



Current Report

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Protein Content of Winter Wheat Varieties in Oklahoma—2013

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General Information

Protein is just one of many attributes which determine 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, differences in varietal protein among environments are generally much larger than differences among varieties. Factors such as nitrogen fertility and drought stress, for example, can sharply impact final protein content of the grain.

The 18.9 percent average protein for the Altus location is a good example of how fertility and environment can impact grain protein. The 2013 Altus wheat variety trial was sown after two successive failed cotton crops, and available soil nitrate nitrogen at the time of sowing was 222 lbs/acre. This amount of nitrogen is sufficient to produce a 111 bu/acre wheat crop. Due to extreme drought, however, average grain yield at Altus in 2013 was 13 bu/acre. Under these circumstances, wheat plants were able to pull large amounts of nitrogen from the soil and move this nitrogen to the developing grain. Grain size

was reduced and grains were shriveled due to drought, thus resulting in abnormally high wheat protein.

Procedures

Approximately 600g 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 CR-2143, *2013 Oklahoma Small Grains Variety Performance Tests* on the web at www.wheat.okstate.edu. Samples were stored in plastic containers for approximately three months following harvest. Samples were analyzed for protein content using a Diode Array Near Infrared instrument (NIR) (model DA 7200, Perten Instruments, Sweden).

Acknowledgments

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2013 Oklahoma Wheat Variety Performance Tests Wheat Protein Summary.

Source	Variety	%wheat protein (12% moisture basis)						
		Afton	Altus	Apache	Apache Fungicide	Chickasha	Goodwell Irrigated	Homestead
WestBred	Armour	13.4	18.6	14.4	14.2	15.2	17.6	14.2
OGI	Billings	14.6	19.1	14.0	14.3	15.3	17.4	15.0
CWRF	Brawl CL Plus	-	18.9	-	-	14.4	16.9	-
CWRF	Byrd	-	19.0	-	-	14.7	16.9	-
OGI	Centerfield	-	19.8	-	-	15.4	17.3	-
Syngenta	CJ	13.5	18.6	13.1	12.5	14.8	16.6	14.5
OSU	Deliver	-	18.6	-	-	15.4	16.3	-
Syngenta	Doans	13.9	19.0	14.0	13.8	15.2	16.6	14.3
OGI	Doublestop CL Plus	13.3	18.8	-	-	14.4	17.1	14.8
OGI	Duster	13.6	18.3	14.8	13.6	14.6	16.6	14.3
OSU	Endurance	13.5	18.9	14.4	14.1	14.7	16.7	14.9
KWA	Everest	13.3	19.1	15.3	13.2	15.5	16.6	14.2
OGI	Gallagher	14.1	18.8	14.0	12.8	15.4	16.7	14.7
OGI	Garrison	14.0	18.6	14.9	14.0	14.5	17.3	14.9
Syngenta	Greer	14.4	18.9	15.4	14.9	15.5	17.5	14.8
OGI	Iba	13.4	18.8	13.9	12.7	14.4	16.1	14.6
Syngenta	Jackpot	13.6	18.7	13.6	12.7	15.3	17.0	15.1
KWA	Jagger	10.4	18.2	15.1	14.6	11.8	17.3	15.4
LCS	LCH08-109	-	19.4	-	-	15.8	16.9	-
LCS	LCH08-80	-	19.4	-	-	15.7	16.7	-
LCS	LCS Mint	-	19.0	-	-	15.0	16.4	-
USDA - UNL	Mace	-	-	-	-	-	16.7	-
OGI	OK Bullet	-	19.2	-	-	14.7	17.5	-
OGI	Pete	-	19.1	-	-	13.9	16.4	-
Syngenta	Razor	-	18.4	-	-	15.1	16.9	-
OGI	Ruby Lee	13.8	19.3	14.7	15.6	15.3	17.2	14.5
LCS	T153	13.9	18.7	13.7	14.1	15.7	16.8	14.5
LCS	T154	13.6	18.7	14.2	13.9	16.0	16.7	14.5
LCS	T158	13.7	19.0	15.0	14.6	14.7	17.2	14.0
AGSECO	TAM 113	-	18.9	-	-	14.7	16.9	-
WestBred	WB-Cedar	13.0	18.7	14.5	14.8	15.7	17.4	15.7
WestBred	WB-Deuce CL+	-	19.5	-	-	15.7	17.9	-
WestBred	WB-Grainfield	-	19.0	-	-	14.4	16.9	-
WestBred	WB-Redhawk	13.6	18.4	14.4	14.0	15.0	17.1	-
WestBred	WB4458	-	18.8	-	-	15.9	17.8	-
WestBred	Winterhawk	-	18.5	-	-	14.5	16.4	13.9
Experimentals								
	OK08328	-	18.7	-	-	-	-	-
	OK09125	-	19.0	13.6	12.4	14.7	17.2	14.3
	OK09528	-	-	-	-	15.9	17.4	-
	OK09528	-	-	-	-	15.6	-	-
	OK09634	13.5	18.9	14.7	14.6	15.4	17.2	14.6
	OK09729	-	-	-	-	-	17.0	-
	OK09935C	-	18.5	-	-	16.0	17.2	-
	Mean	13.5	18.9	14.4	13.9	15.0	17.0	14.6
	LSD (0.05)	NS	NS	NS	2.6	NS	0.6	NS

NS = differences among varieties were nonsignificant

Table 1. 2013 Oklahoma Wheat Variety Trial Grain Protein Summary (cont'd).

Source	Variety	%wheat protein (12% moisture basis)							
		Hooker	Kildare	Kingfisher	Lahoma	Lahoma Fungicide	Marshall Grain Only	Marshall Dual-Purp.	McCloud
WestBred	Armour	17.5	15.3	11.0	13.2	13.2	15.4	15.0	18.2
OGI	Billings	18.0	15.7	11.1	14.4	14.5	16.3	15.2	17.0
CWRF	Brawl CL Plus	18.2	-	-	14.6	14.5	-	-	-
CWRF	Byrd	17.8	-	-	12.9	13.1	-	-	-
OGI	Centerfield	-	-	-	14.3	14.3	-	-	-
Syngenta	CJ	-	14.7	11.2	13.5	13.5	14.7	14.7	17.2
OSU	Deliver	-	-	-	13.7	13.8	-	-	-
Syngenta	Doans	17.4	15.1	11.9	13.7	13.7	15.0	14.6	17.8
OGI	Doublestop CL Plus	-	15.2	11.0	14.7	14.1	15.8	15.8	17.6
OGI	Duster	17.3	14.9	11.2	14.3	14.1	14.6	15.0	16.1
OSU	Endurance	17.0	15.3	11.2	13.5	13.1	14.2	14.2	16.3
KWA	Everest	17.5	15.8	11.4	13.8	13.8	13.7	15.2	17.4
OGI	Gallagher	17.5	15.5	11.1	13.3	13.4	15.4	15.1	17.4
OGI	Garrison	17.4	14.8	10.7	14.7	14.7	16.7	15.8	17.9
Syngenta	Greer	18.1	15.3	10.6	13.5	13.5	15.0	15.0	17.0
OGI	Iba	17.4	15.7	11.1	13.0	12.7	14.7	14.3	16.5
Syngenta	Jackpot	17.6	15.2	10.4	13.5	13.6	15.8	14.9	17.1
KWA	Jagger	17.8	16.0	11.3	13.8	14.4	15.6	15.4	17.6
LCS	LCH08-109	-	-	-	14.4	13.6	-	-	-
LCS	LCH08-80	-	-	-	14.1	14.3	-	-	-
LCS	LCS Mint	-	-	-	13.6	13.1	-	-	-
USDA - UNL	Mace	17.4	-	-	-	-	-	-	-
OGI	OK Bullet	-	-	-	14.3	14.0	-	-	-
OGI	Pete	-	-	-	13.0	13.2	-	-	-
Syngenta	Razor	-	-	-	13.7	13.7	-	-	-
OGI	Ruby Lee	17.7	15.4	10.8	14.7	14.5	15.6	14.9	17.4
LCS	T153	17.1	15.2	11.1	14.2	14.0	15.7	14.6	17.2
LCS	T154	16.9	14.7	11.1	14.2	13.9	14.7	14.6	17.8
LCS	T158	17.0	15.4	11.1	13.5	13.5	14.4	14.4	17.4
AGSECO	TAM 113	17.1	-	-	13.6	13.2	-	-	-
WestBred	WB-Cedar	17.7	14.6	11.7	13.8	13.7	15.7	15.8	17.8
WestBred	WB-Deuce CL+	-	-	-	14.7	14.5	-	-	-
WestBred	WB-Grainfield	-	-	-	13.4	13.3	-	-	-
WestBred	WB-Redhawk	-	15.2	11.3	14.4	14.0	15.4	14.8	17.9
WestBred	WB4458	-	-	-	13.9	14.3	-	-	-
WestBred	Winterhawk	17.2	-	-	13.7	13.6	-	-	-
Experimentals									
	OK08328	-	-	-	-	-	15.1	-	-
	OK09125	17.9	15.9	10.9	13.4	13.2	14.4	14.3	-
	OK09528	-	14.9	-	14.0	13.8	14.3	14.4	-
	OK09528	-	-	-	-	-	-	-	-
	OK09634	-	15.6	11.3	13.8	13.7	-	14.5	16.8
	OK09729	-	-	-	13.8	13.4	-	-	-
	OK09935C	-	-	-	-	-	-	-	-
	Mean	17.5	15.3	11.1	13.9	13.7	15.1	14.9	17.3
	LSD (0.05)	0.8	NS	NS	0.9	0.8	NS	0.7	0.7

NS = differences among varieties were nonsignificant

Participating Seed Companies

AGSECO, Inc.

Steve Ahring, P.O. Box 7, Girard, KS 66743
Phone: (620) 724-6223
www.agseco.com
Varieties: TAM 113

Colorado Wheat Research Foundation (CWRWF)

Darrell Hanovan, 4026 S. Timberline Rd. Ste. 100,
Fort Collins, CO 80525
Phone: (970) 449-6994
Varieties: Byrd, Brawl CL Plus

Kansas Wheat Alliance (KWA)

Daryl Strouts, 2005 Research Park Circle Ste. 107
Manhattan, KS 66502
Phone: (785) 477-3400
www.kswheatalliance.org
Varieties: Everest, Jagger

Limagrain Cereal Seeds (LCS)

Marla Hall, 6414 N Sheridan, Wichita, KS 67204
Phone: (316) 253-6839
www.limargraincerealseeds.com
Varieties: LCH08-80, LCH08-109, LCS Mint, T153, T154,
T158, T173

Oklahoma Genetics Inc. (OGI)

Mark Hodges, P.O. Box 2113, Stillwater, OK 74076
Phone: (405) 744-7741
www.okgenetics.com
Varieties: Duster, Gallagher, Iba, Ruby Lee, Garrison, Billings,
Centerfield, Pete, OK Bullet

Oklahoma Foundation Seed Services

Jeff Wright, 2902 W. 6th Ave., Stillwater, OK 74074
Phone: (405) 744-7741
www.oklahomaseed.com
Varieties: Endurance, Deliver, Doublestop CL Plus

Syngenta Seeds

Rob Borchardt, P.O. Box 1739, Vernon, TX 76385
Phone: (940) 552-8881
www.agriproheat.com
Varieties: Jackpot, Doans, CJ, Greer, Razor

WestBred

John Fenderson, P.O. Box 47, Kiowa, KS 67070
Phone: (620) 243-4263
www.westbred.com
Varieties: Armour, WB-Cedar, WB-Redhawk, WB-Deuce,
WB-Grainfield, Winterhawk, WB4458

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