2	11.3	10.1	10.4	11.0	12.0	13.4	10.0	11.1	8.4
Syngenta	SY Grit	16.2	-	-	11.4	10.9	-	-	-	-	-
Syngenta	SY Llano	-	11.2	10.8	11.3	11.9	11.2	12.7	10.3	11.6	9.1
Syngenta	SY Monument	16.2	10.5	10.3	10.6	10.9	13.3	12.4	9.5	-	-
Syngenta	SY Razor	-	-	-	-	-	-	-	-	11.9	9.2
Syngenta	SY Rugged	16.4	-	-	11.0	10.6	-	-	-	-	-
LCS	T158	15.8	-	-	11.3	10.7	-	-	-	-	-
Watley Seed	TAM 112	17.2	-	-	11.5	11.0	-	-	-	-	-
AGSECO	TAM 114	16.8	-	-	10.9	10.4	-	-	-	-	-
Watley Seed	TAM 204	16.3	10.6	10.9	11.7	11.0	12.5	12.2	10.2	11.5	8.8
KWA	Tatanka	15.7	9.5	9.2	10.0	10.1	12.1	12.0	8.5	-	-
WestBred	WB4269	16.0	-	-	11.3	11.5	-	-	-	-	-
WestBred	WB4303	17.4	-	-	10.4	10.8	-	-	-	-	-
WestBred	WB4458	17.3	11.0	11.5	10.5	11.4	11.8	12.1	10.0	12.1	9.8
WestBred	WB4515	17.3	-	-	11.2	11.1	-	-	-	-	-
WestBred	WB4721	17.2	-	-	11.4	11.7	-	-	-	-	-
WestBred	WB-Cedar	16.6	11.1	10.6	11.1	12.3	11.6	11.9	10.5	10.9	-
WestBred	WB-Grainfield	16.4	9.3	9.8	10.8	11.1	11.7	11.4	9.1	11.3	8.0
WestBred	Winterhawk	15.9	-	-	10.2	10.4	-	-	-	-	8.3
KWA	Zenda	15.5	-	-	10.2	10.8	-	-	-	-	-
OSU Experimentals											
	OK11755W-9W	16.3	-	-	11.4	10.8	-	-	-	-	-
	OK11D25005	-	-	-	-	-	12.2	11.4	-	12.9	8.0
	OK12206-2	16.8	-	-	10.7	11.1	11.9	13.0	-	-	-
	OK12621	-	-	-	-	-	12.9	12.0	-	-	-
	OK12716R/W	16.8	10.7	10.4	10.8	10.9	13.0	12.7	9.4	10.6	7.9
	OK12912C-2	-	12.1	-	12.1	11.9	-	-	-	-	-
	OK12D22002-077	16.9	11.5	10.5	11.4	11.3	-	-	-	-	-
	OK12D22004-016	15.3	-	-	10.8	11.3	-	-	-	-	-
	OK13209	-	12.4	-	12.0	12.0	-	-	-	-	-
	OK13621	16.7	-	-	11.5	11.5	-	-	-	-	-
	OK14319	-	-	-	-	-	12.9	12.1	-	12.1	-
	Mean	**16.5**	**10.8**	**10.4**	**11.2**	**11.2**	**12.3**	**12.2**	**9.7**	**11.9**	**8.5**
	LSD (0.05)	**0.8**	**0.6**	**0.7**	**0.8**	**0.8**	**NS**	**NS**	**0.7**	**1.0**	**0.3**

Notes: Shaded values are not statistically different from the highest value within a column (i.e., location). NS = not significant.

Table 2. Wheat protein content relative to the location mean (expressed as a deviation) for varieties and experimental lines in the 2016-2017 Oklahoma Wheat Variety Performance Tests.

		Afton	*Altus*	*Alva*	*Apache*	*Apache Fungicide*	*Balko*	*Buffalo*	*Cherokee*	*Chickasha*	*Chickasha IWM*
Source	**Variety**	**% wheat protein relative to location mean**									
AGSECO	AG Icon	-	2.0	-	-	-	-	-	-	1.0	0.5
AGSECO	AG Robust	-	1.4	-	-	-	-	-	-	1.3	0.5
PlainsGold	Avery	-		-	0.2	-	-	-0.4	-1.4	0.0	-
-OGI	Bentley	-0.3	-0.4	-0.3	-1.2	0.1	-0.5	1.0	0.2	-1.2	-0.9
OGI	Billings	-0.2	0.8	-	-	-	-	-	-	0.6	0.2
Syngenta	Bob Dole	-	-0.1	-	-	-	-	-	-	0.4	0.7
PlainsGold	Brawl CL Plus	-	-	-0.9	-	-	-0.4	0.4	0.8	-	-
PlainsGold	Byrd	-	-	-1.1	-	-	0.2	-1.3	-0.4	-	-
OGI	Doublestop CL Plus	0.6	0.7	-0.6	1.7	1.0	0.2	2.2	0.8	0.4	0.3
OGI	Duster	-0.3	0.2	-0.6	0.6	0.1	0.4	0.7	0.4	0.3	0.1
OSU	Endurance	-0.1	0.1	-0.1	0.6	0.5	0.8	0.1	0.0	0.9	0.4
OGI	Gallagher	-0.3	-1.3	0.0	-0.7	-0.4	0.0	0.2	-0.1	0.0	0.0
AGSECO	Hot Rod	-	0.3	-	-	-	-	-	-	-0.5	0.0
OGI	Iba	-1.3	-0.4	0.0	-0.5	-0.7	0.5	-0.1	0.3	-0.5	-0.7
KWA	Joe	0.2	-0.6	0.1	-	-	-0.3	0.4	-0.3	0.5	0.2
PlainsGold	Langin	-	-	-0.6	-	-	-0.6	-1.4	-0.3	-	-
KWA	Larry	0.6	0.0	-0.7	-	-	-0.1	-0.7	-0.2	0.3	-0.1
LCS	LCS Chrome	0.6	1.6	0.1	0.2	0.1	-1.6	1.3	0.3	0.4	0.7
LCS	LCS Mint	-1.0	-1.4	0.1	-0.5	-0.7	-0.3	-0.8	-0.3	0.3	0.3
LCS	LCS Pistol	-0.2	-0.6	0.5	-0.5	-0.7	0.7	-0.2	0.5	-0.1	0.0
LCS	LCS Wizard	-	-0.4	-	-	-	-	-		--0.1	-0.4
OGI	Lonerider	0.2	-	-1.0	-	-	-0.4	-0.4	-	-	-
Dyna-Gro	Long Branch	-	0.6	-	-	-	-	-	-	-0.4	0.4
OGI	NF 101	-	0.0	-	-	-	-	-	-	0.0	0.1
OGI	Ruby Lee	0.4	-0.6	0.5	-0.1	0.1	0.4	0.9	0.5	0.6	0.5
OGI	Smith's Gold	-	-1.3	1.5	-0.8	-0.5	-0.3	-	0.1	-0.4	-0.3
OGI	Spirit Rider	-	-	-	-	-	-0.4	-	-0.1	-	-
OGI	Stardust	-	0.0	-	-	-	-	-	-	1.0	0.9
Syngenta	SY Achieve CL2	-	0.3	-	-	-	-	-	-	0.5	0.1
Syngenta	SY Benefit	-0.4	-0.9	-	-	-	-	-	-	-0.8	-0.4
Syngenta	SY Drifter	-	0.4	-	-	-	-	-	-	0.5	0.2
Syngenta	SY Flint	0.2	-0.3	-	0.6	0.4	-	-	-	0.1	0.0
Syngenta	SY Grit	-	-1.0	-	-	-	-	-	-	0.0	0.3
Syngenta	SY Llano	0.3	-0.4	-	0.9	0.6	-	-	-	0.3	-0.2
Syngenta	SY Monument	-0.3	-	0.3	-	-	0.1	0.3	0.1	-	-
Syngenta	SY Razor	-	0.3	-	0.6	0.3	-	-	-	0.2	0.5
Syngenta	SY Rugged	-	0.2	-	-	-	-	-	-	0.9	-0.5
LCS	T158	-	-1.0	-	-	-	-	-	-	-0.5	-0.7
Watley Seed	TAM 112	-	-	-0.1	-	-	0.1	-0.7	0.0	-	-
AGSECO	TAM 114	-	-0.1	-	-	-	-	-	-	-1.3	-0.3
Watley Seed	TAM 204	0.4	0.1	0.8	-0.3	-0.1	0.2	-0.2	0.0	-0.4	-1.1
KWA	Tatanka	-0.6	-1.3	0.2	-	-	0.2	-0.6	-0.2	-1.2	-0.8
WestBred	WB4269	-	0.2	-	-	-	-	-	-	0.4	0.0
WestBred	WB4303	-	0.2	-	-	-	-	-	-	0.0	0.0
WestBred	WB4458	1.0	-0.1	-	-0.4	-0.1	-	-	-	0.6	1.1
WestBred	WB4515	-	0.3	-	-	-	-	-	-	-0.2	0.1
WestBred	WB4721	-	-0.2	-	-	-	-	-	-	-0.3	-0.3
WestBred	WB-Cedar	0.6	0.1	0.8	-	-	1.0	0.5	-0.4	0.0	0.1
WestBred	WB-Grainfield	-0.5	0.6	1.3	-1.4	-1.3	0.6	-0.3	-0.5	-1.5	-0.8
WestBred	Winterhawk	-	-0.8	1.6	-1.0	-0.6	0.4	0.4	-0.2	-0.6	0.3
KWA	Zenda	-	-1.0	-	-	-	-	-	-	-0.8	0.4
OSU Experimentals											
	OK11755W-9W	-	-0.4	-	-	-	-	-	-	-	-
	OK11D25005	-	-	-	-	-	-	-	0.0	-	-
	OK12206-2	0.3	-	-0.4	-	-	-	-	-0.2	-	-
	OK12621	-0.5	-	-	-	-	-	-	-	-	-
	OK12716R/W	-0.4	0.3	0.1	0.2	1.2	-0.8	-0.4	-0.1	0.2	-0.1
	OK12912C-2	-	1.1	0.1	0.7	0.8	-	-	-	-	-
	OK12D22002-077	-0.2	0.0	-0.6	0.1	0.0	-0.1	-	-	-0.1	0.2
	OK12D22004-016	0.2	-	-	-	-	-	-	-	-	-
	OK13209	-0.2	1.9	-0.7	0.5	-0.2	-	-	-	0.3	-0.5
	OK13621	-	0.4	-	-	-	-	-	-	0.2	-0.1
	OK14319	-0.1	-	-	-	-	-	-	0.0	-	-
	Mean	**13.0**	**12.0**	**10.9**	**10.6**	**10.6**	**13.4**	**10.3**	**10.3**	**11.4**	**11.7**
	LSD (0.05)	**1.0**	**1.4**	**0.9**	**1.0**	**1.2**	**NS**	**0.9**	**NS**	**1.1**	**NS**

Table 2. Wheat protein content relative to the location mean (expressed as a deviation) for varieties and experimental lines in the 2016-2017 Oklahoma Wheat Variety Performance Tests. (cont'd).

Source	Variety	*Goodwell Irrigated*	*Homestead*	*Kildare*	*Lahoma*	*Lahoma Fungicide*	*Marshall Dual-Purpose*	*Marshall Grain-only*	*Thomas*	*Union City*	*Walters*
		% wheat protein relative to location mean									
AGSECO	AG Icon	0.4	-	-	0.8	0.5	-	-	-	-	-
AGSECO	AG Robust	0.6	-	-	-0.2	0.0	-	-	-	-	-
PlainsGold	Avery	-1.1	-	-	0.3	-0.8	-	-	-	-	-
OGI	Bentley	-0.5	-0.5	-0.3	-0.4	-0.7	0.1	-0.6	-0.7	-1.9	-0.4
OGI	Billings	0.8	0.7	0.1	0.3	0.0	0.3	-0.4	0.8	0.4	-
Syngenta	Bob Dole	0.5	-	-	0.2	0.3	-	-	-	-	-
PlainsGold	Brawl CL Plus	-0.1	-	-	1.2	1.3	-	-	-	-	-
PlainsGold	Byrd	-0.8	-	-	-0.2	-0.6	-	-	-	-	-
OGI	Doublestop CL Plus	0.8	1.5	1.1	0.9	1.1	-0.4	0.3	0.8	1.7	0.3
OGI	Duster	-0.3	-0.1	0.2	-0.1	-0.4	-0.2	0.1	0.3	0.2	0.0
OSU	Endurance	0.1	0.4	-0.2	0.7	0.6	0.0	-0.4	0.6	1.1	0.6
OGI	Gallagher	0.2	0.1	-0.3	-0.5	-0.2	-1.0	-0.4	0.2	0.2	-0.1
AGSECO	Hot Rod	0.1	-	-	-0.2	-0.2	-	-	-	-	-
OGI	Iba	-1.1	-0.2	-0.4	-0.7	-0.8	-0.4	0.6	-0.2	0.1	-0.3
KWA	Joe	-0.5	-0.8	-0.9	-0.2	-0.4	0.2	-0.2	-0.5	-	-
PlainsGold	Langin	0.4	-	-	-0.3	-0.4	-	-	-	-	-
KWA	Larry	-0.4	-0.5	0.3	-0.2	-0.7	-0.4	0.8	-0.5	-	-
LCS	LCS Chrome	-0.1	0.0	0.5	1.3	1.3	0.2	0.0	0.3	1.0	-0.1
LCS	LCS Mint	-0.8	-1.0	-0.8	-0.5	-0.6	-0.4	-0.1	-0.9	-1.0	0.1
LCS	LCS Pistol	-0.4	-0.2	-0.5	0.1	-0.4	0.0	-0.4	-0.2	0.8	-0.5
LCS	LCS Wizard	-0.2	-	-	0.5	0.5	-	-	-	-	-
OGI	Lonerider	0.5	-0.1	-	-	-	-	-	-0.2	-	-
Dyna-Gro	Long Branch	-1.2	-	-	0.4	0.3	-	-	-	-	-
OGI	NF 101	-0.5	-	-	0.0	0.4	-	-	-	-	-
OGI	Ruby Lee	1.1	0.3	0.0	-0.3	0.5	0.8	-0.7	0.7	2.0	0.0
OGI	Smith's Gold	0.0	-0.5	0.5	0.2	-0.3	-0.1	0.1	-0.5	-1.4	-0.2
OGI	Spirit Rider	-0.1	-	0.4	-	-	-	-	-	-	-
OGI	Stardust	0.6	0.7	-	1.3	0.9	0.6	0.3	-	-	-
Syngenta	SY Achieve CL2	1.4	-	-	0.3	0.2	-	-	-	-	-
Syngenta	SY Benefit	-0.2	-	-	-0.4	-0.9	-	-	-	-	-
Syngenta	SY Drifter	0.4	-	-	0.5	0.6	-	-	-	-	-
Syngenta	SY Flint	-0.3	0.5	-0.3	-0.8	-0.2	-0.3	1.2	0.3	-0.8	-0.1
Syngenta	SY Grit	-0.3	-	-	0.2	-0.3	-	-	-	-	-
Syngenta	SY Llano	-	0.4	0.4	0.1	0.7	-1.1	0.5	0.6	-0.3	0.6
Syngenta	SY Monument	-0.3	-0.3	-0.1	-0.6	-0.3	1.0	0.2	-0.2	-	-
Syngenta	SY Razor	-	-	-	-	-	-	-	-	0.0	0.7
Syngenta	SY Rugged	-0.1	-	-	-0.2	-0.6	-	-	-	-	-
LCS	T158	-0.8	-	-	0.1	-0.5	-	-	-	-	-
Watley Seed	TAM 112	0.7	-	-	0.3	-0.2	-	-	-	-	-
AGSECO	TAM 114	0.3	-	-	-0.3	-0.8	-	-	-	-	-
Watley Seed	TAM 204	-0.2	-0.2	0.5	0.5	-0.2	0.2	0.0	0.5	-0.4	0.3
KWA	Tatanka	-0.9	-1.3	-1.2	-1.2	-1.1	-0.2	-0.2	-1.2	-	-
WestBred	WB4269	-0.5	-	-	0.1	0.3	-	-	-	-	-
WestBred	WB4303	0.9	-	-	-0.8	-0.4	-	-	-	-	-
WestBred	WB4458	0.8	0.2	1.1	-0.7	0.2	-0.5	-0.1	0.3	0.2	1.3
WestBred	WB4515	0.8	-	-	0.0	-0.1	-	-	-	-	-
WestBred	WB4721	0.7	-	-	0.2	0.5	-	-	-	-	-
WestBred	WB-Cedar	0.1	0.3	0.2	-0.1	1.1	-0.7	-0.3	0.8	-1.0	-
WestBred	WB-Grainfield	-0.1	-1.5	-0.6	-0.4	-0.1	-0.6	-0.8	-0.6	-0.6	-0.5
WestBred	Winterhawk	-0.7	-	-	-1.0	-0.8	-	-	-	-	-0.2
KWA	Zenda	-1.0	-	-	-1.0	-0.4	-	-	-	-	-
OSU Experimentals											
	OK11755W-9W	-0.2	-	-	0.2	-0.4	-	-	-	-	-
	OK11D25005	-	-	-	-	-	-0.1	-0.8	-	1.0	-0.5
	OK12206-2	0.3	-	-	-0.5	-0.1	-0.4	0.8	-	-	-
	OK12621	-	-	-	-	-	0.6	**-0.2**	-	-	-
	OK12716R/W	0.3	-0.1	0.0	-0.4	-0.3	0.7	0.5	-0.3	-1.3	-0.6
	OK12912C-2	-	1.3	-	0.9	0.7	-	-	-	-	-
	OK12D22002-077	0.4	0.7	0.1	0.2	0.1	-	-	-	-	-
	OK12D22004-016	-1.2	-	-	-0.4	0.1	-	-	-	-	-
	OK13209	-	1.6	-	0.8	0.8	-	-	-	-	-
	OK13621	0.2	-	-	0.3	0.3	-	-	-	-	-
	OK14319	-	-	-	-	-	0.6	-0.1	-	0.2	-
	Mean	**16.5**	**10.8**	**10.4**	**11.2**	**11.2**	**12.3**	**12.2**	**9.7**	**11.9**	**8.5**
	LSD (0.05)	**0.8**	**0.6**	**0.7**	**0.8**	**0.8**	**NS**	**NS**	**0.7**	**1.0**	**0.3**

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