Langdon Research Extension Center

NORTH DAKOTA STATE UNIVERSITY

2013 Annual Research Report

NDSU NORTH DAKOTA STATE UNIVERSITY

Langdon Research Extension Center

Annual Research Report No. 88

December 2013

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The 2013 annual research report is intended to provide producers information to aid in selecting varieties and/or hybrids. Variety information and research reports on crop disease and production can also be found at our website www.ag.ndsu.edu/langdonrec/. Variety trial results from all NDSU Research Extension Centers and the Main Station at Fargo, along with crop extension bulletins, can be accessed on the web at www.ag.ndsu.edu/varietytrials/.

Choosing a variety is one of the most important decisions a producer makes in successful crop production. Characteristics to consider in selecting a variety may include yield potential, disease resistance, protein content when grown with proper fertility, straw strength, plant height, test weight, yield stability across years and locations, quality and economic profitability. A variety's performance may differ from year to year and from location to location within a year due to varying environmental conditions. When selecting a variety to grow it is best to consider a variety's performance over several years and locations.

The agronomic data presented in this publication are from replicated research plots using experimental designs that enable the use of statistical analysis. The trials are designed so that "real" yield and agronomic differences can be statistically separated from differences that occur by chance. The least significant difference (LSD) values given in the report are used for this purpose. For example, if the LSD 5% is 5 bushels, then if the difference between any two varieties is greater than 5 bushels they are said to be significantly different from one another 95 times out of 100 under those growing conditions. If the difference between two varieties is less than 5 bushels, they are not significantly different from one another. If there is a "NS" for the LSD 5% value it means there was no real difference between any varieties or the trial was too variable to detect a real difference. 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 that a large amount of variation could not be attributed to differences in the varieties or agronomic characteristic.

The NDSU Langdon Research Extension Center, in addition to its on-station research program, conducted variety research trials at several locations in 2013. Trial locations were at Cavalier, Park River, Lakota, Devils Lake and Cando. These locations are in cooperation with the farmer, the Extension Service and the County Agricultural Improvement Association.

2013 Weather Summary

The 2013 growing season was slightly drier and cooler compared to the 30-year average from 1981 to 2010 at Langdon. Fall recharge at Langdon for September through October 2012 was 3.91 inches, 0.67 inch above normal. Precipitation from November 2012 through March 2013 was 3.78 inches, 0.52 inches above normal. Snowfall for the 2012-2013 was 67.1 inches, 29.7 inches above normal. It was a very cold, wet spring with snow cover remaining on many fields towards the end of April. General spring planting start dates varied across the region from mid-May to early June. Many producers continued planting until mid-June but there were still many prevent plant acres across the region. Rainfall ranged from 80-145 percent of normal across the region from April-September while temperatures averaged 0-4 degrees below normal. Temperatures were seasonably cool from July 20 to August 14. At Langdon, the average high for that period was 69.6 ºF. while the average low was 49.4 ºF. This was especially favorable for the cool season crops like small grains and canola. Yields were very good for the cool season crops because the season started with a full moisture profile, grain filling occurred during the cool stretch of weather, disease levels were low, and rainfall was timely. Warm season crops yields were more variable but could be considered average. Harvest extended into late October for all crops with corn and sunflower harvest extending into November.

2013 Crop Management - Langdon						
Field Trial	**Previous Crop**	**Seeding Rate Unit/Acre**	**Yield Goal**	**Planting Date**	**Harvest Date**	**Row Spacing**
Barley	soybean	1.25 million pls	100 bu	May 16	Sept. 6	6
Canola - LL, CL	soybean	610,000 pls	2500 lb	May 24	Sept. 4	6
Canola - RR	soybean	610,000 pls	2500 lb	May 24	Sept. 4	6
Corn	wheat	28,000 thinned	180 bu	May 14	Oct. 31	30
Durum	soybean	1.50 million pls	60 bu	May 16	Sept. 13	6
Drybean	soybean	70-90,000 pls	2000 lb	May 29	Sept. 24	30
Field Pea	soybean	300,000 pls	60 bu	May 16	Aug. 29	6
Flax	soybean	2.8 million pls	40 bu	May 16	Sept. 17	6
HRSW	soybean	1.50 million pls	60 bu	May 16	Sept. 13	6
HRWW	canola	1.2 million pls	100 bu	Sept 19,2012	Aug. 27	6
Oats	soybean	1.0 million pls	120 bu	May 16	Sept. 12	6
Soybean - Conventional	soybean	200,000 pls	60 bu	May 29	Oct. 9	6
Soybean – LL	soybean	200,000 pls	60 bu	May 29	Oct. 4	6
Soybean - RR	soybean	200,000 pls	60 bu	May 29	Oct. 10	6
Sunflower - Confection	wheat	17,000 thinned	2500 lb	May 17	Oct. 21	30
Sunflower-Oil	wheat	20,000 thinned	2500 lb	May 17	Oct. 21	30
Soil Type - Svea-Barnes loam						

Special thanks to our local cooperators and Extension Agents for their efforts in our off-station variety testing.

Allan Wood-Cando
Crystal Martodam -Towner County Agent
Dave Hankey - Park River
Brad Brummond - Walsh County Agent
Kent Schluchter – Cavalier
Samantha Lahman - Pembina County Agent
Scott Nelson – Lakota
Oybek Turayev - Nelson County Agent
Lesley Lubenow – Area Extension Agent

2013 Off-Station Crop Management						
Location(County/ Field Trial	**Previous Crop**	**Seeding Rate Unit/Acre**	**Yield Goal**	**Planting Date**	**Harvest Date**	**Row Spacing**
Cavalier (Pembina)						
HRSW	sugarbeet	1.50 million pls	60 bu	May 9	Aug. 27	6
Barley	sugarbeet	1.25 million pls	100 bu	May 9	Aug. 14	6
Soybeans	sugarbeet	200,000 pls	60 bu	June 6	Oct. 8	6
Drybean	sugarbeet	70,000-90,000 pls	2000 lb	June 6	Sept. 25	30
Park River (Walsh)						
HRSW	fallow	1.50 million pls	65 bu	May 28	Sept. 13	6
Soybean	corn	200,000 pls	60 bu	May 28	Oct. 2	6
Lakota (Nelson)						
HRSW	drybean	1.50 million pls	60 bu	May 10	Aug. 26	6
Soybean	wheat	200,000 million pls	60 bu	June 3	Oct. 10	6
Cando (Towner)						
HRSW	fallow	1.50 million pls	60 bu	June 7	Sept. 23	6
Durum	fallow	1.50 million pls	60 bu	June 7	Sept. 23	6

Location	**Soil Type**
Cavalier	Fargo silty clay – tiled field
Park River	Glyndon silt loam, soybean – Fairdale silt loam
Lakota	Barnes-Buse loam
Cando	Great Bend-Zell silt loam

pls=pure live seeds

Record of Climatological Observation
Langdon, ND

	Precipitation		Dep. from		Temperature		Dep. from
	Normal*	2013	Normal		Normal*	2013	Normal
April	1.23	1.04	-0.19	April	38.1	24.5	-13.6
May	2.29	5.00	+2.71	May	51.5	50.3	-1.2
June	3.23	1.87	-1.36	June	60.8	62.5	+1.7
July	2.86	2.29	-0.57	July	66.4	65.7	-0.7
August	2.59	1.32	-1.27	August	64.5	66.1	+1.6
September	2.00	1.86	-0.14	Sept.	54.4	59.1	+4.7
Total	14.20	13.38	-0.82	Total	56.0	54.7	-1.3

*112 year average

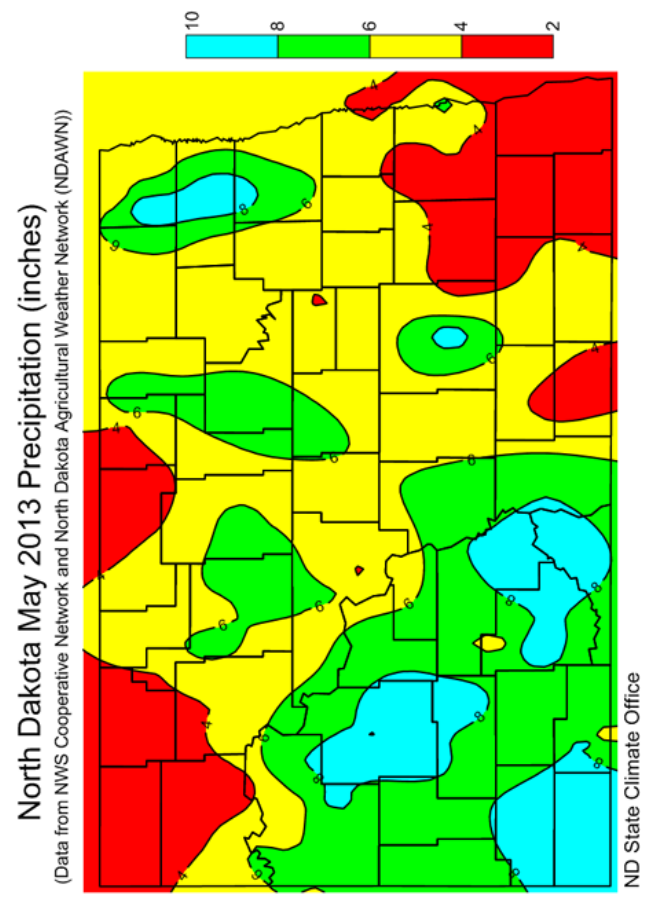
Monthly Growing Degree Days and Normals-Langdon

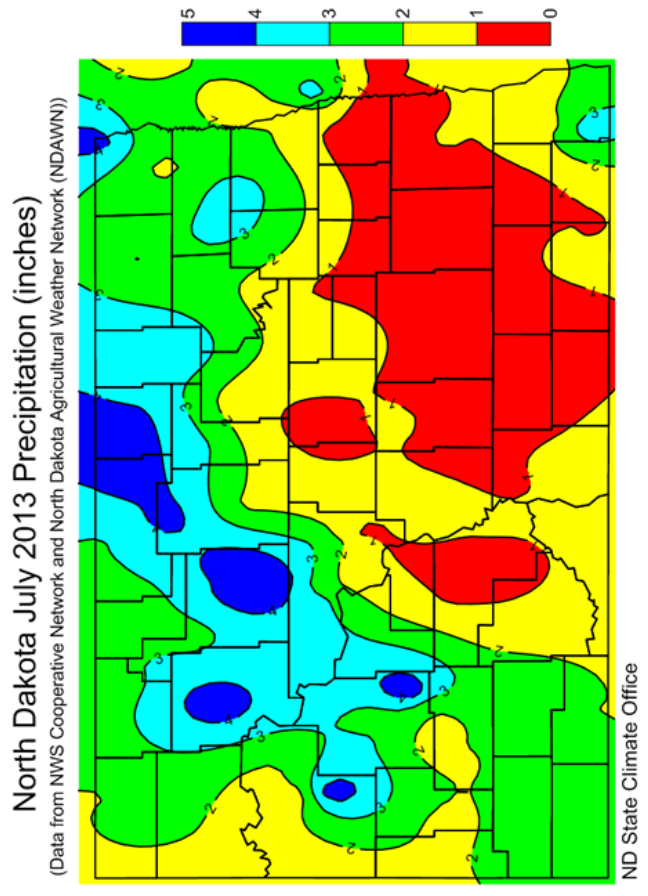
	Wheat Growing Degree Days			Corn Growing Degree Days			Sunflower Growing Degree Days		
	2013	Normal	Deviation	2013	Normal	Deviation	2013	Normal	Deviation
April	54	274	-220	--	--	--	--	--	--
May	585	613	-28	188	219	-31	304	314	-10
June	920	875	+45	422	356	+66	590	519	+71
July	971	1018	-47	494	499	-5	670	685	-15
August	1025	962	+63	496	457	+39	673	642	+31
September	776	671	+105	337	255	+82	475	358	+117
Total	4331	4413	-82	1937	1786	+151	2712	2518	+194

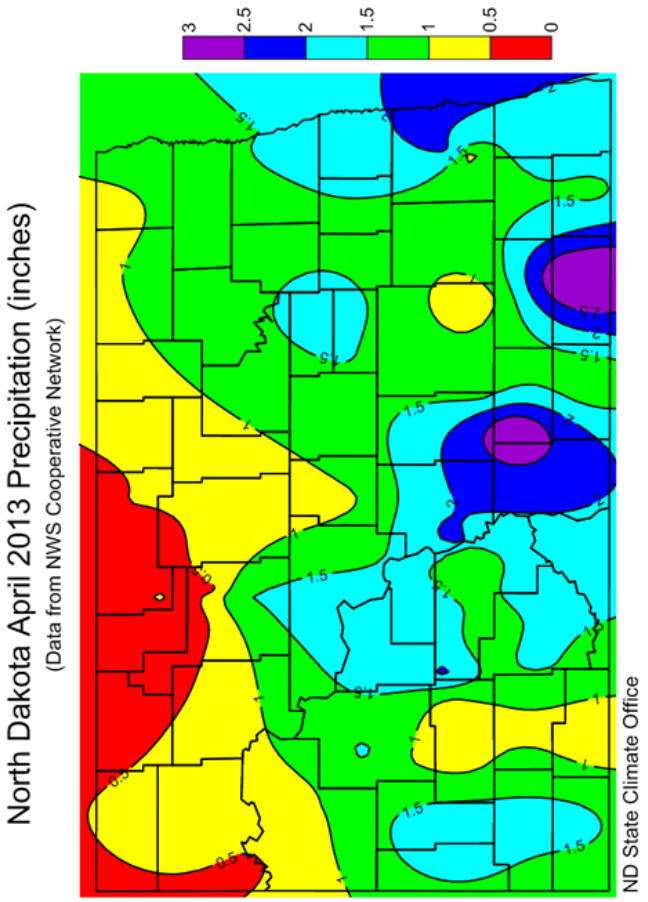
Frost Dates, Langdon and Selected Cities

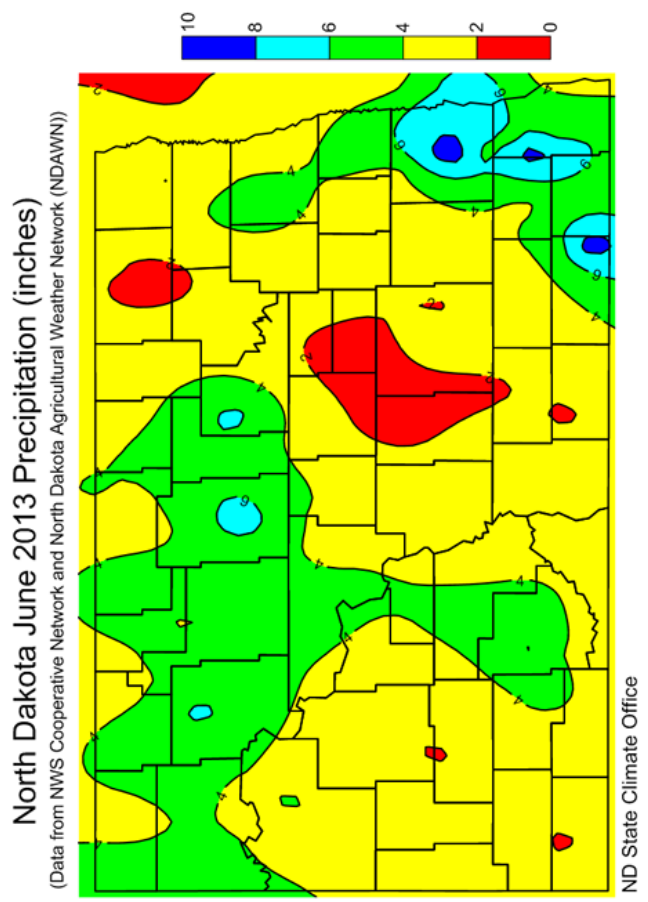
	Last Spring Frost		First Fall Frost		Frost Free Days	
Langdon	32^0F	28^0F	32^0F	28^0F	32^0F	28^0F
Normal	19-May	8-May	21-Sep	28-Sep	123	143
2013	12-May	12-May	30-Sep	13-Oct	141	154
Cavalier						
Normal	14-May	4-May	25-Sep	4-Oct	132	152
2013	12-May	12-May	16-Sep	15-Oct	127	156
Park River						
Normal	8-May	30-Apr	30-Sep	10-Oct	143	163
2013	12-May	12-May	21-Sep	21-Oct	132	162
Petersburg						
Normal	17-May	2-May	25-Sep	2-Oct	133	151
2013	12-May	12-May	6-Oct	21-Oct	147	162

Normals are from the NWS, 2013 frost dates from nearest reporting NDAWN station.


North Dakota May 2013 Precipitation (inches)
(Data from NWS Cooperative Network and North Dakota Agricultural Weather Network (NDAWN))
ND State Climate Office

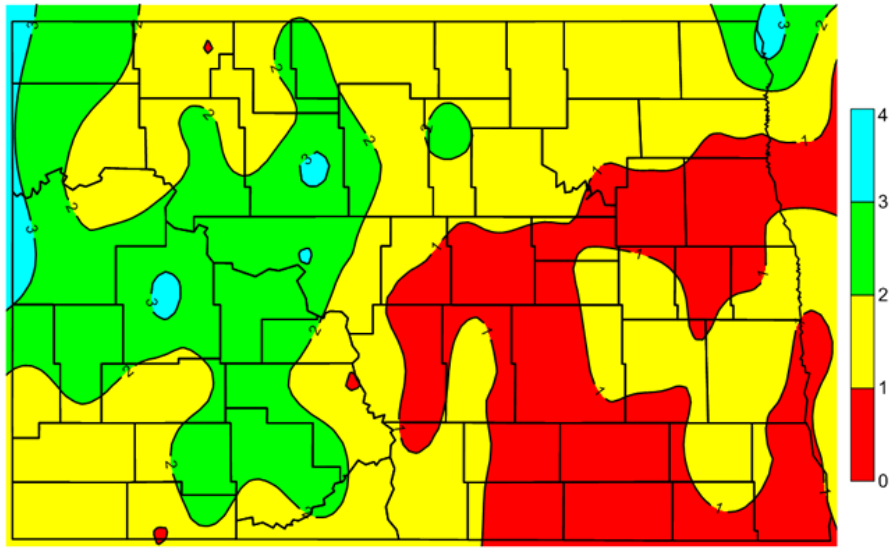

North Dakota July 2013 Precipitation (inches)
(Data from NWS Cooperative Network and North Dakota Agricultural Weather Network (NDAWN))
ND State Climate Office


North Dakota April 2013 Precipitation (inches)
(Data from NWS Cooperative Network)
ND State Climate Office


North Dakota June 2013 Precipitation (inches)
(Data from NWS Cooperative Network and North Dakota Agricultural Weather Network (NDAWN))
ND State Climate Office

North Dakota August 2013 Precipitation (inches)

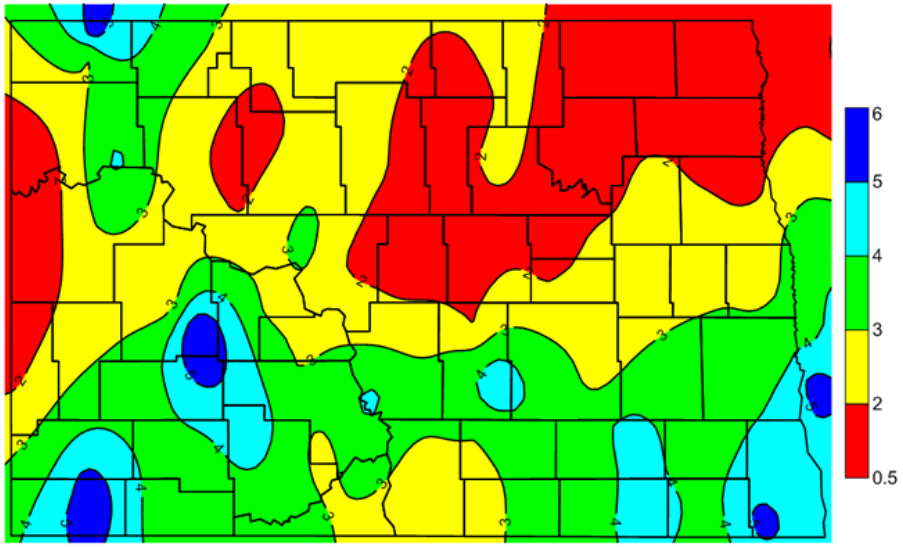
(Data from NWS Cooperative Network and North Dakota Agricultural Weather Network (NDAWN))



ND State Climate Office

North Dakota September 2013 Precipitation (inches)

(Data from NWS Cooperative Network and North Dakota Agricultural Weather Network (NDAWN))



ND State Climate Office

North Dakota April - September 2013 Precipitation (inches)

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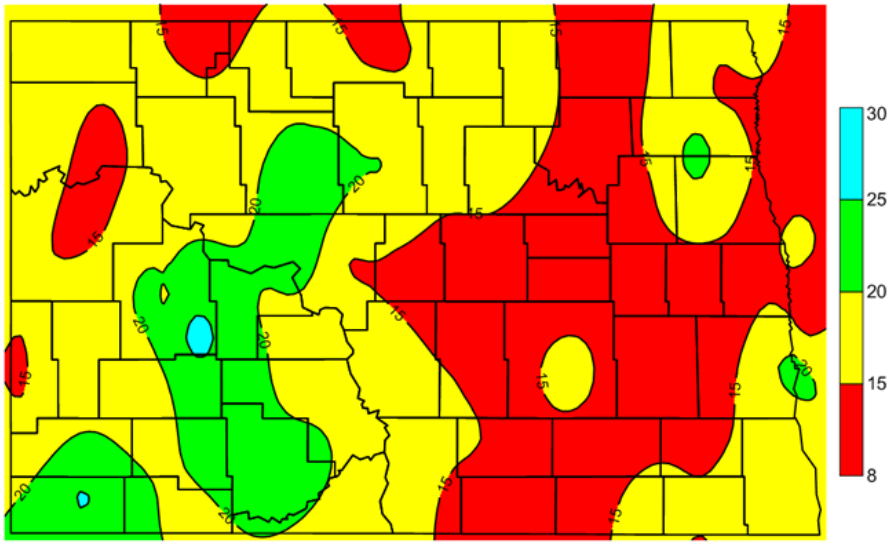
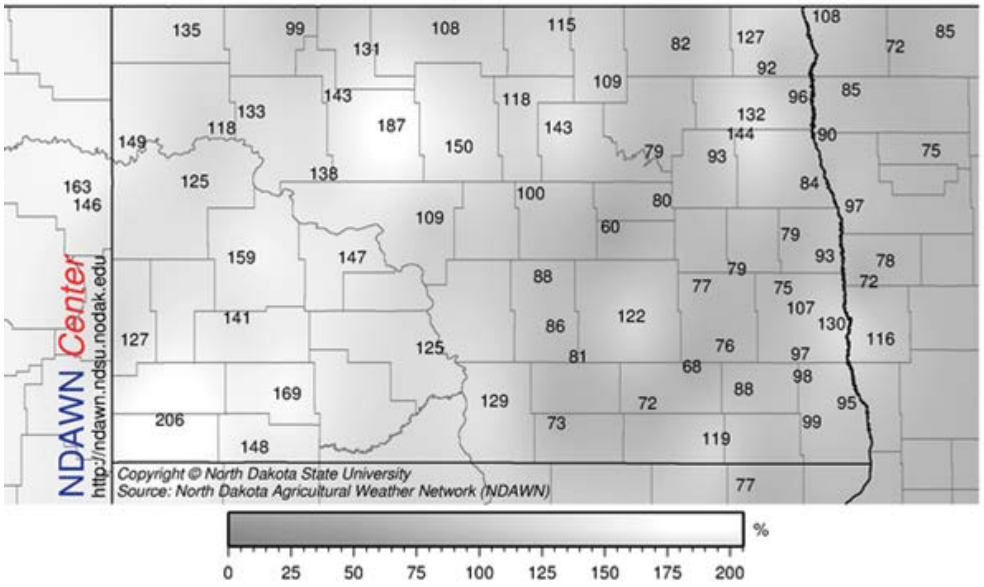
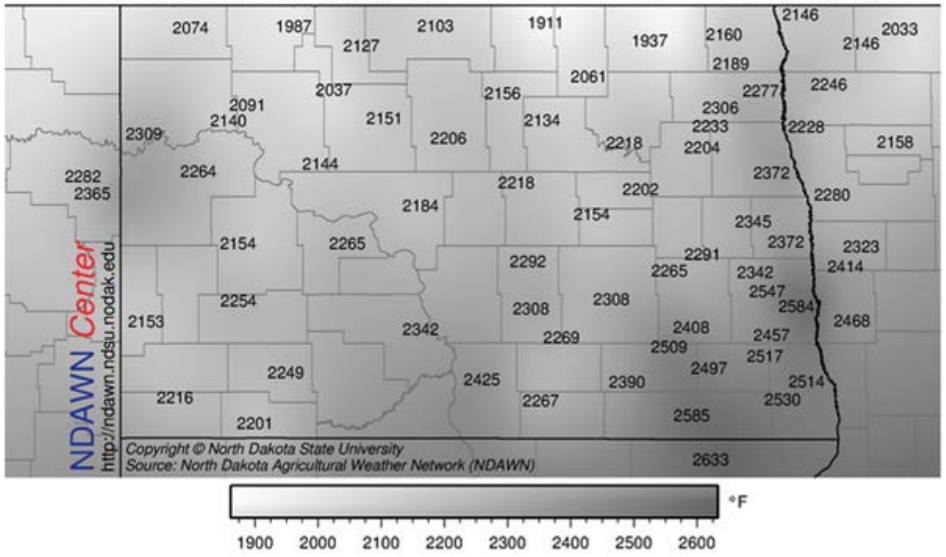


ND State Climate Office

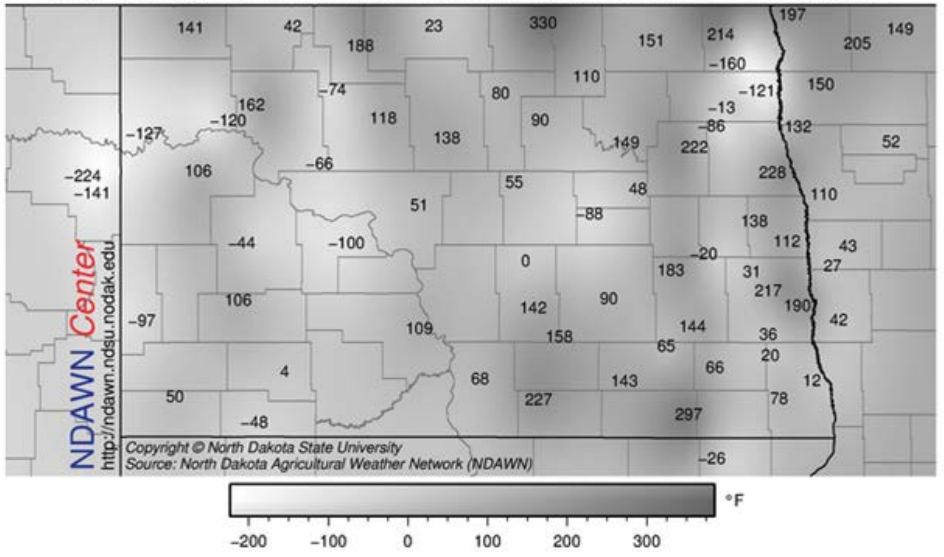
Percent of Normal Rainfall (%) (2013-04-01 – 2013-09-30)



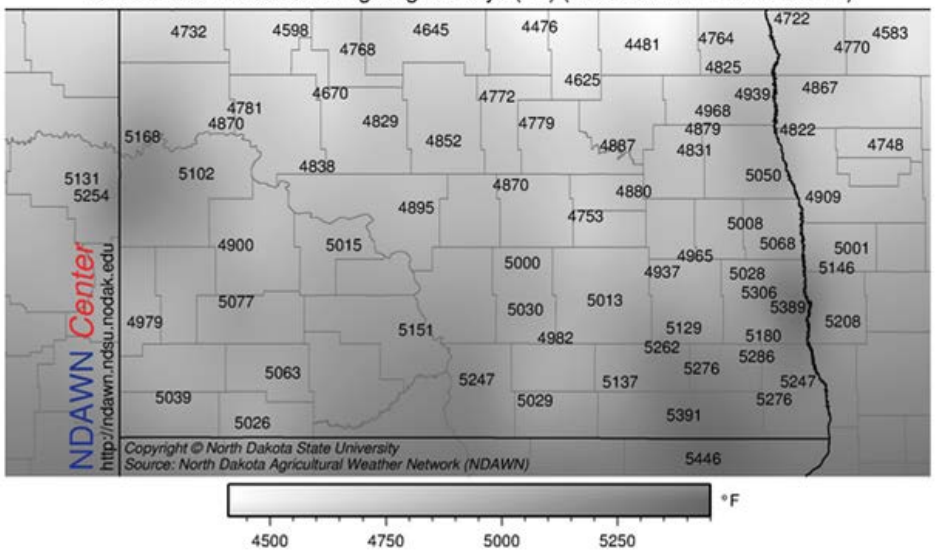
Corn Accumulated Daily Growing Degree Days (°F) (2013–05–01 – 2013–09–30)



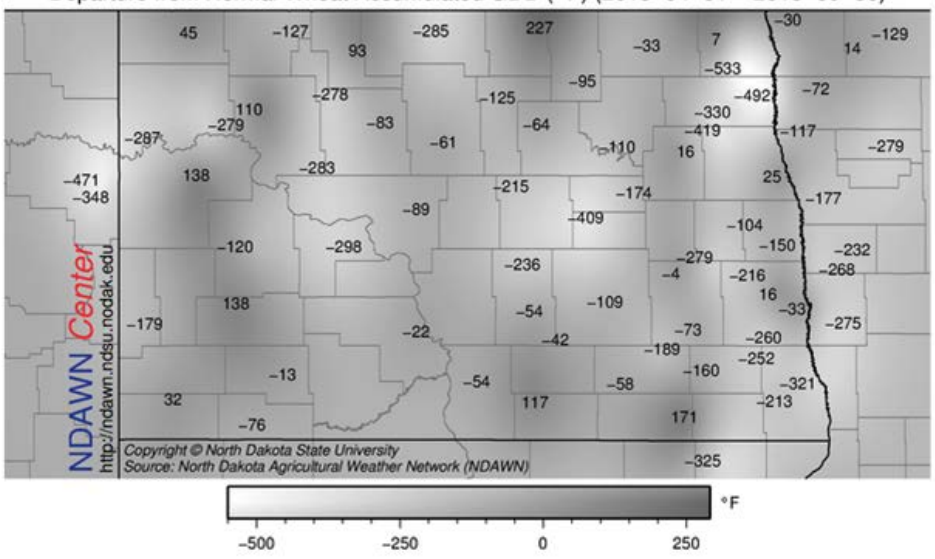
Departure from Normal Corn Accumulated GDD (°F) (2013–05–01 – 2013–09–30)



Accumulated Wheat Growing Degree Days (°F) (2013–04–01 – 2013–09–30)



Departure from Normal Wheat Accumulated GDD (°F) (2013–04–01 – 2013–09–30)



Average Data by Crop and Year Across Sites

HRSW	Yield (bu/a)						Test Weight (lbs/bu)						Protein (%)						Height (in)					Days to Head				
No. Sites	**5**	**4**	**5**	**4**	**5**	**14**	**5**	**4**	**5**	**4**	**5**	**14**	**5**	**4**	**5**	**4**	**5**	**14**	**4**	**5**	**4**	**5**	**14**	**4**	**3**	**4**	**5**	**12**
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**10**	**11**	**12**	**13**	**3yr**	**10**	**11**	**12**	**13**	**3yr**
Faller	90	86	71	80	96	82	58.9	59.6	59.7	58.5	61.3	59.8	13.2	13.4	15.0	12.4	13.4	13.6	38	36	38	34	36	66	53	63	53	56
Glenn	78	70	60	70	78	69	63.2	61.9	62.4	61.8	63.3	62.5	13.9	14.5	15.8	14.1	14.6	14.8	40	37	41	34	37	64	50	59	49	53
RB07	80	76	66	75	85	75	59.7	59.2	59.5	58.4	61.0	59.6	13.7	13.8	15.5	13.4	14.5	14.5	35	33	35	32	33	65	51	59	51	54
Breaker	82	83	66	72	87	75	60.2	61.3	61.0	60.3	62.4	61.2	13.5	13.7	15.2	12.9	13.8	14.0	37	34	36	33	34	67	53	62	52	56
Barlow	81	78	63	72	82	72	60.6	60.4	60.5	59.3	61.8	60.5	13.7	14.2	15.7	13.8	14.1	14.5	38	36	39	33	36	65	51	60	50	54
Jenna	77	79	65	73	85	74	58.8	58.7	58.8	57.5	59.9	58.7	13.7	14.1	15.5	13.4	14.0	14.3	35	32	34	32	33	69	55	64	54	58
Prosper	89	88	74	79	92	82	59.6	59.7	59.9	58.6	61.2	59.9	13.3	13.5	14.9	12.8	13.2	13.6	38	36	37	34	36	68	53	63	53	56
Vantage	--	74	63	62	80	68	--	62.3	61.4	60.4	62.8	61.5	--	15.0	16.5	14.8	15.5	15.6	35	34	35	31	33	71	56	64	55	58
LCS Albany	85	85	--	72	94	--	59.6	59.1	--	57.4	61.6	--	12.4	12.6	--	12.2	12.8	--	35	--	34	33	--	69	--	65	56	--
Samson	82	--	66	71	86	74	58.6	--	59.1	58.7	60.2	59.3	13.3	--	15.2	13.6	13.7	14.2	--	31	31	29	30	--	54	60	52	55
Rollag	--	--	61	68	80	70	--	--	60.4	59.2	62.1	60.6	--	--	16.0	14.1	14.7	14.9	--	32	33	30	32	--	52	60	52	55
SY Soren	--	--	62	73	81	72	--	--	59.9	58.7	61.7	60.1	--	--	15.7	13.5	14.6	14.6	--	31	32	29	31	--	52	61	51	55
WB-Digger	--	--	68	77	93	79	--	--	58.6	58.9	60.7	59.4	--	--	15.0	12.9	13.9	13.9	--	34	36	34	35	--	52	61	53	55
WB-Mayville	--	--	63	71	80	71	--	--	59.8	58.7	60.9	59.8	--	--	15.7	13.9	14.6	14.7	--	30	31	29	30	--	52	61	50	54
Advance	--	--	--	74	86	--	--	--	--	59.3	62.1	--	--	--	--	13.3	13.1	--	--	--	41	31	--	--	--	57	52	--
LCS Breakaway	--	--	--	74	82	--	--	--	--	60.0	62.6	--	--	--	--	13.9	14.6	--	--	--	34	30	--	--	--	60	50	--
Elgin-ND	--	--	--	75	88	--	--	--	--	58.1	61.2	--	--	--	--	13.1	14.3	--	--	--	40	36	--	--	--	61	51	--
Forefront	--	--	--	74	77	--	--	--	--	59.3	61.2	--	--	--	--	12.6	14.6	--	--	--	36	35	--	--	--	59	48	--
Norden	--	--	--	69	82	--	--	--	--	59.9	62.6	--	--	--	--	13.2	13.8	--	--	--	34	31	--	--	--	61	53	--
LCS Powerplay	--	--	--	72	89	--	--	--	--	58.8	61.7	--	--	--	--	12.7	13.6	--	--	--	34	32	--	--	--	61	52	--
SY Rowyn	--	--	--	--	84	--	--	--	--	--	61.0	--	--	--	--	--	13.8	--	--	--	--	30	--	--	--	--	50	--
Linkert	--	--	--	--	77	--	--	--	--	--	61.3	--	--	--	--	--	15.0	--	--	--	--	28	--	--	--	--	52	--
Edge	--	--	--	70	--	--	--	--	--	57.7	--	--	--	--	--	13.5	--	--	--	--	36	--	--	--	--	61	--	--
Velva	86	77	64	74	--	--	58.5	59.0	58.2	58.2	--	--	13.4	13.9	15.5	13.3	--	--	37	34	36	--	--	68	54	63	--	--
Brennan	77	71	61	71	--	--	60.4	59.2	60.0	59.3	--	--	13.8	14.1	15.4	13.7	--	--	33	30	31	--	--	65	52	60	--	--
Cromwell	80	76	63	70	--	--	61.0	60.7	60.2	59.5	--	--	13.5	14.0	15.3	13.4	--	--	37	34	35	--	--	68	54	63	--	--
Howard	84	78	64	--	--	--	60.2	59.9	60.1	--	--	--	13.4	14.1	15.5	--	--	--	38	35	--	--	--	66	54	--	--	--
Kelby	76	72	58	--	--	--	60.7	59.3	59.5	--	--	--	14.0	14.4	15.8	--	--	--	34	30	--	--	--	65	51	--	--	--
Brick	82	74	60	--	--	--	60.8	60.3	61.1	--	--	--	13.3	14.2	15.2	--	--	--	39	37	--	--	--	63	48	--	--	--
Sabin	77	75	59	--	--	--	59.4	59.1	58.2	--	--	--	13.9	14.2	16.1	--	--	--	37	34	--	--	--	66	53	--	--	--
Select	--	66	64	--	--	--	--	59.7	60.7	--	--	--	--	14.0	15.6	--	--	--	38	36	--	--	--	63	50	--	--	--
Kuntz	78	73	--	--	--	--	58.8	58.4	--	--	--	--	13.4	13.8	--	--	--	--	33	--	--	--	--	66	--	--	--	--
Steele-ND	77	76	--	--	--	--	60.4	59.8	--	--	--	--	13.7	14.3	--	--	--	--	39	--	--	--	--	65	--	--	--	--
Hat Trick	76	71	--	--	--	--	60.5	59.2	--	--	--	--	13.3	13.1	--	--	--	--	37	--	--	--	--	67	--	--	--	--
Tom	81	77	--	--	--	--	60.1	59.6	--	--	--	--	13.5	13.8	--	--	--	--	38	--	--	--	--	65	--	--	--	--

Average Data by Crop and Year Across Sites

Durum	Yield (bu/a)						Test Weight (lbs/bu)						Height (in)						Days to Head					
No. Sites	**3**	**3**	**3**	**3**	**2**	**9**	**3**	**3**	**3**	**3**	**2**	**9**	**3**	**3**	**3**	**3**	**2**	**9**	**3**	**3**	**3**	**3**	**2**	**9**
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**
Alkabo	76	79	62	69	86	72	60.5	58.4	59.2	58.5	61.3	59.7	40	42	38	38	42	39	60	69	55	64	52	57
Grenora	84	86	61	67	89	72	59.8	57.9	57.8	57.3	60.2	58.4	39	41	37	37	40	38	60	69	56	63	52	57
Lebsock	80	76	63	68	79	70	61.3	59.5	59.7	58.8	61.1	59.9	40	41	39	38	41	39	59	71	54	62	51	56
DG Max	75	74	59	65	83	69	60.1	58.2	58.7	58.3	60.7	59.2	41	43	40	39	43	41	58	69	55	63	52	57
Tioga	87	80	60	71	88	73	60.1	57.6	57.7	58.2	60.7	58.9	43	45	40	41	45	42	60	70	57	63	53	58
Divide	--	80	59	67	84	70	--	57.2	58.0	58.6	60.0	58.9	--	43	40	40	44	41	--	70	58	64	53	58
Carpio	--	80	62	69	90	74	--	59.4	59.6	58.7	61.6	60.0	--	43	39	40	45	41	--	71	57	65	54	59
Joppa	--	85	67	66	94	76	--	58.3	58.7	58.5	60.7	59.3	--	42	39	41	42	41	--	70	56	63	52	57
Westhope	71	76	61	66	--	--	59.1	58.6	58.9	58.4	--	--	40	41	39	39	--	--	58	70	57	64	--	--
Wales	75	76	--	68	--	--	59.5	57.8	--	58.4	--	--	39	41	--	39	--	--	58	69	--	63	--	--
WB-Belfield	--	--	43	--	--	--	--	--	55.8	--	--	--	--	--	30	--	--	--	--	--	51	--	--	--
DG Star	71	72	--	--	--	--	58.8	57.0	--	--	--	--	40	41	--	--	--	--	58	68	--	--	--	--
Grande D'oro	--	77	--	--	--	--	--	59.7	--	--	--	--	--	42	--	--	--	--	--	71	--	--	--	--

Barley	Yield(bu/a)						Test Weight (lbs/bu)						Protein (%)						Plump (%)						Days to Head				
No. Sites	**3**	**3**	**3**	**3**	**2**	**8**	**3**	**3**	**3**	**3**	**2**	**8**	**3**	**3**	**3**	**3**	**2**	**8**	**3**	**3**	**3**	**3**	**2**	**8**	**3**	**1**	**3**	**2**	**6**
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**10**	**11**	**12**	**13**	**3yr**
Lacey	124	116	94	99	135	109	49.2	50.2	49.8	47.9	50.4	49.4	11.8	12.0	13.4	12.5	12.6	12.8	96	96	94	83	99	92	64	51	59	58	56
Stellar-ND	126	116	99	92	132	108	48.0	48.6	48.8	46.7	49.6	48.4	11.8	11.9	12.8	12.2	12.3	12.4	97	97	94	85	99	93	65	51	60	59	57
Tradition	124	118	97	77	138	104	48.9	49.7	49.8	46.1	50.7	48.9	11.9	12.0	13.0	12.9	12.5	12.8	96	96	92	80	99	90	64	53	62	58	58
Celebration	131	111	91	80	135	102	48.9	49.1	48.7	45.9	49.7	48.1	12.3	12.5	14.3	13.5	13.6	13.8	97	94	90	83	99	91	65	54	62	59	58
Quest	--	118	98	95	132	108	--	48.3	48.6	46.8	48.8	48.1	--	12.0	13.1	12.2	12.3	12.5	--	89	84	75	96	85	65	52	60	60	57
Innovation	--	--	--	94	130	--	--	--	--	47.0	49.4	--	--	--	--	12.7	12.4	--	--	--	--	81	98	--	--	--	59	58	--
Pinnacle*	133	119	99	--	--	--	49.8	49.9	50.8	--	--	--	11.0	10.8	12.0	--	--	--	96	97	95	--	--	--	67	54	--	--	--
Rasmusson	131	126	104	--	--	--	48.9	49.4	49.4	--	--	--	11.6	11.6	12.7	--	--	--	95	94	91	--	--	--	65	50	--	--	--

*2-row barley

HRSW Summary, Langdon 2009-2013

	Yield(bu/a)						Test Weight(lbs/bu)						Protein(%)					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**
Barlow	86	85	66	72	94	77	59.4	60.6	61.7	60.3	61.7	61.2	14.4	14.0	15.6	12.7	14.2	14.2
Brick	90	84	67	76	81	75	59.8	61.3	61.7	60.6	61.5	61.3	13.9	14.0	14.3	11.2	13.9	13.1
Faller	103	92	79	85	112	92	58.5	60.3	60.8	59.4	60.7	60.3	14.0	13.0	14.4	11.3	13.4	13.0
Glenn	85	77	58	68	91	72	62.5	62.5	62.9	62.6	63.0	62.8	14.8	14.2	15.6	13.1	14.6	14.4
Prosper	95	94	77	84	110	90	59.3	60.3	60.8	59.7	60.3	60.3	13.9	13.1	14.8	11.2	13.2	13.1
RB07	75	79	70	74	96	80	56.4	59.8	60.3	58.8	60.4	59.8	14.8	13.5	15.2	12.3	14.5	14.0
Velva	84	74	69	72	99	80	57.1	57.4	60.1	59.2	60.2	59.8	14.4	13.6	14.7	12.1	13.8	13.5
LCS Albany	89	91	72	79	105	85	58.7	59.9	61.1	58.8	61.4	60.4	13.1	12.2	14.2	10.9	12.8	12.6
Breaker	86	88	67	75	99	80	59.5	60.3	62.2	61.3	61.9	61.8	14.5	13.7	14.9	12.1	14.1	13.7
Brennan	78	75	61	70	75	69	58.6	60.0	60.0	59.6	59.6	59.7	14.6	13.9	15.1	12.5	14.8	14.1
Jenna	83	82	72	74	95	81	57.7	59.9	59.4	58.4	59.0	58.9	14.4	13.9	14.8	12.3	13.8	13.6
Samson	79	82	62	72	92	75	56.8	58.3	59.2	60.1	59.8	59.7	14.3	13.0	15.1	12.6	13.9	13.9
Select	70	78	71	78	84	78	57.4	60.9	61.9	60.4	61.7	61.3	14.5	13.7	15.1	11.7	14.0	13.6
Vantage	77	78	58	67	86	70	61.5	62.3	61.8	61.4	62.1	61.8	15.9	14.7	16.0	13.0	15.8	14.9
Elgin-ND	89	89	71	76	99	82	58.2	60.1	60.9	59.2	61.1	60.4	14.7	14.0	15.4	12.0	14.1	13.8
Norden	78	77	67	73	90	77	59.6	61.2	62.6	61.3	62.2	62.0	14.1	13.8	14.9	12.1	13.9	13.6
Alpine	--	79	60	79	99	79	--	59.6	58.7	59.0	59.8	59.2	--	13.0	15.2	11.6	13.8	13.5
Rollag	--	76	63	70	83	72	--	61.4	61.4	60.0	61.6	61.0	--	14.0	16.1	12.6	14.8	14.5
WB Digger	--	81	66	80	99	81	--	59.9	59.5	59.8	60.4	59.9	--	13.3	14.4	11.8	14.1	13.4
LCS Powerplay	--	--	67	75	101	81	--	--	61.1	59.6	61.0	60.6	--	--	15.0	11.5	13.5	13.3
SY Soren	--	--	64	71	86	74	--	--	60.6	59.9	61.4	60.6	--	--	15.6	12.4	14.8	14.3
Forefront	--	--	58	78	89	75	--	--	61.3	60.6	60.5	60.8	--	--	15.4	11.4	14.3	15.4
WB Mayville	--	--	58	70	86	71	--	--	59.9	59.9	60.3	60.0	--	--	15.6	12.9	14.5	14.3
Advance	--	--	70	81	97	83	--	--	61.4	60.1	61.7	61.4	--	--	14.3	12.1	12.9	14.3
LCS Breakaway	--	--	--	76	88	--	--	--	--	61.4	62.2	--	--	--	--	12.6	14.5	--
Linkert	--	--	--	--	81	--	--	--	--	--	60.8	--	--	--	--	--	15.4	--
MS Stingray	--	--	--	--	118	--	--	--	--	--	59.6	--	--	--	--	--	11.4	--
SY Rowyn	--	--	--	--	95	--	--	--	--	--	60.7	--	--	--	--	--	14.0	--
LCS Iguacu	--	--	--	--	94	--	--	--	--	--	60.2	--	--	--	--	--	12.4	--
Alsen	79	78	54	68	--	--	58.6	60.7	60.4	60.1	--	--	14.8	14.2	15.9	12.4	--	--
Briggs	83	83	67	71	--	--	58.2	60.7	60.7	59.3	--	--	14.9	14.1	15.4	12.5	--	--
Cromwell	90	80	66	73	--	--	60.1	61.2	61.9	60.7	--	--	14.3	14.1	14.9	12.1	--	--
Freyr	73	83	60	77	--	--	57.4	60.0	59.5	59.5	--	--	14.5	13.8	15.5	12.0	--	--
Howard	90	88	66	74	--	--	59.4	60.9	61.8	59.2	--	--	14.3	13.8	15.4	12.5	--	--
Kelby	77	79	58	69	--	--	59.2	60.2	59.1	59.8	--	--	14.8	14.1	15.3	12.6	--	--
Steele-ND	85	87	66	73	--	--	59.2	61.0	61.4	59.4	--	--	14.2	14.2	15.3	12.4	--	--
Edge	--	--	--	72	--	--	--	--	--	57.8	--	--	--	--	--	11.9	--	--
Brogan	71	73	66	--	--	--	57.3	59.5	61.0	--	--	--	15.4	13.6	14.6	--	--	--
Kuntz	78	75	64	--	--	--	58.1	58.7	59.7	--	--	--	13.9	13.7	14.9	--	--	--
Sabin	83	81	66	--	--	--	58.3	59.9	59.9	--	--	--	14.6	14.0	15.4	--	--	--
Dapps	93	79	--	--	--	--	59.3	60.1	--	--	--	--	15.0	14.2	--	--	--	--
Knudson	89	83	--	--	--	--	58.4	59.2	--	--	--	--	13.3	13.2	--	--	--	--
Mott	88	76	--	--	--	--	59.7	60.3	--	--	--	--	13.8	13.0	--	--	--	--
Reeder	86	84	--	--	--	--	58.2	60.1	--	--	--	--	14.9	14.0	--	--	--	--
Tom	89	84	--	--	--	--	59.0	60.4	--	--	--	--	14.4	13.7	--	--	--	--
Traverse	94	95	--	--	--	--	56.3	58.0	--	--	--	--	13.2	13.3	--	--	--	--
Blade	83	86	--	--	--	--	60.2	61.1	--	--	--	--	14.4	13.8	--	--	--	--
Hat Trick	79	68	--	--	--	--	58.3	58.8	--	--	--	--	14.8	12.4	--	--	--	--
LSD 5%	7.1	5.0	4.6	4.0	5.7		1.0	0.6	0.5	0.5	0.4		0.5	0.4	0.6	0.6	0.4	

HRSW Summary, Langdon 2009-2013

	Days to Head						Height(in)						Lodging(0-9)		
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**08**	**10**	**2yr**
Barlow	56	67	54	61	52	56	41	40	38	37	33	36	3.0	1.5	2.3
Brick	52	63	50	60	50	53	42	40	39	39	33	37	0.8	1.8	1.3
Faller	60	69	57	63	55	58	40	39	37	37	35	36	1.9	0.8	1.4
Glenn	56	65	53	60	52	55	43	40	38	40	34	37	1.2	0.0	0.6
Prosper	60	70	57	64	55	59	40	39	37	37	34	36	2.2	1.5	1.9
RB07	55	67	54	60	53	56	36	35	36	34	32	34	0.3	2.1	1.2
Velva	59	70	57	63	56	59	41	39	38	36	33	36	3.0	0.0	1.5
LCS Albany	62	70	59	65	57	60	38	36	34	32	32	33	0.8	1.8	1.3
Breaker	60	69	57	63	56	59	39	39	35	33	33	34	0.1	1.0	0.6
Brennan	57	67	57	61	54	57	35	33	32	29	27	29	0.0	3.7	1.9
Jenna	62	71	59	65	56	60	37	36	34	32	33	33	0.6	2.2	1.4
Samson	58	68	58	61	55	58	34	35	31	30	29	30	0.2	0.2	0.2
Select	54	64	52	57	50	53	42	38	39	36	33	36	1.8	1.8	1.8
Vantage	63	74	60	67	58	62	39	35	36	35	31	34	0.0	0.0	0.0
Elgin-ND	59	68	56	61	54	57	43	42	39	38	36	38	--	1.8	--
Norden	60	68	56	62	56	58	36	36	33	33	31	32	--	0.3	--
Alpine	--	68	57	62	54	58	--	37	36	35	32	34	--	2.8	--
Rollag	--	67	55	61	53	56	--	34	34	31	30	32	--	0.8	--
WB Digger	--	67	55	62	55	57	--	38	36	35	32	34	--	1.6	--
LCS Powerplay	--	--	56	62	54	57	--	--	34	34	33	34	--	--	--
SY Soren	--	--	55	62	55	57	--	--	32	31	29	31	--	--	--
Forefront	--	--	51	58	51	53	--	--	42	35	35	37	--	--	--
WB Mayville	--	--	56	62	53	57	--	--	32	29	29	30	--	--	--
Advance	--	--	53	58	54	55	--	--	35	40	31	35	--	--	--
LCS Breakaway	--	--	--	60	52	--	--	--	--	32	29	--	--	--	--
Linkert	--	--	--	--	55	--	--	--	--	--	28	--	--	--	--
MS Stingray	--	--	--	--	58	--	--	--	--	--	33	--	--	--	--
SY Rowyn	--	--	--	--	52	--	--	--	--	--	30	--	--	--	--
LCS Iguacu	--	--	--	--	57	--	--	--	--	--	31	--	--	--	--
Alsen	59	68	56	61	--	--	39	37	36	35	--	--	2.0	0.4	1.2
Briggs	55	66	53	60	--	--	40	39	36	37	--	--	2.5	2.3	2.4
Cromwell	61	70	58	64	--	--	40	38	34	34	--	--	1.6	3.1	2.4
Freyr	58	69	56	63	--	--	40	38	35	35	--	--	0.6	1.8	1.2
Howard	59	68	57	63	--	--	41	40	39	37	--	--	3.4	2.2	2.8
Kelby	55	67	56	60	--	--	35	35	31	30	--	--	0.1	2.9	1.5
Steele-ND	58	68	56	62	--	--	41	40	38	36	--	--	1.7	2.8	2.3
Edge	--	--	--	62	--	--	--	--	--	34	--	--	--	--	--
Brogan	60	69	55	--	--	--	38	35	35	--	--	--	--	0.6	--
Kuntz	59	69	57	--	--	--	35	34	32	--	--	--	0.1	1.1	0.6
Sabin	60	68	57	--	--	--	40	37	39	--	--	--	2.2	1.8	2.0
Dapps	58	66	--	--	--	--	45	43	--	--	--	--	1.9	1.1	1.5
Knudson	59	69	--	--	--	--	38	37	--	--	--	--	0.6	3.6	2.1
Mott	61	70	--	--	--	--	43	41	--	--	--	--	0.7	0.3	0.5
Reeder	57	67	--	--	--	--	41	39	--	--	--	--	1.2	0.8	1.0
Tom	58	67	--	--	--	--	40	38	--	--	--	--	2.7	2.9	2.8
Traverse	57	66	--	--	--	--	44	40	--	--	--	--	1.5	0.1	0.8
Blade	59	68	--	--	--	--	40	38	--	--	--	--	0.5	0.8	0.7
Hat Trick	59	68	--	--	--	--	39	37	--	--	--	--	0.1	1.6	0.9
LSD 5%	1.0	1.0	1.3	1.5	1.0		1.6	1.0	1.9	1.6	1.8		2.1	1.3	

Pembina County HRSW Summary 2009-2013*

	Yield(bu/a)				Test Weight(lbs/bu)				Protein(%)			
Variety	**09**	**11**	**13**	**3yr**	**09**	**11**	**13**	**3yr**	**09**	**11**	**13**	**3yr**
Faller	75	71	100	82	59.8	60.3	61.4	60.5	12.6	14.2	13.6	13.5
Glenn	68	68	82	73	63.2	63.3	63.1	63.2	13.3	15.7	14.8	14.6
RB07	72	70	88	76	60.0	61.2	61.1	60.8	13.5	15.0	14.5	14.3
Breaker	75	66	86	76	61.0	61.0	62.8	61.6	13.4	14.6	13.4	13.8
Samson	79	64	83	75	58.7	59.3	60.5	59.5	12.8	15.2	13.3	13.8
Barlow	67	68	87	74	61.0	62.2	62.2	61.8	13.3	15.0	14.2	14.2
Jenna	70	65	87	74	58.5	59.3	60.5	59.4	13.7	14.9	13.5	14.0
Prosper	77	74	99	83	59.6	59.9	61.4	60.3	12.9	14.4	13.3	13.5
Rollag	--	54	85	--	--	58.6	62.3	--	--	15.8	14.6	--
SY Soren	--	65	82	--	--	61.0	61.6	--	--	15.3	14.1	--
Vantage	--	64	79	--	--	62.0	63.3	--	--	15.9	14.4	--
WB-Digger	--	72	94	--	--	58.2	61.2	--	--	14.3	14.2	--
WB-Mayville	--	66	83	--	--	60.6	61.7	--	--	15.3	14.7	--
Advance	--	--	88	--	--	--	62.0	--	--	--	13.2	--
LCS Breakaway	--	--	86	--	--	--	62.9	--	--	--	14.6	--
Elgin-ND	--	--	93	--	--	--	61.0	--	--	--	14.2	--
Forefront	--	--	81	--	--	--	61.3	--	--	--	14.4	--
Linkert	--	--	80	--	--	--	61.7	--	--	--	14.8	--
Norden	--	--	80	--	--	--	62.9	--	--	--	13.8	--
LCS Powerplay	--	--	92	--	--	--	61.8	--	--	--	13.4	--
SY Rowyn	--	--	90	--	--	--	61.1	--	--	--	13.3	--
LCS Albany	77	--	95	--	59.7	--	61.4	--	11.7	--	12.5	--
Sabin	71	61	--	--	59.2	57.7	--	--	13.4	15.3	--	--
Velva	73	65	--	--	59.2	57.9	--	--	13.1	14.6	--	--
Cromwell	71	67	--	--	61.5	59.7	--	--	13.3	15.0	--	--
Brennan	69	65	--	--	60.0	61.4	--	--	13.6	15.3	--	--
Brick	69	64	--	--	60.4	62.7	--	--	12.6	15.2	--	--
Howard	69	68	--	--	60.5	59.5	--	--	12.8	15.0	--	--
Kelby	68	62	--	--	60.1	61.3	--	--	14.0	15.6	--	--
Select	--	63	--	--	--	61.1	--	--	--	15.2	--	--
Ada	67	--	--	--	61.3	--	--	--	13.0	--	--	--
Freyr	63	--	--	--	59.1	--	--	--	13.3	--	--	--
Traverse	70	--	--	--	57.2	--	--	--	12.3	--	--	--
Kuntz	63	--	--	--	59.2	--	--	--	13.5	--	--	--
Steele-ND	66	--	--	--	60.7	--	--	--	13.1	--	--	--
Hat Trick	74	--	--	--	61.2	--	--	--	12.8	--	--	--
Tom	69	--	--	--	60.7	--	--	--	12.9	--	--	--
LSD 5%	6.5	5.3	5.3		0.6	1.1	0.4		0.6	0.3	0.5	

*The 2010 and 2012 Pembina trials were lost to flood and hail, respectively.

Walsh County HRSW Summary 2009-2013

	Yield(bu/a)						Test Weight(lbs/bu)						Protein(%)						Lodging (0-9)					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**
Faller	93	81	65	82	87	78	58.5	58.4	58.3	61.3	59.9	59.8	14.0	14.1	15.2	11.9	12.3	13.1	6.0	3.9	5.5	0.5	3.1	3.0
Glenn	82	65	60	74	69	68	62.8	61.2	62.5	64.0	62.7	63.1	14.3	14.7	15.6	14.0	12.8	14.1	2.3	4.1	3.3	0.3	0.9	1.5
RB07	90	79	65	78	86	76	58.7	58.4	57.6	60.8	60.0	59.5	14.2	13.9	15.2	13.1	13.4	13.9	3.8	0.7	6.5	0.0	2.6	3.0
LCS Albany	83	76	72	75	90	79	58.2	58.6	58.8	60.1	60.9	59.9	13.4	12.9	13.5	11.7	12.5	12.6	6.5	1.5	4.3	0.0	0.1	1.5
Breaker	83	82	63	71	86	73	60.4	61.1	61.1	62.2	61.5	61.6	13.8	13.9	15.3	12.6	13.2	13.7	4.3	0.3	3.5	0.0	1.5	1.7
Samson	88	77	70	72	92	78	57.5	57.7	59.1	60.7	59.8	59.9	13.6	13.7	14.9	13.7	13.0	13.9	0.0	0.2	2.5	0.0	0.0	0.8
Barlow	80	74	57	76	73	69	60.0	59.6	59.7	60.9	60.8	60.5	14.2	14.6	15.4	14.0	12.5	14.0	2.5	1.8	4.5	1.5	2.2	2.7
Jenna	79	73	63	78	80	74	57.4	57.9	57.8	60.1	58.0	58.6	14.4	14.4	15.6	13.8	13.7	14.4	2.0	0.2	6.8	0.0	0.6	2.5
Prosper	94	80	71	87	81	80	59.5	58.9	59.4	61.6	59.8	60.3	13.8	14.2	14.7	12.4	12.2	13.1	5.8	3.7	5.0	0.3	4.0	3.1
Vantage	--	75	66	69	80	72	--	61.6	61.7	63.3	62.1	62.4	--	15.3	16.5	14.6	15.6	15.6	--	0.2	0.3	0.0	0.0	0.1
WB-Digger	--	79	62	80	89	77	--	58.9	58.0	60.8	59.6	59.5	--	13.5	15.4	12.9	12.8	13.7	--	0.5	5.0	0.0	1.1	2.0
LCS Powerplay	--	--	62	76	81	73	--	--	59.5	61.1	60.5	60.4	--	--	15.0	12.6	13.2	13.6	--	--	5.8	0.0	3.6	3.1
Rollag	--	--	63	74	80	72	--	--	60.5	62.0	61.6	61.4	--	--	15.6	13.9	13.6	14.4	--	--	3.8	0.0	0.2	1.3
SY Soren	--	--	62	79	82	75	--	--	59.2	61.2	60.9	60.4	--	--	15.3	13.9	13.8	14.3	--	--	4.5	0.0	0.0	1.5
WB-Mayville	--	--	63	74	79	72	--	--	59.9	60.3	59.6	59.9	--	--	15.3	14.2	13.8	14.4	--	--	1.0	0.0	0.1	0.4
Advance	--	--	--	79	84	--	--	--	--	61.3	61.2	--	--	--	--	13.5	12.2	--	--	--	--	2.8	1.3	--
LCS Breakaway	--	--	--	80	80	--	--	--	--	61.7	61.8	--	--	--	--	13.7	13.8	--	--	--	--	1.0	2.4	--
Elgin-ND	--	--	--	77	80	--	--	--	--	60.3	60.4	--	--	--	--	13.2	13.5	--	--	--	--	1.5	4.1	--
Forefront	--	--	--	80	75	--	--	--	--	61.8	59.7	--	--	--	--	12.5	14.1	--	--	--	--	1.3	6.4	--
Norden	--	--	--	72	78	--	--	--	--	62.3	61.9	--	--	--	--	13.4	12.9	--	--	--	--	0.0	0.0	--
Linkert	--	--	--	--	77	--	--	--	--	--	60.8	--	--	--	--	--	13.6	--	--	--	--	--	0.0	--
SY Rowyn	--	--	--	--	76	--	--	--	--	--	59.6	--	--	--	--	--	13.1	--	--	--	--	--	3.6	--
Velva	82	74	57	78	--	--	57.7	58.5	57.6	60.7	--	--	14.3	14.1	15.9	13.5	--	--	1.8	1.2	6.3	0.3	--	--
Brennan	82	66	63	74	--	--	59.6	58.5	59.8	61.1	--	--	13.9	14.6	15.0	13.6	--	--	0.5	1.3	3.3	0.0	--	--
Cromwell	86	72	58	71	--	--	60.6	59.5	59.7	62.5	--	--	13.7	14.4	15.7	13.2	--	--	5.8	2.4	7.0	0.0	--	--
Edge	--	--	--	72	--	--	--	--	--	59.0	--	--	--	--	--	13.6	--	--	--	--	--	0.0	--	--
Howard	86	69	55	--	--	--	59.9	58.8	59.1	--	--	--	13.8	14.7	15.6	--	--	--	4.8	4.6	4.0	--	--	--
Kelby	83	71	58	--	--	--	60.0	58.9	58.9	--	--	--	14.3	15.1	15.6	--	--	--	1.0	1.8	6.0	--	--	--
Sabin	76	66	52	--	--	--	58.4	58.2	56.3	--	--	--	14.7	14.6	17.0	--	--	--	4.0	6.9	7.8	--	--	--
Brick	89	64	59	--	--	--	61.1	59.0	60.1	--	--	--	14.2	15.1	15.4	--	--	--	3.8	6.9	6.8	--	--	--
Select	--	54	62	--	--	--	--	58.1	60.1	--	--	--	--	15.0	16.1	--	--	--	--	4.6	5.5	--	--	--
Blade	--	75	--	--	--	--	--	61.4	--	--	--	--	--	14.2	--	--	--	--	--	0.5	--	--	--	--
Brogan	--	73	--	--	--	--	--	59.5	--	--	--	--	--	13.7	--	--	--	--	--	1.7	--	--	--	--
Kuntz	85	71	--	--	--	--	58.2	57.8	--	--	--	--	14.1	14.3	--	--	--	--	0.5	0.6	--	--	--	--
Steele-ND	78	61	--	--	--	--	59.7	58.6	--	--	--	--	14.5	14.7	--	--	--	--	3.5	3.1	--	--	--	--
Hat Trick	74	68	--	--	--	--	58.7	58.9	--	--	--	--	13.5	13.7	--	--	--	--	5.0	0.7	--	--	--	--
Tom	81	72	--	--	--	--	58.8	58.9	--	--	--	--	14.2	13.6	--	--	--	--	5.8	2.7	--	--	--	--
LSD 5%	6.1	6.1	5.8	4.0	6.9		0.9	0.6	1.0	0.6	0.5		0.5	0.6	0.7	0.7	0.8		2.6	1.7	2.7	0.7	2.8	

Nelson County HRSW Summary 2009-2013

	Yield(bu/a)						Test Weight(lbs/bu)						Protein(%)						Lodging(0-9)
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**10**
Faller	92	83	83	81	95	86	59.3	59.5	60.6	57.3	63.2	60.4	12.9	13.1	14.4	13.5	14.0	14.4	0.0
Glenn	78	66	61	77	79	72	63.5	61.2	61.5	60.9	64.7	62.4	14.0	14.5	15.2	14.9	15.4	15.2	0.3
RB07	78	70	68	78	81	76	61.7	58.6	59.6	57.5	63.0	60.0	13.3	14.0	15.5	14.1	15.1	15.5	0.0
Breaker	81	82	74	75	90	80	60.0	62.0	60.4	59.2	63.5	61.0	13.3	13.8	14.9	13.8	14.1	14.9	0.0
LCS Albany	97	89	--	75	103	--	60.9	59.3	--	56.1	63.5	--	12.5	12.6	--	12.9	12.9	--	0.0
Barlow	88	77	68	77	81	75	61.1	60.6	59.8	58.6	63.3	60.6	13.9	14.4	15.4	14.3	14.9	15.4	0.5
Jenna	86	83	64	76	92	77	59.8	58.0	58.4	56.1	62.3	58.9	13.4	14.2	15.2	14.0	14.2	15.2	0.0
Prosper	92	88	84	77	88	83	59.8	59.8	60.5	57.1	63.2	60.3	13.1	13.2	14.5	13.8	13.7	14.5	0.0
Vantage	--	74	71	62	86	73	--	62.5	60.5	59.1	63.6	61.1	--	14.9	16.5	16.0	15.3	16.5	0.0
Rollag	--	--	67	69	85	73	--	--	60.9	57.8	63.8	60.8	--	--	15.6	15.5	15.1	15.6	--
Samson	87	--	65	75	87	76	59.9	--	59.0	57.9	61.9	59.6	13.3	--	14.8	14.3	14.2	14.8	--
SY Soren	--	--	62	75	85	74	--	--	59.0	57.3	63.6	60.0	--	--	15.0	14.2	15.2	15.0	--
WB-Digger	--	--	74	79	99	84	--	--	59.1	57.8	62.1	59.7	--	--	14.8	13.8	14.3	14.8	--
WB-Mayville	--	--	70	76	85	77	--	--	59.8	58.3	62.8	60.3	--	--	15.7	14.5	15.0	15.7	--
Advance	--	--	--	74	84	--	--	--	--	58.4	64.0	--	--	--	--	13.9	13.4	--	--
LCS Breakaway	--	--	--	75	83	--	--	--	--	59.1	63.9	--	--	--	--	14.6	15.0	--	--
Elgin-ND	--	--	--	82	91	--	--	--	--	57.1	62.7	--	--	--	--	13.9	15.0	--	--
Forefront	--	--	--	73	80	--	--	--	--	57.5	63.1	--	--	--	--	13.8	15.4	--	--
Norden	--	--	--	72	89	--	--	--	--	58.5	64.1	--	--	--	--	14.0	14.1	--	--
LCS Powerplay	--	--	--	76	91	--	--	--	--	58.2	63.7	--	--	--	--	13.6	13.9	--	--
Linkert	--	--	--	--	77	--	--	--	--	--	62.9	--	--	--	--	--	15.6	--	--
SY Rowyn	--	--	--	--	86	--	--	--	--	--	62.4	--	--	--	--	--	14.2	--	--
Velva	--	80	75	79	--	--	58.7	59.9	58.4	57.2	--	--	13.2	14.0	15.3	14.0	--	--	0.0
Brennan	79	69	59	74	--	--	62.4	58.5	59.1	58.6	--	--	13.6	13.9	15.0	14.4	--	--	0.0
Cromwell	84	76	69	73	--	--	60.9	60.7	60.5	57.8	--	--	13.5	13.6	14.8	14.3	--	--	0.0
Edge	--	--	--	72	--	--	--	--	--	57.2	--	--	--	--	--	14.2	--	--	--
Brick	81	75	63	--	--	--	62.7	60.0	60.5	--	--	--	13.4	14.0	14.7	--	--	--	0.5
Sabin	77	78	64	--	--	--	60.9	59.0	58.5	--	--	--	13.8	14.3	15.8	--	--	--	1.3
Select	--	63	68	--	--	--	--	59.2	60.4	--	--	--	--	13.9	14.9	--	--	--	1.0
Howard	87	78	73	--	--	--	60.5	60.2	60.2	--	--	--	13.5	14.4	15.1	--	--	--	1.5
Kelby	75	66	56	--	--	--	62.4	58.4	58.5	--	--	--	13.8	14.2	15.4	--	--	--	0.0
Kuntz	85	69	--	--	--	--	58.6	57.9	--	--	--	--	13.5	14.1	--	--	--	--	0.0
Steele-ND	74	76	--	--	--	--	61.5	59.8	--	--	--	--	13.6	14.4	--	--	--	--	1.3
Hat Trick	74	72	--	--	--	--	62.7	59.9	--	--	--	--	12.8	12.9	--	--	--	--	0.0
Tom	84	72	--	--	--	--	60.7	59.0	--	--	--	--	13.6	14.1	--	--	--	--	0.8
LSD 5%	7.5	8.2	5.2	6.9	6.5		1.1	0.5	0.7	1.0	0.4		0.5	0.4	0.6	0.7	0.5		NS

Towner County HRSW Summary 2009-2013

	Yield(bu/a)						Test Weight(lbs/bu)						Protein(%)						Lodging(0-9)
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**11**
Faller	86	86	61	71	85	72	59.0	60.1	58.6	55.8	61.1	58.5	12.5	13.5	16.6	13.0	13.9	16.6	7.3
Glenn	78	73	53	60	70	61	63.8	62.5	62.0	59.5	63.2	61.6	13.0	14.4	16.9	14.3	15.3	15.5	4.0
RB07	84	76	58	71	75	68	61.6	59.8	58.7	56.5	60.3	58.5	12.5	13.8	16.7	13.9	14.9	15.2	4.5
Breaker	84	80	61	66	78	68	60.3	61.8	60.5	58.5	62.4	60.5	12.5	13.4	16.3	13.0	14.3	14.5	3.0
LCS Albany	80	82	--	60	78	--	60.7	58.6	--	54.7	61.0	--	11.5	12.8	--	13.4	13.2	--	--
Samson	77	--	71	64	77	71	60.0	--	58.7	56.0	59.2	58.0	12.7	--	15.8	13.9	14.3	14.7	0.5
Barlow	85	76	54	64	73	64	61.4	60.7	58.9	57.3	60.8	59.0	12.9	13.9	17.3	14.0	14.8	15.4	6.5
Jenna	77	77	62	64	73	66	60.4	58.9	58.9	55.5	59.5	58.0	12.7	13.8	16.9	13.5	15.0	15.1	1.3
Prosper	85	88	65	70	79	72	59.6	59.9	59.1	56.1	61.3	58.8	12.7	13.4	16.3	13.7	13.7	14.6	6.3
Vantage	--	71	56	50	70	58	--	62.6	61.0	57.9	62.7	60.5	--	15.2	17.6	15.7	16.5	16.6	0.8
Rollag	--	--	60	60	68	63	--	--	60.8	57.1	61.4	59.8	--	--	16.8	14.4	15.4	15.5	2.0
SY Soren	--	--	57	66	71	64	--	--	59.8	56.5	61.2	59.2	--	--	17.2	13.6	15.2	15.3	0.8
WB-Digger	--	--	65	68	85	73	--	--	58.3	57.0	60.4	58.6	--	--	16.0	13.1	14.0	14.4	0.8
WB-Mayville	--	--	57	64	68	63	--	--	58.9	56.1	60.0	58.3	--	--	16.4	13.9	14.9	15.1	0.0
Advance	--	--	--	61	78	--	--	--	--	57.5	61.7	--	--	--	--	13.5	13.7	--	--
LCS Breakaway	--	--	--	65	72	--	--	--	--	57.9	62.0	--	--	--	--	14.6	15.1	--	--
Elgin-ND	--	--	--	63	75	--	--	--	--	55.8	60.8	--	--	--	--	13.3	14.7	--	--
Forefront	--	--	--	66	58	--	--	--	--	57.3	60.7	--	--	--	--	12.5	15.0	--	--
Norden	--	--	--	59	74	--	--	--	--	57.3	61.9	--	--	--	--	13.1	14.1	--	--
LCS Powerplay	--	--	--	61	81	--	--	--	--	56.4	61.3	--	--	--	--	13.0	14.0	--	--
Linkert	--	--	--	--	70	--	--	--	--	--	60.1	--	--	--	--	--	15.7	--	--
SY Rowyn	--	--	--	--	73	--	--	--	--	--	61.1	--	--	--	--	--	14.2	--	--
Cromwell	71	75	58	63	--	--	61.9	61.4	59.3	56.9	--	--	12.8	13.9	16.3	13.8	--	--	4.8
Brennan	76	73	58	67	--	--	61.6	59.6	59.9	57.8	--	--	13.0	13.8	16.7	14.1	--	--	1.5
Velva	93	79	55	66	--	--	59.9	60.3	57.2	55.5	--	--	12.2	13.9	17.1	13.7	--	--	3.0
Edge	--	--	--	63	--	--	--	--	--	56.9	--	--	--	--	--	14.1	--	--	--
Sabin	78	73	54	--	--	--	60.3	59.2	58.4	--	--	--	13.2	13.9	16.9	--	--	--	6.5
Howard	90	79	59	--	--	--	60.8	59.6	59.9	--	--	--	12.4	13.6	16.6	--	--	--	4.3
Kelby	75	72	56	--	--	--	61.9	59.5	59.9	--	--	--	13.0	14.2	16.9	--	--	--	1.5
Brick	81	74	48	--	--	--	62.0	60.8	60.7	--	--	--	12.6	13.8	16.6	--	--	--	6.3
Select	--	69	58	--	--	--	--	60.4	60.2	--	--	--	--	13.3	16.8	--	--	--	3.3
Kuntz	78	76	--	--	--	--	59.8	59.0	--	--	--	--	12.2	13.0	--	--	--	--	--
Steele-ND	83	79	--	--	--	--	60.8	59.7	--	--	--	--	13.0	13.7	--	--	--	--	--
Hat Trick	79	76	--	--	--	--	61.7	59.3	--	--	--	--	12.8	13.5	--	--	--	--	--
Tom	82	78	--	--	--	--	61.1	60.0	--	--	--	--	12.6	13.8	--	--	--	--	--
LSD 5%	5.9	4.9	5.8	4.7	6.1		1.0	0.7	1.3	0.9	0.6		0.6	0.3	0.5	0.6	0.4		2.0

HRSW Disease by Location, Year and Variety *

Location / Year	Foliar Necrosis - % of Flag at Soft Dough: 3 sites Ave.	L 12	W 12	L 11	P 11	W 11	N 11	T 11	L 10	N 10	W 10	T 10	L 09	LR%: N 11	FHB[1] FS - %: 2 sites Ave.	L 11	T 11	DON[2] - ppm: 2 sites Ave.	L 12	L 11	L 10	L 08	P 08	N 08	FDK[3] (Tombstones)-%: 2 sites Ave.	L 12	L 11	L 10
Variety:																												
Barlow	14	15	15	13	13	25	22	20	7	9	7	5	4	1	2.8	0.6	5.0	0.9	0.5	1.2	1.1	--	--	--	1.4	2	1	1
Breaker	19	20	30	8	10	23	17	45	6	9	10	8	7	0	1.4	0.4	2.3	1.0	0.7	1.2	1.0	0.9	0.5	0.6	1.0	1	1	0
Brennan	26	20	38	19	14	17	27	25	27	43	55	23	20	0	0.6	0.6	0.6	1.2	0.3	2.1	0.3	--	--	--	0.9	0	1	1
Cromwell	15	13	18	13	8	10	18	14	4	11	12	8	5	1	0.5	0.3	0.7	0.9	0.4	1.4	0.3	0.7	--	--	0.9	1	1	0
Faller	16	10	20	18	8	20	15	18	15	21	11	5	5	3	1.3	0.3	2.3	0.5	0.3	0.7	0.5	0.8	0.3	0.3	0.6	0	1	0
Glenn	20	18	25	18	11	32	22	23	16	38	17	4	7	1	1.1	0.5	1.6	0.6	0.4	0.8	0.3	0.7	0.6	0.3	0.4	0	0	0
Jenna	18	25	18	11	11	18	25	25	4	11	16	10	12	0	0.9	0.4	1.3	1.8	0.9	2.6	1.0	--	--	--	0.5	1	2	1
Prosper	14	11	18	14	8	20	15	17	4	7	8	4	5	3	0.9	0.6	1.2	0.9	0.4	1.3	1.5	--	--	--	0.3	0	0	0
RB07	24	28	28	15	9	80	38	63	15	48	19	17	41	0	0.9	0.7	1.0	1.0	0.4	1.5	0.5	0.9	0.5	0.3	0.3	0	0	0
Rollag	19	28	18	10	15	28	20	18	--	--	--	--	--	0	0.1	0.0	0.2	0.4	0.3	0.5	--	--	--	--	--	1	0	--
Samson	29	38	38	10	10	22	27	24	22	--	20	--	21	1	1.4	1.3	1.5	3.4	1.4	5.4	1.9	3.2	3.9	2.1	1.1	2	5	4
SY Soren	16	15	15	18	21	17	27	21	--	--	--	--	--	0	0.3	0.4	0.2	0.5	0.3	0.7	--	--	--	--	--	0	1	--
Vantage	10	10	10	9	8	17	10	26	8	24	4	7	11	0	6.4	4.1	8.6	1.8	1.4	2.1	1.1	1.1	--	--	1.9	2	5	0
Velva	9	9	6	13	9	13	10	22	8	5	13	2	6	0	1.6	2.7	0.5	3.1	1.2	4.9	3.0	--	--	--	2.3	4	1	2
WB Digger	19	20	18	20	8	25	23	28	17	--	23	--	--	0	3.5	3.7	3.2	2.8	1.5	4.0	1.5	--	--	--	1.9	1	4	2
WB-Mayville	48	35	40	68	27	63	70	78	--	--	--	--	--	0	0.9	1.1	0.7	1.9	1.2	2.5	--	--	--	--	2.6	2	3	6
LCS Albany	20	13	33	14	--	12	--	--	9	28	32	13	21	--	--	0.1	--	1.2	1.1	1.2	0.8	0.8	0.8	0.5	2.3	1	2	0
Norden	33	43	30	25	--	--	--	--	--	--	--	--	--	--	--	0.1	--	1.1	0.3	1.9	--	--	--	--	--	1	1	--
Forefront	19	20	18	18	--	--	--	--	--	--	--	--	--	--	--	0.0	--	0.4	0.5	0.3	--	--	--	--	--	1	0	--
Advance	12	15	8	13	--	--	--	--	--	--	--	--	--	--	--	0.4	--	2.0	0.3	3.6	--	--	--	--	--	0	2	--
Elgin-ND	14	15	10	18	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	0.3	--	--	--	--	--	--	0	1	--
LCS Powerplay	45	45	45	45	--	70	--	--	--	--	--	--	--	--	--	0.1	--	1.1	0.4	1.7	--	--	--	--	--	0	2	--
LCS Breakaway	--	13	15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5	--	--	--	--	--	--	1	--	--
Edge	--	23	28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	--	--	--	--	1	--	--
Select	--	43	--	23	8	45	23	25	33	86	77	59	42	0	0.7	0.2	1.1	0.9	0.3	1.4	0.8	--	--	--	0.8	1	1	1
Alpine	--	20	--	15	--	--	--	--	12	--	--	--	--	--	--	0.6	--	1.5	0.7	2.2	1.4	--	--	--	0.9	1	1	1
Alsen	--	38	--	28	--	--	--	--	12	--	--	--	12	--	--	0.1	--	1.0	0.4	1.5	0.3	0.6	0.6	0.3	0.7	0	1	1
Brick	--	23	--	48	14	38	22	65	17	35	28	36	11	0	0.1	0.1	0.1	0.6	0.3	0.8	0.3	--	--	--	0.6	1	0	0
Howard	--	15	--	20	4	45	13	55	8	8	23	7	4	1	1.1	0.4	1.7	1.3	0.8	1.7	1.0	1.1	1.8	0.7	0.7	1	2	1
Steele-ND	--	23	--	35	--	--	--	--	8	10	37	7	10	--	--	0.9	--	1.3	0.7	1.8	0.9	1.2	1.2	1.2	0.7	1	1	1
Briggs	--	13	--	13	--	--	--	--	10	--	--	--	11	--	--	0.8	--	1.1	0.5	1.7	1.0	1.2	0.6	0.3	0.8	1	1	0

L=Langdon, P=Pembina, W=Walsh, T=Towner, R=Ramsey, N=Nelson

[1]FHB-Fusarium Head Blight-Field Severity (Incidence x head severity)

[2]DON test results reported as <0.5 ppm on 2 replications are listed as 0.3 ppm

[3]Fusarium Damaged Kernels

LR%=Leaf Rust % - Flag Leaf

* Disease levels were low in 2013, no notes were recorded.

Durum Summary, Langdon 2009-2013

	Yield (bu/a)						Test Weight (lbs/bu)						Lodging (0-9)					Height (in)					Days to Head				
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**08**	**09**	**10**	**11**	**4yr**	**10**	**11**	**12**	**13**	**3yr**	**10**	**11**	**12**	**13**	**3yr**
AC Commander	61	72	54	71	95	73	53.8	54.1	57.1	58.0	59.9	58.3	6.0	0.0	5.0	0.0	2.8	36	34	32	34	33	71	60	65	58	61
AC Navigator	58	63	47	64	89	66	56.5	54.0	57.3	58.3	60.1	58.6	3.3	2.2	4.7	0.5	2.7	37	34	34	36	35	70	60	65	57	61
Alkabo	88	89	65	75	97	79	60.2	58.1	60.5	60.0	61.5	60.7	0.8	0.0	3.7	0.7	1.3	43	41	39	39	40	71	59	65	58	61
Ben	84	90	64	74	90	76	59.5	59.4	60.1	60.2	61.3	60.5	1.5	1.8	3.5	0.4	1.8	44	42	42	41	42	69	58	64	57	60
DG Star	67	80	69	73	--	--	57.0	56.5	60.4	59.0	--	--	0.0	0.5	2.9	0.6	1.0	43	44	41	--	--	68	55	63	--	--
Dilse	80	84	61	70	--	--	59.4	57.0	59.7	59.4	--	--	3.3	1.9	5.5	0.2	2.7	43	43	40	--	--	72	61	66	--	--
Grenora	96	95	64	76	98	79	58.7	57.6	59.0	58.7	60.8	59.5	1.5	2.8	5.1	1.1	2.6	43	39	39	38	39	71	59	64	58	60
Lebsock	96	87	69	79	89	79	60.5	58.7	60.6	60.0	61.2	60.6	2.0	0.0	3.3	0.3	1.4	43	41	40	38	40	72	57	64	57	59
Maier	79	81	64	73	91	76	58.2	56.1	59.2	59.1	60.4	59.6	3.8	1.3	5.7	0.2	2.8	43	40	39	38	39	71	58	65	57	60
Mountrail	89	87	61	77	103	80	59.3	57.7	59.1	59.0	60.3	59.5	3.8	3.8	5.3	0.1	3.3	45	41	41	39	40	73	61	65	58	61
Pierce	85	87	66	77	101	81	59.7	58.4	60.7	60.3	61.9	61.0	3.3	1.5	5.1	0.4	2.6	45	43	41	40	41	71	59	65	58	61
Strongfield	75	81	63	73	102	79	58.0	55.3	59.9	59.5	61.2	60.2	2.3	0.0	6.3	0.2	2.2	43	40	39	39	39	73	59	66	59	61
Tioga	98	90	65	78	96	80	58.9	57.1	59.5	59.4	60.9	59.9	3.5	1.5	4.4	1.2	2.7	47	45	41	41	42	72	60	65	58	61
DG Max	78	78	64	69	90	74	58.6	57.2	60.4	59.7	61.0	60.4	2.3	0.7	5.1	0.4	2.1	45	43	41	39	41	69	57	65	57	60
Wales	78	84	68	79	--	--	56.6	57.1	60.8	60.3	--	--	1.0	0.0	3.2	2.1	1.6	42	41	40	--	--	70	60	65	--	--
Carpio	88	92	71	79	105	85	60.3	59.1	61.6	60.3	61.9	61.3	4.5	0.0	5.9	0.0	2.6	45	43	41	41	42	74	61	66	59	60
Westhope	71	85	75	75	--	--	56.5	58.2	61.2	60.1	--	--	--	0.6	3.4	0.5	--	42	42	39	--	--	70	60	65	--	--
Alzada	--	58	50	61	73	61	50.4	53.5	56.5	56.7	59.6	57.6	0.0	0.0	7.2	0.3	1.9	33	31	31	29	30	66	55	62	56	58
Divide	--	90	65	75	94	78	--	56.7	59.9	60.0	60.2	60.0	1.8	--	5.8	0.3	--	45	43	40	40	41	71	61	66	59	62
CDC Verona	--	81	57	70	103	77	--	55.8	59.4	59.0	61.2	59.9	--	--	4.4	0.4	--	44	40	40	40	40	73	61	66	60	62
Rugby	--	--	58	67	86	71	--	--	59.8	59.4	60.6	59.9	--	--	--	0.3	--	--	47	46	44	46	--	59	65	57	60
Joppa	101	95	75	75	102	84	60.1	60.0	60.1	--	60.7	--	4.0	1.7	4.7	0.7	2.8	44	42	42	37	40	63	59	64	58	60
VT Peak	--	--	--	--	97	--	--	--	--	--	61.7	--	--	--	--	--	--	--	--	--	38	--	--	--	--	57	--
WB-Belfield	--	--	45	--	--	--	--	--	55.8	--	--	--	--	--	--	0.1	--	--	31	--	--	--	--	52	--	--	--
Grande D'oro	87	87	--	--	--	--	60.5	59.2	--	--	--	--	2.0	0.8	3.9	--	--	44	--	--	--	--	73	--	--	--	--
LSD 5%	8.5	5.5	6.5	4.6	6.4		1.7	1.0	0.8	0.8	0.5		NS	2.0	1.3	1.4		2.0	2.2	1.5	1.7		1.0	1.0	0.9	1.0	

Durum Summary, Nelson County 2008-2012

	Yield (bu/a)						Test Weight (lbs/bu)						Height (in)						Days to Head					
Variety	**08**	**09**	**10**	**11**	**12**	**3yr**	**08**	**09**	**10**	**11**	**12**	**3yr**	**08**	**09**	**10**	**11**	**12**	**3yr**	**08**	**09**	**10**	**11**	**12**	**3yr**
Alkabo	66	68	75	60	75	70	59.0	61.1	57.5	57.0	58.7	57.7	35	37	41	37	39	39	61	56	69	58	64	64
Grenora	69	72	84	62	72	73	57.7	61.0	57.3	56.1	57.4	56.9	33	36	40	36	37	38	61	56	69	59	64	64
Lebsock	66	72	74	64	74	71	60.0	62.5	59.3	58.6	59.0	59.0	33	37	40	36	39	38	60	55	72	58	62	64
DG Max	--	77	74	59	73	68	--	61.5	57.9	56.9	58.9	57.9	--	37	42	40	39	40	--	55	68	58	63	63
Tioga	--	80	75	65	78	73	--	61.1	56.5	55.9	58.6	57.0	--	40	45	38	43	42	--	57	70	59	64	64
Westhope	--	73	73	58	67	66	--	60.9	58.4	58.4	58.3	58.4	--	39	41	38	39	39	--	55	70	60	64	65
Divide	64	--	75	62	75	71	58.7	--	56.0	57.1	59.0	57.4	35	--	42	40	41	41	62	--	70	60	65	65
Carpio	--	--	82	63	72	72	--	--	56.9	58.4	58.9	58.1	--	--	42	38	41	40	--	--	71	60	66	66
Joppa	--	--	87	66	71	75	--	--	58.5	57.2	58.8	58.2	--	--	41	37	41	40	--	--	70	59	63	64
Wales	68	75	70	--	72	--	58.4	61.6	57.9	--	58.3	--	35	37	40	--	39	--	59	55	69	--	64	--
WB-Belfield	--	--	--	44	--	--	--	--	--	56.3	--	--	--	--	--	29	--	--	--	--	--	56	--	--
DG Star	64	74	63	--	--	--	57.5	60.3	56.0	--	--	--	34	38	40	--	--	--	58	55	68	--	--	--
Grande D'oro	69	--	69	--	--	--	60.2	--	58.6	--	--	--	34	--	41	--	--	--	60	--	72	--	--	--
LSD 5%	NS	NS	7.5	6.9	NS		0.9	0.8	1.1	1.4	0.6		NS	NS	1.0	2.6	1.4		2.1	1.3	1.0	0.6	0.6	

2008 yield data is from Devils Lake

Durum Summary, Towner County 2009-2013

	Yield (bu/a)						Test Weight (lbs/bu)						Height (in)						Days to Head					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**10**	**11**	**12**	**13**	**3yr**	**10**	**11**	**12**	**13**	**3yr**
Alkabo	73	74	61	57	74	64	60.2	59.5	60.0	56.9	61.0	59.3	41	37	36	45	39	68	48	62	46	52
Grenora	84	78	59	53	80	64	59.8	58.7	58.4	55.7	59.5	57.9	40	36	34	41	37	68	49	61	45	52
Lebsock	73	65	57	51	68	59	60.8	60.5	59.9	57.1	61.0	59.3	40	40	35	44	40	68	47	60	45	51
DG Max	71	71	55	53	75	61	60.2	59.4	58.9	56.4	60.4	58.6	42	37	38	46	40	68	48	61	46	52
Tioga	84	76	50	57	79	62	60.4	59.2	57.6	56.5	60.5	58.2	44	38	39	49	42	68	53	61	47	54
Westhope	68	71	49	56	--	--	59.8	59.1	57.2	56.8	--	--	40	37	38	--	--	69	51	63	--	--
Divide	--	74	51	52	73	59	--	58.9	56.9	56.8	59.8	57.8	42	37	38	47	41	69	54	62	47	54
Carpio	--	66	52	56	75	61	--	56.9	58.7	57.0	61.2	59.0	41	37	38	48	41	69	51	63	48	54
Joppa	--	74	60	52	85	66	--	59.0	59.0	56.7	60.7	58.8	42	37	39	46	41	69	50	62	46	53
Wales	73	73	--	54	--	--	60.2	58.4	--	56.7	--	--	42	--	37	--	--	69	--	61	--	--
WB-Belfied	--	--	39	--	--	--	--	--	55.3	--	--	--	--	31	--	--	--	--	46	--	--	--
DG Star	72	72	--	--	--	--	59.2	58.6	--	--	--	--	40	--	--	--	--	68	--	--	--	--
Grande D'oro	--	75	--	--	--	--	--	61.3	--	--	--	--	42	--	--	--	--	68	--	--	--	--
LSD 5%	6.9	7.2	5.3	NS	6.7		NS	1.0	1.3	NS	0.5		2.0	3.1	2.6	1.2		NS	1.2	1.2	0.6	

Durum Diseases by Location, Year and Variety *

Location	Foliar Necrosis % of Flag at Soft Dough										FHB[1] FS - %				FDK[2] (Tombstones) %						DON ppm						
	7 Sites	L	L	N	T	L	T	N	L	L	2 sites	L	L	T	3 Sites	L	L	L	L	L	5 Sites	L	L	T	L	L	L
Year	Avg.	12	11	11	11	10	10	10	09	08	Avg.	12	11	11	Avg.	12	11	10	09	08	Avg. [3]	12	11	11	10	09	08
Variety:																											
AC Commander	--	73	73	--	--	15	--	--	21	20	2.8	0.6	4.9	--	4	2	4	6	2	6	4.3	2.7	3.9	--	4.2	3.7	7.0
AC Navigator	--	73	73	--	--	30	--	--	11	23	1.8	0.6	2.9	--	4	3	5	6	3	6	4.2	4.0	6.3	--	4.6	2.1	4.0
Alkabo	23	33	15	50	33	4	19	10	4	15	0.4	0.2	0.5	0.8	1	1	2	1	2	2	2.5	2.6	3.3	4.2	3.7	1.8	1.2
Alzada	--	97	83	--	--	75	--	--	67	23	3.6	0.5	6.6	--	5	2	6	8	3	10	4.0	1.4	6.8	--	4.3	3.3	4.2
Ben	--	8	43	--	--	2	--	--	5	20	1.6	0.4	2.7	--	1	1	2	1	1	1	3.0	2.7	5.1	--	3.0	1.8	2.2
Carpio	21	18	18	35	53	4	12	6	2	30	1.1	1.7	0.4	0.7	2	2	1	2	2	3	--	2.1	2.3	3.4	3.1	--	--
Joppa	20	15	30	28	43	4	18	2	3	--	1.7	0.4	3.0	2.0	2	2	2	2	2	3	--	2.8	3.3	3.1	3.5	--	--
CDC Verona	--	13	13	--	--	6	--	--	--	--	1.8	1.6	2.0	--	2	3	2	3	--	--	--	2.1	2.6	--	4.3	--	--
DG Max	23	20	28	43	28	7	26	9	12	--	1.0	0.5	1.4	0.2	2	2	1	3	1	--	--	2.0	2.1	4.3	3.5	1.8	--
DG Star	--	63	48	--	--	35	29	74	24	27	0.3	0.0	0.5	--	1	1	0	2	1	1	1.7	1.7	2.3	--	2.5	1.3	0.8
Dilse	--	20	33	--	--	1	--	--	4	23	2.9	1.1	4.7	--	2	2	2	3	2	3	3.1	3.3	3.6	--	3.0	3.4	2.2
Divide	--	15	10	16	20	4	6	5	--	22	0.3	0.2	0.4	0.4	2	2	2	1	--	2	--	1.4	2.5	3.0	4.0	--	1.5
Grenora	11	15	8	22	17	0	14	3	2	12	1.0	0.2	1.7	1.2	2	2	1	2	1	3	4.0	2.6	4.7	5.9	6.0	4.3	2.5
Lebsock	16	8	25	40	32	1	5	2	6	17	1.5	0.4	2.6	0.7	2	1	1	2	1	1	2.3	2.2	2.8	4.5	2.8	1.9	1.8
Maier	--	20	25	--	--	3	--	--	4	20	1.4	0.6	2.2	--	2	2	2	3	2	3	3.5	3.2	3.6	--	4.0	2.9	3.8
Mountrail	--	15	10	--	--	3	--	--	3	17	1.2	0.6	1.7	--	4	5	3	3	2	3	--	3.6	3.8	--	4.2	2.9	--
Pierce	--	11	23	--	--	6	--	--	5	23	1.5	0.5	2.5	--	2	2	2	2	1	2	3.1	4.0	2.2	--	4.0	2.6	2.9
Strongfield	--	13	38	--	--	6	--	--	5	10	2.0	0.7	3.3	--	2	2	2	3	2	3	3.0	2.8	4.1	--	2.8	3.1	2.4
Tioga	23	48	28	48	32	0	5	3	1	--	0.6	0.1	1.0	1.9	1	2	1	1	2	--	--	1.6	3.4	2.9	3.2	--	--
Wales	--	38	33	--	--	19	22	41	31	33	0.6	0.6	0.5	--	1	1	1	2	1	3	2.5	3.3	2.7	--	1.8	2.0	2.7
Westhope	39	35	38	80	47	11	23	43	26	--	1.2	0.8	1.6	1.4	2	2	2	2	2	--	--	3.5	2.9	3.2	4.0	3.2	--

L=Langdon, N=Nelson, T=Towner.

[1]FHB-Fusarium Head Blight-Field Severity (Incidence x head severity)

[2]Fusarium Damaged Kernels

[3]Includes L12, 11, 10, 9, 8

* Disease levels were low in 2013, no notes were recorded.

Winter Wheat - Langdon, ND - 2011-2013

		Yield - bu/ac								Test Weight - lb/bu								% Protein							
	Winter[a]	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*	NoF*	wF*
Variety	Hardiness	11	11	12	12	13	13	3yr	3yr	11	11	12	12	13	13	3yr	3yr	11	11	12	12	13	13	3yr	3yr
Accipiter	2	57.9	65.4	65.4	74.1	97.7	106.5	73.7	82.0	59.4	60.4	60.8	61.9	61.1	60.1	60.4	60.8	11.7	11.7	10.1	9.1	11.4	11.5	11.1	10.7
Art	8	66.8	69.6	67.4	75.2	73.7	79.6	69.3	74.8	61.2	61.8	61.3	61.6	61.9	61.1	61.5	61.5	13.0	13.0	9.8	10.1	14.3	14.5	12.3	12.5
Boomer	3	60.3	64.1	71.0	80.5	102.2	112.7	77.8	85.8	58.9	60.2	59.7	60.8	61.7	60.6	60.1	60.5	12.0	12.1	8.9	8.7	11.7	11.6	10.9	10.8
CDC Falcon	4	67.6	73.4	68.0	76.0	92.0	100.5	75.9	83.3	59.9	60.7	60.6	61.1	61.9	60.8	60.8	60.9	11.5	11.4	8.9	9.3	11.6	12.0	10.7	10.9
Decade	2	65.5	71.7	68.4	80.3	83.1	85.2	72.3	79.1	60.9	61.6	60.7	61.8	59.0	60.4	60.2	61.3	11.5	12.3	9.2	9.6	13.8	13.8	11.5	11.9
Expedition	4	52.7	59.9	57.0	76.1	91.2	96.1	67.0	77.4	60.1	60.6	59.3	61.0	61.7	60.9	60.3	60.8	12.2	12.3	8.6	9.1	12.2	12.5	11.0	11.3
Ideal	5	69.6	73.7	65.2	74.5	88.9	95.6	74.6	81.3	60.7	61.3	60.3	60.9	61.7	61.8	60.9	61.3	11.5	11.5	9.8	9.6	12.2	12.7	11.2	11.3
Jerry	3	65.1	72.9	62.5	69.8	91.7	95.9	73.1	79.5	59.7	60.4	60.3	61.1	60.9	59.7	60.3	60.4	12.0	11.9	9.3	9.5	13.4	13.0	11.6	11.5
Lyman	5	57.9	66.7	65.9	69.7	97.0	99.2	73.6	78.5	60.7	61.0	60.5	61.5	61.0	60.8	60.7	61.1	13.4	13.3	10.7	10.0	14.0	14.2	12.7	12.5
Overland	5	59.7	65.2	73.9	74.5	88.6	91.8	74.1	77.2	60.8	61.3	60.8	61.4	61.3	61.4	61.0	61.4	11.9	12.0	9.3	9.4	13.3	13.2	11.5	11.5
Peregrine	2	70.7	72.0	73.7	76.2	85.8	85.6	76.7	77.9	60.9	61.0	61.1	61.0	61.1	60.7	61.0	60.9	11.1	11.2	8.8	9.3	11.2	11.6	10.3	10.7
SY Wolf	6	59.0	62.6	68.8	73.2	81.9	82.1	69.9	72.6	60.5	61.1	61.4	62.0	59.5	60.8	60.5	61.3	12.2	12.4	9.5	10.1	12.5	12.7	11.4	11.7
WB Matlock	2	54.8	63.2	65.5	78.7	93.4	102.6	71.2	81.5	60.1	60.8	61.1	62.0	61.7	61.3	61.0	61.4	13.0	12.8	9.2	9.0	12.7	12.2	11.6	11.3
Wesley	6	54.7	59.2	59.0	71.9	72.9	78.3	62.2	69.8	59.7	60.5	60.8	61.6	60.5	59.9	60.3	60.7	12.6	13.3	10.3	10.1	14.1	13.9	12.3	12.4
AC Broadview	4	--	--	68.8	81.4	80.1	91.3	--	--	--	--	59.0	60.3	59.0	58.2	--	--	--	--	9.0	8.8	11.4	11.8	--	--
McGill	4	--	--	69.9	77.7	87.6	86.9	--	--	--	--	60.4	61.5	61.1	61.4	--	--	--	--	9.4	9.0	12.4	12.5	--	--
Robidoux	6	--	--	72.2	79.5	76.3	94.0	--	--	--	--	59.8	61.2	62.1	61.0	--	--	--	--	9.5	9.1	11.9	12.0	--	--
Flourish	2	--	--	--	--	92.0	103.7	--	--	--	--	--	--	61.3	60.4	--	--	--	--	--	--	11.9	12.1	--	--
Sunrise[b]	3	--	--	--	--	85.7	91.2	--	--	--	--	--	--	58.6	58.5	--	--	--	--	--	--	10.9	10.7	--	--
Freeman	6	--	--	--	--	92.0	97.3	--	--	--	--	--	--	60.5	59.8	--	--	--	--	--	--	12.4	12.6	--	--
Moats	2	--	--	--	--	90.5	99.6	--	--	--	--	--	--	61.8	61.3	--	--	--	--	--	--	11.9	12.2	--	--
WB Grainfield	6	--	--	--	--	84.6	79.3	--	--	--	--	--	--	61.0	60.4	--	--	--	--	--	--	12.6	12.4	--	--
AC Radiant	2	--	--	59.9	65.7	--	--	--	--	--	--	60.4	60.8	--	--	--	--	--	--	8.9	8.9	--	--	--	--
Carter	6	57.6	66.7	55.1	65.1	--	--	--	--	60.4	61.3	60.6	61.5	--	--	--	--	12.5	12.4	10.3	10.1	--	--	--	--
Darrell	6	57.7	65.1	63.3	68.9	--	--	--	--	60.4	60.8	61.1	61.7	--	--	--	--	12.0	12.5	9.9	10.3	--	--	--	--
Hawken	7	51.1	62.9	66.0	76.1	--	--	--	--	59.1	60.1	60.9	61.9	--	--	--	--	13.3	13.1	10.2	10.6	--	--	--	--
LSD 5%		5.1		7.2		11.1				0.6		0.7		1.4				0.4		0.9		0.6			
Average		61.1	67.0	66.0	74.5	87.7	93.4	72.2	78.6	60.3	60.9	60.5	61.3	60.9	60.5	60.6	61.0	12.1	12.2	9.4	9.4	12.4	12.5	11.4	11.5

2011 & 13 - wF = Stratego at herbicide time, 4oz/a + Prosaro at early flower, 6.5 oz/a + NIS 0.125% v/v, **NoF** = No Fungicide

[a]Relative winter hardiness rating: 1 = excellent, 10 = very poor. No Winter Kill has occurred in 4 years. Thin stands in 2013 were not due to winter kill since Art had adequate stand.

[b]Soft red winter wheat

HRWW Summary - Devils Lake, Willow City, Tolna and 2010-2012 Averages *

Yield (bu/a)

	No Fungicide						With Fungicide[c]					
Variety	2010[a] Ave	2011[b] Ave	Devils Lake	Willow City	Tolna	2012 Avg	2010[a] Ave	2011[b] Ave	Devils Lake	Willow City	Tolna	2012 Avg
Accipiter	89	67	78	73	78	76	98	89	90	72	70	77
Art	--	74	105	65	69	80	--	87	105	68	79	84
Boomer	92	67	90	74	60	75	99	81	87	75	65	76
CDC Falcon	90	68	86	72	75	78	99	83	89	74	71	78
Darrel	--	80	99	73	74	82	--	89	100	71	83	84
Decade	--	77	99	70	69	79	--	89	99	74	67	80
Expedition	--	--	99	67	59	75	--	--	104	67	56	76
Hawken	90	69	--	--	--	--	97	82	--	--	--	--
Ideal	--	--	93	72	78	81	--	--	106	74	79	86
Jerry	95	69	86	74	64	75	102	78	94	75	66	79
Lyman	98	74	--	--	--	--	100	85	--	--	--	--
Millennium	99	73	--	--	--	--	104	87	--	--	--	--
Overland	99	79	109	72	73	85	105	91	109	74	77	86
Smoky Hill	--	--	107	69	52	76	--	--	115	71	64	83
Striker	91	61	--	--	--	--	100	78	--	--	--	--
SY Wolf	--	82	104	68	66	80	--	90	104	69	72	82
WB-Matlock	95	68	--	--	--	--	101	84	--	--	--	--
Site Average	94	72	95	71	68	78	101	85	100	72	71	81
LSD 5%			8.5	2.4	8.5				8.5	2.4	8.5	

Test Weight (lbs/bu)

	No Fungicide						With Fungicide[c]					
Variety	2010[a] Ave	2011[b] Ave	Devils Lake	Willow City	Tolna	2012 Avg	2010[a] Ave	2011[b] Ave	Devils Lake	Willow City	Tolna	2012 Avg
Accipiter	60.3	59.4	57.9	61.4	61.1	60.1	62.1	61.2	57.9	61.7	61.6	60.4
Art	--	59.5	61.0	61.4	63.3	61.9	--	61.0	61.8	61.8	63.3	62.3
Boomer	59.1	57.6	57.6	61.0	60.8	59.8	60.1	59.6	58.3	61.4	61.2	60.3
CDC Falcon	59.2	57.9	57.5	60.9	60.6	59.7	60.8	59.9	58.7	61.7	62.0	60.8
Darrel	--	60.4	60.3	61.9	62.6	61.6	--	60.6	60.9	61.9	62.6	61.8
Decade	--	59.7	60.1	62.5	62.1	61.6	--	60.7	60.4	63.1	62.9	62.1
Expedition	--	--	61.3	62.4	62.7	62.1	--	--	61.9	63.2	62.5	62.5
Hawken	60.0	--	--	--	--	--	61.3	--	--	--	--	--
Ideal	--	--	60.4	62.5	62.8	61.9	--	--	61.0	63.1	63.2	62.4
Jerry	59.2	59.4	58.2	61.4	60.9	60.2	60.4	60.4	59.9	61.9	60.8	60.9
Lyman	60.8	61.1	--	--	--	--	60.4	61.7	--	--	--	--
Millennium	60.3	60.2	--	--	--	--	60.5	61.1	--	--	--	--
Overland	60.3	60.2	61.8	61.7	62.1	61.9	60.6	61.0	61.8	61.5	62.3	61.9
Smoky Hill	--	--	60.9	62.9	63.6	62.5	--	--	61.9	63.0	63.8	62.9
Striker	59.7	58.5	--	--	--	--	60.8	60.8	--	--	--	--
SY Wolf	--	60.6	61.3	62.2	63.4	62.3	--	61.0	60.4	62.6	63.6	62.2
WB-Matlock	60.3	60.0	--	--	--	--	61.1	61.1	--	--	--	--
Site Average	59.9	59.6	59.9	61.8	62.1	61.3	60.8	60.8	60.4	62.1	62.5	61.7
LSD 5%			1.2	0.4	0.7				1.2	0.4	0.7	

[a]2010 data is an average of Tolna, Leeds and Lakota sites.

[b]2011 data is an average of Devils Lake and Willow City sites.

[c]2010 with Fungicide = Prosaro at early flower, 6.5 oz/a +NIS 0.125 v/v

[c]2011-12 with Fungicide = Stratego at herbicide time, 4 oz/a + Prosaro at early flower, 6.5 oz/a + NIS 0.125 v/v

* No remote sites were harvested in 2013 due to poor establishment last fall.

HRWW Summary - Devils Lake, Willow City, Tolna and 2010-2012 Averages *

Protein (%)

	No Fungicide						With Fungicide[c]					
Variety	2010[a] Ave	2011[b] Ave	Devils Lake	Willow City	Tolna	2012 Avg	2010[a] Ave	2011[b] Ave	Devils Lake	Willow City	Tolna	2012 Avg
Accipiter	10.8	11.7	10.7	11.2	9.5	10.5	10.9	11.3	10.7	11.3	8.7	10.2
Art	--	12.6	11.3	13.4	10.2	11.6	--	12.5	11.5	13.5	10.6	11.9
Boomer	11.4	12.4	10.5	11.8	8.8	10.4	11.5	12.1	11.0	11.9	8.9	10.6
CDC Falcon	11.0	12.2	10.8	11.2	9.8	10.6	11.4	11.9	11.3	11.4	9.5	10.7
Darrel	--	12.0	10.8	11.8	9.8	10.8	--	12.0	10.8	11.8	10.6	11.1
Decade	--	12.0	11.0	12.4	10.4	11.3	--	11.8	11.1	12.1	11.2	11.5
Expedition	--	--	10.8	11.7	10.0	10.8	--	--	10.6	12.0	10.8	11.1
Hawken	12.0	--	--	--	--	--	12.1	--	--	--	--	--
Ideal	--	--	10.3	11.0	8.8	10.0	--	--	10.5	11.7	9.3	10.5
Jerry	11.9	12.2	10.8	11.3	9.8	10.6	11.9	12.3	11.0	11.9	10.1	11.0
Lyman	12.2	12.6	--	--	--	--	12.1	13.1	--	--	--	--
Millennium	11.4	12.0	--	--	--	--	11.3	12.2	--	--	--	--
Overland	11.6	12.0	10.3	11.7	8.2	10.1	11.6	12.1	10.8	11.9	8.6	10.4
Smoky Hill	--	--	11.0	12.2	9.9	11.0	--	--	11.2	12.3	10.1	11.2
Striker	11.5	12.4	--	--	--	--	11.7	12.3	--	--	--	--
SY Wolf	--	12.3	11.0	12.2	9.5	10.9	--	12.3	10.9	12.3	9.7	11.0
WB-Matlock	11.8	12.7	--	--	--	--	11.8	12.8	--	--	--	--
Site Average	11.6	12.2	10.8	11.7	9.5	10.7	11.6	12.2	10.9	11.9	9.8	10.9
LSD 5%			0.5	0.6	1.0				0.5	0.6	1.0	

[a]2010 data is an average of Tolna, Leeds and Lakota sites.

[b]2011 data is an average of Devils Lake and Willow City sites.

[c]2010 with Fungicide = Prosaro at early flower, 6.5 oz/a +NIS 0.125 v/v

[c]2011-12 with Fungicide = Stratego at herbicide time, 4 oz/a + Prosaro at early flower, 6.5 oz/a + NIS 0.125 v/v

* No remote sites were harvested in 2013 due to poor establishment last fall.

Barley Summary - Langdon - 2009-2013

	Yield (bu/a)						Test Weight (lbs/bu)						Lodging (0-9)			Plump (%)					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**07**	**08**	**2yr**	**09**	**10**	**11**	**12**	**13**	**3yr**
Lacey	121	128	110	97	164	123	48.1	50.3	49.6	48.5	50.9	49.7	2.8	2.8	2.8	93	94	94	86	98	93
Stellar-ND	123	128	116	94	159	123	47.6	49.1	48.6	48.4	50.0	49.0	4.8	1.0	2.9	98	97	95	88	99	94
Tradition	125	131	114	69	163	115	48.5	49.8	49.3	47.0	50.9	49.1	3.8	1.0	2.4	95	95	92	81	98	90
Celebration	134	123	108	78	165	117	48.3	49.4	49.3	47.0	50.3	48.9	--	1.0	--	96	92	95	86	98	93
Quest	130	133	108	94	163	122	46.0	48.4	48.7	48.2	49.3	48.7	--	0.5	--	86	88	87	76	96	86
Innovation	--	126	117	91	160	123	--	49.6	48.7	47.4	50.2	48.8	--	--	--	--	93	92	81	98	90
Rasmusson	124	150	117	--	--	--	48.1	48.9	49.5	--	--	--	2.8	1.8	2.3	94	94	94	--	--	--
Drummond	115	--	--	--	--	--	47.4	--	--	--	--	--	2.0	0.3	1.2	94	--	--	--	--	--
Legacy	120	--	--	--	--	--	47.5	--	--	--	--	--	4.5	2.5	3.5	89	--	--	--	--	--
Robust	132	--	--	--	--	--	48.8	--	--	--	--	--	3.8	0.3	2.1	91	--	--	--	--	--
AC Metcalfe*	124	122	93	71	154	106	48.5	50.0	49.4	47.6	52.5	49.8	7.3	3.0	5.2	87	94	88	81	97	89
CDC Copeland*	133	136	89	86	172	116	47.9	48.2	49.2	47.6	49.9	48.9	7.5	1.3	4.4	90	97	92	84	96	91
Conlon*	114	125	99	83	138	107	49.8	51.5	51.6	49.3	52.5	51.1	6.5	2.3	4.4	94	97	97	92	99	96
Pinnacle*	133	130	115	91	180	129	49.7	49.1	51.1	49.7	53.1	51.3	6.8	0.3	3.6	94	95	95	91	98	95
Rawson*	132	140	107	83	166	119	47.2	48.7	49.4	47.7	51.8	49.6	6.0	3.5	4.8	95	98	95	95	99	96
Conrad*	130	--	98	77	155	110	48.0	--	50.1	47.7	51.2	49.7	7.8	3.5	5.7	87	--	92	88	97	92
Lilly*	--	116	92	--	--	--	--	50.6	48.8	--	--	--	--	--	--	--	91	87	--	--	--
Sunshine*	--	128	--	--	--	--	--	49.8	--	--	--	--	--	--	--	--	96	--	--	--	--
LSD 5%	14.1	13.7	10.9	6.4	10.3		1.2	0.7	0.8	0.8	0.6		3.1	NS		5.8	0.5	3.3	3.9	0.7	

*2-row

Barley Summary - Langdon - 2009-2013

	Height (in)						Protein (%)						Days to Head					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**
Lacey	33	39	36	37	28	34	11.8	12.3	13.3	12.2	12.5	12.7	57	64	51	61	52	55
Stellar-ND	34	39	34	35	29	33	12.2	12.1	12.4	12.0	12.5	12.3	57	64	51	63	53	56
Tradition	37	40	36	34	29	33	12.1	12.0	12.7	12.2	12.5	12.5	59	65	53	64	52	56
Celebration	36	38	35	34	28	32	12.8	12.3	13.7	13.3	13.6	13.5	57	66	54	65	53	57
Quest	38	39	38	37	31	35	12.5	11.9	12.7	12.2	12.2	12.4	57	66	52	62	54	56
Innovation	--	38	33	37	26	32	--	12.3	12.5	12.8	12.4	12.6	--	64	51	61	52	55
Rasmusson	32	37	32	--	--	--	11.6	12.1	12.5	--	--	--	56	66	50	--	--	--
Drummond	36	--	--	--	--	--	12.5	--	--	--	--	--	57	--	--	--	--	--
Legacy	38	--	--	--	--	--	12.7	--	--	--	--	--	59	--	--	--	--	--
Robust	39	--	--	--	--	--	13.1	--	--	--	--	--	57	--	--	--	--	--
AC Metcalfe*	38	38	35	31	32	33	12.3	11.9	13.7	12.7	11.7	12.7	59	67	54	65	56	58
CDC Copeland*	39	40	36	35	35	35	11.3	11.3	12.9	12.1	11.8	12.3	62	70	56	65	59	60
Conlon*	35	35	34	35	30	33	12.0	12.3	12.7	12.8	11.7	12.4	53	60	49	57	50	52
Pinnacle*	37	39	35	35	31	34	10.9	10.8	12.0	11.7	11.3	11.7	58	66	54	62	55	57
Rawson*	37	38	36	33	31	33	11.9	11.3	11.9	11.6	10.8	11.4	55	63	50	61	52	54
Conrad*	36	--	31	28	29	29	12.5	--	12.7	12.0	12.3	12.3	60	--	55	65	57	59
Lilly*	--	32	31	--	--	--	--	11.2	12.1	--	--	--	--	67	53	--	--	--
Sunshine*	--	32	--	--	--	--	--	11.5	--	--	--	--	--	68	--	--	--	--
LSD 5%	3.1	1.0	3.3	1.7	2.0		0.9	0.5	0.7	0.9	0.6		1.2	1.0	1.0	1.2	1.1	

*2-row

Barley Summary - Pembina County - 2009-2013

	Yield (bu/a)						Test Weight (lbs/bu)						Protein (%)						Plump (%)					
Variety	09	10	11	12	13	3yr	09	10	11	12	13	3yr	09	10	11	12	13	3yr	09	10	11	12	13	3yr
Lacey	128	103	95	116	106	106	49.5	49.4	50.4	48.9	49.9	49.7	11.6	11.6	13.2	11.1	12.6	12.3	96	99	93	91	99	94
Stellar-ND	131	108	100	108	104	104	47.7	47.4	49.6	46.5	49.2	48.4	11.8	11.7	12.5	11.4	12.1	12.0	95	99	92	88	99	93
Tradition	127	101	97	94	113	101	48.7	48.7	51.0	45.8	50.4	49.1	11.8	11.6	12.9	12.0	12.4	12.4	96	98	92	84	99	92
Celebration	133	95	95	88	105	96	49.0	48.5	49.1	46.0	49.0	48.0	12.2	12.4	14.2	13.1	13.6	13.6	96	96	88	85	99	91
Quest	--	99	105	111	100	106	--	48.1	50.3	46.9	48.3	48.5	--	11.8	13.0	10.8	12.3	12.0	--	93	86	84	96	89
Pinnacle*	141	105	102	--	--	--	48.8	48.8	51.8	--	--	--	11.1	10.6	11.7	--	--	--	96	99	96	--	--	--
Rassmusson	141	101	110	--	--	--	48.9	48.8	50.8	--	--	--	11.5	11.0	12.4	--	--	--	94	97	91	--	--	--
Innovation	--	--	--	113	101	--	--	--	--	47.9	48.6	--	--	--	--	11.0	12.4	--	--	--	--	90	98	--
LSD 5%	NS	NS	7.0	6.1	NS		0.8	0.5	0.8	0.5	0.6		NS	0.7	0.7	0.9	0.6		NS	1.0	3.2	2.2	0.5	

*Two row barley

Barley trials are conducted in Pembina County in odd number years and Walsh County in even numbered years. 2010 and 2012 data is from Walsh County.

Barley Summary - Towner County - 2008-2012

	Yield (bu/a)						Test Weight (lbs/bu)						Lodging (0-9)			Protein (%)						Plump (%)				
Variety	**08**	**09**	**10**	**11**	**12**	**3yr**	**08**	**09**	**10**	**11**	**12**	**3yr**	**10**	**11**	**2yr**	**08**	**09**	**10**	**11**	**12**	**3yr**	**08**	**09**	**10**	**11**	**12**	**3yr**
Lacey	73	122	118	77	83	93	46.2	50.1	50.8	49.3	46.4	48.8	2.3	0.5	1.4	13.9	11.9	12.2	13.7	14.2	13.4	77	98	95	95	72	87
Stellar-ND	73	125	112	83	75	90	45.1	48.6	49.2	48.3	45.1	47.5	2.8	1.0	1.9	14.1	11.3	11.8	13.5	13.1	12.8	82	98	97	95	78	90
Tradition	79	122	123	81	68	90	47.4	49.5	50.6	49.1	45.5	48.4	1.0	0.8	0.9	14.1	11.7	12.4	13.4	14.4	13.4	87	98	96	93	76	88
Celebration	--	126	116	71	73	86	--	49.4	49.5	47.8	44.6	47.3	6.3	1.3	3.8	--	11.8	12.8	15.1	14.1	14.0	--	98	92	89	77	86
Quest	--	--	120	81	78	93	--	--	48.4	46.7	45.3	46.8	2.3	3.0	2.7	--	--	12.3	13.6	13.6	13.2	--	--	87	80	66	78
Innovation	--	--	--	--	76	--	--	--	--	--	45.6	--	--	--	--	--	--	--	--	14.3	--	--	--	--	--	71	--
Rasmusson	75	128	128	84	--	--	45.8	49.8	50.5	47.9	--	--	4.3	1.5	2.9	14.1	11.6	11.7	13.3	--	12.5	73	97	91	87	--	--
Pinnacle*	86	125	121	79	--	--	49.8	50.9	51.7	49.6	--	--	0.0	2.0	1.0	12.9	11.0	10.9	12.4	--	11.7	97	99	98	94	--	--
LSD 5%	7.2	NS	NS	5.6	10.0		0.8	0.4	0.7	0.8	NS		1.0	1.1		0.5	0.4	0.4	0.4	NS		9.1	0.6	2.8	3.7	8.3	

*2-row barley

Oat Summary, Langdon 2009-2013

	Yield (bu/a)						Test Weight (lbs/bu)						Days to Head					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**
AC Pinnacle	222	175	184	173	235	198	34.7	33.7	37.1	36.5	40.2	37.9	61	73	61	65	58	61
Beach	190	174	147	173	204	175	38.9	37.3	41.9	39.9	40.9	40.9	59	70	58	63	56	59
CDC Dancer	203	188	152	166	229	182	37.4	37.9	42.0	39.7	39.9	40.5	59	72	59	65	56	60
HiFi	197	204	177	170	216	188	38.4	40.1	40.7	39.2	38.7	39.5	59	71	58	64	57	60
Hytest	146	141	123	140	176	146	41.8	41.5	42.8	41.6	41.3	41.9	56	67	54	62	54	57
Killdeer	176	172	158	169	208	178	37.2	35.9	38.3	37.1	38.1	37.8	57	68	55	63	55	58
Morton	181	143	130	149	195	158	39.1	37.4	40.5	39.8	39.2	39.8	59	70	57	63	57	59
Otana	149	123	112	144	188	148	35.1	29.9	36.5	37.5	37.5	37.2	62	71	59	64	56	60
Rockford	206	191	180	166	211	186	39.5	40.6	42.0	40.6	39.5	40.7	60	71	59	64	58	60
Souris	204	197	162	167	202	177	37.5	39.4	41.1	38.7	38.7	39.5	58	70	57	64	57	59
Stallion	168	176	157	154	194	168	39.1	39.0	42.3	38.7	40.8	40.6	60	69	57	62	56	58
Stark*	156	136	139	130	180	150	42.4	43.1	45.4	43.8	42.8	44.0	62	73	60	66	59	62
Furlong	171	157	141	158	218	172	36.4	34.4	38.4	38.2	38.5	38.4	64	73	62	65	59	62
Minstrel CDC	180	157	154	169	232	185	34.7	32.3	36.3	35.2	37.7	36.4	57	70	57	63	57	59
Newburg	241	216	177	168	228	191	38.7	38.8	40.1	38.2	38.2	38.8	60	69	58	63	56	59
Leggett	207	212	185	154	221	187	36.5	38.1	41.3	38.6	38.8	39.6	59	72	58	65	57	60
Jury	222	210	161	162	225	183	38.4	40.3	41.9	39.7	39.7	40.4	59	68	57	62	56	58
Shelby 427	--	168	152	143	189	161	--	41.3	41.9	39.7	40.7	40.8	--	65	52	60	54	55
Horsepower	--	--	--	160	171	--	--	--	--	39.5	39.1	--	--	--	--	61	53	--
Goliath	--	--	--	--	212	--	--	--	--	--	39.7	--	--	--	--	--	57	--
Buff*	131	132	104	108	--	--	44.9	46.6	48.6	45.4	--	--	53	65	52	60	--	--
Jerry	152	140	121	--	--	--	38.6	38.4	40.2	--	--	--	56	67	55	--	--	--
Youngs	189	140	131	--	--	--	36.7	33.4	39.1	--	--	--	60	72	59	--	--	--
Monida	--	116	119	--	--	--	--	29.0	34.0	--	--	--	--	72	57	--	--	--
Streaker	--	120	113	--	--	--	--	48.7	49.5	--	--	--	--	65	53	--	--	--
Maida	165	152	--	--	--	--	36.7	38.5	--	--	--	--	58	70	--	--	--	--
Paul*	151	125	--	--	--	--	41.9	44.0	--	--	--	--	62	72	--	--	--	--
LSD 5%	23.5	18.1	13.4	10.1	14.3		1.3	1.7	1.1	0.9	1.3		1.2	1.0	1.1	0.7	1.2	

*Naked-hull variety

Oat Summary, Langdon 2009-2013

	Height (in)						Protein(%)						Lodging (0-9)					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**08**	**09**	**10**	**11**	**12**	**3yr**
AC Pinnacle	43	49	45	42	42	43	7.5	10.3	9.7	13.7	14.0	12.5	0.3	0.8	8.5	0.0	2.0	3.5
Beach	45	52	48	45	43	45	9.1	11.2	11.9	15.2	16.0	14.4	0.3	0.0	8.7	0.0	0.0	2.9
CDC Dancer	46	51	48	44	42	45	7.3	10.1	11.0	13.7	14.5	13.1	1.0	0.0	8.2	0.0	0.0	2.7
HiFi	45	54	45	42	42	43	9.1	12.8	14.4	15.3	15.6	15.1	0.0	0.0	6.3	0.0	1.7	2.7
Hytest	46	52	46	42	44	44	12.2	15.4	15.4	17.8	18.9	17.4	0.5	0.3	8.4	0.0	3.4	3.9
Killdeer	37	44	39	38	37	38	8.0	10.8	10.4	14.4	14.6	13.1	0.0	1.0	8.8	0.0	2.0	3.6
Morton	46	54	48	45	44	46	8.8	12.0	13.3	16.4	15.5	15.1	0.0	0.5	6.0	0.0	0.0	2.0
Otana	48	52	47	43	44	45	7.3	10.9	10.9	14.8	14.3	13.3	1.8	7.3	9.0	0.0	5.9	5.0
Rockford	48	53	46	43	42	44	9.5	13.0	13.6	16.4	16.4	15.5	0.0	1.0	6.8	0.0	0.2	2.3
Souris	39	48	42	39	39	40	8.9	12.5	13.1	14.8	15.2	14.4	0.0	0.0	6.5	0.0	0.0	2.2
Stallion	47	53	47	43	44	45	10.5	13.7	14.0	16.2	17.4	15.9	1.3	3.3	8.3	0.0	5.9	4.7
Stark*	44	51	46	44	44	45	10.5	13.8	12.1	17.4	19.2	16.2	0.0	1.0	6.7	0.0	0.3	2.3
Furlong	43	49	44	41	42	42	9.5	12.2	11.3	16.0	17.8	15.0	1.3	1.8	9.0	0.0	1.2	3.4
Minstrel CDC	40	47	43	39	39	40	6.7	9.0	9.2	12.6	12.9	11.6	0.0	0.0	8.9	0.0	0.4	3.1
Newburg	48	55	49	44	45	46	8.5	11.7	13.0	14.9	14.7	14.2	0.0	0.8	7.5	0.0	2.6	3.4
Leggett	42	48	43	40	41	41	10.2	12.9	13.7	16.4	16.8	15.6	--	1.8	7.3	0.0	0.5	2.6
Jury	49	55	50	42	47	46	9.3	12.3	13.0	15.5	15.5	14.7	0.5	1.5	7.8	0.0	4.2	4.0
Shelby 427	--	48	43	40	40	41	--	13.3	14.0	16.0	17.9	16.0	--	--	7.1	0.0	0.9	2.7
Horsepower	--	--	--	38	36	--	--	--	--	15.2	15.9	--	--	--	--	--	0.1	--
Goliath	--	--	--	--	47	--	--	--	--	--	15.9	--	--	--	--	--	--	--
Buff*	39	47	40	38	--	--	10.9	13.5	14.4	18.4	--	--	0.0	0.0	7.8	0.0	0.0	2.6
Jerry	42	50	46	--	--	--	10.0	11.6	12.0	--	--	--	0.0	1.5	8.9	0.0	--	--
Youngs	46	53	47	--	--	--	10.4	12.7	13.8	--	--	--	1.5	0.0	7.7	0.0	--	--
Monida	--	50	45	--	--	--	--	10.7	10.1	--	--	--	--	--	9.1	0.0	--	--
Streaker	--	49	44	--	--	--	--	16.3	14.4	--	--	--	--	--	8.8	0.0	--	--
Maida	44	50	--	--	--	--	9.4	12.0	--	--	--	--	0.0	2.3	9.1	--	--	--
Paul*	45	52	--	--	--	--	12.9	14.9	--	--	--	--	0.0	0.8	5.4	--	--	--
LSD 5%	3.0	2.0	2.4	2.1	1.9		0.8	0.8	1.0	0.5			NS	2.0	1.2	NS	2.6	

*Naked-hull variety

Oat Disease Summary, 2009-2012 *

	Crown Rust %					Crown Rust %					Crown Rust %			
Variety	**09**	**10**	**12**	**3yr**	**Variety**	**09**	**10**	**12**	**3yr**	**Variety**	**09**	**10**	**12**	**3yr**
Beach	2	12	1	5	Horsepower	--	--	0	--	AC Pinnacle	2	4	1	2
Buff	1	4	2	2	Killdeer	4	28	6	12	Rockford	0	0	0	0
CDC Dancer	2	5	3	3	Leggett	0	0	0	0	Shelby427	--	0	0	--
Furlong	5	15	4	8	Minstrel CDC	7	47	14	23	Souris	0	1	0	0
Hytest	1	14	1	5	Morton	1	26	0	9	Stallion	0	0	0	0
Jury	0	0	0	0	Newburg	0	0	0	0	Stark	1	1	0	1
HiFi	0	0	0	0	Otana	53	73	25	50	LSD 5%	12	8	11	

Crown Rust - % flag leaf

* Disease levels were low in 2013, no notes were recorded.

Flax Summary, Langdon 2009-2013

	Yield (bu/a)						Test Weight (lbs/bu)						Lodging(0-9)			Height (in)						Days to Flower					
Variety	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**2yr**	**09**	**10**	**11**	**12**	**13**	**3yr**	**09**	**10**	**11**	**12**	**13**	**3yr**
Carter*	37	47	41	37	38	39	50.8	53.0	53.5	52.9	53.4	53.3	1.5	0.0	0.8	30	29	28	25	19	24	53	42	50	58	50	53
CDC Arras	36	48	40	33	40	38	49.8	52.6	53.0	52.5	53.6	53.0	3.3	0.5	1.9	30	32	28	25	21	25	53	43	50	57	51	53
CDC Bethune	37	51	37	32	39	36	50.3	53.2	52.8	52.6	53.8	53.1	2.0	0.0	1.0	30	32	28	25	20	24	53	43	50	58	51	53
Hanley	35	51	41	35	41	39	50.1	53.0	53.1	52.0	53.7	52.9	2.5	0.5	1.5	26	30	29	26	20	25	52	41	50	57	51	53
Lightning	40	48	40	35	40	38	51.7	52.9	53.3	52.5	53.6	53.1	0.5	0.3	0.4	28	31	27	25	20	24	52	43	50	57	51	53
Linott	35	46	44	33	39	39	51.2	52.9	53.4	52.7	53.5	53.2	3.3	0.0	1.7	31	32	29	26	21	25	52	43	50	58	51	53
McGregor	38	51	44	34	37	38	51.5	53.2	53.4	52.5	53.4	53.1	2.8	0.0	1.4	31	31	28	25	21	25	54	43	50	59	51	53
Neche	42	50	37	33	40	37	52.1	52.8	53.0	52.5	53.8	53.1	2.0	0.2	1.1	32	33	29	25	21	25	53	43	51	58	51	53
Nekoma	40	49	38	34	38	37	52.5	53.2	53.1	52.7	53.7	53.2	2.8	0.2	1.5	31	30	28	25	20	24	53	42	49	57	50	52
Omega*	31	45	42	32	39	38	49.9	52.9	53.5	52.8	53.7	53.3	4.3	0.0	2.2	27	28	28	24	20	24	52	42	51	58	51	53
Pembina	40	49	45	33	38	39	52.9	52.7	53.1	52.6	53.3	53.0	1.0	0.3	0.7	31	32	29	25	21	25	53	42	50	57	50	52
Prairie Blue	41	50	44	35	34	38	50.0	52.6	53.0	52.2	53.2	52.8	1.5	0.7	1.1	30	31	27	24	19	23	54	43	51	58	51	53
Prairie Thunder	28	51	41	37	45	41	48.1	52.1	53.3	53.0	53.9	53.4	2.0	0.7	1.4	26	28	25	26	22	24	52	41	48	59	50	52
Rahab 94	40	50	40	35	32	36	51.0	52.5	53.0	52.0	53.0	52.7	2.0	0.0	1.0	29	29	25	24	20	23	53	43	50	58	50	53
Webster	37	54	43	35	45	41	51.4	53.6	53.6	52.7	54.0	53.4	3.3	0.0	1.7	32	33	30	25	21	25	54	43	52	59	51	54
York	42	48	44	35	39	39	52.1	52.4	53.3	52.5	53.6	53.1	2.5	0.0	1.3	31	30	28	24	19	24	53	42	50	56	50	52
CDC Sorrel	34	45	41	33	38	37	50.8	52.5	52.9	51.9	53.0	52.6	5.0	1.0	3.0	30	34	30	25	22	26	56	44	52	57	52	54
Prairie Grande	30	51	38	33	31	34	47.8	52.3	53.0	52.0	53.3	52.8	2.8	0.7	1.8	25	25	24	23	18	22	51	40	48	55	51	51
CDC Glas	--	--	--	39	42	--	--	--	--	51.8	52.5	--	--	--	--	--	--	--	26	21	--	--	--	--	60	51	--
CDC Sanctuary	--	--	--	32	42	--	--	--	--	52.0	53.3	--	--	--	--	--	--	--	24	21	--	--	--	--	59	51	--
Prairie Sapphire	--	--	--	36	47	--	--	--	--	51.5	52.7	--	--	--	--	--	--	--	25	22	--	--	--	--	58	51	--
Shape	--	--	--	37	45	--	--	--	--	51.8	53.0	--	--	--	--	--	--	--	25	22	--	--	--	--	58	50	--
Bison	29	45	37	33	--	--	49.1	52.4	53.3	52.7	--	--	4.5	0.5	2.5	31	31	28	24	--	--	53	42	50	56	--	--
LSD 5%	7.0	3.3	5.9	3.3	6.0		1.1	0.9	0.3	0.3	0.4		2.2	0.8		1.5	3.5	1.9	1.1	1.8		0.8	0.8	1.1	0.6	1.2	

*Yellow seeded.

Canola - Liberty Link, Clearfield Varieties - 2012-2013

Company/Brand	Variety	Type[1]	Blackleg Rating[2]	Days to First Flower			Days to End Flower			Days to Mature			% Cover[4]		
				12	13	2yr	12	13	2yr	12	13	2yr	12	13	2yr
Bayer CropScience	InVigor L130	H,LL,TR	R	54	41	48	68	60	64	90	90	90	69	83	76
Bayer CropScience	InVigor L120	H,LL,TR	R	54	40	47	67	58	63	91	91	91	75	91	83
Bayer CropScience	InVigor 5440	H,LL,TR	R	--	41	--	--	60	--	--	92	--	--	85	--
Bayer CropScience	InVigor L156	H,LL,TR	R	--	41	--	--	61	--	--	93	--	--	86	--
Bayer CropScience	InVigor L252	H,LL,TR	R	--	42	--	--	61	--	--	93	--	--	85	--
Croplan	VT X 121 CL	H,CL,TR	R	--	39	--	--	57	--	--	90	--	--	53	--
Mycogen	Nexera 2012 CL	H,CL,HO	MR	55	40	48	69	59	64	93	91	92	84	80	82
Mycogen	CL268726H	H,CL,HO	R	--	44	--	--	65	--	--	93	--	--	59	--
Mycogen	CL2537357H	H,CL,HO	R	--	42	--	--	62	--	--	92	--	--	78	--
RR Check[3]	DKL 30-42	H,RR,TR	R	--	40	--	--	58	--	--	89	--	--	86	--
RR Check[3]	HyClass 955	H,RR,TR	R	52	41	47	66	60	63	91	92	92	86	83	85
LSD 5%				1.3	1.1		0.9	1.6		2.8	2.1		6.1	8.6	

[1]H-Hybrid, OP-Open Pollinated, LL-Liberty Link, CL-Clearfield System
TR-Traditional Oil Type, HO-High Oleic Oil Type

[2]Blackleg Rating: S-Susceptible, MS-Moderately Susceptible, MR-Moderately Resistant, R-Resistant, Provided by company.

[3]Roundup ready check variety.

[4]% Cover-Visual rating of percent area of plot covered by plant growth. This is a measure of stand and vigor. Plants were at 5-6 leaf stage.

Canola - Liberty Link, Clearfield Varieites - 2011-2013

Company/Brand	Variety	Height (in)			Lodging (0-9)	Oil[1] (%)			Yield[1] (lbs/a)				
		12	13	2yr	12	12	13	2yr	2011	2012	2013	2yr	3yr
Bayer CropScience	InVigor L130	44	48	46	0.5	44.4	44.4	44.4	1802	2163	3714	2939	2560
Bayer CropScience	InVigor L120	45	44	45	1.8	44.8	43.8	44.3	1946	2109	3758	2934	2604
Bayer CropScience	InVigor 5440	--	48	--	0.3	--	44.0	--	--	--	4094	--	--
Bayer CropScience	InVigor L156	--	45	--	1.5	--	44.1	--	--	--	3739	--	--
Bayer CropScience	InVigor L252	--	47	--	1.3	--	46.5	--	--	--	3968	--	--
Croplan	VT X 121 CL	--	44	--	0.0	--	41.4	--	--	--	2019	--	--
Mycogen	Nexera 2012 CL	47	42	45	0.3	43.7	45.9	44.8	1928	2386	3435	2911	2583
Mycogen	CL268726H	--	47	--	0.0	--	45.0	--	--	--	2872	--	--
Mycogen	CL2537357H	--	47	--	0.0	--	46.6	--	--	--	3388	--	--
RR Check	DKL 30-42	--	39	--	2.8	--	46.3	--	--	--	3430	--	--
RR Check	HyClass 955	41	43	42	2.8	47.1	46.6	46.9	--	2327	3551	2939	--
LSD 5%		2.8	3.7		1.3	2.1	1.2		387	249	491		

[1] 8.5% moisture

Canola - Roundup Ready - 2012-2013

Company	Variety	Type[1]	Blackleg Rating[2]	Days to First Flower			Days to End Flower			Days to Mature			% Cover[3]		
				12	13	2yr	12	13	2yr	12	13	2yr	12	13	2yr
Brett Young	6070RR	H,TR	R	52	40	46	68	60	64	92	90	91	73	84	79
Brett Young	6044RR	H,TR	R	--	41	--	--	64	--	--	91	--	--	73	--
Cargill	V12-1	H,HO	R	57	42	50	68	61	65	93	91	92	75	87	81
Cargill	V2045	H,HO	R	55	40	48	68	58	63	90	88	89	75	85	80
Cargill	V12-2	H,HO	R	--	45	--	--	64	--	--	94	--	--	75	--
Cargill	V2170	H,HO	R	--	43	--	--	63	--	--	92	--	--	82	--
Croplan Genetics	HyClass 930	H,TR	R	52	39	46	67	58	63	88	89	89	75	78	77
Croplan Genetics	HyClass 955	H,TR	R	53	41	47	67	59	63	90	89	90	82	78	80
Croplan Genetics	HyClass 969	H,TR	R	--	40	--	--	60	--	--	90	--	--	78	--
Dekalb	DKL30-42	H,TR	R	52	38	45	66	57	62	87	88	88	85	81	83
Dekalb	DKL55-55	H,TR	R	52	39	46	66	58	62	89	89	89	79	75	77
Dekalb	DKL70-07	H,TR	R	54	41	48	67	61	64	91	90	91	76	73	75
Dekalb	DKL38-48	H,TR	R	--	41	--	--	61	--	--	89	--	--	73	--
Dekalb	DKL72-40	H,TR	R	--	41	--	--	59	--	--	90	--	--	74	--
Integra	7150 R	H,TR	R	51	39	45	67	57	62	88	91	90	76	80	78
Integra	7152 R	H,TR	R	53	39	46	68	57	63	89	90	90	74	86	80
Monsanto	G08695	H,TR	R	--	42	--	--	62	--	--	92	--	--	69	--
Monsanto	G19275	H,TR	R	--	42	--	--	63	--	--	93	--	--	77	--
Monsanto	G29075	H,TR	R	--	41	--	--	60	--	--	89	--	--	79	--
Monsanto	G19719	H,TR	R	--	43	--	--	66	--	--	91	--	--	81	--
Mycogen	1012 RR	H,HO	R	57	43	50	72	67	70	93	93	93	78	81	80
Mycogen	1016 RR	H,HO	R	57	42	50	68	61	65	91	91	91	71	79	75
Mycogen	G1570046H	H,HO	R	--	44	--	--	64	--	--	92	--	--	77	--
Mycogen	G1570048H	H,HO	R	--	44	--	--	63	--	--	91	--	--	64	--
Proseed	CS 1	H,TR	R	--	40	--	--	60	--	--	89	--	--	79	--
Proseed	CD 2	H,TR	R	--	42	--	--	60	--	--	91	--	--	80	--
Star	Star 402	H,TR	R	52	41	47	68	60	64	91	92	92	75	78	77
Star	Star 514	H,TR	R	--	41	--	--	59	--	--	89	--	--	69	--
LSD 5%				1.0	1.1		0.9	1.7		1.6	1.6		5.9	8.1	

[1]OP-Open Pollinated, H-Hybrid, TR-Traditional Oil Type, HO-High Oleic Oil Type

[2]Blackleg Rating: S=Susceptible, MS=Moderately Susceptible, MR=Moderately Resistant, R=Resistant. Rating provided by company.

[3] % Cover- Visual rating of percent area of plot covered by plant growth. This is a measure of stand and vigor. Plants were at 5-6 leaf stage.

Canola - Roundup Ready - 2011-2013

Company	Variety	Height (in)			Lodging (0-9)	Oil[1] (%)			Yield[1] (lbs/a)				
		12	13	2yr	13	12	13	2yr	11	12	13	2yr	3yr
Brett Young	6070RR	42	43	43	0.3	45.9	45.9	45.9	2820	2123	3504	2814	2816
Brett Young	6044RR	--	43	--	0.0	--	46.3	--	--	--	3464	--	--
Cargill	V12-1	44	44	44	0.2	43.8	45.3	44.6	2777	2236	3938	3087	2984
Cargill	V2045	41	44	43	0.5	44.4	45.8	45.1	--	1941	3176	2559	--
Cargill	V12-2	--	42	--	0.5	--	43.6	--	--	--	3168	--	--
Cargill	V2170	--	43	--	0.0	--	45.3	--	--	--	3040	--	--
Croplan Genetics	HyClass 930	38	39	39	0.8	47.9	49.5	48.7	2086	2280	3781	3031	2716
Croplan Genetics	HyClass 955	40	41	41	1.3	47.4	49.0	48.2	2686	2286	3481	2884	2818
Croplan Genetics	HyClass 969	--	42	--	1.2	--	48.3	--	--	--	3426	--	--
Dekalb	DKL30-42	39	38	39	0.8	46.2	48.7	47.5	2217	2413	3336	2875	2655
Dekalb	DKL55-55	41	40	41	1.3	48.4	49.1	48.8	1824	2269	3248	2759	2447
Dekalb	DKL70-07	41	41	41	1.2	46.6	47.9	47.3	2447	2314	3433	2874	2731
Dekalb	DKL38-48	--	41	--	1.0	--	47.4	--	--	--	3280	--	--
Dekalb	DKL72-40	--	41	--	1.0	--	48.1	--	--	--	3180	--	--
Integra	7150 R	39	41	40	1.9	47.4	47.9	47.7	2057	2177	3310	2744	2515
Integra	7152 R	40	38	39	1.7	46.6	47.3	47.0	2159	2126	3498	2812	2594
Monsanto	G08695	--	44	--	0.0	--	47.9	--	--	--	3377	--	--
Monsanto	G19275	--	45	--	0.3	--	48.4	--	--	--	3698	--	--
Monsanto	G29075	--	42	--	2.0	--	45.1	--	--	--	3722	--	--
Monsanto	G19719	--	46	--	0.5	--	44.5	--	--	--	3417	--	--
Mycogen	1012 RR	46	47	47	0.0	44.4	44.3	44.4	2332	2275	3514	2895	2707
Mycogen	1016 RR	42	43	43	0.0	44.3	45.9	45.1	2475	1897	3407	2652	2593
Mycogen	G1570046H	--	43	--	0.0	--	45.7	--	--	--	3152	--	--
Mycogen	G1570048H	--	47	--	0.2	--	45.7	--	--	--	3092	--	--
Proseed	CS 1	--	38	--	0.5	--	48.2	--	--	--	3305	--	--
Proseed	CD 2	--	43	--	1.0	--	47.0	--	--	--	3485	--	--
Star	Star 402	41	41	41	0.3	48.9	50.4	49.7	--	2168	3545	2857	--
Star	Star 514	--	41	--	1.0	--	50.6	--	--	--	3077	--	--
LSD 5%		3	4		1.0	1.2	1.3		396	254	465		

[1] 8.5% Moisture

Langdon - Drybean - 2011-2013

Variety	Type	Days to Maturity	100 Seed Wt.	Yield 2011	Yield 2012	Yield 2013	Yield 2 yr Avg.	Yield 3 yr Avg.
			grams	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a
LaPaz	Pinto	100	32.8	3172	3510	3324	3417	3335
Lariat	Pinto	101	35.6	3124	3697	2832	3265	3218
Mariah	Pinto	96	34.1	--	--	2960	--	--
Maverick	Pinto	95	33.2	--	3079	2860	2970	--
Medicine Hat	Pinto	95	35.5	3024	2823	2600	2711	2816
ND-307	Pinto	99	36.4	2428	3257	2792	3024	2826
Stampede	Pinto	100	36.6	3032	3423	2720	3072	3058
Windbreaker	Pinto	99	37.2	3076	3457	2328	2892	2954
Merlot	Small Red	99	31.1	2700	--	2224	--	--
Rio Rojo	Small Red	99	25.9	--	--	2252	--	--
Sedona	Pink	99	30.7	2628	2587	1800	2193	2338
Mean		98	33.6	2898	3229	2608	--	--
C.V. %		1.8	5.1	14.3	10.0	11.9	--	--
LSD 10%		2.4	1.8	604	439	398	--	--
LSD 5%		2.9	2.1	NS	531	477	--	--

Variety	Type	Days to Maturity	100 Seed Wt.	Yield 2011	Yield 2012	Yield 2013	Yield 2 yr Avg.	Yield 3 yr Avg.
			grams	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a
Avalanche	Navy	101	18.3	2868	3092	1952	2522	2637
Bolt	Navy	101	20.9	--	--	2008	--	--
Ensign	Navy	98	18.9	3472	3524	2852	3188	3283
HMS Medalist	Navy	101	16.3	3268	2996	2292	2644	2852
Nautica	Navy	101	16.2	--	--	2372	--	--
Navigator	Navy	102	17.2	--	2980	2132	2556	--
Norstar	Navy	104	17.9	--	--	1612	--	--
Mist	Navy	104	18.0	--	--	2192	--	--
Rexeter	Navy	103	18.5	--	2224	2424	2324	--
T9905	Navy	102	19.7	--	3208	2616	2912	--
Vista	Navy	101	16.2	2564	2094	2584	2339	2414
Eclispse	Black	100	18.0	3664	2503	2568	2536	2912
Loreto	Black	101	17.6	--	2788	2332	2560	--
Zorro	Black	101	20.7	3080	2166	2580	2373	2609
Mean		101	18.2	3153	2758	2446	--	--
C.V. %		1.8	5.1	14.3	10.1	11.9	--	--
LSD 10%		2.4	1.8	604	381	398	--	--
LSD 5%		2.9	2.1	NS	461	477	--	--

Pembina County - Drybean - 2011-2013

Variety	Type	Days to Maturity	100 Seed Wt.	Yield 2011	Yield 2012[1]	Yield 2013	2 yr Avg.	3 yr Avg.
			grams	lbs/a				
LaPaz	Pinto	91	35.3	2505	2104	3820	2962	2810
Lariat	Pinto	92	37.4	3112	--	3460	--	--
Stampede	Pinto	90	37.3	2983	2012	3348	2680	2781
Maverick	Pinto	90	36.1	2902	1824	3456	2640	2727
ND-307	Pinto	90	38.1	2990	1720	3540	2630	2750
Mariah	Pinto	89	34.0	--	--	3488	--	--
Medicine Hat	Pinto	88	38.1	2815	1768	3348	2558	2644
Rio Rojo	Small Red	89	26.0	--	--	2972	--	--
Windbreaker	Pinto	91	38.3	2883	2256	3392	2824	2844
Merlot	Small Red	95	37.0	2260	1212	2968	2090	2147
Sedona	Pink	90	33.9	2672	1816	2700	2258	2396
Mean		90	35.6	2791	1652	3317	--	--
C.V. %		1.4	3.6	17.0	13.6	6.9	--	--
LSD 10%		1.8	1.3	--	319	319	--	--
LSD 5%		2.1	1.6	NS	386	382	--	--

Variety	Type	Days to Maturity	100 Seed Wt.	Yield 2011	Yield 2012[1]	Yield 2013	2 yr Avg.	3 yr Avg.
			grams	lbs/a				
HMS Medalist	Navy	93	17.6	2760	2696	3420	3058	2959
Mist	Navy	92	19.7	--	--	3492	--	--
Bolt	Navy	91	22.2	--	--	3208	--	--
Avalanche	Navy	91	19.7	2514	2412	3440	2926	2789
Nautica	Navy	92	18.0	--	--	3204	--	--
Ensign	Navy	92	21.2	2544	2164	3728	2946	2812
Vista	Navy	93	17.1	2641	2164	3432	2798	2746
Rexeter	Navy	97	19.9	--	1760	3516	2638	--
T9905	Navy	93	21.1	--	2220	3484	2852	--
Norstar	Navy	92	18.0	--	--	3092	--	--
Navigator	Navy	93	18.8	--	1516	3108	2312	--
Eclispse	Black	89	18.5	2458	1904	3436	2670	2599
Zorro	Black	93	21.4	2559	2244	3576	2910	2793
Loreto	Black	93	20.2	2878	2304	3392	2848	2858
Mean		93	19.5	2647	2064	3395	--	--
C.V. %		1.4	3.6	12.0	9.6	6.9	--	--
LSD 10%		1.8	1.3	--	280	319	--	--
LSD 5%		2.1	1.6	NS	339	382	--	--

Lariat and Majesty are not included in 2012 results due to seed problems.

[1]A fairly significant hail storm occurred on July 4 causing some damage. Drybeans were mostly in the R1 stage. Drybeans recovered nicely but were later maturing than normal.

Field Pea - Langdon - 2013

Variety	Days to 1st Flower	Days to Mature	Vine Length	Canopy Ht at Harvest	Height Index[1]	Harvest Ease[2]	Protein	1000 KWT	Test Weight	Yield 2011	Yield 2012	Yield 2013	Average 2 year	Average 3 year
			in	in	%	0-9	%	gms	lb/bu	bu/a	bu/a	bu/a	bu/a	bu/a
Yellow Cotyledon Type														
Agassiz	51	91	30	24	84	1.5	23.5	277	64.3	65.6	65.1	90.7	77.9	73.8
DS Admiral	50	88	23	20	86	1.8	24.4	286	64.5	58.4	62.5	69.0	65.8	63.3
CDC Meadow	51	89	25	23	92	1.0	23.1	252	65.1	--	--	73.0	--	--
Mystique	51	92	30	27	88	1.0	23.2	287	63.9	--	--	79.9	--	--
Nette	50	90	23	22	94	1.0	24.9	276	64.8	--	--	64.2	--	--
PUSA 10003	50	91	28	26	95	1.0	25.1	266	64.8	--	--	66.1	--	--
PUSA EXP312	51	90	28	28	97	1.0	25.0	288	64.4	--	--	73.5	--	--
Vegas	52	91	25	24	94	1.3	26.0	288	64.1	--	--	66.1	--	--
Green Cotyledon Type														
CDC Striker	51	89	21	18	89	2.0	23.5	279	64.5	56.9	65.1	67.6	66.4	63.2
Cruiser	50	90	27	21	83	2.8	24.3	242	64.2	51.0	59.0	67.5	63.3	59.2
Majoret	52	91	25	19	81	1.5	25.2	252	64.8	64.3	62.3	74.4	68.4	67.0
Mean	51	90	26	23	88	1.4	24.4	269	64.4	64.6	62.9	62.9	--	--
C.V. %	1.4	1.5	9.4	15.7	12.9	42.0	2.0	4.6	0.5	8.7	6.3	6.3	--	--
LSD 5%	1.0	1.9	3.5	5.1	NS	0.9	0.7	27.5	0.5	9.3	5.7	5.7	--	--

[1] Height Index: Plant height at time of harvest relative to plant height at the end of bloom

[2] Harvest Ease: 0=plants standing erect, 9=plants laying horizontal.

Langdon - Conventional Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity	Plant Height	Protein	Oil	Yield 2013	Yield 2yr Avg
			Date[2]	in	%	%	bu/a	bu/a
NDSU	Ashtabula	0.4	9/25	39	34.4	15.6	51.7	51.5
NDSU	Cavalier	00.9	9/18	38	35.6	14.9	47.9	50.2
NDSU	Traill	0.0	9/19	37	35.8	14.9	44.4	46.1
Richland IFC	MK0249	0.2	9/24	35	37.0	13.8	42.9	--
SK Food	SK0007	000.7	9/7	28	37.5	15.2	38.7	40.6
SK Food	SK923	00.9	9/17	35	34.4	15.7	46.9	--
SunOpta	Bravado	00.9	9/17	36	35.1	15.2	47.3	50.2
RR Check[3]	AG00932	00.9	9/19	38	35.0	14.6	54.3	--
Trial Mean			9/19	36	35.7	14.9	47.5	--
C.V. %			1.3	4.7	1.4	1.8	8.2	--
LSD 10%			1.8	2.0	0.9	0.5	4.7	--
LSD 5%			2.2	2.4	1.1	0.6	5.6	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]Roundup Ready check variety.

Walsh County - Conventional Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity	Plant Height	Protein	Oil	Yield 2013	Yield 2yr Avg
			date[2]	in	%	%	bu/a	bu/a
NDSU	Ashtabula	0.4	9/18	32	33.2	17.2	52.4	50.2
NDSU	Cavalier	00.9	9/14	31	35.1	15.9	52.2	--
NDSU	Traill	0.0	9/14	31	36.0	16.2	50.2	52.4
Richland IFC	MK0249	0.2	9/17	27	32.8	17.2	45.4	--
SK Food	SK0007	000.7	9/4	22	36.3	15.9	33.0	31.5
SK Food	SK923	00.9	9/10	29	34.3	16.7	48.7	--
SunOpta	Bravado	00.9	9/8	27	32.4	17.8	41.9	44.0
RR Check[3]	AG00932	00.9	9/15	31	33.8	16.7	53.7	--
Trial Mean			9/13	29	34.1	16.8	47.9	--
C.V. %			1.7	7.3	2.7	3.4	11.5	--
LSD 10%			2.6	3.0	1.7	1.0	7.8	--
LSD 5%			3.2	3.6	2.1	NS	9.4	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]Roundup Ready check variety.

Yield, oil and protein reported at 13% moisture.

Langdon - Liberty Link Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity Date[2]	Plant Height in	Protein %	Oil %	Yield 2013 bu/a	Yield 2yr Avg bu/a
Hefty	H008L3	00.8	9/15	30	36.1	16.0	50.7	54.0
Integra	30080LL	00.8	9/15	31	34.9	16.1	54.5	56.5
Northstar	0095LL	00.9	9/14	29	35.1	16.9	51.8	--
Peterson	L009-13	00.9	9/15	29	35.4	16.2	51.0	53.3
Proseed	PX09LL	00.9	9/15	31	35.4	16.0	53.5	--
Trial Mean			9/15	30	35.4	16.2	52.1	--
C.V. %			1.1	4.3	1.9	2.1	6.4	--
LSD 10%			NS	1.4	NS	NS	NS	--
LSD 5%			NS	NS	NS	NS	NS	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color).

Oil and protein reported at 13% moisture.

Walsh County - Liberty Link Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity Date[2]	Plant Height in	Protein %	Oil %	Yield 2013 bu/a	Yield 2yr Avg bu/a
Hefty	H008L3	00.8	9/13	27	33.3	17.8	49.8	53.2
Integra	30080LL	00.8	9/13	27	32.9	18.0	50.5	53.4
Northstar	0499LL	0.4	9/13	27	32.9	18.0	46.6	--
Northstar	0129LL	0.1	9/16	33	31.5	18.1	65.6	--
PFS	L01-14	0.1	9/14	33	33.1	17.3	60.4	--
PFS	L03-12N	0.3	9/17	29	34.3	17.2	54.1	51.5
Proseed	LL11-31LL	0.3	9/17	28	32.7	18.1	41.2	--
Proseed	PX05LL	0.4	9/22	28	32.5	17.9	58.5	--
Trial Mean			9/15	29	32.8	17.8	52.7	--
C.V. %			1.0	9.7	2.4	2.8	13.2	--
LSD 10%			2.0	NS	NS	NS	NS	--
LSD 5%			2.5	NS	NS	NS	NS	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color).

Yield, oil and protein reported at 13% moisture.

Langdon - Roundup Ready Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity date[2]	Plant Height	Protein	Oil	Yield 2013	Yield 2 yr Avg.	Yield 2-site Avg.[3]
				in	%	%	bu/a	bu/a	bu/a
Asgrow	AG00632	00.6	9/18	40	35.5	15.1	52.6	46.4	54.9
Asgrow	AG00932	00.9	9/18	38	35.5	14.3	52.7	46.5	55.2
Channel	00806R2	00.8	9/18	37	35.1	15.5	55.5	--	--
Channel	0205R2	0.2	9/21	43	35.1	15.2	52.4	--	--
Croplan	R2T0091	00.9	9/18	39	34.2	15.4	55.9	50.1	--
Croplan	R2T0041	00.4	9/17	34	34.7	15.6	48.1	48.3	--
Croplan	R2T00832	00.8	9/19	40	34.8	15.2	58.5	51.5	--
Dyna-Gro	30RY04	00.4	9/17	36	35.4	15.4	51.2	46.8	54.4
Dyna-Gro	S02RY74	0.2	9/23	37	35.4	14.6	55.6	--	60.8
Dyna-Gro	S007RY44	00.7	9/18	34	36.2	14.9	51.4	--	55.0
Gold Cntry	0053	00.5	9/15	35	35.3	14.8	52.2	--	55.3
Hefty	H01R3	0.1	9/26	35	37.0	13.7	45.9	--	50.6
Hefty	H007Y12	00.7	9/18	38	36.3	15.2	51.6	47.1	56.5
Hefty	H008R3	00.8	9/20	37	34.6	15.6	52.9	--	55.8
Hefty	H02R3	0.2	10/4	40	35.5	13.8	47.8	--	53.9
Hefty	H00Y12	0.0	9/20	32	37.3	14.7	48.8	45.8	52.3
Integra	20031	00.7	9/17	36	34.7	15.0	56.5	48.3	60.9
Integra	20085N	00.8	9/16	32	35.7	14.9	49.7	--	51.9
Integra	20052 R2Y	00.5	9/16	37	35.0	14.7	51.2	47.6	53.3
Integra	20090 R2Y	00.9	9/20	39	33.9	15.7	57.2	49.5	57.9
Integra	20107	0.0	9/27	37	36.9	13.7	47.3	--	50.8
Mycogen	5B005R2	00.5	9/18	37	35.7	15.5	55.6	50.1	56.4
Mycogen	5G009R2	00.9	9/19	40	34.7	14.9	55.4	--	58.0
Northstar	0057R2	00.5	9/17	38	36.3	14.1	49.7	49.2	51.5
Northstar	0080R2	00.7	9/18	39	34.7	15.1	60.8	--	61.9
Northstar	0077R2	00.7	9/18	38	36.7	15.5	52.9	50.1	55.3
NuTech/G2	6009	00.9	9/18	33	34.7	16.6	46.6	44.8	51.7
NuTech/G2	6005	00.5	9/16	30	35.3	16.0	47.9	44.3	51.3
NuTech/G2	0090	00.9	9/19	36	36.4	16.0	51.9	46.8	52.6
NuTech/G2	6021	0.2	9/23	35	36.1	15.3	45.8	--	51.3

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our northern region. Langdon REC and Pembina County (Cavalier).

Yield, oil and protein reported at 13% moisture.

Langdon - Roundup Ready Soybean - 2013 (continued)

Brand	Variety	Maturity Group[1]	Maturity	Plant Height	Protein	Oil	Yield 2013	Yield 2 yr Avg.	Yield 2-site Avg.[3]
			date[2]	in	%	%	bu/a	bu/a	bu/a
Peterson	14R02	0.2	9/28	39	36.2	14.2	48.7	--	57.2
Peterson	11R01	0.1	9/19	38	34.5	15.7	51.0	46.9	54.6
Peterson	14R008	00.8	9/15	33	36.0	15.1	50.5	--	52.8
Prairie Brand	PB-00560R2	00.5	9/16	35	34.5	16.0	51.3	50.2	53.0
Prairie Brand	PB-00844R2	00.8	9/22	39	35.1	15.2	52.1	48.2	54.1
Prairie Brand	PB-0291R2	0.2	9/27	39	35.3	14.4	51.4	--	56.9
Prairie Brand	PB-00950R2	00.9	9/20	39	35.0	15.3	59.8	--	63.8
Prairie Brand	PB-00821R2	00.7	9/15	33	35.6	15.0	46.3	--	51.2
Proseed	P2 11-05	00.5	9/16	34	34.1	16.1	49.8	48.8	52.1
Proseed	P2 11-07	00.7	9/18	39	34.7	16.0	48.0	45.3	53.6
Proseed	P2 10-08	00.8	9/17	41	34.5	15.3	56.5	48.7	57.6
Proseed	PX009	00.9	9/15	32	35.2	15.2	43.4	--	51.4
Proseed	P2 20-08	00.8	9/20	40	34.8	15.1	54.7	50.1	58.5
REA	53G32	00.3	9/15	32	34.9	15.7	47.3	46.0	50.0
REA	55G14	00.5	9/16	39	35.3	14.9	46.7	--	51.9
REA	58G82	00.8	9/22	38	34.3	15.3	47.9	45.2	52.9
REA	61G21	0.1	9/17	41	34.2	15.9	52.4	48.0	55.7
Syng NK	S00-A7 Brand	00.7	9/18	40	35.4	16.1	51.2	49.0	54.2
Syng NK	S02-B4 Brand	00.2	9/19	41	35.1	15.2	57.2	48.0	61.3
Wensman	W 30078R2	00.7	9/16	33	35.9	15.2	50.8	--	52.8
Wensman	W 30099R2	00.9	9/22	43	34.5	15.6	53.3	48.1	58.8
Wensman	W 3024R2	0.2	9/23	39	36.3	14.2	57.9	--	61.3
Wensman	W 3030R2	0.2	9/23	43	36.2	14.5	55.5	--	56.8
Wensman	W 30084R2	00.8	9/21	42	35.4	14.9	60.8	48.8	60.4
Trial Mean			9/19	37	35.4	15.2	52.0	--	--
C.V. %			1.9	5.6	1.6	2.0	7.7	--	--
LSD 10%			2.5	2.5	0.9	0.5	4.7	--	--
LSD 5%			3.0	2.9	1.1	0.6	5.6	--	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our northern region. Langdon REC and Pembina County (Cavalier).

Yield, oil and protein reported at 13% moisture.

Pembina County - Roundup Ready Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity date[2]	Plant Height in	Protein %	Oil %	Yield 2013 bu/a	Yield 2 yr Avg. bu/a	Yield 2-site Avg.[3] bu/a
Asgrow	AG00632	00.6	9/14	34	34.5	16.1	57.2	51.1	54.9
Asgrow	AG00932	00.9	9/15	32	34.5	15.9	57.7	51.3	55.2
Asgrow	AG0231	0.2	9/17	33	33.1	16.4	57.4	--	--
Dyna-Gro	30RY04	00.4	9/13	30	33.7	17.4	57.6	48.6	54.4
Dyna-Gro	S007RY44	00.7	9/13	31	33.8	16.7	58.6	--	55.0
Dyna-Gro	S02RY74	0.2	9/17	31	33.9	16.4	66.0	--	60.8
Gold Cntry	0053	00.5	9/12	32	33.7	16.3	58.4	--	55.3
Hefty	H007Y12	00.7	9/12	30	34.2	17.2	61.4	52.6	56.5
Hefty	H008R3	00.8	9/15	31	33.5	16.2	58.8	--	55.8
Hefty	H01R3	0.1	9/18	32	34.9	15.6	55.2	--	50.6
Hefty	H02R3	0.2	9/23	33	34.7	15.4	59.9	--	53.9
Hefty	H00Y12	0.0	9/15	28	34.7	16.3	55.9	49.0	52.3
Integra	20031	00.7	9/14	33	33.3	16.2	65.2	58.5	60.9
Integra	20052	00.5	9/12	32	34.4	15.4	55.4	--	53.3
Integra	20107	0.0	9/19	33	35.6	15.0	54.3	--	50.8
Integra	20085N	00.8	9/12	29	33.7	16.6	54.1	--	51.9
Integra	20090	00.9	9/16	34	32.9	16.5	58.7	--	57.9
Mycogen	5B005R2	00.5	9/14	31	34.4	16.9	57.1	53.2	56.4
Mycogen	5G009R2	00.9	9/16	33	33.4	16.3	60.6	53.5	58.0
Northstar	0080R2	00.7	9/14	34	33.5	16.2	62.9	--	61.9
Northstar	0057R2	00.5	9/12	29	34.2	15.5	53.3	51.0	51.5
Northstar	0088R2	00.8	9/16	32	33.9	16.3	60.1	--	--
Northstar	0077R2	00.7	9/13	32	34.8	16.8	57.7	51.4	55.3
NuTech/G2	6005	00.5	9/15	29	34.1	16.8	54.6	51.1	51.3
NuTech/G2	0090	00.9	9/15	32	35.1	17.3	53.4	50.7	52.6
NuTech/G2	6021	0.2	9/20	29	35.0	16.1	56.7	--	51.3
NuTech/G2	6009	00.9	9/13	31	32.6	17.9	56.7	51.5	51.7
Peterson	11R01	0.1	9/15	33	32.3	17.1	58.2	52.3	54.6
Peterson	14R02	0.2	9/20	33	35.3	15.1	65.6	--	57.2
Peterson	14R008	00.8	9/12	29	33.4	16.7	55.1	--	52.8
Prairie Brand	PB-00560R2	00.5	9/11	30	33.8	17.3	54.8	52.3	53.0
Prairie Brand	PB-00950R2	00.9	9/16	36	34.3	16.3	67.8	--	63.8
Prairie Brand	PB-0291R2	0.2	9/20	32	34.6	15.3	62.4	--	56.9
Prairie Brand	PB-00821R2	00.7	9/11	28	34.0	16.8	56.2	--	51.2
Prairie Brand	PB-00844R2	00.8	9/15	30	33.9	16.7	56.1	49.4	54.1

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our northern region. Langdon REC and Pembina County (Cavalier).

Yield, oil and protein reported at 13% moisture.

Pembina County - Roundup Ready Soybean - 2013 (continued)

Brand	Variety	Maturity Group[1]	Maturity date[2]	Plant Height	Protein	Oil	Yield 2013	Yield 2 yr Avg.	Yield 2-site Avg.[3]
				in	%	%	bu/a	bu/a	bu/a
Proseed	P2 11-05	00.5	9/10	27	33.7	16.9	54.4	48.1	52.1
Proseed	P2 11-07	00.7	9/12	31	34.6	16.9	59.2	54.0	53.6
Proseed	P2 10-08	00.8	9/15	33	32.8	16.7	58.8	49.3	57.6
Proseed	P2 20-08	00.8	9/15	32	34.0	16.0	62.2	51.1	58.5
Proseed	PX009	00.9	9/12	28	34.0	16.3	59.4	--	51.4
REA	53G32	00.3	9/11	26	33.4	17.0	52.6	47.6	50.0
REA	55G14	00.5	9/13	32	34.3	15.8	57.0	--	51.9
REA	58G82	00.8	9/17	34	32.5	16.8	58.0	51.0	52.9
REA	61G21	0.1	9/15	33	32.8	16.7	59.0	53.6	55.7
Stine	01RE00	0.0	9/18	31	34.6	15.9	63.0	--	--
Stine	01RD66	0.0	9/14	29	34.5	17.0	62.3	53.2	--
Syng NK	S00-A7 Brand	00.7	9/12	31	34.7	17.0	57.2	53.6	54.2
Syng NK	S02-B4 Brand	00.2	9/14	35	32.8	17.2	65.5	57.5	61.3
Wensman	W 3024R2	0.2	9/17	30	34.2	16.4	64.7	--	61.3
Wensman	W 3030R2	0.3	9/16	35	34.1	16.6	58.1	--	56.8
Wensman	W 30078R2	00.7	9/12	30	33.9	16.1	54.9	--	52.8
Wensman	W 30099R2	00.9	9/18	36	33.2	16.7	64.4	54.9	58.8
Wensman	W 30084R2	00.8	9/17	35	33.8	16.4	60.0	52.4	60.4
Trial Mean			9/15	31.4	34.0	16.5	58.4	--	--
C.V. %			1.3	5.7	1.3	1.8	6.8	--	--
LSD 10%			1.5	2.1	0.8	0.5	4.7	--	--
LSD 5%			1.8	2.5	0.9	0.6	5.6	--	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our northern region. Langdon REC and Pembina County (Cavalier).

Yield, oil and protein reported at 13% moisture.

Walsh County - Roundup Ready Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity	Plant Height	Protein	Oil	Yield 2013	Yield 2 yr Avg.	Yield 2-site Avg.[3]
			date[2]	in	%	%	bu/a	bu/a	bu/a
Asgrow	AG00632	00.6	9/9	34	32.7	17.5	46.0	47.4	--
Asgrow	AG00932	00.9	9/9	37	33.3	16.7	56.9	54.7	51.3
Asgrow	AG0333	0.3	9/21	36	34.7	15.9	60.5	60.8	55.4
Asgrow	AG0231	0.2	9/12	34	32.5	17.2	47.6	50.3	46.0
Channel	00806R2	00.8	9/9	33	33.4	16.9	46.1	--	--
Channel	0205R2	0.2	9/10	34	32.6	17.5	51.6	--	--
Dyna-Gro	30RY04	00.4	9/6	30	33.1	17.7	42.9	46.7	43.1
Dyna-Gro	S007RY44	00.7	9/6	26	32.7	17.3	43.1	--	42.2
Dyna-Gro	S02RY74	0.2	9/13	31	33.6	17.2	48.1	--	50.1
Hefty	H007Y12	00.7	9/7	32	33.4	17.6	47.0	47.7	44.8
Hefty	H008R3	00.8	9/7	32	33.5	16.9	48.3	--	48.1
Hefty	H02R3	0.2	9/19	32	34.1	16.2	55.0	--	55.4
Hefty	H01R3	0.1	9/12	27	33.4	16.5	42.7	--	39.2
Hefty	H00Y12	0.0	9/12	26	35.8	16.2	43.8	49.4	46.4
Integra	20031	00.7	9/9	31	32.6	17.1	48.2	47.6	48.4
Integra	20085N	00.8	9/5	27	33.6	16.8	45.3	--	43.7
Integra	20090	00.9	9/9	33	31.1	18.0	46.5	44.2	44.6
Integra	20107	0.0	9/13	30	33.8	16.8	46.9	--	45.1
Integra	20109	0.2	9/18	28	34.0	16.8	53.0	49.9	--
Mycogen	5G009R2	00.9	9/11	36	33.3	17.0	49.0	46.0	48.0
Mycogen	5H009R2	00.9	9/8	33	33.7	16.7	50.1	--	48.1
Mycogen	5B012R2	0.1	9/10	35	34.4	17.0	49.2	--	49.3
Northstar	0096R2	00.9	9/11	35	32.0	17.8	51.6	50.7	49.8
Northstar	0080R2	00.7	9/8	35	32.3	17.3	50.6	51.7	49.6
Northstar	0108R2	0.1	9/13	28	34.2	16.6	42.1	43.4	41.8
Northstar	0088R2	00.8	9/8	32	33.7	16.7	50.4	--	46.5
NuTech/G2	0090	00.9	9/10	33	33.9	17.7	41.2	44.1	44.0
NuTech/G2	6009	00.9	9/7	31	33.1	17.4	40.7	43.0	39.2
NuTech/G2	6005	00.5	9/6	28	33.6	17.4	43.9	--	39.7
NuTech/G2	6021	0.2	9/13	30	33.6	17.3	51.5	--	47.8

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our southern region. Walsh County (Park River) and Nelson County (Lakota).

Yield, oil and protein reported at 13% moisture.

Walsh County - Roundup Ready Soybean - 2013 (continued)

Brand	Variety	Maturity Group[1]	Maturity date[2]	Plant Height	Protein	Oil	Yield 2013	Yield 2 yr Avg.	Yield 2-site Avg.[3]
				in	%	%	bu/a		
Peterson	11R01	0.1	9/9	31	31.3	18.1	47.3	47.7	46.5
Peterson	14R02	0.2	9/14	31	35.5	15.5	52.1	--	54.9
Peterson	13R03	0.3	9/20	32	33.9	16.6	53.4	51.8	53.2
Peterson	14R008	00.8	9/7	28	32.9	17.1	44.2	--	41.7
Prairie Brand	PB-00950R2	00.9	9/9	34	33.5	17.3	49.5	49.8	53.2
Prairie Brand	PB-00961R2	00.9	9/5	31	36.5	15.0	44.2	--	42.1
Prairie Brand	PB-00821R2	00.7	9/6	28	32.9	17.2	41.4	--	41.2
Prairie Brand	PB-00844R2	00.8	9/10	31	32.4	17.3	49.0	51.4	44.6
Prairie Brand	PB-0291R2	0.2	9/15	32	34.9	15.9	53.4	--	52.7
Proseed	PX01	0.1	9/15	31	34.2	15.8	51.2	--	55.0
Proseed	PX02	0.2	9/15	36	34.5	16.8	58.1	--	55.5
Proseed	P2 10-20	0.2	9/12	36	32.5	17.0	52.6	49.9	49.8
Proseed	P2 20-30	0.2	9/19	30	33.1	16.6	51.7	--	52.9
Proseed	P2 10-08	00.8	9/12	34	32.0	17.5	51.7	49.2	--
REA	55G14	00.5	9/5	35	33.2	16.9	47.1	--	44.9
REA	58G82	00.8	9/12	35	32.0	17.0	55.1	53.5	50.9
REA	61G21	0.1	9/9	34	32.2	17.6	48.5	45.2	49.7
REA	62G22	0.2	9/10	35	32.9	17.6	45.5	47.7	46.9
Stine	02RE03	0.2	9/15	33	35.1	15.5	56.9	--	--
Stine	02RD00	0.2	9/15	28	34.1	17.2	55.8	51.4	--
Syng NK	S00-A7 Brand	00.7	9/5	33	33.6	17.4	42.4	45.4	44.2
Syng NK	S02-B4 Brand	00.2	9/8	35	32.0	17.6	50.7	47.4	47.8
Syngenta	NK S04-D3	0.4	9/10	33	33.0	16.7	49.1	--	46.8
Wensman	W 30099R2	00.9	9/10	35	31.9	17.8	55.1	54.8	50.8
Wensman	W 30078R2	00.7	9/5	28	33.2	17.1	44.1	--	42.4
Wensman	W 3030R2	0.2	9/10	35	32.7	17.4	48.2	--	47.6
Wensman	W 3024R2	0.2	9/13	32	34.0	17.0	53.6	--	54.5
Trial Mean			9/10	32	33.4	17.0	48.0	--	--
C.V. %			1.8	7.4	2.7	2.8	11.5	--	--
LSD 10%			2.3	2.8	1.5	0.8	6.5	--	--
LSD 5%			2.7	3.3	1.8	1	7.7	--	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our southern region. Walsh County (Park River) and Nelson County (Lakota).

Yield, oil and protein reported at 13% moisture.

Nelson County - Roundup Ready Soybean - 2013

Brand	Variety	Maturity Group[1]	Maturity date[2]	Plant Height	Protein	Oil	Yield 2013	Yield 2 yr Avg.	Yield 2-site Avg.[3]
				in	%	%	bu/a		
Asgrow	AG00932	00.9	9/13	29	34.3	16.0	45.7	55.4	51.3
Asgrow	AG0333	0.3	9/24	28	33.8	15.4	50.3	56.8	55.4
Asgrow	AG0231	0.2	9/18	28	32.6	16.5	44.3	57.6	46.0
Asgrow	AG0430	0.4	9/16	24	33.5	16.2	45.4	54.8	--
Dairyland	DSR-C506/R2Y	00.5	9/11	24	34.3	16.9	39.5	53.9	--
Dairyland	DSR-0305/R2Y	0.3	9/24	28	33.1	16.4	56.7	--	--
Dairyland	DSR-C905/R2Y	00.9	9/10	26	34.7	15.7	46.9	55.0	--
Dairyland	DSR-0404/R2Y	0.4	9/22	28	33.5	15.9	56.7	61.7	--
Dyna-Gro	30RY04	00.4	9/8	25	33.9	17.2	43.3	51.2	43.1
Dyna-Gro	S007RY44	00.7	9/10	21	32.5	16.6	41.2	--	42.2
Dyna-Gro	S02RY74	0.2	9/15	26	34.0	15.9	52.2	--	50.1
Gold Cntry	0053	00.5	9/9	27	33.6	16.4	45.0	--	--
Hefty	H00Y12	0.0	9/13	22	35.0	16.8	49.0	56.5	46.4
Hefty	H007Y12	00.7	9/8	26	34.8	16.7	42.7	50.8	44.8
Hefty	H02R3	0.2	9/25	29	33.6	15.6	55.9	--	55.4
Hefty	H008R3	00.8	9/12	24	33.5	16.9	47.9	--	48.1
Hefty	H01R3	0.1	9/17	25	34.3	16.2	35.7	--	39.2
Integra	20031	00.7	9/11	25	33.1	16.4	48.6	58.5	48.4
Integra	20073	00.7	9/10	25	33.3	17.4	43.0	--	--
Integra	20085N	00.8	9/8	25	32.8	16.9	42.1	--	43.7
Integra	20090	00.9	9/12	27	32.7	16.7	42.7	53.1	44.6
Integra	20107	0.0	9/18	26	33.3	16.4	43.2	--	45.1
Mycogen	5G009R2	00.9	9/14	28	32.6	17.0	47.1	56.5	48.0
Mycogen	5H009R2	00.9	9/11	25	33.4	16.9	46.1	48.1	48.1
Mycogen	5B012R2	0.1	9/12	28	35.0	16.5	49.4	--	49.3
Mycogen	5B024R2	0.2	9/14	28	34.3	16.6	45.6	55.7	--
Northstar	NS0096R2	00.9	9/12	26	32.7	17.2	48.0	56.4	49.8
Northstar	NS0088R2	00.8	9/12	25	33.7	16.7	42.6	--	46.5
Northstar	NS0080R2	00.7	9/12	26	33.0	16.7	48.7	--	49.6
Northstar	NS0108R2	0.1	9/19	23	34.2	16.3	41.6	52.6	41.8
NuTech/G2	0090	00.9	9/12	26	35.6	16.7	46.7	52.0	44.0
NuTech/G2	6005	00.5	9/10	21	33.4	17.4	35.6	--	39.7
NuTech/G2	6009	00.9	9/10	24	33.9	16.7	37.7	48.7	39.2
NuTech/G2	6021	0.2	9/18	23	34.7	16.2	44.2	--	47.8
Peterson	14R008	00.8	9/8	22	34.6	16.1	39.2	--	41.7
Peterson	14R02	0.2	9/18	27	34.7	15.4	57.7	--	54.9
Peterson	11R01	0.1	9/13	27	32.6	17.0	45.7	56.0	46.5
Peterson	13R03	0.3	9/24	24	33.6	15.9	53.1	58.3	53.2

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our southern region. Walsh County (Park River) and Nelson County (Lakota).

Yield, oil and protein reported at 13% moisture.

Nelson County - Roundup Ready Soybean - 2013 (continued)

Brand	Variety	Maturity Group[1]	Maturity	Plant Height	Protein	Oil	Yield 2013	Yield 2 yr Avg.	Yield 2-site Avg.[3]
			date[2]	in	%	%	bu/a	bu/a	bu/a
Prairie Brand	PB-00844R2	00.8	9/10	26	34.2	16.4	40.2	55.0	44.6
Prairie Brand	PB-00821R2	00.7	9/9	22	34.4	16.1	41.0	--	41.2
Prairie Brand	PB-00961R2	00.9	9/10	25	36.1	14.9	40.0	--	42.1
Prairie Brand	PB-0291R2	0.2	9/17	26	34.9	15.5	52.1	--	52.7
Prairie Brand	PB-00950R2	00.9	9/14	29	31.9	17.0	56.8	61.6	53.2
Proseed	P2 10-20	0.2	9/15	28	33.1	16.3	47.0	55.8	49.8
Proseed	PX009	00.9	9/13	22	34.1	16.2	38.7	--	--
Proseed	PX01	0.1	9/22	28	33.0	15.6	58.7	--	55.0
Proseed	PX02	0.2	9/24	31	32.8	16.7	52.8	--	55.5
Proseed	P2 20-30	0.2	9/26	26	33.2	16.2	54.1	59.6	52.9
REA	58G82	00.8	9/16	26	32.7	16.4	46.8	53.9	50.9
REA	55G14	00.5	9/11	27	33.4	16.7	42.7		44.9
REA	61G21	0.1	9/13	28	32.7	17.2	50.9	57.3	49.7
REA	62G22	0.2	9/16	29	33.6	16.6	48.3	56.8	46.9
Syng NK	S00-A7 Brand	00.7	9/9	24	33.8	17.2	46.0	52.2	44.2
Syng NK	S02-B4 Brand	0.2	9/12	28	31.8	17.1	45.0	55.2	47.8
Syngenta	NK S04-D3	0.4	9/11	25	35.0	16.0	44.4	--	46.8
Wensman	W 30078R2	00.7	9/9	21	32.4	16.8	40.7	--	42.4
Wensman	W 3030R2	0.2	9/14	29	33.1	16.8	47.1	--	47.6
Wensman	W 3024R2	0.2	9/13	28	34.8	16.3	55.4	--	54.5
Wensman	W 30099R2	00.9	9/14	25	32.7	17.3	46.5	55.3	50.8
Trial Mean			9/14	26	33.7	16.5	45.9	--	--
C.V. %			2.2	9.2	2.6	2.5	11.5	--	--
LSD 10%			2.7	2.8	1.5	0.7	6.2	--	--
LSD 5%			3.2	3.3	1.7	0.8	7.4	--	--

[1]Maturity Group provided by company

[2]Days to physiological maturity at R7 stage (one brown pod on the main stem obtains mature brown or tan color.)

[3]A 2-site average of our southern region. Walsh County (Park River) and Nelson County (Lakota).

Yield, oil and protein reported at 13% moisture.

Langdon - Corn Grain - 2013

Brand	Hybrid	RM[2]	Days to Silk	Harvest Moist.	Test Weight	Yield 2013	Yield 2 yr avg
				%	lbs/bu	-------bu/a-------	
Channel	180-18VT2PRIB	80	96	29	47.3	89.5	--
Channel	181-92VT2PRIB	81	94	27	47.9	114.0	--
Dekalb	KDC27-55	77	89	23	55.1	107.9	--
Dekalb	DKC31-10	81	93	28	48.4	110.2	--
Dyna-Gro Seed	D19RR91	79	94	32	47.4	100.2	116.1
Dyna-Gro Seed	D20VC73	80	93	31	47.7	95.3	119.9
Dyna-Gro Seed	D23VC35	82	96	36	43.9	88.9	--
Gold Country Seed	76-67R2P	76	91	27	49.5	120.0	132.0
Gold Country Seed	81-19R2P	81	96	28	47.9	111.0	131.0
Hyland Seeds	3093	78	93	26	49.8	110.0	126.4
Hyland Seeds	8105	80	98	40	42.7	80.9	102.9
Hyland Seeds	3085	78	94	29	47.4	96.6	109.7
Integra	9272	77	95	29	48.8	106.4	--
Integra	2803	78	93	32	46.0	96.9	--
Integra	9301	80	93	32	47.9	100.0	116.6
Integra	9302	80	94	32	47.6	100.8	--
Latham	LH 2772 GT	77	96	33	43.4	104.6	--
Latham	LH 2847 VT2PRO	78	95	30	46.9	100.0	--
NorthStar-Viking	81-481	81	96	35	46.9	89.1	104.0
NorthStar-Viking	80-580	80	95	29	47.3	103.7	--
NorthStar-Viking	VS 77-377	77	96	32	45.8	105.9	--
NorthStar-Viking	VS 78-510	78	94	27	50.2	108.4	--
Nuseed/Seeds2000	2771 RR	77	96	36	43.8	86.1	110.9
Nuseed/Seeds2000	2823 GT	82	97	41	41.7	78.2	111.9
NuTech Seed	5B-782	82	98	42	41.0	88.8	116.5
NuTech Seed	5B-7701[1]	77	95	31	46.3	93.4	--
NuTech/G2	5Z-775	75	90	25	46.9	110.4	--
NuTech/G2	5H-8002[1]	80	94	30	45.2	100.2	--
NuTech/G2	3A-080	80	96	39	42.0	103.8	124.0
NuTech/G2	5Z-781	81	96	37	41.6	88.0	--
PFS	71C80	71	95	33	46.5	98.4	122.4
PFS	28N78	78	94	29	46.3	98.4	--
Proseed	PX77 CBGTCBLL	77	94	29	48.1	91.2	--
Proseed	1278 GTCBLL	78	95	41	40.6	82.8	109.4
Proseed	1280 VT2P	80	94	32	47.7	87.7	--
Proseed	PX78 VT2P	78	94	28	47.0	105.7	--
Proseed	PX82 VT2P	82	95	33	45.9	101.9	--
REA Hybrids	1B102-RIB	76	91	27	49.4	124.0	--
REA Hybrids	1V115-RIB	78	91	27	49.1	119.0	132.4
REA Hybrids	1B770-RIB	77	90	28	49.0	117.4	--
REA Hybrids	1B790-RIB	79	95	27	49.4	117.0	--
REA Hybrids	1B801-RIB	80	95	28	47.9	105.3	--
Stine	9000GTCBLL	79	94	27	49.9	104.0	--
Wensman Seed	W 8076VT2RIB	79	94	27	49.1	109.0	128.3
Wensman Seed	W 8083VT2RIB	82	93	29	48.0	115.4	--
Wensman Seed	W 8082VT2RIB	82	95	33	46.6	111.8	134.6
Trial Mean			94	31.0	46.8	101.8	--
C.V. %			1.5	9.3	3.4	11.9	--
LSD 10%			1.9	3.9	2.1	16.4	--
LSD 5%			2.3	4.7	2.6	19.6	--

All lines are commerically available except those designated experimental[1]

[2]Relative maturity and hybrid traits as submitted by the company

Langdon - Confection (non-oil) Sunflower - 2013

Brand	Hybrid	Status	Days to Flower	Plant Height	Test Weight	Seed over screen			Yield @ 10% moisture			Yield Average	
						22/64	20/64	18/64	2011	2012	2013	2 yr	3yr
			days	in	lbs/bu	----------% over----------			----------lbs/a----------				
CanSun LLC	EX 753	EXP	80	71	22.7	85	92	94	--	--	4215	--	--
CanSun LLC	EX 8253	EXP	80	72	23.4	86	92	94	--	--	3896	--	--
CanSun LLC	EX 8255	EXP	83	71	23.1	79	89	92	--	--	4044	--	--
CanSun LLC	EX 5255	EXP	82	73	23.6	78	86	90	--	--	4013	--	--
Genosys	12GCF05	CA	91	71	25.8	85	92	94	--	1004	4084	2544	--
Genosys	12GCF12	CA	91	94	21.6	93	95	95	--	--	4266	--	--
Mycogen Seeds	8C451CP[1]	CA	87	72	21.8	84	92	93	2436	1789	3306	2548	2510
NuSeed Global	5009	CA	88	74	22.4	88	96	96	--	--	3592	--	--
NuSeed Global	NHW11904[2]	EXP	83	72	19.3	92	96	96	--	--	2798	--	--
NuSeed Global	NHW11928	EXP	82	72	20.6	91	95	95	--	--	3178	--	--
NuSeed Global	NHW12706[2]	EXP	89	83	25.9	78	92	94	--	--	3364	--	--
NuSeed Global	NHW11915	EXP	91	80	26.5	80	91	93	--	--	3619	--	--
NuSeed Global	NHW12725[2]	EXP	80	68	21.3	86	90	92	--	--	3323	--	--
NuSeed Global	NHW10403	EXP	88	81	21.9	92	95	95	--	--	3286	--	--
NuSeed Global	X98578	EXP	87	77	22.9	89	94	94	--	--	3619	--	--
NuSeed Global	NHW12717	EXP	91	76	26.0	82	94	96	--	--	2936	--	--
NuSeed Global	X3939	EXP	85	73	25.0	76	86	89	--	--	3811	--	--
NuSeed Global	NHW12709	EXP	85	74	22.9	84	91	93	--	--	3347	--	--
NuSeed Global	X4417	EXP	80	71	18.9	90	93	94	--	--	3555	--	--
NuSeed Global	NHW11921	EXP	89	77	21.6	81	92	94	--	--	2545	--	--

Langdon - Confection (non-oil) Sunflower - 2013 (continued)

Brand	Hybrid	Status	Days to Flower	Plant Height	Test Weight	Seed over screen 22/64	Seed over screen 20/64	Seed over screen 18/64	Yield @ 10% moisture 2011	Yield @ 10% moisture 2012	Yield @ 10% moisture 2013	Average 2 yr	Average 3yr
			days	in	lbs/bu	---------% over---------			----------lbs/a----------				
NuSeed/Seeds 2000	Jaguar[1]	CA	82	68	21.7	83	91	93	3035	2297	3208	2753	2847
NuSeed/Seeds 2000	Jaguar DMR[1,2]	CA	78	67	22.6	88	94	94	2992	2489	3595	3042	3025
NuSeed/Seeds 2000	x9180	EXP	81	65	22.8	80	89	91	--	--	3929	--	--
NuSeed/Seeds 2000	NSK12N069[2]	EXP	84	72	24.2	80	90	92	--	--	3555	--	--
RRC	2215	CA	85	73	24.0	85	92	93	2404	2124	4552	3338	3027
RRC	2215-CL[1]	CA	87	74	24.2	81	90	91	2823	1785	4003	2894	2870
RRC	8015	CA	83	67	20.0	90	94	95	--	--	3670	--	--
RRC	2217-CP[1]	CA	87	70	22.1	83	92	93	--	--	3542	--	--
SunOpta/Dahlgren	9521	CA	87	72	24.5	85	91	93	--	--	4683	--	--
USDA	924	CK	81	73	25.5	17	74	90	2720	1413	3666	2540	2600
Trial Mean			85	73	23.0	--	--	--	2612	1775	3640	--	--
C.V. %			1.3	5.8	3.5	--	--	--	12.6	19.7	8.3	--	--
LSD 10%			1.5	5.9	1.1	--	--	--	459	484	414	--	--
LSD 5%			1.8	7.1	1.3	--	--	--	NS	583	496	--	--

[1] Clearfield hybrid, [2] Downy mildew resistant

[3] Status: CA-Commercially available, Exp-experimental, CK-long term hybrid check

Langdon - Oil Sunflower - 2013

Brand	Hybrid	Hybrid Type[1]	Status[2]	Days to Flower	Plant Height	Oil[3]	Test Weight	Yield @ 10% moisture 2011	2012	2013	Average 2yr	3yr
				days	in	%	lb/bu	lbs/a				
Croplan	432 E	NS,EX, DMR	CA	81	65	35.7	30.6	--	2184	3827	3006	--
Croplan	460 E	NS,EX, DMR	CA	88	75	40.9	30.6	1682	1836	3329	2583	2282
Croplan	548 CL	NS,CL,DMR	CA	86	72	37.3	30.6	1641	1377	3336	2357	2118
Croplan	559 CL	NS,CL,DMR	CA	88	75	40.0	30.9	1140	1769	3736	2753	2215
Croplan	545 CL	NS,CL,DMR	CA	85	59	39.2	31.4	--	--	3700	--	--
Genosys	12G20	HO,CL	CA	85	68	37.1	28.1	--	--	3812	--	--
Genosys	11G08	NS	CA	87	73	37.4	30.2	--	1642	3268	2455	--
Genosys	12E06	HO,DMR	CA	84	79	35.7	31.9	--	--	3714	--	--
Genosys	12E12	HO,DMR	CA	84	76	32.6	28.8	--	1421	3243	2332	--
Genosys	12E13	HO,CL,DMR	CA	87	72	34.3	29.4	--	1989	3577	2783	--
Genosys	12E14	HO,CL,DMR	CA	88	79	33.4	27.7	--	1521	3437	2479	--
Mycogen Seeds	8N358CLDM	NS,CL,DMR	CA	86	68	39.2	30.4	1723	1522	3308	2415	2184
Mycogen Seeds	8N270CLDM	NS,CL,DMR	CA	80	60	39.7	30.9	1975	1781	3190	2486	2315
Mycogen Seeds	8D310CL	NS,CL	CA	87	70	33.8	27.4	--	--	3775	--	--
Mycogen Seeds	8H288CLDM	HO,CL,DMR	CA	83	65	41.5	30.0	1512	1518	3362	2440	2131
Proseed	E-85 CL	HO,CL,DMR	CA	87	78	34.4	28.1	--	--	3618	--	--
Proseed	E-21 CL	HO, CL, DMR	CA	85	73	33.5	29.2	--	1512	3230	2371	--
Proseed	E-362436	HO,DMR	CA	84	78	36.8	31.6	--	1989	4070	3029	--
Proseed	E-31 CL	HO,CL,DMR	CA	87	74	36.0	29.6	--	--	3540	--	--

[1]Type: HO = High Oleic, NS = NuSun, Trad = Traditional, CL = Clearfield, EX= Express, DMR = Downy Mildew Resistant.

[2]Status: CA-Commercially available, EXP-Experimental, CK-Long term hybrid check

[3]Oils were adjusted to 10% moisture. Oil % of NuSun and Traditional hybrids were adjusted for oil type.

Maturity Checks: Days to Flower. Falcon, 8N270, 559CL

Langdon - Oil Sunflower - 2013 (continued)

Brand	Hybrid	Hybrid Type[1]	Status[2]	Days to Flower	Plant Height	Oil[3]	Test Weight	Yield @ 10% moisture 2011	2012	2013	Average 2yr	3yr
				days	in	%	lb/bu	lbs/a				
NuSeed/Seeds 2000	Falcon	NS,EX	CA	87	61	40.6	31.8	1279	1626	2984	2305	1963
NuSeed/Seeds 2000	Camaro II	NS, CL, DMR	CA	85	69	36.9	32.9	--	2160	3841	3001	--
NuSeed/Seeds 2000	Cobalt II	HO, CL, DMR	CA	86	64	37.2	32.4	--	1918	3127	2522	--
NuSeed/Seeds 2000	NLK12S069	NS,EX	EXP	86	69	34.9	26.3	--	--	3682	--	--
NuSeed/Seeds 2000	NLK12S070	NS,EX	EXP	84	64	37.3	26.8	--	--	3869	--	--
NuSeed/Seeds 2000	Hornet	HO,CL,DMR	CA	88	68	39.1	30.2	--	--	3532	--	--
SunOpta/Dahlgren	4421CL	HO,CL	CA	87	66	33.3	27.3	--	--	3646	--	--
Syngenta	3845 HO	NS	CA	87	65	38.3	30.6	1428	1455	2922	2188	1935
Syngenta	7111 HO/CL/DM	HO,CL,DMR	CA	81	55	38.2	30.8	--	--	3059	--	--
Syngenta	3733 NS/DM	NS,DMR	CA	88	61	39.4	31.3	1768	1990	3190	2590	2316
USDA	894	Trad	CK	84	66	36.7	29.8	1288	1663	3443	2553	2131
Trial Mean				86	69	37.0	29.9	1768	1723	3479	--	--
C.V. %				1.2	5.7	2.8	1.9	15.6	16.5	9.0	--	--
LSD 10%				1.4	5.4	1.4	0.8	--	386	430	--	--
LSD 5%				1.7	6.5	1.7	0.9	449	462	516	--	--

[1]Type: HO = High Oleic, NS = NuSun, Trad = Traditional, CL = Clearfield, EX= Express, DMR = Downy Mildew Resistant.

[2]Status: CA-Commercially available, EXP-Experimental, CK-Long term hybrid check

[3]Oils were adjusted to 10% moisture. Oil % of NuSun and Traditional hybrids were adjusted for oil type.

Maturity Checks: Days to Flower. Falcon, 8N270, 559CL

Langdon - Betaseed Energy Sugarbeet Trial - 2011

Variety Entry ID	Sugar Content	Sugar Content	Root Yield TONS	Sugar Yield	Sugar Yield
	%	% check	tons/a	lb/a	% check
Check	20.1	100	26.0	10,433	100
EAR122	21.2	106	28.3	11,996	115
EAR133	20.5	102	28.4	11,655	112
EAR155	21.4	107	24.9	10,634	102
EGR199	20.5	102	23.7	9,724	93
EHR144	20.4	102	27.4	11,210	107
Mean	20.7	--	26.5	10,942	--
CV%	3.4	--	5.5	--	--
LSD 5%	1.8	--	3.4	--	--

Date Planted : 5/26/2011
Date Harvested: 10/10/2011

Langdon - Betaseed Energy Sugarbeet Trial - 2012

Variety Entry ID	Sugar Content	Sugar Content	Root Yield TONS	Sugar Yield	Sugar Yield
	%	% check	tons/a	lb/a	% check
Check	17.9	100	34.1	12,164	100
EGR229	18.1	101	30.3	10,954	90
EMR231	18.4	103	30.3	11,141	92
ENR242	18.9	106	30.3	11,418	94
EMR232	17.8	100	27.9	9,960	82
EAR233	17.5	98	34.9	12,233	101
Mean	18.1	--	31.3	11,311	--
CV%	4.2	--	15.7	--	--
LSD 5%	1.9	--	12.6	--	--

Date Planted : 4/30/2012
Date Harvested: 10/12/2012

Langdon - Betaseed Energy Sugarbeet Trial - 2013

Variety Entry ID	Sugar Content	Sugar Content	Root Yield TONS	Sugar Yield	Sugar Yield
	%	% check	tons/a	lb/a	% check
ENR221	18.4	100	29.3	10,735	100
ENR224	18.2	99	28.6	10,376	97
EMR231	18.4	100	28.8	10,593	99
EAR234	19.1	104	29.5	11,243	105
ERR223	17.9	97	29.4	10,505	98
Mean	18.4	--	29.1	10,690	--
CV%	1.9	--	5.3	--	--
LSD 5%	0.9	--	3.9	--	--

Date Planted : 5/16/2013
Date Harvested: 10/17/2013

Fungicide efficacy for the control of tan spot and Fusarium head blight of wheat

Pravin Gautam and Amanda Arens
NDSU Langdon Research Extension Center

Objective

Objective of this study was to evaluate efficacy of foliar fungicides to control tan spot caused by *Pyrenophora tritici-repentis* and Fusarium head blight caused by *Fusarium graminearum* in spring wheat.

Methods

Location: NDSU Langdon Research Extension Center.

Experimental Design: Randomized complete block with four replications.

Previous crop: Hard red spring wheat.

Cultivars: FHB susceptible cultivar 'Samson' was used.

Planting: 1.2 million pure live seed/A was planted on May 24, 2013. A border plot was planted between treated plots to minimize interference from spray drift.

Plot size: Seven rows at six inch spacing. Individual plot was 5 x 20 sq. ft., mowed back to 5 x15 sq. ft.

Inoculation: Plots were inoculated with *Fusarium graminearum* by spreading corn spawn inoculum at around boot stage (Feekes 9-10) at the rate of 286 g/plot. Plots were naturally infected for tan spot.

Fungicide treatments: Fungicide treatments, their chemistry, application rates and time are listed in Table 1. Fungicides were applied, with CO_2-pressurized backpack sprayer with three nozzle boom (XR8001), at the water volume of 10 GPA. Fungicides were applied at Feekes' growth stage 3.3 on June 18 (wind westerly, speed five MPH, temperature 69°F at 10:00 AM). Flowering time fungicide application was made at Feekes 10.51 on July 15 (wind westerly, speed three MPH, temperature 67°F at 9:00 AM).

Table 1. Chemical treatments, their chemistry and FRAC/WSSA/IRAC group, and rate of application.

TRT#	Treatments[t]	Chemistry (FRAC/WSSA/IRAC group)	App. rate
1	Untreated		
2	Stratego (A) Wolverine (A)[u]	Trifloxystrobin (11) + Propiconazole (3) FOPS (1) + Bromoxynil (6)+ Pyrasulfotole (27)	4 oz/A 27.4 oz/A
3	Stratego (A) Baythroid XL (A)[v] Wolverine (A)	Trifloxystrobin (11) + Propiconazole (3) β-clyfluthrin (3) FOPS (1) + Bromoxynil (6)+ Pyrasulfotole (27)	1 oz/A 1.6 oz/A 27.4 oz/A
4	Wolverine (A) Prosaro 421 SC (B)[w]	FOPS (1) + Bromoxynil (6)+ Pyrasulfotole (27) Prothioconazole (3)+Tebuconazole (3)	27.4 oz/A 6.5 oz/A
5	Stratego (A) Wolverine (A) Prosaro 421 SC (B)	Trifloxystrobin (11) + Propiconazole (3) FOPS (1) + Bromoxynil (6)+ Pyrasulfotole (27) Prothioconazole (3)+Tebuconazole (3)	4 oz/A 27.4 oz/A 6.5 oz/A
6	Stratego (A) Wolverine (A) Prosaro 421 SC (B) Baythroid (B)	Trifloxystrobin (11) + Propiconazole (3) FOPS (1) + Bromoxynil (6)+ Pyrasulfotole (27) Prothioconazole (3)+Tebuconazole (3) β-clyfluthrin (3)	4 oz/A 27.4 oz/A 6.5 oz/A 1.6 oz/A

Notes:
[t] A = herbicide timing, B = flowering timing
[u] Wolverine is a herbicide
[v] Baythroid is an insecticide
[w] Prosaro 421SC was applied with NIS @ 0.125% v/v.

Disease Assessment: Tan spot severity was rated twice. First rating was done at around Feekes 10.54 (watery ripe stage, July 19) and second on at around Feekes 11.1 (late milk stage, August 02). Tan spot severity was determined as percent leaf area symptomatic on arbitrary ten top three leaves (three of each of flag and flag-1 leaves, and four of flag-2 leaves) excluding outer rows. Disease incidence was calculated by counting numbers of symptomatic leaves out of 10 leaves that were rated for severity.

Fusarium head blight severity (FHB SEV) was rated twenty days after flowering time fungicide application (August 05). FHB head severity was rated using 0-100% scale on arbitrary 25 heads, excluding two outer rows. FHB incidence (FHB INC) was calculated by counting numbers of heads showing FHB symptoms out of 25 heads that were rated for severity. FHB index (FHB I) was calculated using formula FHB I = (SEV*INC)/100.

Harvest: Plots were harvested 05 September (104 days after planting) with a small plot combine and the yield and test weight determined. Deoxynivalenol (DON) was tested on 50 g sub-sample at Veterinary Diagnostic Laboratory, NDSU.

Data Analysis: Data on leaf disease severity first rating and yield were squared root and log transformed, respectively, to achieve homoscedasticity. Other variables were analyzed untransformed. Data were analyzed using the general linear model (GLM) in SAS. Fisher's least significant difference (LSD) were used to compare means at $P \leq 0.05$. Actual means are presented in table for simplicity of understanding.

Results

Results are presented in Table 2. Tan spot was the major leaf disease observed.

Tan Spot Incidence: Tan Spot incidence on the first rating was significantly lower by more than half in treatments which included Prosaro 421SC compared to that of untreated. No treatment resulted in statistically lower leaf disease compared to the untreated in second rating. However, the incidence was significantly lower in treatments Wolverine (A)+Prosaro (B) and Stratego (A)+Wolverine (A)+Prosaro (B) than in Stratego (A)+Wolverine (A).

Tan Spot Severity: Tan Spot severity on the first rating was significantly lower in treatments which included Prosaro 421SC compared to the untreated. However, in second rating none of the treatments resulted in significantly lower severity than untreated.

FHB Incidence: Similar to leaf disease incidence, treatments which included Prosaro 421SC significantly lowered FHB incidence than the untreated. Treatment which included Stratego and Wolverine at tillering followed by Prosaro 421SC and Batthroid at flowering stage resulted in the least FHB incidence.

FHB Severity: The trend of FHB incidence was also true for FHB severity with treatments which included Prosaro 421SC resulted in significantly lower than the untreated.

FHB Index: The trend of significantly reduced FHB disease compared to the untreated was also observed for FHB Index in treatments which included Prosaro 421SC.

Deoxynivalenol: None of the treatments significantly reduced DON levels compared to the untreated. However, the treatment Wolverine at tillering followed by Prosaro 421SC at flowering resulted in the least amount of DON (3.18 ppm).

Yield: Yield was significantly higher by 6.4 bu/A in the treatment where Stratego and Wolverine was applied at tillering followed by Prosaro at flowering compared to the untreated. Other treatments resulted in statistically similar yield to that of the untreated. However, except treatment Wolverine (A)+Prosaro 421SC (B), yield was numerically lower in other treatments by 11.19 - 16.15 bu/A compared to the untreated.

Test Weight: None of the treatments resulted in statistically higher or lower test weight compared to the untreated. However, test weight in Stratego (A)+Baythroid XL (A)+ Wolverine (A) had significantly lower test weight than in treatments Wolverine (A)+ Prosaro 421SC (B) and Stratego (A)+ Wolverine (A)+ Prosaro 421SC (B).

Table 2. Mean comparison of treatments for first and second rating of Leaf disease incidence (%) and severity (%), FHB head severity (%), FHB incidence (%), FHB index, yield (bu/A), test weight (lb/bu), and DON (ppm).

TRT#	Treatments[p]	TS1 INC[r] (%)	TS 1 SEV[s] (%)	TS 2 INC[t] (%)	TS 2 SEV[u] (%)	FHB INC[w] (%)	FHB SEV[v] (%)	FHB I[x]	Yield (bu/A)	Test Weight (lb/bu)	DON (ppm)
1	Untreated	75.0 a[q]	3.13 b[q]	62.5 ab[q]	12.65 a[q]	70.67 a[q]	11.66 a[q]	8.34 a[q]	85.99 ab[q]	61.34 ab[q]	4.43 a[q]
2	Stratego (A) Wolverine (A)	87.5 a	5.28 ab	72.5 a	11.33 a	71.00 a	12.52 a	9.15 a	74.23 ab	61.31 ab	-
3	Stratego (A) Baythroid XL (A) Wolverine (A)	82.5 a	7.55 a	62.5 ab	14.73 a	68.00 a	11.63 a	7.95 a	74.80 ab	60.38 b	-
4	Wolverine (A) Prosaro 421SC (B)[y]	37.5 b	1.18 c	57.5 b	7.68 a	42.00 b	5.22 b	2.35 b	86.40 ab	61.78 a	3.18 a
5	Stratego (A) Wolverine (A) Prosaro 421SC (B)	37.5 b	0.98 c	52.5 b	8.08 a	46.00 b	5.19 b	2.48 b	92.39 a	61.68 a	3.23 a
6	Stratego (A) Wolverine (A) Prosaro 421SC (B) Baythroid XL (B)	30.0 b	1.28 c	65.0 ab	9.05 a	32.00 b	2.59 b	0.97 b	69.84 b	61.17 ab	3.50 a
Mean		58.33	3.23	62.08	10.19	54.94	8.13	5.21	80.61	61.28	3.59
% CV		48.40	50.19	17.11	59.92	33.55	59.32	78.10	3.95	1.45	35.45
Max		87.5	7.55	72.5	14.73	71.00	12.52	9.15	92.39	61.78	4.43
Min		30.00	0.98	52.5	7.68	32.00	2.59	0.97	69.84	60.38	3.18

[p] A: Feekes 2 (tillering/herbicide) application, B: Feekes 10.5 (flowering application)
[q] Means with same letter within individual variable (within column) are not significantly different at 5% level of significance.
[r] TS 1 INC: Tan spot incidence first rating
[s] TS 1 SEV: Tan spot severity first rating
[t] TS 2 INC: Tan spot incidence second rating
[u] TS 2 SEV: Tan spot severity second rating
[v] FHB SEV: Fusarium head blight head severity
[w] FHB INC: Fusarium head blight incidence
[x] FHB I: Fusarium head blight index
[y] Prosaro 421SC was applied with non-ionic surfactant at the rate of 0.125% v/v

Conclusion

Since results are from only one location and year, additional year or location is needed to conclude definitely. Study was carried out with artificial inoculation of *Fusarium graminearum* by spreading corn inoculum to promote disease. No artificial inoculation was done for tan spot. All treatments which included Prosaro 421SC, significantly reduced FHB disease incidence and severity than the untreated. Fungicide Stratego at tillering stage with herbicide and/or insecticide was not effective in controlling tan spot, and did not resulted in increased yield unless it was followed by Prosaro 421SC at flowering stage. Yield was significantly higher by 6.4 bu/A in the treatment where Stratego and Wolverine was applied at tillering followed by Prosaro at flowering compared to the untreated. Except treatment Wolverine (A)+Prosaro 421SC (B), yield was numerically lower in other treatments by 11.19 - 16.15 bu/A compared to the untreated. None of the treatments resulted in statistically higher or lower test weight and DON compared to the untreated.

Acknowledgements

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Evaluation of foliar fungicides for disease control and plant health in Spring Wheat

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Objective

Objectives of this study were to evaluate i) efficacy of foliar fungicides to control leaf diseases at early timing, and ii) impact on plant health and yield.

Methods

Location: NDSU Langdon Research Extension Center.

Experimental Design: Randomized complete block with four replications.

Previous crop: Hard red spring wheat.

Cultivars: FHB susceptible cultivar 'Samson' was used.

Planting: 1.2 million pure live seed/A was planted on May 24, 2013. A border plot was planted between treated plots to minimize interference from spray drift.

Plot size: Seven rows at six inch spacing. Individual plot was 5 x 20 sq. ft., mowed back to 5 x15 sq. ft.

Inoculation: Plots were naturally infected without artificial inoculation.

Fungicide treatments: Fungicide treatments, their chemistry and application rates and time are listed in Table 1. Fungicides were applied, with CO_2-pressurized backpack sprayer with three nozzle boom (XR8001), at the water volume of 10 GPA. Fungicides were applied at Feekes' growth stage 3.3 on June 18 (wind westerly, speed five MPH, temperature 69°F at 10:00 AM).

Table 1. Fungicide treatments, their chemistry and FRAC group, and rate of application.

TRT #	Treatments	Chemistry (FRAC group)	App. rate
1	Untreated		
2	Headline	Pyraclostrobin (11)	3 oz/A
3	Priaxor	Pyraclostrobin (11) + Fluxapyroxad (7)	2 oz/A
4	Tilt	Propiconazole (3)	2 oz/A
5	Quilt Xcel	Azoxystrobin (11) + Propiconazole (3)	5 oz/A
6	Aproach	Picoxystrobin (11)	3 oz/A
7	Evito	Fluoxastrobin (11)	1 oz/A
8	Stratego YLD	Prothioconazole (3)	2 oz/A
9	Priaxor	Pyraclostrobin (11) + Fluxapyroxad (7)	3 oz/A
10	Twinline	Pyraclostrobin (11) + Metconazole (3)	3.5 oz/A
11	Caramba	Metconazole (3)	2 oz/A
Notes:	Fungicides were applied at Feekes growth stage 3.3. All treatments were applied with NIS @ 0.125% v/v.		

Plant Health Assessment: Roots of six random plants excluding border rows were dug on 10 days after treatment (DAT), rinsed in water and pictures taken along with ruler. Root length was measured from picture later on. Crop response was rated at plot level as either more or less foliar disease and foliage density compared to that of control. For simplicity in data visualization, following scale was used; 0 = less than untreated, 1 = untreated or similar to untreated, 2 = more than untreated.

Disease Assessment: Leaf disease severity was rated on the day of treatment application (June 18) and subsequently on 14 (July 02), 28 (July 16) and 42 (July 30) DAT. Leaf disease severity was rated as percent leaf area showing disease symptoms. Disease ratings were carried out on samples of 10 top three leaves (three of each flag and flag-1 leaves, and four flag-2 leaves) excluding outer rows. Disease incidence was calculated by counting numbers of symptomatic leaves out of 10 leaves that were rated for severity.

Harvest: Plots were harvested 04 September (103 days after planting) with a small plot combine and the yield and test weight determined.

Data Analysis: Data on 0, 14, 28 and 42 DAT severity were log transformed to achieve homoscedasticity. 28 and 42 DAT incidence were squared root transformed. Other variables were analyzed untransformed. Data were analyzed using the general linear model (GLM) in SAS. Fisher's least significant difference (LSD) was used to compare means at $P \leq 0.05$. Actual means are presented in table for simplicity of understanding.

Results

Results are shown in Table 2.

Leaf Disease Incidence: Leaf disease incidence was not statistically different on the day of treatment application (0 DAT). Two weeks after treatment application, Incidence was significantly lower in Quilt Xcel than untreated. On 28 DAT, disease incidence was significantly lower in Headline, Aproach, Evito, Twinline, and Priaxor (2 oz/A)

compared to the untreated. None of the treatment significantly lowered disease incidence in 42 DAT.

Leaf Disease Severity: Leaf disease severity also was statistically similar in all plots on the day of treatment application. None of the treatment significantly resulted in lower 14 DAT severity than untreated. On 28 DAT rating Headline, Priaxor (2 oz/A), Tilt, Priaxor (3 oz/A) and Twinline resulted in statistically lower disease severity compared to untreated. Priaxor (2 oz/A), Tilt, Aproach and Evito were the only treatments with statistically lower disease severity than untreated.

Crop Response: All fungicide treated plots had higher foliage density on 42 DAT compared to untreated. Overall disease level at plot basis was lower in Headline, Priaxor (2 oz/A), Tilt, Stratego YLD, Priaxor (3 oz/A), and Caramba compared to untreated. However, a disease level at plot basis rating was higher than untreated in Aproach treated plots. Disease was similar in Quilt Xcel, Evito and Twinline treated plots to untreated.

Root Length: None of the fungicide treatment resulted in statistically higher of lower root length than untreated. However, root length in Priaxor (2 oz/A) treatment was significantly lower than in Headline treatment.

Yield: None of the fungicide treatments resulted in statistically higher or lower yield than untreated. Numerically, Quilt Xcel and Priaxor (3 oz/A) resulted in 0.69 bu/A and 0.71 bu/A lower yield, respectively, than untreated. All other treatments resulted in numerically higher yield by 0.14 - 3.55 bu/A than untreated.

Test Weight: None of the fungicide resulted in significantly higher or lower test weight than untreated. However, test weight in Headline and Tilt treatment was significantly lower than Priaxor (3 oz/A). Numerically, Priaxor (3 oz/A) and Headline treatment resulted in the highest and the lowest test weight, respectively.

Table 1. Mean comparison of treatments for Leaf disease incidence and severity rated 0, 14, 28 and 42 days after treatment (DAT), 42 DAT crop response, root length taken on 10 DAT, yield, and test weight.

Treatments	0 DAT		14 DAT		28 DAT		42 DAT				Root length (cm)	Yield (bu/A)	Test weight (lb/bu)
	INC[w] (%)	SEV[x] (%)	INC[w] (%)	SEV[x] (%)	INC[w] (%)	SEV[x] (%)	INC[w] (%)	SEV[x] (%)	Crop response (Disease)	Crop response (foliage)			
Untreated	9.09 a[v]	0.12 a[v]	15.91 ab[v]	1.35 a[v]	79.55 a[v]	9.63 a[v]	86.36 ab[v]	13.88 a[v]	1.00	1.00	7.43 ab[v]	76.16 a[v]	61.30 ab[v]
Headline	6.82 a	0.13 a	29.55 ab	0.43 a	56.82 bc	4.33 cd	81.82 ab	8.43 abc	0.50	1.75	7.89 a	76.88 a	61.04 b
Priaxor (2oz/A)	9.09 a	0.15 a	25.00 ab	0.33 a	38.64 c	1.65 d	72.73 ab	6.20 bc	0.50	1.50	6.01 b	79.02 a	61.19 ab
Tilt	9.09 a	0.15 a	29.55 ab	0.43 a	65.91 ab	3.98 bcd	75.00 ab	5.53 c	0.75	1.25	6.92 ab	78.66 a	61.11 b
Quilt Xcel	6.82 a	0.21 a	11.36 b	0.13 a	59.09 ab	5.83 abc	81.82 ab	10.40 abc	1.00	1.75	6.28 ab	75.47 a	61.18 ab
Aproach	9.09 a	0.13 a	15.91 ab	0.98 a	56.82 b	5.10 abc	79.55 ab	6.38 bc	1.25	1.00	6.84 ab	79.71 a	61.26 ab
Evito	6.82 a	0.50 a	20.45 ab	0.20 a	52.27 bc	5.15 abc	79.55 ab	6.45 bc	1.00	2.00	6.80 ab	77.01 a	61.40 ab
Stratego YLD	11.36 a	0.25 a	36.36 a	0.45 a	61.36 ab	9.23 ab	86.36 ab	11.90 ab	0.75	1.75	6.31 ab	76.30 a	61.25 ab
Priaxor (3oz/A)	6.82 a	0.17 a	15.91 ab	0.10 a	63.64 ab	2.60 cd	72.73 ab	11.90 abc	0.75	1.25	6.25 ab	75.45 a	61.69 a
Twinline	11.36 a	0.35 a	22.73 ab	0.20 a	54.55 bc	3.73 cd	70.45 b	8.93 abc	1.00	1.75	6.83 ab	77.04 a	61.14 ab
Caramba	9.09 a	0.10 a	31.82 ab	0.40 a	59.09 ab	4.73 abc	90.91 a	10.23 abc	0.75	1.75	6.68 ab	76.49 a	61.34 ab
%CV	63.72	100.81	66.42	122.94	13.65	34.83	8.46	20.26			17.78	5.85	0.63
Mean	8.68	0.21	23.14	0.45	58.88	5.08	79.75	9.11	0.84	1.52	6.75	77.11	61.26
Max	11.36	0.50	36.36	1.35	79.55	9.63	90.91	13.88	1.25	2.00	7.89	79.71	61.69
Min	6.82	0.10	11.36	0.10	38.64	1.65	70.45	5.53	0.50	1.00	6.01	75.45	61.04

[v] Means with same letter within individual variable (within column) are not significantly different at P≤0.05

[w] INC: Leaf disease incidence

[x] SEV: Leaf disease severity

Conclusion

Results are from only one location and year, thus additional year or location. Study was carried out on natural inoculation and no supplemental water provided. Generally all fungicide lowered disease levels compared to untreated. Only Tilt, Aproach, and Evito were significant on 42 DAT rating. All fungicide except Aproach resulted in higher foliage density than untreated. No statistical difference was observed between untreated and fungicide treatments for root length. Although yield increase of 0.14 - 3.55 bu/A was observed in fungicide treated plots than untreated, none of them were significant. None of the fungicide treatment resulted in significant increase in test weight.

Acknowledgements

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Sequential fungicide program evaluation in Spring Wheat

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Objective

Objective of this study was to evaluate sequential fungicide program on controlling Fusarium head blight (FHB) and Deoxynivalenol (DON) contamination in hard red spring wheat (HRSW).

Methods

Location: NDSU Langdon Research Extension Center.

Experimental Design: Randomized complete block with six replications.

Previous crop: Hard red spring wheat.

Cultivars: FHB susceptible cultivar 'Samson' was used.

Planting: 1.2 million pure live seed/A was planted on May 15, 2013. A border plot was planted between treated plots to minimize interference from spray drift.

Plot size: Seven rows at six inch spacing. 5 x 20 sq. ft., mowed back to 5 x15 sq. ft.

Inoculation: Plots were inoculated by spreading corn spawn inoculum at around boot stage (Feekes 9-10) at the rate of 286 g/plot.

Disease development: Supplemental moisture was provided by running overhead irrigation from Feekes 10.5 to 11.25 at the rate of 1 hour per day to create conducive environment for FHB development.

Table 1. Fungicide treatments, their chemistry and FRAC group, rate, and timing of application.

TRT #	Treatments	Chemistry (FRAC group)	App. rate
1	Untreated		
2	Caramba (C)	Metconazole (3)	13.5 oz/A
3	Prosaro (C)	Prothiconazole (3) +Tebuconazole (3)	6.5 oz/A
4	Headline (A) Caramba (C)	Pyraclostrobin (11) Metconazole (3)	3 oz/A 13.5 oz/A
5	Priaxor (A) Caramba (C)	Pyraclostrobin (11) + Fluxapyroxad (7) Metconazole (3)	2 oz/A 13.5 oz/A
6	Tilt (A) Prosaro (C)	Propiconazole (3) Prothioconazole (3) + Tebuconazole (3)	2 oz/A 6.5 oz/A
7	Priaxor (A) Twinline (B) Caramba (C)	Pyraclostrobin (11) + Fluxapyroxad (7) Pyraclostrobin (11) + Metconazole (3) Metconazole (3)	2 oz/A 9 oz/A 13.5 oz/A

Notes: A = herbicide timing, B = flag leaf timing, C = flowering timing
All treatments were applied with NIS @ 0.125% v/v.

Fungicide treatments: Fungicide treatments, their chemistry and application rates and time are listed in Table 1. Fungicides were applied, with CO_2-pressurized backpack sprayer with three nozzle boom (XR8001), at the water volume of 10 GPA. Herbicide timing fungicide applications (A) were made at Feekes' growth stage 5 on June 12 (wind westerly, speed two MPH, temperature 63°F at 08:30 AM). Flag leaf timing fungicide application (B) was made at Feekes 9 on July 02 (wind easterly, speed three MPH, 83° F at 2:30 PM). Flowering timing fungicide application (C) was made at Feekes 10.51 on July 11 (wind southerly, speed 10 MPH, 70° F at 8:30 AM).

Disease Assessment: Fusarium head blight (FHB) severity and crop response were rated 14 and 28 days after treatments (DAT) of flowering timing (C). Crop response was rated at plot level as either more or less foliar disease and foliage density compared to that of control. For simplicity in data visualization, the following scale was used; 0 = less than untreated, 1 = untreated or similar to untreated, 2 = more than untreated. FHB head severity (SEV) was rated using 0-100% scale on arbitrary 25 heads, excluding two outer rows on 14, 21 and 28 DAT. FHB incidence (INC) was calculated by counting numbers of heads showing FHB symptoms out of 25 heads that were rated for severity. FHB index (FHBI) was calculated using formula FHBI = (SEV*INC)/100.

Harvest: Plots were harvested 04 September (112 days after planting) with a small plot combine and the yield and test weight determined. Deoxynivalenol (DON) was tested on 50 g sub-sample at Veterinary Diagnostic Laboratory, NDSU.

Data Analysis: Data on 14 DAT severity and index, and 28 DAT index were squared root transformed to achieve homoscedasticity. 28 DAT severity was log transformed. Data were analyzed using the general linear model (GLM) in SAS. Fisher's least significant difference (LSD) were used to compare means at $P \leq 0.05$. Actual means are presented in table for simplicity of understanding.

Results

Results are presented in Table 2.

FHB Incidence: FHB incidence on 14 DAT was significantly lower only in Prosaro treated plots compared to

untreated. On 28 DAT, Except for Prosaro and Tilt+Prosaro, other fungicide resulted in statistically similar level of FHB incidence.

FHB Severity: 14 DAT FHB severity was significantly lower in Prosaro and Priaxor+Twinline+Caramba treatments compared to that of untreated. On 28 DAT rating, in addition to Prosaro and Priaxor+Twinline+Caramba, Tilt+Prosaro also resulted in statistically lower FHB severity than untreated.

FHB Index: 14 DAT FHB Index was significantly lower than untreated only in Prosaro treatment. But in 28 DAT it was significantly lower in Prosaro, Tilt+Prosaro and Priaxor+Twinline+Caramba treatments than untreated.

DON: Except for Headline+Caramba and Tilt+Prosaro treatment, all fungicide resulted in significantly lower DON compared to untreated. Numerically Caramba resulted in lowest DON levels.

Crop Response: Except for 28 DAT foliage density in Headline+Caramba treatment, all fungicide treated plots had lower foliage disease and higher foliage density on 14 and 28 DAT compared to untreated. On 28 DAT rating, foliage density of Headline+Caramba treatment was similar to that of untreated plot.

Yield: None of the fungicide treatments resulted in statistically higher or lower yield than untreated. Numerically, Prosaro and Tilt+Prosaro resulted in 3.8 bu/A and 6.44 bu/A lower yield, respectively, than untreated. Caramba and Headline+Caramba resulted in 0.67 bu/A and 0.13 bu/A more yield, respectively than untreated.

Test Weight: None of the fungicide resulted in significantly higher or lower test weight than untreated. Numerically, Tilt+Prosaro and Prosaro treatment resulted in the highest and the lowest test weight, respectively.

Table 2. FHB incidence (%), severity (%) and index, crop response (disease and foliage density) rated on 14 and 28 days after treatment (DAT), yield (bu/A), test weight (lb/bu) and DON (ppm) in hard red spring wheat.

Treatments[t]	14 DAT					28 DAT					Yield (bu/A)	Test Weight (lb/bu)	DON (ppm)
	FHB INC[v] (%)	FHB SEV[w] (%)	FHB I[x]	Crop response		FHB INC[v] (%)	FHB SEV[w] (%)	FHB I[x]	Crop response				
				Disease	Foliage				Disease	Foliage			
Untreated	16.67 a[u]	1.35 ab[u]	0.29 ab[u]	1.00	1.00	76.67 a[u]	12.01 a[u]	9.65 a[u]	1.00	1.00	93.43 a[u]	60.98 a[u]	7.13 a[u]
Caramba (C)	10.00 ab	0.89 ab	0.11 abc	0.17	1.17	74.00 ab	9.39 abc	7.00 abc	0.67	1.17	94.10 a	61.12 a	4.77 b
Prosaro (C)	7.33 b	0.61 b	0.06 c	0.67	1.17	56.67 c	6.26 d	3.69 d	0.50	1.17	89.56 a	60.82 a	5.53 b
Headline (A) Caramba (C)	10.67 ab	0.79 ab	0.11 abc	0.33	1.17	72.00 ab	10.17 ab	7.31 abc	0.67	1.00	93.56 a	61.08 a	5.95 ab
Priaxor (A) Caramba (C)	12.67 ab	1.03 ab	0.16 abc	0.50	1.50	76.00 a	10.03 ab	7.90 ab	0.83	1.67	93.37 a	61.07 a	5.08 b
Tilt (A) Prosaro (C)	17.33 a	1.65 a	0.34 a	0.33	1.33	63.33 abc	8.25 bcd	5.44 bcd	0.67	1.33	86.99 a	61.21 a	5.85 ab
Priaxor (A) Twinline (B) Caramba (C)	10.00 ab	0.70 b	0.10 bc	0.17	1.17	60.00 bc	7.08 cd	4.57 cd	0.17	1.50	93.21 a	61.08 a	5.53 b
% CV	59.56	72.29	132.06			19.80	34.69	50.62			8.07	0.62	24.76
Mean	12.10	1.00	0.17			68.38	9.03	6.51			92.00	61.05	5.69
Max	17.33	1.65	0.34	1.00	1.50	56.67	12.01	9.65	1.00	1.67	94.10	61.21	7.13
Min	7.33	0.61	0.06	0.17	1.00	76.67	6.26	3.69	0.17	1.00	86.99	60.82	4.77

[t] A: Herbicide timing application, B:Flag leaf timing application; C: Flowering timing

[u] Means with same letter within individual variable (within column) are not statistically different at P<0.05

[v] FHB INC: Fusarium head blight Incidence

[w] FHB SEV: Fusarium head blight severity

[x] FHB I: Fusarium head blight Index

Conclusion

Results are from only one location and year which was carried out with artificial inoculation and under supplemental overhead irrigation to promote disease. Though Prosaro applied at flowering resulted in significantly lower FHB disease and DON levels, it resulted in 3.8 bu/A numerically lower yield and test weight than untreated. In addition to the levels of FHB disease and DON being similar to Prosaro applied at flowering, application of Priaxor at herbicide timing, followed by Twinline at flag leaf and Caramba at flowering stage yielded numerically lower only by 0.22 bu/A compared to untreated.

Acknowledgements

We would like to thank Bryan Hanson, NDSU-LREC for technical assistance, Kelly Benson, NDSU Veterinary Diagnostic Laboratory for DON analysis, and BASF Crop Protection for financial support of the study.

Evaluation of sequential fungicide program in Barley

Pravin Gautam and Amanda Arens
NDSU Langdon Research Extension Center

Objective

Objective of this study was to evaluate sequential fungicide program on controlling Fusarium head blight (FHB) and Deoxynivalenol (DON) contamination in Barley.

Methods

Location: NDSU Langdon Research Extension Center.

Experimental Design: Randomized complete block with six replications.

Previous crop: Hard red spring wheat.

Cultivars: FHB susceptible cultivar 'Celebration' was used in the study.

Planting: 1.2 million pure live seed/A was planted on May 16, 2013. A border plot was planted between treated plots to minimize interference from spray drift.

Plot size: Seven rows at six inch spacing. 5 x 20 sq. ft., mowed back to 5 x15 sq. ft.

Inoculation: Plots were inoculated by spreading corn spawn inoculum before boot stage (Feekes 8-9) at the rate of 286 g/plot.

Disease development: Supplemental moisture was provided by running overhead irrigation from Feekes 10.5 to 11.25 at the rate of 1 hour per day to create conducive environment for FHB development.

Table 1. Fungicide treatments, their chemistry and FRAC group, rate, and timing of application.

TRT #	Treatments	Chemistry (FRAC group)	App. rate
1	Untreated		
2	Caramba (C)	Metconazole (3)	13.5 oz/A
3	Prosaro (C)	Prothiconazole (3) +Tebuconazole (3)	6.5 oz/A
4	Headline (A) Caramba (C)	Pyraclostrobin (11) Metconazole (3)	3 oz/A 13.5 oz/A
5	Priaxor (A) Caramba (C)	Pyraclostrobin (11) + Fluxapyroxad (7) Metconazole (3)	2 oz/A 13.5 oz/A
6	Tilt (A) Prosaro (C)	Propiconazole (3) Prothioconazole (3) + Tebuconazole (3)	2 oz/A 6.5 oz/A
7	Priaxor (A) Twinline (B) Caramba (C)	Pyraclostrobin (11) + Fluxapyroxad (7) Pyraclostrobin (11) + Metconazole (3) Metconazole (3)	2 oz/A 9 oz/A 13.5 oz/A

Notes: A = herbicide timing, B = flag leaf timing, C = flowering timing
All treatments were applied with NIS @ 0.125% v/v.

Fungicide treatments: Fungicide treatments, their chemistry and application rates and time are listed in Table 1. Fungicides were applied, with CO_2-pressurized backpack sprayer with three nozzle boom (XR8001), at the water volume of 10 GPA. Herbicide timing fungicide applications (A) were made at Feekes' growth stage 5 on June 12 (wind westerly, speed two MPH, temperature 63°F at 08:30 AM). Flag leaf timing fungicide application (B) was made at Feekes 9 on June 28 (wind northerly, speed 10.8 MPH, 69°F at 10:00 AM). Flowering timing fungicide application (C) was made at Feekes 10.5 on July 08 (wind southerly, speed five MPH, 73°F at 9:00 AM).

Disease Assessment: Fusarium head blight (FHB) severity was rated 14, 21 and 28 days after treatments (DAT) of flowering timing (C). Crop response was rated 28 DAT at plot level as either more or less foliar disease and foliage density compared to that of control. For simplicity in data visualization, the following scale was used; 0 = less than untreated, 1 = untreated or similar to untreated, 2 = more than untreated. FHB head severity (SEV) was rated using 0-100% scale on arbitrary 25 heads, excluding two outer rows. FHB incidence (INC) was calculated by counting numbers of heads showing FHB symptoms out of 25 heads that were rated for severity. FHB index (FHBI) was calculated using formula FHBI = (SEV*INC)/100.

Harvest: Plots were harvested on August 30 (107 days after planting) with a small plot combine and the yield and plump kernel percent determined. Deoxynivalenol (DON) was tested on 50 g sub-sample at Malting Barley Quality Laboratory, NDSU.

Data Analysis: Data on 14 and 21 DAT FHB incidence, and 28 DAT FHB index were squared root transformed to achieve homoscedasticity. 14 DAT FHB severity, index and 21 DAT index were log transformed. Data were analyzed using the general linear model (GLM) in SAS. Fisher's least significant difference (LSD) were used to compare means at $P \leq 0.05$.

Results

Results are presented in Table 2.

FHB Incidence: 14 DAT FHB Incidence was significantly lower in all fungicide treated plots compared to untreated except in Headline+Caramba. FHB incidence was significantly lower only in Headline+Caramba in 21 DAT and none of the fungicide treatment differ significantly 28 DAT than untreated.

FHB Severity: Similar to FHB incidence, 14 DAT FHB severity was significantly lower than untreated in all

treatments except Headline+Caramba. 21 DAT severity was significantly lower in all treatments compared to untreated. 28 DAT FHB severity was significantly lower in Prosaro, Headline+Caramba and Priaxor and Caramba treated plots.

FHB Index: All fungicides except Headline+Caramba resulted in statistically lower 14 DAT FHB Index than untreated. In 21 DAT, except Tilt+Prosaro, all treatments had significantly lower FHB Index than untreated. However, none of the fungicide resulted in statistically lower level of FHB Index than untreated on 28 DAT.

DON: Except Tilt+Prosaro, none of the treatments resulted in significant reduction in DON levels compared to untreated. Numerically, all fungicide treatments resulted in lower DON levels than untreated.

Crop Response: Crop response as visually evaluated for foliar disease at plot level was generally higher in Caramba and Tilt+Prosaro treated plots compared to untreated. Other fungicide treatments had visually lower levels of foliar diseases than untreated.

Yield: None of the fungicide treatments resulted in statistically higher or lower yield than untreated. However, Priaxor+Caramba and Tilt+Prosaro treatments resulted in 1.41 bu/A and 0.98 bu/A higher yield, respectively, than untreated. Rest of the fungicide treatments resulted in numerically 0.39 - 1.59 bu/A lower yield than untreated.

Plump Kernel: All fungicide treatment resulted in higher plump kernel percentage than untreated, though it was not statistically significant.

Table 2. FHB incidence (%), severity (%) and index rated 14 21 and 28 days after treatment (DAT), crop response (disease) on 28 DAT, yield (bu/A), plump kernel (%) and DON (ppm) in barley.

Treatments[t]	14 DAT			21 DAT			28 DAT				Yield (bu/A)	Plump kernel (%)	DON (ppm)
	FHB INC[v] (%)	FHB SEV[w] (%)	FHB I[x]	FHB INC[v] (%)	FHB SEV[w] (%)	FHB I[x]	FHB INC[v] (%)	FHB SEV[w] (%)	FHB I[x]	Crop response disease			
Untreated	36.67 a[u]	1.57 a[u]	3.99 a[u]	68.00 a[u]	9.31 a[u]	6.49 a[u]	74.00 a[u]	10.19 ab[u]	7.61 a[u]	1.00	127.26 a[u]	97.73 a[u]	7.78 a[u]
Caramba (C)	20.00 b	0.45 b	2.18 b	53.33 ab	6.25 b	3.91 b	68.67 a	11.65 a	8.16 a	1.17	126.19 a	97.93 a	5.14 ab
Prosaro (C)	18.00 b	0.38 b	1.63 b	52.67 ab	5.92 b	3.28 b	69.78 a	9.11 b	6.41 a	0.67	126.87 a	97.99 a	5.62 ab
Headline (A) Caramba (C)	28.67 ab	0.87 ab	2.47 ab	52.00 b	5.40 b	2.94 b	67.33 a	8.79 b	6.24 a	0.67	125.49 a	97.96 a	6.09 ab
Priaxor (A) Caramba (C)	22.67 b	0.54 b	1.96 b	55.33 ab	6.18 b	3.52 b	68.00 a	8.88 b	6.03 a	0.33	128.67 a	98.02 a	6.48 ab
Tilt (A) Prosaro (C)	18.67 b	0.35 b	1.59 b	58.67 ab	6.33 b	3.97 ab	66.67 a	9.83 ab	6.65 a	1.17	128.24 a	98.31 a	4.40 b
Priaxor (A) Twinline (B) Caramba (C)	22.00 b	0.52 b	1.77 b	51.33 b	6.49 b	3.56 b	72.00 a	9.81 ab	7.20 a	0.33	125.16 a	98.18 a	5.06 ab
% CV	48.66	57.60	105.10	23.62	36.96	61.95	12.97	22.37	31.15		8.85	0.52	42.28
Mean	23.81	0.66	2.23	55.90	6.55	3.95	69.49	9.75	6.90		126.84	98.02	5.79
Max	36.67	1.57	3.99	68.00	9.31	6.49	74.00	11.65	8.16	1.17	128.67	98.31	7.78
Min	18.00	0.35	1.59	51.33	5.40	2.94	66.67	8.79	6.03	0.33	125.16	97.73	4.40

[t] A: Borad leaf timing application, B:Flag leaf timing application; C: Flowering timing application

[u] Means with same letter within individual variable (within column) are not statistically different at P<0.05

[v] FHB INC: Fusarium head blight Incidence

[w] FHB SEV: Fusarium head blight severity

[x] FHB I: Fusarium head blight Index or field severity

Conclusion

Since results are from only one location and year, additional year or location is needed to conclude definitely. The study was carried out with artificial inoculation and under supplemental overhead irrigation to promote disease. Overall, Headline applied at herbicide timing followed by Caramba at flowering and Prosaro at flowering resulted in lower level of FHB disease than untreated, though in many cases it was not statistically significant. Yield and plump kernel percentage was numerically higher in Prioxor at herbicide timing followed by Caramba at flowering and Tilt at herbicide timing followed by Prosaro at flowering compared to that of untreated. DON was significantly lower compared to untreated in Tilt at herbicide followed by Prosaro at flowering treatment.

Acknowledgements

We would like to thank Bryan Hanson, NDSU-LREC for technical assistance; Paul Schwarz, Malting Barley Quality Laboratory, NDSU for DON analysis; and BASF Crop Protection for financial support of the study.

Canola Seeding Rate and Hybrid Effect on Yield and other Agronomic Traits-Langdon 2013

Bryan Hanson and Travis Hakanson- NDSU Langdon Research Extension Center

A canola seeding rate x hybrid trial was established in 2013 to determine if yield and agronomic differences exists between seeding rates of a Liberty Link vs a Roundup Ready hybrid. The trial was conducted using best management practices for canola including seeding date, fertility, fungicide and harvest management. Each hybrid was sprayed with its corresponding herbicide trait for weed control. Two hybrids cultivars were used; Liberty Link InVigor L130 and Roundup Ready HyClass 955. Seed size for L130 and 955 was 108,095 and 113,500 seeds/pound, respectively. Since the seed sizes are so close together, for comparisons purposes, the average seeding rate in lbs/a would be 1.2, 2.3, 3.5, 4.7, and 5.9 at the seeding rates of 3, 6, 9, 12, and 15 pure live seed (PLS)/ft^2 used in this study. The trial was planted on May 24, later than normal due to a very late spring with wet soil conditions. Precipitation levels were below normal June through August while temperature were above normal except for July which was slightly below normal. A three week cool period during flowering and seed fill helped result in very high yields for the year.

This is the first year of trial results from this study and additonal studies will be conducted to confirm first year results.

Significant differences between the two hybrids only occurred for plant height and percent oil. InVigor L130 had a numerical yield advantage of 334 lbs/a though the difference was not statistically significant.

Plant emergence and harvest stand was excellent, greater than 90%, for all seeding rates. The greater the seeding rate, the faster % total ground cover was obtained. Lowering the seeding rate generally resulted in a delay in flowering and maturity although differences were not always significant. Plant height was greater at the lower seeding rates while lodging increased slightly with increasing planting rates although the differences were not significant. Seeding rate had no effect of percent oil.

Yield increased with higher seeding rates. The 3 PLS /ft^2 yielded significantly less than the 9, 12, or 15 pls/ft^2 seeding rate while the 6, 9, and 12 pls/ft2 seeding rate were not significantly different from one another.

Data from this one year study and other studies conducted from 1999-2001 at the LREC suggests optimum seeding rates would range from 10 to 12 pls/ft. This also takes into consideration seed cost from the higher seeding rates.

Canola Seeding Rate Trial - 2013

Seeding date effect on canola yield and other agonomic traits averaged over cultivars.

Seeding Rate PLS/ft^2	Yield lbs/a	Harvest Stand plts/ft^2	1st Flower DAP[1]	End Flower DAP[1]	Flower Duration Days	Maturity DAP[1]	Cover %[2]	HT[3] in	Lodging 0-9	Oil %
3	3307	2.9	42.1	59.2	17.1	92.8	28.8	48.0	0.8	46.8
6	3629	6.0	40.4	57.4	17.0	91.6	56.9	47.1	0.9	46.8
9	3743	9.2	39.5	56.8	17.2	90.9	71.2	47.4	1.6	47.3
12	3901	10.9	40.2	57.0	16.8	90.4	76.2	45.2	1.8	46.7
15	3961	14.1	39.1	56.2	17.1	90.4	82.5	44.5	2.0	46.4
LSD 5%	366	1.8	1.0	1.8	NS	NS	6.5	2.5	NS	NS
C.V. %	9.6	20.7	2.4	2.9	5.6	2.1	10	12.6	79	3.6
Comparison of canola cultivars averaged over planting dates										
HyClass 955	3541	8.9	40.6	57.7	17.2	91.2	63.0	48.4	0.8	45.1
InVigor L130	3875	8.3	40.0	57.0	17.0	91.2	60.2	44.5	2.0	48.5
LSD 5%	NS	NS	NS	NS	NS	NS	NS	3.0	NS	2.4
C.V. %	15.2	9.3	2.1	2.1	4.0	3.4	6.5	6.3	98	5.1

[1]DAP=Days after planting.

[2]Visual rating of percent area of plot covered by plant growth. Rated at 5-6 leaf stage.

[3]Plant height

Effect of Sulfur Deficiency and Its Various Forms on The Quality and Yield of Canola in North Eastern North Dakota

By

Naeem Kalwar (Extension Area Specialist/Soil Health)

John Lukach (Extension Area Specialist/Winter Cereals Agronomist)

Objectives

Considering the high sulfur requirements of canola versus most of the crops, a sulfur fertilizer study was started in 2012 on behalf of Sulvaris Inc. Calgary, Alberta. Year 2013 was the continuation of the same study. The objective of the study was to compare different sulfur fertilizer products available in sulfate (SO_4^{2-}) and elemental sulfur (S^o) forms on the yield and quality of canola. Two products, Carbon Ammonium Sulfate (CAS) and Vitasul (marketed as Rapid Release Sulfur in 2012) were supplied by Sulvaris Inc. whereas Ammonium Sulfate (AS) and Tiger-90 were obtained from the market.

Trial Locations

Trials locations remained the same as 2012; North Dakota State University, Langdon Research Extension Center, Cavalier County, ND and Bina Farm, 5 miles Southwest of Lankin, Walsh County, ND. The only difference was the change of sites at both locations.

Treatments and Replications

Different treatments were used in 2013 versus 2012. The first four treatments included an equal rate of 30 pounds of sulfur/acre for all four products along with a recommended rate of NPK based on the soil analysis reports. Fifth treatment was a control (no sulfur) with added rates for NPK. The first five treatments were used based on the input provided by Sulvaris Inc. Later, four more treatments were added based on the results of previously conducted NDSU studies in order to broaden the scope of research. That was achieved by using 10 and 20 pounds of sulfur/acre for AS and CAS each with recommended rates of NPK. Overall there were nine treatments and four replications (details in the below table).

		Sulfur pounds/acre			
Treatment	**Sulfur Product**	**Sulfate Sulfur (SO_4)**	**Elemental Sulfur (S^o)**	**Total Sulfur**	**NPK/acre**
T1	Vitasul (90% S)	0	30	30	Recommended rate
T2	Tiger-90 (90% S)	0	30	30	Recommended rate
T3	AS (26% S)	30	0	30	Recommended rate
T4	CAS (21% S)	30	0	30	Recommended rate
T5	Control	0	0	0	Added rate
Additional Treatments					
T6	AS (26% S)	20	0	20	Recommended rate
T7	CAS (21% S)	20	0	20	Recommended rate
T8	AS (26% S)	10	0	10	Recommended rate
T9	CAS (21% S)	10	0	10	Recommended rate

Based on the soil analysis reports for both sites, following nutrient rates were applied in pounds/acre.

Langdon REC Site					
Treatment	**Sulfur Product**	**Sulfur (lb/acre)**	**N (lb/acre)**	**P2O5 (lb/acre)**	**K2O (lb/acre)**
T1	Vitasul (90% S)	30	120	28	0
T2	Tiger-90 (90% S)	30	120	28	0
T3	AS (21% N + 24% S)	30	120	28	0
T4	CAS (18% N + 21% S)	30	120	28	0
T5	Control	0	150	35	0
T6	AS (21% N + 24% S)	20	120	28	0

T7	CAS (18% N + 21% S)	20	120	28	0
T8	AS (21% N + 24% S)	10	120	28	0
T9	CAS (18% N + 21% S)	10	120	28	0
Lankin (Bina Farm) Site					
Treatment	**Sulfur Product**	**Sulfur (lb/acre)**	**N (lb/acre)**	**P2O5 (lb/acre)**	**K2O (lb/acre)**
T1	Vitasul (90% S)	30	120	15	12
T2	Tiger-90 (90% S)	30	120	15	12
T3	AS (21% N + 24% S)	30	120	15	12
T4	CAS (18% N + 21% S)	30	120	15	12
T5	Control	0	150	20	15
T6	AS (21% N + 24% S)	20	120	15	12
T7	CAS (18% N + 21% S)	20	120	15	12
T8	AS (21% N + 24% S)	10	120	15	12
T9	CAS (18% N + 21% S)	10	120	15	12

At Langdon REC site, anhydrous ammonia was applied in Fall 2012 at the rate of 110 pounds/acre, so nitrogen rates were compensated for that at the time of starter fertilizer application. Also at the Langdon REC site, starter fertilizer rates were applied and incorporated into the plots one day before planting on May 23rd. At the Lankin site, since nitrogen was not applied in Fall 2012, at planting time 29.42 pounds of nitrogen/acre was applied through sulfur and phosphate fertilizers. The remaining nitrogen (120.58 pounds for control and 90.58 pounds/acre for rest of the treatments) was top dressed 15 days after planting. Urea and Mono Ammonium Phosphate fertilizers were applied to fulfill the nitrogen and phosphorous requirements.

Design, Plot Sizes and Layout

Both trials were planted in a randomized complete block design. Plot sizes at both locations were 13 X 25 feet.

Planting Data

Location	Variety	Planting Date	Seed Rate (lbs./acre)	Drilling Space
Lankin	DKL72-40 Canola	May 15, 2013	7	7” with 1” depth
Langdon REC	DKL72-40 Canola	May 24, 2013	7	7” with 1” depth

Harvesting Data

Lankin site was harvested on September 4th, with desiccant being sprayed on August 22nd, 2013. At the Langdon REC site desiccant was sprayed on August 20th whereas trial was harvested on September 6th, 2013.

Results and Discussion

Data from both sites was analyzed using SAP statistical package with F-test protected LSD to determine the treatment effect only.

Lankin Location:

Treatments	Yield/acre (lbs.)	Test Weight (lbs./bushel)	1000 Seed Weight (g)	Seed / Pound	Oil Percentage
1	2633	51.4	3.19	142685	47.1
2	2161	51.9	2.55	185963	43.9
3	3084	51.6	3.30	138281	47.1
4	2613	51.5	3.12	145540	48.0
5	2685	51.5	2.91	157364	44.6
6	2556	51.2	3.07	148248	48.6

7	2463	51.9	3.18	143314	46.7
8	2828	51.6	3.17	143643	46.8
9	2392	52.0	3.14	145062	45.7
HIGH MEAN	3084	52.0	3.30	185963	48.6
LOW MEAN	2161	51.2	2.55	138281	43.9
EXP MEAN	2602	51.6	3.07	150011	46.5
C.V. %	22.3	0.9	9.16	11.9	6.6
LSD 5%	NS	NS	0.41	26151.4	NS
LSD 1%	NS	NS	NS	NS	NS
No. OF REPS	4	4	4	4	4
F-TRT	0.8	1.2	2.46	2.6	1

Note: Plot number 107, 205, 302 and 409 (all on the North side of the trial) were severely affected first by flea beetle attack (right after germination) and later by very strong weed competition.

Langdon REC Location:

Treatments	Yield/acre (lbs.)	Test Weight (lbs./bushel)	1000 Seed Weight (g)	Seed / Pound	Oil Percentage
1	2122	51.8	3.30	140053	42.3
2	2650	51.7	3.50	129672	48.1
3	2776	51.8	3.31	138181	47.3
4	2172	52.7	3.17	143724	42.0
5	2446	52.3	3.43	132438	46.3
6	2490	51.8	3.16	143711	45.2
7	2828	51.5	3.41	133354	48.8
8	2514	52.2	3.47	131725	44.2
9	2722	51.5	3.38	134555	47.5
HIGH MEAN	2828	52.7	3.50	143724	48.8
LOW MEAN	2122	51.5	3.16	129672	42.0
EXP MEAN	2525	51.9	3.34	136379	45.7
C.V. %	16.7	1.0	7.27	7.9	8.8
LSD 5%	NS	NS	NS	NS	NS
LSD 1%	NS	NS	NS	NS	NS
No. of REPS	4	4	4	4	4
F-TRT	1.4	2.1	1.01	0.9	1.5

Summary

At the Lankin location, Treatment 1, 3, 4, 6, 7, 8, and 9 were found significantly higher for 1000 seed weight (grams) than Treatment 2 at 95% confidence interval. For the same parameter, control (Treatment 5) was found numerically higher than Treatment 2. For seed per pound, Treatment 2 was found significantly higher than rest of the Treatments at 95% confidence interval. For the same parameter, control (Treatment 5) was found numerically higher than Treatment 1, 3, 4, 6, 7, 8 and 9. This shows that Treatment 2 had higher number of seed per pound with smaller size and weight followed by control. For yield, test weight and oil percentage no statistically significant differences were observed at 95% and 99% confidence intervals.

At the Langdon REC location, yield, test weight, 1000 seed weight, seed per pound and oil percentage showed no statistically significant differences at 95% as well as 99% confidence intervals.

Langdon REC Foundation Seed Stocks Program

The Langdon REC supports a Foundation Seed Stocks Program to help increase and distribute the newest NDSU varieties of HRSW, Durum, Barley and Flax. Each year approximately 350 acres is planted into the FSS program. The harvested acreage is available for sale to producers and seedsman in the region. The varieties of crops that are available for the 2014 growing season are listed below:

HRSW – Glenn, Faller, Prosper, Elgin-ND
Durum – Lebsock
Barley – Tradition, Lacey
Flax – Rahab 94

Growers who have grown seed for certification in one of the last four years who request seed prior to December 1 will be guaranteed an allocation. Any seed inventories available after December 1 will be sold on a first come, first serve basis. Seed availability and prices may be obtained by calling the Langdon Research Extension Center.

Visit our web site at www.ag.ndsu.edu/langdonrec/

TILE DRAINAGE PROJECT PROPOSAL AT LANGDON RESEARCH EXTENSION CENTER

Soil salinity and sodicity are a big concern in regards to soil health problems facing the producers in North Dakota. As per a study, there are nearly 5.8 million acres in North Dakota which are affected by soil salinity (Brennan, J., and M. Ulmer, 2010, Salinity in the Northern Great Plains, Natural Resources Conservation Service, Bismarck, N.D.). According to another estimate, nearly 90% of the producers statewide are facing some sort of productivity losses due to reduced germination, poor plant vigor and growth environment due to soil salinity and sodicity problems.

The main source of these problems in North Dakota is the parent material of the soils and the underlying sodium-rich shale bedrock below the soil sediments. The main carrier, however, for bringing in the excessive salts/sodium close to the soil surface is the groundwater. Water eventually evaporates, leaving behind the salts. With the fluctuation of the groundwater levels soil salt and sodium levels also fluctuate. Considering that, management of soil salinity and sodicity will require the management of soil groundwater level by keeping it at an optimum depth for ideal plant growth.

One of the ways to keep the soil groundwater level under control is by installing a tile drainage system, which is supposed to drain the excess/gravitational water out of the plant root zone within a reasonable amount of time. Once soil groundwater level will go down, excessive salts will also leach out. However, the efficiency of tiles also depends upon how rapidly the excess/gravitational water infiltrates through the soil layers above the tiles. That in turn will depend upon the soil texture, structure (aggregation), porosity, soil salt and sodium levels. Excessive sodium is adsorbed at the cation exchange sites and is not mobile in the soil groundwater unlike excessive salts. Soil sodium levels are extremely important in terms of tiling efficiency and can lead to soil dispersion resulting in the sealing of soil layers above or around the tiles, if placed below or within the sodic soil layers. Excessive soil salt levels counter the soil dispersion due to the greater flocculation (opposite of dispersion) power of calcium and magnesium over sodium. Soil sodicity problems are especially prevalent in the western part of the state and Red River Valley along with soil salinity.

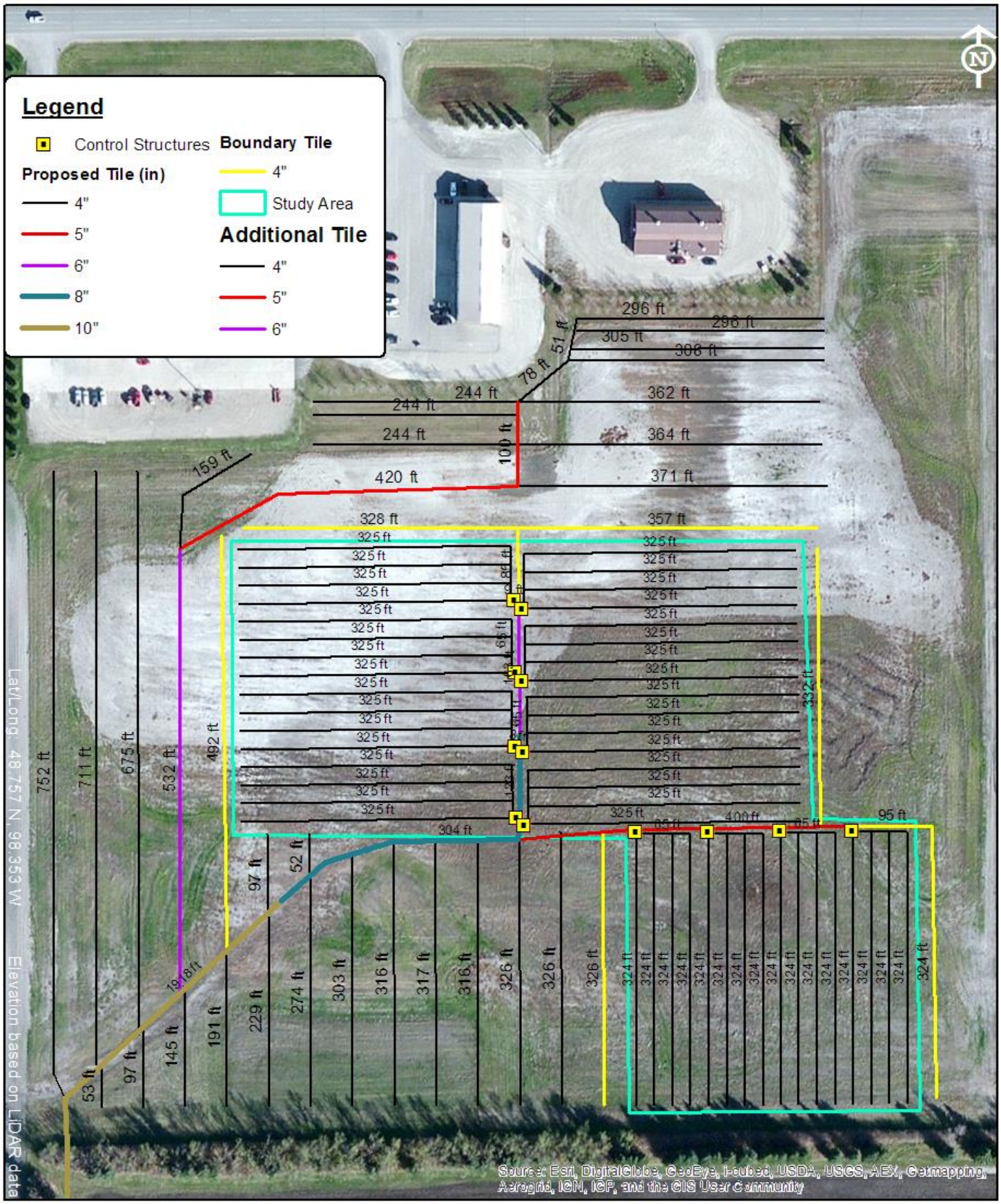
Sodic soils can be remediated by applying calcium supplements like gypsum followed by salinity remediation practices of improving soil drainage and lowering down the water-table level. This is done to displace the excessive sodium from the cation exchange sites with the help of calcium. Once displaced, sodium (Na^+) converts into a salt (Na_2SO_4) and leaches out of the rooting zone. This should be done before the start of the salt leaching process or installation of a drainage system. However, there are some producers who may have tiled their saline-sodic lands before applying any calcium supplements. That environment can potentially lead to the leaching of salts (calcium and magnesium) not the sodium, resulting in increased soil dispersion. So, the main question in that situation will be whether or not we can still successfully remediate a saline-sodic or sodic soil along with increasing the efficiency of tiling.

To address this as well as other soil health related questions, a tiling project has been proposed at the NDSU Langdon Research Extension Center on a 25 acre saline-sodic piece located south of Stables Restaurant, FSA and D & B Motors in Langdon, ND. The project site is unique in the sense that it is realizing all the problems (salinity, sodicity and high groundwater level), typically faced by the producers.

Project layout has been designed by Nathan Utt of Ecosystem Services Exchange by using the actual topographic and LiDAR data. Total project area is about 25 acres with 7.2 acres dedicated to the research of determining the tiling efficiency of saline-sodic soils, efficiency of different calcium supplements to remediate saline-sodic soils, selection of water-use efficient and salt-tolerant crops. The research area will have three replications with four treatments in each replication. Treatment size will be 0.6 acre (80 X 325 feet). Each treatment will have four 4 inch sized laterals which will be 20 feet apart from each other along with a water control structure to maintain different water table depths or to simulate different drainage conditions. Each treatment will also be surrounded by 5 feet deep plastic barriers to minimize the impact of neighboring treatments.

It is expected that the data generated from the project will help the growers make better decisions to adopt practices to achieve better soil health leading to higher crop profitability.

Drainage Water Management Study Plots



0 100 200 400 Feet

ESE

Map created by Nathan Utt 7 Aug 2013
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