North Central Research Extension Center

MINOT, NORTH DAKOTA

2013 Annual Research Report No. 31

- Agronomy
- Foundation Seed Increase
- Extension Education
- Weed Science

NDSU EXTENSION SERVICE

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

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Temperature Averages in Degrees Fahrenheit

Crop Season (November 2012-October 2013)

Months	Minot Ward County	[1]Minot LT Ward County	Mohall Renville County	Rugby Pierce County
Nov 2012-Oct 2013	39	40	37	37
April	45	41	44	45
May	54	53	54	55
June	64	63	64	65
July	73	69	72	73
August	68	67	66	66
September	59	56	57	56
Coldest Date	Jan-31-13	Feb-15-13	Feb-01-13	Feb-01-13
Coldest Temp	-22	-49	-26	-28
Days ≤ 0°	48	51	64	57
Days ≥ 90°	4	12	9	3
Highest Date	Aug-19-13	[2]see below	Aug-19-13	Aug-20-13
Highest Temp	92	109	95	93
Last Spring Frost	May-11-13	19-May	May-12-13	May-12-13
First Fall Frost	Oct-05-13	Sep-17-13	Oct-05-13	Oct-05-13
Frost Free Days	147	121	146	146
[3]GDD for Corn	2003	1861[4]	--	--
[5]GDD for Wheat	3813	3762[4]	3806	3813
[6]GDD for Sunflower	2759	2611[4]	--	--

[1] Long Term average (107 years)

[2] July 11, 1936 and June 20, 1910.

[3] May 31 to November 7, 2013 for all locations.

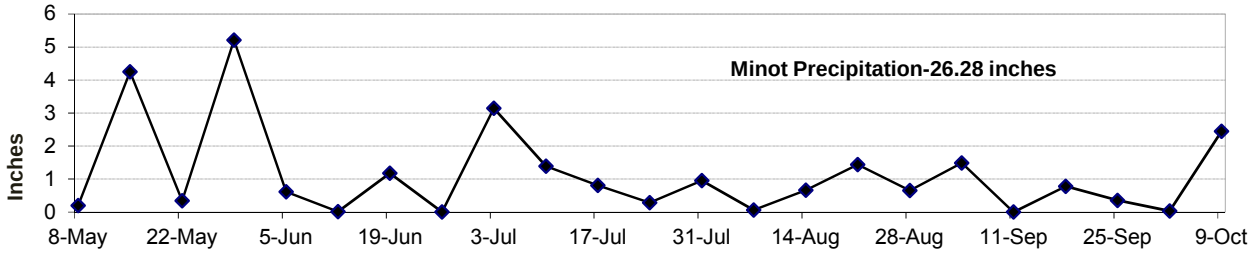
[4] 20 year NDAWN average.

[5] Based on dates of May 15 to September 7 for Minot; June 12 to October 10, 2013 for Renville & Pierce counties.

[6] Based on dates from May 31 to November 7, 2013 for all locations.

Precipitation Amounts Received at NCREC Research Sites

Crop Season (May-October 2013)



[1] Precipitation amounts presented as one week summations.

2013 Research Summary

Locations: The North Central Research Extension Center (NCREC) conducts the majority of its agronomic field research trials at the main research facility south of Minot. The agronomy program also utilized off-station locations to strengthen and enhance its research capabilities. Off-station sites have been established at the Dean Schoenberg farm west of Mohall, at the Dave Teigen farm west of Rugby, at the Mike Zimmerman farm north of Garrison and at the Rod Speten farm north of Wilton. A few individual trials were also conducted at various locations throughout the region as are noted in individual research reports. The NCREC thanks these farmer-cooperators along with county Extension staff, agricultural crop improvement associations, and many others for their dedicated support with various research efforts.

Methodology: Beginning with the 2013 cropping year, all agronomic research studies (with a few exceptions) were conducted utilizing no-till methods in a continuous cropping system. Broadleaf crops were typically planted into standing durum stubble and small grain crops were typically planted into field pea or flax stubble. Soil samples from each research site were randomly collected and analyzed for macro and micro nutrients. Each research site then received fertilizer applications based on those results. Urea (46-0-0) was the primary source of nitrogen and was surface broadcast prior to seeding. Monoammonium phosphate (11-52-0) was the primary source of phosphorous and was applied either directly in the seed row or in a side band at planting. Seeding rates were adjusted for seed size and germination to provide a uniform number of pure live seeds (PLS) per acre for each crop and variety. Small plots were seeded with no-till drills equipped with coulter type disc openers set at a 7-inch row spacing. Row crops were planted on a 30-inch row spacing utilizing John Deere Max Emerge openers. All small grain crops received an early post-emergence herbicide/fungicide combination for weed and disease control and a fungicide application at flowering/heading to control head diseases. Broadleaf crops typically received a pre-plant herbicide application to control broadleaf weeds followed by a post-emergence herbicide application to control grassy weeds. Other specific pest problems such as flea beetles in canola and leaf rust on sunflower were also treated with appropriate pest control measures when possible.

Interpreting Statistics: The primary purpose of this report is to assist farmers in making informed management decisions on variety selection, insect and plant disease control, soil fertility, crop production, and weed control based on sound, unbiased research. The agronomic data presented in this publication are from replicated research plots using sound experimental field designs that enable the use of statistical analysis to detect differences between varieties or treatments. The field trials were designed so the “real” yield differences can be statistically separated from yield differences that occur by chance. Since other factors such as environment, soil pH, soil organic matter, and soil texture can affect yield, treatments were randomized and replicated. Data was analyzed statistically to show the Least Significant Difference (LSD 10%) required to reflect a true difference in measurable variables. These values for each variable are given below each table. For example, the yield of the Hard Red Spring Wheat Variety Trial at Minot shows an LSD 10% value of 4.1 bushels. Thus, if there is a difference greater than 4.1 bushels between two varieties, then they would be significantly different 90% of the time under similar growing conditions. For a variable that has NS (not significant) for the LSD 10% value, it means that there was no statistical difference between varieties or treatments for that particular variable grown in that environment. Little confidence can be placed in a variety or treatment unless the results differ by more than the LSD value. The coefficient of variability (C.V.) for a variable is included as an indicator of how much variation occurred across replications for a variety or treatment in the trial and is expressed as a percentage. This statistic is a measurement of the precision or effectiveness of a trial and the procedures used in conducting it. In summation, a trial with a C.V. of 6 is more precise and more can be concluded from it than from a trial with a C.V. of 16.

Growing Conditions: After a relatively warm and dry 2012 growing season, fields began to dry out during the late summer leaving little topsoil moisture for the ensuing winter crop planting window. Much of the winter wheat planted in September was seeded into dry soil which failed to germinate until mid-October and then developed only one or two leaves prior to freeze up. The winter of 2012-13 was the 4th snowiest on record with a total accumulation of 73 inches. A relatively cool April prolonged the snow melt, relieving concerns of another catastrophic flood. Some serious localized flooding took place; however, the biggest ag. related problem was the prevention of all early spring field work. Rainfall in May and June was fairly persistent. Just as fields started to dry out, another rainfall event would occur, setting back timely field work. Weed control was very challenging with new flushes occurring with almost every wet/dry cycle and wet fields preventing timely herbicide applications. Another problem associated with these wet conditions was the leaching of water soluble nutrients out of the root zone. Nitrogen and sulfur deficiencies were common. Rainfall was a continuous issue throughout the growing season. The longest rain free period for the entire growing season was a 10 day stretch between June 24 and July 3. Needless to say, there was a significant amount of land that was not planted this year. Minot's 107 year average annual precipitation amount is 16.53 inches. Minot exceeded this amount on July 5 and exceeded the all time amount (27 inches in 1975) on September 9. These wet conditions were not all negative, however, as yields of most crops were exceptionally good. Temperatures were also an important factor with this year's growing season. Relatively cool temperatures throughout the growing season allowed late planted cool season crops (small grains and canola) to develop and set seed when we typically have scorching hot summer days. Minot had only four days where temperatures were greater than 90 degrees with the highest daytime temperature reaching 92 degrees on August 19. Small grain harvest began in earnest during the first half of September. Minot also had an extended frost free period with the first killing frost recorded on October 5, 18 days later than normal. This extended the growing season and allowed row crops to mature, but not necessarily dry down in a timely manner. Corn yields were above average, but very little of it was harvested without the use of supplemental drying, and many acres were still being harvested in December.

Despite the continuously wet growing season, fungal diseases tended to be less prevalent and less severe than what would normally be expected. There were a few reports of fusarium heaf blight in wheat, durum, and barley; white mold in dry beans; rust, phomopsis, and sclerotinia in sunflowers; and root rots in field peas. There was a bad infestation of flea beetles in canola and some minor reports of late season grain and pea aphids.

Our goals at the North Central Research Extension Center are to conduct research to find practical answers to crop production problems, conduct educational programs and demonstrations to address these problems, and to increase foundation grade seed of new and popular varieties for this area. New crops, varieties, and production methods are tested as they become introduced to determine their feasibility in our environment.

Agronomy

The NCREC continues to be an important source of agronomic information for growers as they select cultivars adapted to their farming operations and make management decisions. Cropping systems and crop production studies, public and private seed company hybrid/variety performance trials, and advanced breeder nurseries are evaluated in replicated field trials at the center. Cereal grains, broadleaf crops, oil-seed crops, and many other new alternative crops are evaluated for their agronomic traits, seed quality, and yield potential. Off-station research trials are conducted to supplement and enhance on-station research efforts. Off-station sites have been established at Mohall (Renville County), Rugby, (Pierce County), Garrison (McLean County), and at Wilton (Burleigh County) to evaluate cereal grains, pulse crops and soybeans. NCREC provides an excellent source of data regarding the performance of both public and private crop varieties.

Bio-energy continues to be a national priority and is a significant focal point in our research efforts to develop new sources and enhance traditional feedstock sources for north central North Dakota. A long-term biomass study was established in 2006 and is continuing to determine the potential value of perennial plant species in the cellulosic ethanol bio-refinery industry. Corn hybrid performance evaluations continue to increase as additional acres are required to support the ethanol industry. Canola and numerous other oilseed crops are being evaluated to identify high oil and high seed yield lines adapted to this region. The center invested a significant amount of effort into Ethiopian mustard (*Brassica carinata),* a potential bio-energy feedstock with growth habits similar to canola. Other promising bio-energy crops including pennycress and energy beets are being evaluated at the center. These efforts will undoubtedly continue to grow as national policy and consumer demand dictates the use of more environmentally friendly and sustainable sources of energy.

North Dakota leads the nation in the production of 13 crops. The NCREC works closely with all 10 of the plant breeding programs at NDSU. The goal of the NDSU plant breeding programs is to improve and enhance the genetic makeup of all major crops being grown in North Dakota and is the primary reason for the $4 billion in on-farm cash receipts each year. The center evaluates more than 3,000 experimental lines every year. Experimental varieties which are especially adapted to this growing region are identified, followed by seed increase and distribution as foundation seed. Clean, genetically pure seed provides farmers with enhanced yield, quality, and disease resistance of the new varieties brought forward. In 2013, the NCREC undertook a new research initiative with the introduction of more than 2,000 grape accessions with a primary objective of developing cold hardy adapted varieties. This effort will have an immediate and direct impact on this new and rapidly growing high value industry.

North Dakota leads the nation in production of both dry pea and lentil. Because of the need for new varieties specifically adapted to ND, the legislature approved the establishment of a pulse crop breeding program at NDSU. This legislative initiative provided two new positions: a pulse crop breeder stationed in Fargo and an assistant pulse crop breeder located in Minot. The position in Minot is advantageous because it gives the breeding program a strong presence and is centrally located in the main pulse growing region of ND. The main goal of this program is to develop new varieties of dry pea, lentil, and chickpea for ND producers. Experiments conducted in Minot and the surrounding region will include variety trials, early and advanced yield trials, disease screening nurseries, and single plant/row selections. Utilization of onsite greenhouse space to conduct crop breeding of favorable traits will continue.

Extension

The North Central Region of North Dakota has a diverse agricultural landscape with many different crops and types of agricultural operations. The NCREC works closely with NDSU state specialists and county Extension staff to develop educational programs to address various issues pertaining to crop and livestock production systems. The 2013 program events included but were not limited to crop clinics, scout schools, field day presentations, commodity group meetings, marketing clubs, cow calf and feedlot workshops, range tours, and youth livestock shows.

Livestock issues and Extension efforts reflected the unique year and change in the area impacted by oil development. The closure of the Minot Livestock Auction which has served as the primary market for the areas cattle producers, resulted in participation with a producer led committee to raise funds for study of the cost and feasibility of a new livestock market and recruitment of potential owner operations. The late cold and wet spring brought on issues of calf health and losses, considerable prevented plant acres, widespread cover crop

interest, and a much expanded corn acreage followed by a wet fall and poor dry down. Responses have included several summer/fall cover crop field days, in which grazing and utilization by cattle was addressed; and numerous inquiries on the use, storage, and handling of high moisture corn for feed. Collaboration in a producer demonstration project on the use or synchronized time bred artificial insemination of commercial beef herds has entailed participation in educational/planning meetings, assistance with on farm herd processing, and consultations with two cooperators involved. Participation in planning and presenting at ongoing programs as the NDSU Feedlot School, Beef Classic, backgrounding workshops, and localized county producer meetings continued with addressing topics as Genomics, heifer development and selection, feeding opportunities, utilizing corn silage and residue, and hay marketing.

Agronomic program activities in 2013 included participation in commodity group meetings, REC and county-based field tours, and county Extension agent trainings. We hosted a late-maturing corn workshop at the NCREC and participated in the Northwest Area Cropping Decisions Workshops. We continue to educate youth on the importance of agriculture as well as promoting future careers in the agricultural industry. Research/Extension efforts included participation in the state-wide projects aiming to increase durum yield and quality and correlating proper stand establishment in corn to overall crop yield.

The weather was favorable for disease development in many crops this year. Among the insect pests grasshopper infestation was in low to moderate amounts in cereal crops. Cereal aphids and thrips made their appearance, but didn't contribute to any major yield losses. Fusarium head blight has been the leading disease in cereals and was well managed this year. Tanspot and septoria leaf spots made their appearances early in wheat. In barley incidence of net blotch, spot blotch, and Fusarium head blight were reported. Alfalfa weevil infestation was reported, but was managed without serious damage. Soybean fields had the incidence of diseases such as the bacterial leaf spot and brown leaf spot; it's worth mentioning not to go for a bactericide or fungicidal spray as the soybean plant can retaliate the damage caused by these diseases. Some reports of soybean white mold incidence have been received from neighboring counties. The corn crop was mostly free of diseases. European corn borer has been a problem in the hybrids that do not have resistance for this trait. Among the corn ear rots, Fusarium could be a major problem in future years as it made its presence this year. Sunflowers had the infestation of bud moth, banded sunflower moth, red sunflower weevil, and stem borers. Whereas, white mold, phoma, and phomopsis were the leading diseases that infected sunflowers this year. Canola had severe flea beetle infestation in the start of the season, while the canola diseases black leg and white mold were hardly seen.

Soil educational activities for 2013 covered many different topics. 2013 started out with a soil health workshop at the NCREC with several educational opportunities afterwards that included soil fertility, soil pits, vertical tillage, salinity/sodicity, and cover crops. The year concluded with a series of soil water management workshops across northern North Dakota.

The NCREC strives to provide information which producers can use to help make management decisions and keep pace with their dynamic industry. Along with planned educational programs, the Extension staff at the NCREC work together with county Extension staff to address immediate production issues as they arise throughout the season. In some cases, informational meetings will be coordinated to provide knowledge and education on the issue at hand. Producers should also feel free to call the NCREC (701-857-7682) anytime they would like to discuss a particular issue with a crop, soil, or livestock specialist.

The NCREC Foundation Seed program works closely with the Foundation Seedstocks program and plant breeders at NDSU's main campus in Fargo. The NCREC's role is to help facilitate the increase of new varieties from Fargo's main campus out to producers in north central North Dakota. The program also maintains inventory of several popular varieties among eight different crops that are grown in the area. To give a degree of impact to the region, the NCREC marketed seed to 130 producers in 12 different states in 2012-2013.

The different crops and varieties that will be available for the 2013-2014 cropping season:
Barley–Celebration, Conlon, Tradition
Durum–Divide, Grenora, Tioga
Field pea
Flax–Omega, York
HRSW–Barlow, Brick, Elgin, Faller, Glenn, Howard, RB07, Select, Velva
HRWW–Decade, Darrell
Lentil–Crimson (red)
Oat–Jury

Hard Red Spring Wheat Variety Descriptions

Variety	Agent or Origin[1]	Year Rlsd	Height (in)	Straw Strgth[2]	Days to Head[3]	Reaction to Disease[4] Stem Rust	Leaf Rust	Leaf Spot[5]	Head Scab
Advance	SD	2012	32	6	64	MR	MR	NA	MS
Agawam[6]	WestBred	2008	30	7	58	NA	MR/MS	NA	MS
Alpine[7]	AgriPro	2008	34	6	62	NA	S	MS	MS
Alsen	ND	2000	34	3	63	R	MR/MS	S	MR
Barlow	ND	2009	35	6	62	R	MR/MS[9]	MR	M
Blade	WestBred/Sabre	2007	33	4	64	R	MS[9]	MS	M
Breaker	WestBred	2007	34	3	64	R	MR/MS[9]	MS	M
Brennan	AgriPro	2009	30	4	62	R	MR	M	MS
Brick	SD	2009	35	5	60	R/MR	MR/MS	MS/S	MR
Briggs	SD	2002	35	7	61	R/MR	MR/MS	MS	S
Edge	WestBred/Sabre	2008	33	5	62	NA	S	MS	MS
Elgin-ND	ND	2012	36	5	65	R	M[9]	NA	M
Faller	ND	2007	35	5	65	R	S[9]	MR	M
Forefront	SD	2012	37	5	61	MR	MR	NA	MR
Glenn	ND	2005	37	4	61	R	MR/MS[9]	M	MR
Howard	ND	2006	36	7	63	R	R	M	M
Jenna	AgriPro	2009	32	4	66	R	MR/MS	M	M
Kelby	AgriPro	2006	30	4	62	MR	MR/MS[9]	M	M
Kuntz	AgriPro	2007	31	4	65	R	MS[9]	MS	M
LCS Albany	Limagrain	2008	32	5	67	MR	S	MS	M
LCS Breakaway	Limagrain	2011	32	5	63	NA	R	MS	M
LCS Powerplay	Limagrain	2011	33	5	65	NA	MR	MS	M
Linkert	**MN**	**2013**	**31**	**2**	**63**	**R**	**MR**	**NA**	**M**
Mott[6]	ND	2009	36	3	66	MR	S[9]	MS	MS
MS Stingray	**Limagrain**	**2013**	**35**	**NA**		**NA**	**MS**	**NA**	**NA**
ND901CL PLUS[8]	ND	2010	36	4	60	R/MR	MR	NA	M
Norden	MN	2012	32	3	6	R	R/MR	M	M
Pivot	WestBred	2010	27	3	67	MS	S[9]	MR	S
Prosper	NDSU	2011	35	5	65	R	S[9]	M	M
RB07	MN	2007	32	5	62	R	R/MR[9]	MS	MR
Rollag	MN	2011	32	3	63	R	MS	MR	MR
Sabin	MN	2009	33	6	65	R	MR	MS	M
Samson	WestBred	2007	31	2	63	R	MR/MS	MS	S
Select	SD	2010	35	6	60	R/MR	R/MR	R/MR	MR
Steele-ND	ND	2004	35	7	63	R	R	MS	M
SY Rowyn	**Syngenta/AgriPro**	**2013**	**31**	**4**	**63**	**R**	**MR**	**M**	**M**
SY Soren	Sygenta/AgriPro	2011	30	4	63	R	MR	M	M
SY Tyra[6]	Sygenta/AgriPro	2011	31	5	62	R	MR	NA	S
SY605 CL[8]	AgriPro	2009	34	7	62	R/MR	MR/MS	MS	S
Vantage	WestBred	2007	32	2	67	MR	MR/MS	MS	MS
Velva	NDSU	2011	35	4	63	R	MR/MS[9]	M	MS
WB Digger	WestBred	2009	34	6	63	MR	MR/MS	NA	MS
WB Gunnison	**WestBred**	**2013**	**31**	**NA**		**NA**	**MS**	**MS**	**MS**
WB Mayville	Monsanto/WB	2011	30	4	63	R	MR/MS	MS	S

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

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

[3] Days to Head = the number of days from planting to head emergence from the boot averaged from several locations in 2010 and 2011.

[4] R = resistant, MR = moderately resistant, M = intermediate, MS = moderately susceptible, S = susceptible. NA indicates insufficient information is available to make an accurate assessment.

[5] Leaf spot refers to the leaf fungal diseases such as tan spot and septoria. It does not include bacterial leaf streak.

[6] Solid stemmed or semisolid stem, imparting resistance to sawfly. *[7] Hard white wheat.*

[8] CL = refers to a Clearfield variety, with tolerance to the Beyond ™ family of herbicides.

[9] These lines were resistant to moderately resistant to races prevalent prior to 2011, and show some level of susceptibility to a new race of the pathogen that was detected at low frequency in 2012.

Note: Published in NDSU publication A-574 (revised).

Hard Red Spring Wheat Variety Trial—Minot

Variety	Days to Head	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2011	2012	2013	2 Year	3 Year
	DAP[1]	inches	0-9[2]	lbs/bu	%	bu/A				
Select	51	34	0	62.4	12.4	27.9	58.7	59.9	59.3	48.8
Advance	56	31	1	62.1	12.5	26.5	55.5	59.1	57.3	47.0
LCS Albany	58	31	0	62.5	12.7	30.0	46.9	62.8	54.8	46.6
Faller	58	32	1	61.7	12.3	24.9	47.4	63.4	55.4	45.2
Norden	56	29	0	62.9	12.9	24.3	57.8	53.6	55.7	45.2
Velva	55	33	0	61.1	12.9	27.6	50.6	54.5	52.6	44.2
LCS Power Play	55	31	0	62.0	12.3	21.4	52.6	58.3	55.4	44.1
Forefront	51	36	1	61.8	13.0	39.0	43.4	48.3	45.8	43.6
Mott	55	36	0	61.2	13.6	26.1	47.4	56.6	52.0	43.4
Barlow	52	33	0	62.8	13.2	23.5	50.8	54.5	52.7	42.9
Elgin-ND	57	35	1	61.8	13.3	31.1	38.2	58.3	48.3	42.5
Breaker	57	32	1	62.0	13.6	21.1	52.1	49.9	51.0	41.0
WB Digger	55	32	1	60.9	12.6	21.2	34.5	66.6	50.6	40.8
Vantage	58	32	0	62.6	14.3	25.4	44.9	51.5	48.2	40.6
Brick	50	33	1	62.3	12.7	29.4	32.2	60.2	46.2	40.6
Alsen	55	31	1	61.6	13.9	23.1	50.7	46.7	48.7	40.2
ND901CL Plus	52	34	0	60.5	14.3	23.6	43.1	52.8	47.9	39.8
RB07	53	30	1	62.0	13.4	20.1	46.4	51.4	48.9	39.3
SY Soren	54	28	0	62.1	14.2	28.2	36.4	53.1	44.7	39.2
Freyr	57	32	2	61.2	13.9	20.9	45.6	51.1	48.4	39.2
Jenna	58	31	1	60.8	13.7	28.3	36.2	53.0	44.6	39.2
WB Mayville	55	27	0	59.6	14.2	24.7	42.8	49.2	46.0	38.9
Brennan	52	27	0	61.0	12.9	22.9	48.1	45.4	46.7	38.8
Briggs	51	31	1	61.8	13.0	26.1	27.0	53.3	40.1	35.5
Choteau	57	30	1	59.5	13.2	14.6	46.5	44.3	45.4	35.1
WB Gunnison	57	29	0	60.3	13.2	14.9	37.6	45.7	41.6	32.7
Prosper	57	32	1	62.3	11.5	--	44.2	66.2	55.2	--
Howard	54	33	1	62.6	13.3	--	51.1	54.0	52.6	--
Rollag	56	30	0	62.1	13.9	--	51.0	54.1	52.5	--
Steele-ND	55	33	2	63.1	13.9	--	50.0	54.8	52.4	--
LCS Breakaway	53	29	0	63.3	13.6	--	51.3	53.0	52.2	--
SY Tyra	56	27	0	61.5	12.9	--	47.4	56.9	52.1	--
Samson	56	29	0	60.1	13.3	--	40.7	55.3	48.0	--
Duclair	54	32	0	61.0	13.3	--	39.9	56.1	48.0	--
Glenn	52	32	0	63.7	13.1	--	46.3	48.6	47.5	--
SY605CL	51	33	0	62.0	13.4	--	37.8	55.6	46.7	--
Kelby	53	29	1	61.1	13.8	--	48.7	40.3	44.5	--
Alpine	58	31	1	59.6	13.8	--	36.4	51.2	43.8	--
MS Stingray	60	34	0	60.2	10.6	--	--	61.7	--	--
LCS Iguacu	58	29	0	62.1	12.0	--	--	55.6	--	--
Sabin	57	31	0	61.8	13.5	--	--	50.9	--	--
Linkert	57	28	0	61.4	13.4	--	--	49.3	--	--
SY Rowyn	54	28	0	61.8	13.0	--	--	47.2	--	--
Mean	54	31	1	61.8	13.2	23.4	46.9	54.5	--	--
C.V.%	1.5	3.4	140	1.3	3.3	14.9	8.2	6.4	--	--
LSD 10%	1	1	1	1.0	0.5	8.4	4.5	4.1	--	--

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.*

Planted on May 15 with a seeding rate of 1.25 million PLS/A and harvested on September 3.
Previous Crop: 2010 = summer fallow, 2011 & 2012 = field pea
Soil Type: Williams Loam

Hard Red Spring Wheat Variety Trial—Rugby **Cooperator: Dave Teigen**

Variety	Plant Height	Test Weight	Grain Protein	Grain Yield
	inches	lb/bu	%	bu/A
LCS Albany	31	58.4	12.1	69.6
Faller	36	58.4	12.2	68.2
Jenna	30	59.3	13.0	66.9
Prosper	34	58.3	11.8	63.9
SY Rowyn	33	60.5	12.8	63.2
LCS Power Play	32	59.8	12.1	62.5
Velva	35	56.7	12.7	62.3
Duclair	33	58.6	12.0	60.8
Advance	34	59.3	12.3	60.8
RB07	33	59.7	13.1	60.4
Elgin-ND	37	58.8	13.3	59.5
Barlow	31	59.5	12.9	59.0
SY Soren	34	60.1	13.5	58.2
Glenn	35	57.6	13.6	56.3
Select	34	62.5	12.0	56.2
Brennan	29	59.6	14.0	55.5
Linkert	33	60.2	14.1	55.1
Norden	35	59.6	13.1	54.3
Forefront	34	60.5	13.1	53.5
Kelby	29	60.6	13.8	51.2
Trial Mean	33	59.4	12.9	59.9
C.V.%	8.2	1.8	4.0	7.5
LSD 10%	3	1.2	0.6	5.3

Planting Date: June 12
Planting Rate: 1.25 million PLS/A
Harvest Date: September 30
Previous Crop: Soybean
Soil Type: Gardena silt loam
Note: The trial was planted late due to excessive moisture.

Hard Red Spring Wheat Variety Trial—Wilton **Cooperator: Rod Speten**

Variety	Plant Height	Test Weight	Grain Protein	Grain Yield
	inches	lb/bu	%	bu/A
Velva	36	58.4	13.3	68.7
Select	36	62.1	13.7	66.6
Advance	33	60.7	12.7	66.4
RB07	32	60.3	14.0	62.7
LCS Power Play	32	60.9	12.3	62.6
Elgin-ND	38	60.6	13.6	61.3
Prosper	36	59.6	13.7	60.8
SY Soren	29	60.9	13.4	60.7
Faller	36	59.0	12.7	59.4
SY Rowyn	29	60.4	13.1	59.2
Glenn	36	61.9	14.6	59.1
Norden	33	61.6	13.3	59.1
LCS Albany	35	59.7	11.6	58.9
Barlow	35	61.0	14.5	58.6
Kelby	28	60.2	13.5	58.5
Jenna	34	59.3	14.2	57.2
Forefront	36	60.1	14.3	56.2
Brennan	28	59.9	14.2	56.0
Linkert	29	60.9	14.3	54.9
Duclair	33	58.7	12.6	53.9
Trial Mean	33	60.3	13.5	60.0
C.V.%	3.9	1.0	4.0	4.3
LSD 10%	2	0.7	0.6	3.0

Planting Date: June 7
Planting Rate: 1.25 million PLS/A
Harvest Date: September 17
Previous Crop: winter wheat
Soil Type: Williams-Zahl loam
Note: The trial was planted late due to excessive moisture.

Hard Red Spring Wheat Varietal Tolerance to Foliar and Head Diseases—Minot

	---------- Tan Spot----------		--------- Leaf Rust ---------		Fusarium Head Blight	
Variety	Incidence	Severity	Incidence	Severity	Incidence	Severity
	%	%	%	%	%	%
Select	16	18	0	0	5	7
Advance	19	49	0	0	5	8
LCS Albany	15	39	0	0	6	17
Faller	14	25	0	0	4	17
Norden	12	43	0	0	5	8
Velva	11	28	0	0	4	19
LCS Power Play	16	30	0	0	4	9
Forefront	6	9	0	0	1	3
Mott	9	28	0	0	7	47
Barlow	6	15	0	0	4	8
Elgin-ND	13	35	0	0	7	20
Breaker	13	18	1	1	2	7
WB Digger	12	9	0	0	4	9
Vantage	14	7	0	0	4	50
Brick	7	5	0	0	2	24
Alsen	6	8	1	1	2	13
ND901CL Plus	6	8	0	0	4	27
RB07	14	20	1	5	3	5
SY Soren	11	19	0	0	2	8
Freyr	14	34	0	0	3	27
Jenna	9	8	0	0	2	4
WB Mayville	16	31	0	0	2	34
Brennan	4	10	0	0	1	1
Briggs	12	27	0	0	2	29
Choteau	16	39	0	0	5	22
WB Gunnison	6	14	0	0	2	25
Prosper	13	31	0	0	2	4
Howard	6	15	0	0	4	15
Rollag	4	9	0	0	3	5
Steele-ND	9	27	0	0	5	23
LCS Breakaway	10	26	0	0	2	18
SY Tyra	5	6	0	0	5	22
Samson	7	11	0	0	2	12
Duclair	6	9	0	0	5	64
Glenn	8	17	0	0	1	32
SY605CL	8	7	0	0	2	38
Kelby	12	19	0	0	3	12
Alpine	8	20	0	0	2	20
MS Stingray	13	15	0	3	5	44
LCS Iguacu	11	18	0	0	4	33
Sabin	20	28	0	0	5	23
Linkert	5	11	0	0	2	8
SY Rowyn	16	19	0	0	1	2

Incidence = the percentage of plants infected with disease.
Severity = the percentage of leaf or head surface area infected with disease.

Hard Red Spring Wheat Varietal Tolerance to Foliar and Head Diseases—Rugby

	---------- Tan Spot ----------		--------- Leaf Rust ---------		Fusarium Head Blight	
Variety	Incidence	Severity	Incidence	Severity	Incidence	Severity
	%	%	%	%	%	%
Prosper	8	11	0	0	0	0
Faller	8	8	0	0	0	0
Barlow	12	14	0	0	0	0
Glenn	8	15	0	0	0	0
Velva	12	15	0	0	0	0
Elgin-ND	8	11	2	2	0	1
Norden	5	5	0	0	0	0
Linkert	10	9	0	0	0	1
Select	15	12	0	0	0	5
Forefront	4	15	0	0	0	0
Advance	12	18	0	0	0	0
SY Soren	5	10	0	0	0	0
SY Rowyn	10	15	0	0	0	0
LCS Albany	7	5	0	0	0	1
LCS Power Play	5	11	0	0	0	0
Duclair	4	6	0	0	0	0
Brennan	2	1	0	0	0	0
RB07	6	4	0	0	0	0
Jenna	6	6	0	0	0	1
Kelby	1	1	0	0	0	0

Incidence = the percentage of plants infected with disease.
Severity = the percentage of leaf or head surface area infected with disease.

Durum Variety Descriptions

Variety	Agent or Origin[1]	Year Rlsd	Height (in.)	Straw Strength[2]	Days to Heading[3]	Reaction to Disease[4]			
						Stem Rust	Leaf Rust	Foliar Disease	Head Scab
AC Commander	Can.	2002	32	5	68	R	R	MS	NA
AC Napoleon	Can.	2001	40	5	68	R	R	S	NA
AC Navigator	Can.	1999	32	5	66	R	R	M	S
Alkabo	ND	2005	36	2	67	R	R	M	MS
Alzada[5]	WB	2004	30	6	63	R	R	S	VS
Belzer	ND	1997	39	5	66	R	R	M	MR
Ben	ND	1996	39	3	67	R	R	MR	S[6]
CDC Verona	Can.	2010	38	4	69	R	R	MR	S
Carpio	ND	2012	37	5	69	R	R	M	M
DG Max	DGP	2008	38	5	66	R	MR	MR	MS
DG Star	DGP	2007	37	4	64	R	R	M	NA
Dilse	ND	2002	37	5	68	R	R	M	MS
Divide	ND	2005	38	5	68	R	R	M	MR
Grande D'Oro	WB/DGP	2005	37	4	68	R	R	M	NA
Grenora	ND	2005	35	5	67	R	R	M	MS
Kyle	Can.	1984	39	7	68	R	MR	M	NA
Lebsock	ND	1999	37	3	67	R	R	M	MS
Maier	ND	1998	37	5	67	R	R	M	S[6]
Mountrail	ND	1998	37	5	68	R	R	M	S[6]
Pierce	ND	2001	38	5	67	R	R	MS	S
Plaza	ND	1999	29	7	68	R	R	M	MS
Rugby	ND	1973	38	5	64	R	R	MR	S[6]
Strongfield	Can.	2004	37	6	68	R	R	MS	S
Tioga	ND	2010	39	4	68	R	R	M	MS
Wales	WB	2008	36	3	67	R	R	M	S[6]
WB-Belfield	WB	2011	30	2	62	R	R	S	S
Westhope	WB	2009	36	3	67	R	R	MS	S

[1]Refers to agent or developer: Can. = Agriculture Canada, WB = Westbred, ND = North Dakota State University, DGP = Dakota Growers Pasta.

[2] Straw Strength = 1-9 scale, with 1 the strongest and 9 the weakest. Based on recent data. These values may change as more data becomes available.

[3] Days to Head = the number of days from planting to head emergence from the boot. Averaged from several locations in 2010.

[4] R = resistant, MR = moderately resistant, M = intermediate, MS = moderately susceptible, S = susceptible, VS = very susceptible, Foliar Disease = reaction to tan spot and septoria leaf spot complex.

[5] Alzada has a disease-resistance package that makes it more adapted to drier growing conditions (for example, western North Dakota).

[6] Indicates yields and/or quality often have been higher than would be expected based on visual symptoms. NA = Not adequately tested.

Note: Published in NDSU publication A-1067 (revised).

Durum Variety Trial—Minot

Variety	Days to Head	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2010	2012	2013	2 Year	3 Year
	DAP[1]	inches	0-9[2]	lbs/bu	%	----------bu/A----------				
Pierce	59	38	3	60.7	12.4	55.8	52.6	64.1	58.4	57.5
Carpio	60	39	1	59.7	12.9	55.4	47.8	64.5	56.1	55.9
Mountrail	59	39	1	60.3	12.0	63.3	41.1	61.5	51.3	55.3
Grenora	57	39	3	60.6	11.8	55.4	43.8	63.9	53.9	54.4
Maier	57	39	1	60.8	11.8	47.6	49.4	62.6	56.0	53.2
Tioga	57	35	3	60.5	11.3	44.7	44.4	68.1	56.3	52.4
Joppa	57	40	2	60.8	11.4	40.7	49.0	65.5	57.2	51.7
Alkabo	57	38	1	60.8	11.4	52.0	45.4	56.8	51.1	51.4
Lebsock	57	38	1	62.0	10.7	51.9	42.4	59.5	50.9	51.3
AC Commander	57	39	2	60.5	12.2	51.8	33.6	64.6	49.1	50.0
Ben	58	41	2	61.5	11.4	50.2	39.2	60.3	49.7	49.9
Strongfield	57	39	1	60.4	11.4	48.9	40.8	58.6	49.7	49.4
Divide	58	40	2	60.6	12.2	42.0	44.1	60.9	52.5	49.0
DG Max	56	41	5	60.5	12.1	44.6	43.8	52.2	48.0	46.9
AC Navigator	57	36	1	60.6	11.9	47.5	23.9	55.9	39.9	42.4
Normanno	57	36	2	60.7	12.1	--	51.4	56.8	54.1	--
Rugby	57	39	2	60.4	11.8	--	41.6	62.1	51.8	--
CDC Verona	58	38	1	61.2	12.0	--	37.7	64.4	51.1	--
Alzada	57	35	1	60.9	11.1	--	27.3	59.1	43.2	--
VT Peak	57	38	2	60.6	12.0	--	--	60.4	--	--
Mean	58	38	2	60.8	11.9	50.8	42.7	61.1	--	--
C.V.%	1.5	4.7	94	1.0	4.3	17.9	8.2	5.1	--	--
LSD 10%	1	2	2	0.7	0.6	NS	1.6	3.6	--	--

[1] DAP = Days after planting.

[2] Lodging: 0 = none, 9 = lying flat on the ground.

NS = no statistical difference between varieties.

Planted on May 15 with a seeding rate of 1.5 million PLS/A and harvested on September 4.
Previous Crop: 2009 = summer fallow, 2011 & 2012 = field pea
Soil Type: Williams loam
Note: The 2011 trial was destroyed.

Durum Variety Trial—Mohall **Cooperator: Dean Schoenberg**

Variety	Plant Height	Test Weight	Grain Protein	Grain Yield
	inches	lb/bu	%	bu/A
Carpio	40	61.4	13.2	65.7
Mountrail	39	61.3	12.6	62.5
Grenora	36	61.3	14.6	59.9
Joppa	41	61.6	13.7	59.9
Alkabo	38	61.8	12.4	56.1
Tioga	43	60.2	13.7	54.8
Divide	41	59.9	14.0	51.5
Trial Mean	39	61.0	13.4	58.6
C.V.%	4.8	1.1	3.6	5.9
LSD 10%	2	0.8	0.6	4.2

Planting Date: June 13
Planting Rate: 1.5 million PLS/A
Harvest Date: October 10
Previous Crop: winter wheat
Soil Type: Barnes loam

Durum Variety Trial—Wilton **Cooperator: Rod Speten**

Variety	Plant Height	Test Weight	Grain Protein	Grain Yield
	inches	lb/bu	%	bu/A
Grenora	35	60.5	12.2	60.4
Tioga	38	59.9	13.6	60.1
Mountrail	36	61.2	12.5	59.7
Carpio	37	61.0	12.6	58.8
Joppa	38	60.3	13.1	56.3
Alkabo	34	62.0	12.6	53.5
Divide	38	58.3	13.5	52.6
Trial Mean	37	60.4	12.9	57.4
C.V.%	5.1	1.8	4.8	2.5
LSD 10%	2	1.3	0.7	1.8

Planting Date: June 7
Planting Rate: 1.5 million PLS/A
Harvest Date: September 17
Previous Crop: winter wheat
Soil Type: Williams-Zahl loam

Durum Varietal Tolerance to Foliar and Head Diseases—Minot

	------ Tan Spot ------		----- Leaf Rust -----		Fusarium Head Blight	
Variety	**Incidence**	**Severity**	**Incidence**	**Severity**	**Incidence**	**Severity**
	%	**%**	**%**	**%**	**%**	**%**
Mountrail	25	60	0	0	6	5
Alkabo	50	30	0	0	10	9
Grenora	27	11	0	0	10	9
Divide	39	31	0	0	11	10
Tioga	29	11	0	0	6	7
Carpio	21	4	0	0	10	7
Joppa	36	20	0	0	8	11
Rugby	24	10	0	0	8	7
Ben	21	23	0	0	13	8
Maier	26	18	0	0	4	5
Lebsock	27	19	0	0	7	9
Pierce	40	5	0	0	14	7
DG Max	21	6	0	0	6	5
Alzada	16	5	0	0	10	8
Strongfield	23	6	0	0	14	9
AC Commander	3	2	0	0	9	5
AC Navigator	3	2	0	0	5	5
CDC Verona	3	1	0	0	4	5
Normanno	4	2	0	0	8	15
VT Peak	3	1	0	0	5	5

Incidence = the percentage of plants infected with disease.
Severity = the percentage of leaf or head surface area infected with disease.

Barley Variety Descriptions

Variety	Use[1]	Origin[2]	Year Rlsd	Awn Type[3]	Rachilla Hair Length[4]	Aleurone Color	Height	Straw Strength	Relative Maturity	Reaction to Disease[5]			
										Stem Rust	Spot-form Net Blotch	Spot Blotch	Net Blotch
Six-rowed													
Celebration	M/F	BARI	2008	S	S	White	M.short	Strg.	Med.	S	MS	MR/R	MS/S
Drummond	M/F	ND	2000	S	L	White	M.short	V.strg.	Med.	S	MR	MR/R	MS/S
Innovation	MT	BARI	2009	S	L	White	M.short	Strg.	Med.	S	MS	MR/R	MS/S
Lacey	M/F	MN	1999	S	S	White	M.short	Strg.	Med.	S	MR	MR/R	MS/S
Legacy	M/F	BARI	2000	S	L	White	Med.	Strg.	M.late	S	MS	MR/R	MS/S
Quest[6,8]	M/F	MN	2010	S	L	White	M.short	V.strg.	Med.	S	MR	MR/R	MS/S
Rasmusson	M/F	MN	2008	S	S	White	M.short	Strg.	Med.	S	MS	MR/R	MS/S
Robust	M/F	MN	1983	S	S	White	Med.	M.strg.	Med.	S	MS/S	MR/R	MS/S
Stellar-ND	M/F	ND	2005	S	L	White	M.short	V.strg.	Med.	S	MS	MR/R	MS/S
Tradition	M/F	BARI	2003	S	L	White	M.short	V.strg.	Med.	S	MS	MR/R	MS/S
Two-rowed													
AC Metcalfe	M	Canada	1997	R	L	White	Med.	Med.	Late	S	MS	MS	MS
CDC Copeland	M	Canada	1999	R	L	White	Tall	Med.	Late	S	MS	MS	MR
Champion	F	WestBred	2007	NA[7]	L	White	Tall	NA	M.late	NA	NA	NA	NA
Conlon[8]	M/F	ND	1996	S	L	White	M.short	Med.	M.Early	S	MR	MS	MR/R
Conrad	M	BARI	2007	R	L	White	Tall	M.weak	Late	S	MS	NA	NA
Eslick	F	MT	2003	R	L	White	Med.	M.weak	M.late	S	NA	MS	NA
Harrington[9]	F	Canada	1981	R	L	White	Med.	M.weak	Late	S	S	S	MS
Haxby	F	MT	2003	R	L	White	Med.	Med.	Med.	S	MS	MS	NA
Hockett	M/F	MT	2008	R	L	White	Med.	Med.	Med.	S	NA	NA	NA
Lilly	F	Germany	NA	R	L	White	Short	M.strg.	Late	S	MS/S	S	MR/R
Pinnacle	M/F	ND	2006	S	L	White	Med.	Strg.	M.late	S	S	MR	MS
Rawson	F	ND	2005	R	L	White	Med.	Med.	Med.	S	MS	MR	MS
Scarlett	M	Germany	1995	R	L	White	Short	Med.	Late	S	NA	S	MR
Sunshine	F	Germany	NA	R	L	White	Short	M.strg.	Late	S	S	S	MS
Specialty													
Enduro	SP	WestBred	2007	H	L	White	Med.	NA	M.late	NA	NA	NA	NA
Wanubet	SP	MT	1990	H	L	White	Med.	Weak	Late	S	NA	S	S

[1] M = malting, MT = Being tested in plant-scale tests for malting and brewing quality, F = feed, SP = special uses (hulless).

[2] BARI = Busch Agricultural Resources Inc., MN = University of Minnesota, MT = Montana State University, ND = North Dakota State University.

[3] R = rough, S = smooth, H = hulless.

[4] S = short, L = long.

[5] R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, NA = not available.

[6] Moderately resistant to Fusarium head blight.

[7] NA = Not available.

[8] Lower DON accumulations than other varieties tested.

[9] Recommended as a malting barley in western U.S.

Note: Published in NDSU publication A-1049 (revised).

Barley Variety Trial—Minot

Variety	Days to Head	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2010	2011	2013	2 Year	3 Year
	DAP[1]	inches	0-9[2]	>6/64	<5/64	lbs/bu	%	bu/A				
6 Row Types												
Innovation	52	30	1	96	0.6	48.3	13.8	101.3	47.8	85.8	66.8	78.3
Lacey	52	27	1	96	0.1	46.8	12.9	100.5	60.2	73.6	66.9	78.1
Celebration	58	32	2	94	0.4	47.6	14.9	110.2	52.3	66.9	59.6	76.5
Quest	52	29	3	96	0.4	46.2	13.2	97.8	59.5	71.2	65.4	76.2
Tradition	57	29	1	96	0.4	47.3	12.9	94.1	55.6	68.3	62.0	72.7
Stellar-ND	52	31	2	95	0.3	46.7	13.1	97.6	43.2	75.7	59.4	72.2
Robust	51	33	5	94	0.4	47.8	15.0	87.3	46.4	74.7	60.6	69.5
2 Row Types												
CDC Copeland	62	35	2	96	0.3	48.6	12.7	95.1	46.7	81.4	64.0	74.4
Pinnacle	57	35	4	94	0.9	47.7	11.4	102.6	44.1	73.5	58.8	73.4
Conrad	63	31	3	95	0.7	48.5	13.9	102.9	43.0	71.8	57.4	72.6
Conlon	51	31	4	97	0.3	49.4	12.9	96.0	49.8	62.3	56.0	69.4
AC Metcalfe	60	33	2	95	0.7	48.8	13.9	89.3	45.7	69.7	57.7	68.2
Rawson	55	29	4	97	0.3	47.3	12.1	96.0	43.8	62.8	53.3	67.5
Mean	55	31	2	96	0.4	47.8	13.0	97.6	48.4	77.4	--	--
C.V.%	2.2	7.6	86	1.6	77	2.0	3.8	8.0	8.3	6.2	--	--
LSD 10%	1	3	2	2	0.4	1.2	0.6	13.2	8.0	5.7	--	--

[1] *DAP = Days after planting.*

[2] *Lodging: 0 = none, 9 = lying flat on the ground.*

Planted on May 15 with a seeding rate of 1 million PLS/A and harvested on September 3.
Previous Crop: 2009 & 2010 = summer fallow, 2012 = field pea.
Soil Type: Williams loam
Note: 2012 trial data not reported due to severe herbicide injury.

Barley Variety Trial—Mohall **Cooperator: Dean Schoenberg**

Variety	Plant Height	% Plump	% Thin	Test Weight	Protein	Yield
	inches	>6/64	<5/64	lbs/bu	%	bu/A
6 Row Types						
Innovation	30	93	7	44.1	15.6	62.7
Lacey	33	91	8	45.8	14.9	58.6
Celebration	32	89	10	43.2	16.2	58.0
Quest	33	89	10	43.9	14.9	56.5
Stellar-ND	31	93	6	43.1	14.6	55.3
Tradition	36	88	12	43.3	14.9	54.3
2 Row Types						
Conlon	32	98	2	48.4	14.4	54.6
Rawson	33	98	2	46.9	14.3	53.6
AC Metcalf	33	94	5	46.2	15.4	52.7
Pinnacle	32	91	8	45.1	12.9	38.2
Mean	33	92	7	45.0	14.9	55.2
C.V.%	4.0	3.1	39	1.1	3.0	6.6
LSD 10%	2	4	3	0.6	0.6	4.6

Planting Date: June 13
Planting Rate: 1 million PLS/A
Harvest Date: October 10
Previous Crop: winter wheat
Soil Type: Barns loam
Note: The trial was adversely affected by late planting date and wet soil conditions.

Barley Variety Trial—Wilton **Cooperator: Rod Speten**

Variety	Plant Height	% Plump	% Thin	Test Weight	Protein	Yield
	inches	>6/64	<5/64	lbs/bu	%	bu/A
6 Row Types						
Celebration	27	95	4	47.7	14.0	74.0
Tradition	29	95	5	47.9	12.3	73.4
Innovation	28	94	5	47.0	12.3	73.2
Stellar-ND	27	95	4	46.1	12.3	70.7
Lacey	29	96	3	48.1	13.3	66.2
Quest	28	94	5	46.2	13.0	63.0
2 Row Types						
Rawson	28	98	2	49.6	11.9	78.0
Pinnacle	27	96	4	48.1	11.2	73.0
AC Metcalf	27	92	7	49.0	12.9	71.6
Conlon	25	96	4	50.2	13.3	--
Mean	27	95	4	48.0	12.7	71.5
C.V.%	3.5	1.3	27	1.3	4.0	5.6
LSD 10%	1	1	1	0.8	0.6	4.9

Planting Date: June 7
Planting Rate: 1 million PLS/A
Harvest Date: September 17
Previous Crop: winter wheat
Soil Type: Williams-Zahl loam
Note: Conlon yield note reported due to wildlife predation.

Oat Variety Descriptions

Variety	Origin[1]	Year Rlsd	Grain Color	Height	Straw Strength	Mat[2]	Reaction to Diseases: Stem Rust[3]	Reaction to Diseases: Crown Rust[3]	Reaction to Diseases: Barley Y.Dwf[4]	Bu/Wt.	Protein[5]
AC Assiniboia	CPS	1997	Red	Med	Strong	L	S	S	T	Good	ML
AC Gwen	CSC	2000	Hulless	Tall	Strong	L	S	S	R	Good	L
AC Kaufman	Can.	2000	Yellow	Tall	Strong	L	S	S	MT	V.good	ML
AC Pinnacle	CQAS	1999	White	Tall	Med.	L	S	S	S	V.good	L
AC Ronald	CSC	2001	White	M.short	V.strg.	L	S	S	T	V.good	M
Beach	ND	2004	White	Tall	M.strg.	ML	S	MR/MS	MS	V.good	M
Buff	SD	2002	Hulless	Med.	M.strg.	L	S	MR/MS	MT	Good	H
CDC Dancer	CC	2000	White	Tall	Strong	L	S	MS	S	V.good	M
CDC Minstrel	Sask.	2006	White	Tall	M.strg.	L	S	S	S	Good	M
CDC Orrin	CQC	2001	White	Tall	Strong	L	S	S	S	Good	ML
CDC Weaver	Can.	2005	Yellow	Med.	M.strg.	L	S	S	S	Good	M
Furlong	AW	2003	Red	Tall	M.strg.	L	S	S	T	V.good	M
HiFi	ND	2001	White	Tall	Strong	L	MR/MS	R	T	Good	M
Horsepower	SD	2012	White	Short	Strong	EM	MS	R	MT	V.good	MH
Hytest	SD	1986	White	Tall	M.strg.	E	S	MS	S	V.good	H
Jury	ND	2012	White	Tall	M.strg.	M	R	R	MT	V.good	M
Killdeer	ND	2000	White	Med.	Strong	M	S	MS	MT	Good	M
Leggett	AW	2005	White	Tall	Strong	L	MR	R	S	Good	M
Leonard	MN	2001	Yellow	Tall	M.strg.	L	S	S	T	Fair	ML
Loyal	SD	2000	Ivory	Tall	M.strg.	L	S	MR	T	Good	MH
Maida	ND	2005	Yellow	Med.	Strong	M	R	S	MS	V.good	MH
Minstrel	Sask.	2008	White	M.tall	Strong	L	MR/MS	S	S	Good	M
Morton	ND	2001	White	Tall	V.strg.	L	S	S	MT	V.good	M
Newburg	ND	2011	White	Tall	Med.	L	R	R	MT	Good	M
Otana	MT	1977	White	M.tall	M.weak	L	S	S	S	V.good	ML
Paul	ND	1994	Hulless	V.tall	Strong	L	R	MR/MS	T	Good	H
Reeves	SD	2002	White	M.tall	Med.	E	S	MR	MT	Good	H
Rockford	ND	2008	White	Tall	Strong	L	S	R	MT	V.good	M
Sesqui	MN	2001	Yellow	M.tall	Strong	L	S	S	T	Good	M
Shelby 427	SD	2008	White	Med.	Strong	E	S	R	NA	V.good	NA
Souris	ND	2006	White	Med.	Strong	M	MS	R	MS	V.good	M
Stallion	SD	2006	White	Tall	Med.	L	S	MR	NA	V.good	M
Stark	ND	2004	Hulless	Tall	M.strg.	L	R	MR/MS	T	V.good	M
Streaker	SD	2008	Hulless	Tall	M.weak	M	S	R/MR	NA	V.good	MH
Summit	AW	2008	White	Med.	Strong	L	S	R	MT	Good	M

[1] Can = Canada, ND = North Dakota State University, SD = South Dakota State University, MT = Montana State University, Sask. = Saskatchewan, CPS = Can. Proven Seed, CC = Can. Cargill, AW = AAFC Winnipeg, CSC = Can. SeCan, CQAS = Can. QAS, CQC = Can. QAS/Cargill, MN = Minnesota.

[2] E = early, M = medium, L = late.

[3] R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

[4] Barley Yellow Dwarf Virus, S = susceptible, MS = moderately susceptible, MT = moderately tolerant, T = tolerant, VT = very tolerant, NA = not available. Varieties rated MT or T have a relatively good degree of protection against barley yellow dwarf virus.

[5] H = high, M = medium, L = low.

Note: Published in NDSU publication A-1049 (revised).

Oat Variety Trial—Minot

Variety	Days to Head	Plant Height	Lodging	Test Weight	Grain Yield 2011	2012	2013	2 Year	3 Year
	[1]DAP	inches	[2]0-9	lb/bu	bu/A				
Newburg	59	51	5	36.9	122.4	152.1	127.2	139.7	133.9
Shelby427	52	41	1	39.0	122.6	136.3	126.5	131.4	128.5
Souris	58	44	3	36.3	129.1	144.8	111.2	128.0	128.4
Jury	57	48	3	37.1	122.3	126.1	128.4	127.2	125.6
Rockford	59	45	3	38.0	116.4	143.1	116.4	129.7	125.3
HiFi	60	44	2	37.9	119.1	141.7	114.3	128.0	125.0
Stallion	60	44	7	37.1	104.5	167.9	86.2	127.1	119.5
Leggett	57	41	2	35.2	114.9	123.6	117.5	120.5	118.7
AC Pinnacle	61	47	8	33.6	98.5	146.1	98.8	122.5	114.5
Killdeer	59	39	7	34.8	88.6	144.1	100.6	122.4	111.1
CDC Dancer	60	45	3	39.0	86.2	136.4	107.8	122.1	110.1
CDC Minstrel	58	42	7	30.8	98.1	139.5	82.4	111.0	106.7
Beach	61	50	7	36.1	91.5	135.6	79.3	107.4	102.1
Morton	59	48	3	36.6	76.3	138.5	75.8	107.2	96.9
Furlong	63	44	8	33.8	74.2	121.8	88.3	105.0	94.8
Stark	61	45	7	38.8	91.9	115.8	70.0	92.9	92.6
Hytest	54	45	8	36.0	73.5	130.3	60.9	95.6	88.2
Horsepower	53	36	1	37.8	--	135.2	110.9	123.1	--
Otana	60	45	9	30.4	--	134.5	60.8	97.6	--
Goliath	60	56	7	37.2	--	--	96.9	--	--
Mean	59	46	5	36.7	101.2	136.6	104.8	--	--
C.V.%	1.6	5.1	32	3.6	8.3	7.4	7.4	--	--
LSD 10%	1	3	2	1.6	14.3	10.7	9.1	--	--

[1] DAP = Days after planting.

[2] Lodging: 0 = none, 9 = lying flat on the ground.

Planted on May 16 with a seeding rate of 1 million PLS/A and harvested on September 6.
Previous Crop: 2010 & 2011 = summer fallow, 2012 = durum.
Soil Type: Williams loam

Hard Winter Wheat Variety Descriptions

Variety	Agent or Origin[2]	Year	Reaction to Disease[1] Stripe Rust	Leaf Rust	Stem Rust	Scab	Maturity[3]	Straw[4] Strength	Height[5] (inches)	Winter[6] Hardiness
AC Broadview	Can.	2011	MS	R	R	S/VS	0	5	36	4
AC Radiant[7]	Can.	2005	R	S	S	S	+1	2	36	2
Accipiter	W. Ag	2008	NA	MS	R	S	0	4	36	2
Alice[8]	SD	2006	NA	S	MR	S	-3	5	33	5
Art	Agripro	2008	R	R	R	MS	-4	4	33	8
Boomer	WB	2009	MS	MR	R	S	0	4	34	3
Carter	WB	2010	S	NA	NA	S	0	4	32	6
CDC Buteo	WB	2004	NA	MS	NA	S	0	6	36	2
CDC Falcon	WB	2000	MS	MS	NA	S	0	5	34	4
Darrell	SD	2006	NA	S	R	MS	-2	4	35	6
Decade	MT/ND	2010	S	VS	R	VS	-2	4	35	2
Expedition	SD	2002	MS	MS	R	S	-3	4	34	4
Flourish	Can.	2011	MR	MS	MS	S	0	5	35	2
Freeman	ARS-NE	2013	MR/S	MR/S	MR/MS	MS	-3	4	33	6
Hawken	Agripro	2007	S	MR	MR	S	-3	4	28	7
Ideal	SD	2011	NA	R	MR	S	-1	5	33	5
Jagalene	Agripro	2002	MS	S	MR	VS	-2	4	33	6
Jerry	ND	2001	MR	MR	R	S	0	4	37	3
Lyman	SD	2008	MS	R	R	MR	-2	7	35	5
Mace	ARS-NE	2008	NA	MS	R	MS	0	4	33	5
McGill	ARS-NE	2010	MS	MS	MR	MS	-3	4	36	4
Millennium	NE/SD	1999	MR	MR	MR	S	-2	4	37	6
Moats	Can.	2011	NA	R	R	MR	0	5	38	2
Overland	NE	2006	MR	MR/R	MR	S	-2	4	35	5
Peregrine	W. Ag	2008	R	MR	R	MS	+1	4	39	2
Ransom	ND	1998	NA	MR	MR	S	+1	6	37	3
Robidoux	ARS-NE	2010	MR	MS	MR	S	-1	4	34	6
Roughrider	ND	1975	NA	S	R	MS	0	5	42	2
Smoky Hill	WB	2007	S	R	R	S	0	5	35	7
Striker	WB	2009	MS	MR	R	S	-2	4	32	5
Sunrise[9]	Can.	2011	R	MR	MR	S	0	6	36	3
SY Wolf	Agripro	2010	MS	MR	R	MS	-2	4	33	6
WB Grainfield	WB	2013	MS	MS	NA	S	-3	6	33	6
WB-Matlock	WB	2010	MS	MS	R	MS	+1	4	36	2
Wesley	NE/SD/WY	2000	MR	MS	R	S	-3	5	32	6
Yellowstone	MT	2005	R	S	S	VS	+2	6	33	5

[1] R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible, NA = not available.

[2] W.Ag = Western Ag, WB = WestBred, SD = South Dakota State University, MT = Montana State University, ARS = USDA Agricultural Research Service, NE = University of Nebraska, WY = Wyoming.

[3] Days to heading relative to Jerry.

[4] Straw strength = 1 to 9 scale, with 1 strongest and 9 weakest. These ratings may change as additional data become available.

[5] Based on the average of several locations in 2011, and should be used for comparing varieties. The environment can impact the height of varieties.

[6] Relative winter hardiness rating: 1 = excellent, 10 = very poor. These values are subject to change as additional information becomes available.

[7] Curl mite resistant.

[8] White wheat.

[9] Soft red winter wheat.

Note: Published in NDSU publication A-1196 (revised).

Hard Winter Wheat Variety Trial—Minot

Variety	Yield (bu/a)		Test Wt (lb/bu)		Protein (%)	
	Fung	No Fung	Fung	No Fung	Fung	No Fung
Redfield	119.4	98.5	61.8	60.9	12.4	12.1
CDC Moats	116.8	96.8	62.2	61.7	13.0	12.3
CDC Falcon	116.6	93.7	61.3	59.3	11.9	12.0
Boomer	116.3	90.5	61.0	59.9	13.1	12.3
Accipiter	115.9	93.0	61.5	60.2	11.7	11.5
Ideal	115.4	104.9	61.3	61.1	12.8	11.9
AC Broadview	115.0	98.9	60.5	60.5	12.1	11.9
CDC Ptarmigan	113.9	94.0	58.0	56.4	10.7	9.8
AC Flourish	112.9	100.7	60.9	60.0	12.3	12.2
Freeman	112.5	106.2	60.2	59.3	12.3	12.1
Decade	112.0	109.1	61.6	59.9	13.3	12.7
WB-Matlock	111.8	92.4	62.1	61.3	13.1	12.8
SY Wolf	111.7	94.7	61.6	60.6	12.3	12.0
CDC Sunrise	110.8	93.4	58.7	57.6	11.4	11.3
Wesley	107.9	96.8	60.8	59.5	13.5	13.2
Art	107.8	98.9	62.3	60.8	12.7	12.0
SD08080	107.0	98.4	60.4	60.0	13.4	12.5
WB-Redhawk	106.8	106.1	60.8	60.2	12.9	12.6
Expedition	106.7	90.3	61.4	60.4	12.5	12.1
Darrell	106.1	99.5	61.7	60.9	12.7	12.1
Robidoux	104.8	79.2	61.0	58.6	12.5	12.0
Jerry	103.4	90.5	61.5	60.0	13.5	12.9
NI08708	103.2	90.2	58.3	56.9	12.8	12.1
Lyman	102.9	98.5	61.6	62.0	14.0	13.6
Overland	102.9	98.8	61.0	60.7	13.2	12.3
WB-Grainfield	102.8	101.4	60.8	60.6	12.6	12.2
Peregrine	101.2	97.2	61.8	62.2	12.0	11.8
McGill	99.0	84.1	61.1	59.6	13.0	12.1
MSWW-13-001	97.2	94.0	62.6	62.3	13.2	13.3
Mean:	109.0	96.2	61.0	60.1	12.7	12.2
Fung Resp:	12.8 bu/a		0.9 lb/bu		0.5 %	
LSD (.05):	11.2 bu/a		0.9 lb/bu		0.6 %	
CV:	6.8 %		0.9 %		2.8 %	

Seeding Date:
September 18, 2012
Seeding Rate:
1.3 million PLS/a
Seed Treatment:
Evergol Energy+ Gaucho
Herbicide:
13.7 oz/a Huskie Complete
Fung. Treatment:
4 oz/a Stratego w/ herb.
8.2 oz/a Prosaro at early flower
N Fert:
120 lbs/a N as UAN on 5/10/13
Starter Fert:
80 lb/a MAP with seed
(9 lb/a N & 42 lb/a P_2O_5)
Seeder:
Bourgault No-Till Drill (disc openers)
Prior Crop:
Durum
Soil Test N (0-24"):
61 lb/a
Soil Test (Olsen) P:
6 ppm (L)
Soil Test Org Matter:
2.6%

Winter Cereals: Sustainability in Action is a joint research and education initiative of Ducks Unlimited and Bayer CropScience. The initiative promotes improving agriculture productivity while maintaining habitat for wildlife by increasing winter wheat acres in the Prairie Pothole Region.

Sponsors
Ducks Unlimited, Bayer CropScience, NDSU, WinField Solutions, North Central Research Extension Center, ND Foundation Seed, SD Foundation Seed, AgriPro, WestBred, Western Ag Labs, Meridian Seeds, Gylling Data Mgt, AGVISE Laboratories

Winter Wheat Varietal Tolerance to Diseases—Minot

	------ Tan Spot ------		WSMV*	Fusarium Head Blight	
Variety	Incidence	Severity	Incidence	Incidence	Severity
	%	%	%	%	%
Red Hawk	0	0	0	20	45
Matlock	0	0	4	2	5
Graifield	0	0	2	16	20
AC Flourish	0	0	2	6	15
AC Emerson	0	0	3	0	0
AC Broadview	14	5	0	6	5
CDC Falcon	10	5	0	2	5
Boomer	12	5	5	0	0
Art	0	0	0	2	5
SY Wolf	0	0	0	8	5
Peregrine	0	0	0	2	5
Accipiter	0	0	0	6	5
Wesley	0	0	0	12	5
Robidoux	0	0	0	8	5
Overland	0	0	6	4	5
CDC Sunrise	0	0	0	4	5
CDC Ptarmigan	0	0	5	10	5
CDC Moats	0	0	10	2	5
Lyman	0	0	10	0	0
Darrell	0	0	0	0	0
Expedition	0	0	5	10	5
Ideal	0	0	4	4	5
Decade	0	0	0	0	0
Jerry	0	0	0	0	0

*Wheat Streak Mosaic Virus

Incidence = the percentage of plants infected with disease.
Severity = the percentage of leaf or head surface area infected with disease.

Silage Corn Trial—Minot

Company	Hybrid	Relative Maturity	Harvest Moisture	Yield	
				Dry wt.	65% Moist.
			%	Tons per Acre	
Proseed	STS 106	106	66	5.20	14.86
Integra	STPCX99	99	66	5.31	15.18
Integra	STP 7897	97	63	5.78	16.51
Gold Country Seed	98-11SLSRF	98	66	4.80	13.72
NuTech	5N-183	83	60	5.49	15.69
NuTech	5B-186	86	61	4.57	13.06
NuTech	5B-290	90	62	6.12	17.48
NuTech	5B-888	88	59	5.24	14.97
NuTech/G2 Genetics	5H-080	83	64	5.39	15.41
NuTech/G2 Genetics	5X-890	90	63	4.81	13.76
Late Matur. Grain Check	D26VP56	86	66	4.48	12.81
Early Matur. Grain Check	5Z-775	75	60	3.65	10.43
Mean				5.07	14.89
C.V.%				12.1	12.1
LSD 10%				0.73	2.10

Planting Date: May 25
Harvest Date: October 2
Seeding Rate: 28,000 pls/A
Row Spacing: 30"
Previous Crop: spring wheat
Soil Type: Williams loam

Grain Corn Trial—Minot

Company/Brand	Hybrid	GDU's	Relative Maturity	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield				
								2011	2012	2013	2 Year	3 Year
		*	days	DAP**	inches	%	lbs/bu	bu/A				
AgVenture/Scherr	RL1131YHB	1840	76	71	44	21.3	52.4	--	--	121	--	--
AgVenture/Scherr	N962.N944	--	77	74	41	21.3	52.7	--	--	140	--	--
AgVenture/Scherr	RL2106YHB	1890	81	76	42	24.2	49.4	--	--	112	--	--
AgVenture/Scherr	GL2949AB	2035	84	77	41	23.3	52.8	--	--	112	--	--
Channel	180-18VT2PRIB	2000	80	75	43	21.6	51.2	--	--	124	--	--
Channel	181-92VT2PRIB	2035	81	73	37	19.8	51.1	--	--	127	--	--
Channel	183-23VT2PRIB	2050	83	74	38	20.1	52.2	--	--	127	--	--
Dekalb	DKC27-55	1925	77	70	44	21.1	57.4	--	--	137	--	--
Dekalb	DKC31-10	2025	81	73	40	19.8	50.6	--	--	137	--	--
Dekalb	DKC33-78	2075	83	73	38	21.7	52.7	--	--	104	--	--
Dyna-Gro	D20VC73RIB	2050	80	76	41	22.5	55.6	--	74	88	81	--
Dyna-Gro	D23VC35RIB	2120	83	75	40	23.0	51.1	--	80	126	103	--
Dyna-Gro	D24VC44RIB	--	84	74	39	23.2	52.9	--	--	104	--	--
Dyna-Gro	D26VP56	2195	86	78	40	23.9	48.6	--	--	133	--	--
Gold Country Seed	76-67R2P	--	76	70	39	22.6	55.1	--	--	122	--	--
Gold Country Seed	81-19R2P	2000	81	74	45	19.9	50.5	--	--	119	--	--
Integra	2803	--	78	73	41	21.0	53.5	--	--	126	--	--
Integra	9301	2025	80	73	43	21.0	53.2	--	77	115	96	--
Integra	9302	--	80	75	40	23.6	54.2	--	--	94	--	--
Integra	9333	2030	83	77	43	23.7	55.2	135	84	135	109	118
Northstar Genetics	VS77-311	1975	77	73	41	21.6	54.4	--	--	142	--	--
Northstar Genetics	VS78-510	2020	78	73	39	21.6	53.6	--	--	137	--	--
Northstar Genetics	VS80-580	2200	80	75	40	21.6	52.8	--	--	100	--	--
Northstar Genetics	VS81-481	2230	81	75	43	21.6	53.8	--	89	124	106	--
Nuseed/Seeds 2000	2771 RR	1980	77	76	39	24.4	49.1	125	103	129	116	119
Nuseed/Seeds 2000	XM177G	--	77	77	43	24.3	48.6	--	--	117	--	--
Nuseed/Seeds 2000	8202 VP3220	2020	82	76	41	20.6	50.3	--	--	111	--	--
Nuseed/Seeds 2000	8001 VT2P	2000	80	73	40	21.2	53.9	--	--	105	--	--
NuTech	5B-782	2120	82	78	42	23.5	51.4	--	91	120	106	--
NuTech	5N-183	2130	83	75	39	21.6	50.0	160	101	142	121	134
NuTech	5B-7701	2015	77	74	43	21.2	52.3	--	--	140	--	--
NuTech	3A-678	2030	78	77	46	23.3	49.3	--	--	129	--	--
NuTech	5B-7901	2045	79	74	44	22.4	56.0	--	--	134	--	--
NuTech/G2 Genetics	5Z-775	2025	75	72	43	20.9	51.9	--	--	128	--	--
NuTech/G2 Genetics	5H-8002	2090	80	74	41	22.4	49.8	--	--	133	--	--
NuTech/G2 Genetics	3A-080	2100	80	74	41	21.5	48.8	133	95	121	108	116
NuTech/G2 Genetics	5Z-781	2120	81	76	41	21.4	49.8	--	--	148	--	--
NuTech/G2 Genetics	5H-080	2130	83	77	42	23.2	48.5	167	92	125	109	128
Peterson Farms Seed	21N78	1925	78	73	42	21.0	53.9	--	--	108	--	--
Peterson Farms Seed	71C80	1995	80	74	38	22.6	54.3	--	77	100	89	--

Continued on next page

Grain Corn Trial—Minot—Continued

Company/Brand	Hybrid	GDU's	Relative Maturity	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield				
								2011	2012	2013	2 Year	3 Year
		*	days	DAP**	inches	%	lbs/bu	bu/A				
Proseed	1278 GTCBLL	1938	78	77	43	25.6	48.2	--	100	132	116	--
Proseed	EXP77R RR	--	77	75	39	21.8	51.9	--	--	140	--	--
Proseed	PX78 VT2P	--	78	74	43	21.5	52.6	--	--	123	--	--
Proseed	1280 VT2P	--	80	72	43	22.1	54.2	--	--	121	--	--
Proseed	1182 GTCBLL	2010	82	76	40	23.1	47.7	--	89	131	110	--
Proseed	PX82M GT	--	82	77	37	22.0	48.4	--	--	122	--	--
Proseed	1283 VT2P	--	83	73	39	23.0	53.9	--	--	124	--	--
Proseed	1083 GT3000	2050	83	78	42	21.6	47.6	--	100	147	123	--
Rea Hybrids	1B102-RIB	1925	76	72	44	20.8	54.7	--	--	128	--	--
Rea Hybrids	1V115-RIB	1950	78	71	42	21.8	53.5	110	67	129	98	102
Rea Hybrids	1B801-RIB	2000	80	74	43	22.5	53.0	--	--	107	--	--
Rea Hybrids	2B830-RIB	2100	83	75	41	23.9	53.4	--	--	116	--	--
Rea Hybrids	1C790	2000	79	72	40	18.7	52.9	--	--	87	--	--
Thunder Seed	4377RR2	--	77	75	40	22.1	51.5	--	--	121	--	--
Thunder Seed	4578RR2	--	78	75	41	21.1	50.2	--	--	123	--	--
Thunder Seed	4383VT2P	--	83	71	37	22.4	53.4	--	--	112	--	--
Thunder Seed	4384RR2	--	84	73	40	22.9	50.7	--	--	103	--	--
Thunder Seed	4585RR2	--	85	77	41	23.8	52.5	--	--	123	--	--
Thunder Seed	6382VT2P RIB	--	82	76	42	22.3	51.6	--	--	136	--	--
Wensman Seed	W 8076VT2RIB	1975	79	73	41	22.1	54.5	--	--	136	--	--
Wensman Seed	W 8082VT2RIB	1985	82	73	42	20.9	52.5	--	--	127	--	--
Wensman Seed	W 8083VT2RIB	2050	82	73	45	22.1	54.4	--	--	120	--	--
Trial Mean				74	41	22.1	52.1	127	86	123	--	--
C.V.%				2.0	7.2	7.1	4.2	10.1	7.9	10.0	--	--
LSD 10%				2	3	1.8	2.6	15	8	14	--	--

**Growing Degree Units to Black Layer.*
***DAP = Days after planting.*

Planting Date: May 25
Seeding Rate: 26,000 PLS/A
Row Spracing: 30"
Harvest Date: November 6
Previous Crop: 2011 = summer fallow, 2012 = HRSW
Soil Type: Williams loam
Note: Test weight and yield are adjusted to 15.5% moisture.

Corn Fungicide Trial—Minot

Protocol Trt	Application Timing	Product	Product Rate	Foliar Disease	Foliar Disease	Foliar Disease	Spider Mite	Ear Height	Harvest Moisture	Test Weight	Grain Yield
			oz/A	20-Jul	5-Aug	15-Aug	15-Aug	inches	%	lbs/bu	bu/A
1		Untreated		0	0	0	0	43	20.8	54.1	134.7
5	V6	Quadris + NIS	6 + 0.25%	0	0	0	0	40	19.3	53.5	155.5
6	V6	Evito + NIS	2 + 0.25%	0	0	0	0	40	22.0	54.7	125.6
7	V6	Evisto-T + NIS	5 + 0.25%	0	0	0	0	36	23.2	55.1	126.4
8	V6	Headline + NIS	6 + 0.25%	0	0	0	0	42	23.5	55.2	142.8
9	V6	Headline AMP + NIS	10 + 0.25%	0	0	0	0	37	21.4	54.2	112.5
10	V6	Stratego + NIS	10 + 0.25%	0	0	0	0	39	20.0	53.1	121.8
11	V6	Stratego YLD + NIS	4 + 0.25%	0	0	0	0	41	19.9	54.1	133.7
12	V6	Quilt + NIS	7 + 0.25%	0	0	0	0	42	21.2	54.1	112.9
13	V6	Priaxor + NIS	4 + 0.25%	0	0	0	0	41	20.9	54.6	146.4
14	V6	Vertizan + NIS	10 + 0.25%	0	0	0	0	43	23.0	55.5	139.0
15	V6	Aproach + NIS	3 + 0.25%	0	0	0	0	43	20.0	53.4	127.2
16	R1	Quadris + NIS	6 + 0.25%	0	0	0	0	42	21.5	54.3	134.0
17	R1	Evito + NIS	2 + 0.25%	0	0	0	0	42	19.4	53.3	123.1
18	R1	Evisto-T + NIS	5 + 0.25%	0	0	0	0	43	20.3	54.1	144.3
19	R1	Headline + NIS	6 + 0.25%	0	0	0	0	42	21.3	54.6	133.6
20	R1	Headline AMP + NIS	10 + 0.25%	0	0	0	0	41	22.0	55.0	143.3
21	R1	Stratego + NIS	10 + 0.25%	0	0	0	0	40	22.5	54.6	141.7
22	R1	Stratego YLD + NIS	4 + 0.25%	0	0	0	0	43	22.6	55.6	126.7
23	R1	Quilt + NIS	7 + 0.25%	0	0	0	0	42	21.8	55.1	149.8
24	R1	Priaxor + NIS	4 + 0.25%	0	0	0	0	43	24.6	56.8	140.6
25	R1	Vertizan + NIS	10 + 0.25%	0	0	0	0	40	21.4	54.9	144.9
26	R1	Aproach + NIS	6 + 0.25%	0	0	0	0	42	21.0	54.7	128.1
xx	V6 Fb	Headline + NIS	6 + 0.25%								
	R1	Headline AMP + NIS	10 + 0.25%	0	0	0	0	38	22.9	55.5	113.6
Trial Mean				0	0	0	0	41	21.5	54.6	133.4
C.V. %				0	0	0	0	8	--	1.7	10.8
LSD 0.1				ns	ns	ns	ns	4	--	1.1	17.1

Planting Date: May 25
Hybrid: P39D97
Plant Pop: 28,000 plants/A
Row Spacing: 30"
Tillage: No-till
Harvest Date: November 5
Previous Crop: Durum
Soil Type: Williams loam
Fungicide Application Dates: V6 = July 20, R1 = August 5
Note: Grain yield and test weights are adjusted to 15.5% moisture. This trial was partially funded by the North Dakota Corn Council.

Oil Type Sunflower Variety Trial—Minot

Company/Brand	Hybrid	Herbicide System	Oil Type	Days to Bloom	Days to Mature	Plant Height	Oil	Test Weight	Seed Yield 2011	2012	2013	2 Year	3 Year
				DAP*	DAP*	inches	%	lbs/bu	----------		lbs/A	----------	
AgVenture Scherr	3H93DM	Clearfield	HO	64	110	66	41.2	26.3	--	--	2381	--	--
AgVenture Scherr	3N94DM	Clearfield	NS	66	107	75	40.8	25.5	--	--	2468	--	--
AgVenture Scherr	3H95	Clearfield	HO	68	109	63	40.8	24.6	--	--	2163	--	--
Croplan	432 E	Express	NS	61	107	69	37.0	22.9	--	--	2091	--	--
Croplan	460 E	Express	NS	66	109	73	45.0	25.1	1297	2428	2352	2390	2026
Croplan	559 CL	Clearfield	NS	66	108	70	42.8	26.6	2446	3040	2483	2761	2656
Croplan	548 CL	Clearfield	NS	66	106	74	43.9	24.8	--	2132	2454	2293	--
Croplan	13-59 CL	Clearfield	NS	67	111	65	41.4	26.5	--	--	2396	--	--
Genosys	12G20	Clearfield	HO	65	106	71	41.9	23.1	--	--	2744	--	--
Genosys	12E12	Clearfield	HO	65	107	75	38.2	23.9	--	2070	2599	2335	--
Genosys	12E13	Clearfield	HO	65	104	75	39.6	22.0	--	2572	1902	2237	--
Genosys	12E14	Clearfield	HO	68	108	80	39.6	22.3	--	2978	2541	2760	--
Genosys	11G08	Convent.	NS	66	104	82	43.6	28.0	--	2257	2904	2581	--
Genosys	12E06	Convent.	HO	65	107	81	42.1	25.8	--	--	2715	--	--
Mycogen Seeds	8N270CLDM	Clearfield	NS	61	104	63	42.8	24.3	1435	3040	1830	2435	2102
Mycogen Seeds	8H288CLDM	Clearfield	HO	63	107	64	44.8	24.1	1316	2504	2134	2319	1985
Mycogen Seeds	8N358CLDM	Clearfield	NS	66	106	65	43.7	24.1	1483	2998	2294	2646	2258
Mycogen Seeds	8N421CLDM	Clearfield	NS	67	106	73	42.3	23.7	1779	3526	1946	2736	2417
Mycogen Seeds	8H449CLDM	Clearfield	HO	68	108	67	45.5	24.8	1443	3548	1975	2761	2322
Mycogen Seeds	8N310CL	Clearfield	NS	67	106	77	38.4	23.4	--	--	2599	--	--
Mycogen Seeds	8D417	Convent.	NS	68	112	55	37.2	21.4	--	2566	1655	2111	--
Nuseed/Seeds 2000	Camaro II	Clearfield	NS	66	109	70	42.8	26.1	--	3063	2280	2671	--
Nuseed/Seeds 2000	Falcon	Express	NS	66	107	63	43.8	25.7	1890	2460	1960	2210	2103
Nuseed/Seeds 2000	NLK12S069	Express	NS	66	106	72	45.2	23.9	--	--	2454	--	--
Nuseed/Seeds 2000	NLK12S070	Express	NS	64	104	70	42.2	23.5	--	--	2033	--	--
Nuseed/Seeds 2000	Torino	Clearfield	NS	69	110	70	42.3	25.8	1947	3020	1931	2476	2299
Nuseed/Seeds 2000	Cobalt II	Clearfield	HO	67	108	66	42.3	25.3	--	1930	1844	1887	--
Nuseed/Seeds 2000	Daytona	Clearfield	HO	67	111	63	42.6	24.6	--	2459	2236	2348	--
Nuseed/Seeds 2000	NHK12M010	Clearfield	HO	68	110	71	42.7	23.5	--	--	2657	--	--
Nuseed/Seeds 2000	NLK12M006	Clearfield	NS	66	107	67	41.2	25.5	--	--	2396	--	--
Nuseed/Seeds 2000	NLK12M178	Clearfield	NS	68	110	71	39.2	23.4	--	--	2265	--	--
Nuseed/Seeds 2000	NHK12M140	Clearfield	HO	68	110	71	42.1	21.9	--	--	2033	--	--
Nuseed/Seeds 2000	NHK12M141	Clearfield	HO	69	105	77	41.4	23.4	--	--	2991	--	--
Nutrisun	MS9024	Convent.	NS	69	107	76	42.3	24.6	--	--	2991	--	--
Proseed	E-85 CL	Clearfield	HO	66	104	78	40.4	23.4	--	2626	2004	2315	--
Proseed	E-21 CL	Clearfield	HO	65	108	78	39.8	23.1	1767	2086	2120	2103	1991
Proseed	E-31 CL	Clearfield	HO	65	106	77	38.9	23.2	--	--	2222	--	--
Proseed	E-362436	Convent.	HO	61	108	74	36.9	24.6	--	2647	2933	2790	--
Sunopta/Dahlgren	4421	Convent.	NS	64	106	78	41.5	22.6	--	1831	2410	2121	--
Sunopta/Dahlgren	4421CL	Clearfield	NS	66	106	72	38.9	23.3	--	2370	2614	2492	--
USDA	Hybrid 894	Convent.		64	105	76	42.6	24.2	--	--	2396	--	--
Trial Mean				66	107	71	41.5	24.2	1577	2582	2327	--	--
C.V.%				1.9	1.9	6.8	5.8	5.1	21.6	10.7	9.5	--	--
LSD 10%				2	2	6	2.8	1.4	343	321	259	--	--

**DAP = Days after planting.*

Planting Date: June 13
Seeding Rate: 24,000 PLS/A
Row Spracing: 30"
Previous Crop: 2010 & 2011 = summer fallow, 2012 = field pea
Harvest Date: November 12
Soil Type: Williams loam
Note: Oil content, test weight and seed yield are adjusted to 10% moisture.

Sunflower Variety Trial—Non-Oil—Minot

Company/Brand	Hybrid	Days to Flower	Days to Maturity	Plant Height	Test Weight	Seed Over Screen			Seed Yield				
						>22/64	>20/64	>18/64	2011	2012	2013	2 Year	3 Year
		DAP[1]	DAP[1]	inches	lb/bu	%-			lbs/A-				
CanSun	EX753	62	102	73	21.0	85	92	96	--	--	1525	--	--
CanSun	EX8253	61	104	66	19.5	86	91	94	--	--	1540	--	--
CanSun	EX8255	63	102	71	20.1	82	91	95	--	--	1912	--	--
CanSun	EX5255	63	102	73	20.4	87	92	96	--	--	1958	--	--
Mycogen Seeds	8C451CP	68	102	73	19.4	90	95	97	--	2024	1962	1993	--
Nuseed Global	NHW10403	68	104	72	18.2	88	93	96	--	--	1557	--	--
Nuseed Global	X98578	67	106	77	16.9	92	95	96	--	--	1656	--	--
Nuseed Global	NHW12717	68	105	82	20.0	79	90	96	--	--	1686	--	--
Nuseed Global	X3939	63	102	73	22.2	78	91	96	--	--	1706	--	--
Nuseed Global	NHW12709	63	100	76	20.5	91	96	98	--	--	2248	--	--
Nuseed Global	X4417	61	100	75	18.0	94	96	97	--	--	1520	--	--
Nuseed Global	NHW11921	67	105	81	18.7	82	92	95	--	--	1417	--	--
Nuseed Global	NHW11904	61	98	74	18.9	88	95	96	--	--	1914	--	--
Nuseed Global	5009	67	104	76	20.8	86	94	97	--	--	2022	--	--
Nuseed Global	NHW11928	62	103	77	19.6	88	94	96	--	--	1698	--	--
Nuseed Global	NHW12706	68	104	78	19.3	81	91	96	--	--	2012	--	--
Nuseed Global	NHW11915	69	104	81	20.5	81	92	96	--	--	1554	--	--
Nuseed Global	NHW12725	60	98	75	19.3	90	94	96	--	--	1938	--	--
Genosys	12GCF05	69	100	71	19.2	85	90	94	--	1880	1909	1894	--
Genosys	12GCF12	68	100	85	16.6	90	93	94	--	--	2572	--	--
CHS	13EXP04	68	106	77	18.7	87	94	97	--	--	1919	--	--
CHS	12EXP01	67	105	76	18.9	95	97	98	--	2231	1417	1824	--
Sunopta/Dahlgren	9530CL	68	104	73	21.2	86	92	94	2118	2295	1817	2056	2077
Sunopta/Dahlgren	9592CL+	69	105	72	19.5	87	93	96	--	2200	1496	1848	--
Sunopta/Dahlgren	EX22	61	99	70	16.9	90	94	96	--	--	1588	--	--
Sunopta/Dahlgren	9521	65	105	78	21.3	93	97	98	--	--	2217	--	--
Sunopta/Dahlgren	9579	65	100	70	17.9	88	92	95	--	--	1696	--	--
Sunopta/Dahlgren	9589CL	65	102	77	16.4	89	94	96	--	--	1806	--	--
RR Commodities	8015	65	104	64	17.7	89	92	93	--	--	1314	--	--
RR Commodities	2217 CP	67	104	65	18.8	91	95	97	1967	1243	1731	1487	1647
RR Commodities	2215 CL	68	103	74	21.3	90	95	96	2064	2409	1562	1986	2012
RR Commodities	2215	63	102	71	21.9	88	96	97	2130	2289	1702	1995	2040
Nuseed/Seeds 2000	X9180	62	100	60	21.5	67	82	91	1980	1992	1519	1755	1830
Nuseed/Seeds 2000	6946 DMR	63	99	65	21.6	56	79	90	1982	2126	1784	1955	1964
Nuseed/Seeds 2000	Sundance DMR	62	101	70	21.2	77	91	95	--	2048	1792	1920	--
Nuseed/Seeds 2000	Panther DMR	61	98	62	21.5	88	93	96	--	--	1909	--	--
Nuseed/Seeds 2000	Jaguar DMR	60	98	69	21.9	87	95	97	2148	1846	1940	1893	1978
Nuseed/Seeds 2000	Jaguar	60	99	63	21.7	82	91	95	1966	1947	1724	1836	1879
Trial Mean		64	102	73	19.7	86	93	96	1904	2027	1769	--	--
C.V.%		1.4	1.3	3.7	3.8	4.9	2.9	1.8	25.0	13.2	17.8	--	--
LSD 10%		1	2	3	0.9	5	3	2	566	316	369	--	--

[1]Days After Planting

Planting Date: June 19
Planting Rate: 22,000 seeds/A, thinned to 18,000 plants/A
Row Spacing: 30"
Harvest Date: November 12
Previous Crop: 2010 & 2011 = Summer fallow, 2012 = field pea
Soil Type: Williams loam

NipsIt Seed Treatment Trial—Minot

NipsIt Suite OF is an on-farm cereal seed protectant developed and marketed by Valent. It contains a combination of two systemic fungicides and an insecticide. Release is a plant growth regulator (gibberellin) being promoted to enhance seedling growth and vigor by stimulating enzymes that convert stored seed starch into the simple sugar energy source required for germination and early seedling growth.

Treatment	Product Rate	Days to Head	Plant Height	1000 Seed wt	Test Weight	Grain Protein	Grain Yield
	oz/kwt	DAP	in	g	lb/bu	%	bu/A
Untreated		55	31	33.8	62.9	14.9	59.8
NipsIt Suite OF	6	54	32	33.8	63.8	15.0	63.6
Release	1	55	32	32.3	63.4	15.0	53.5
NipsIt Suite OF + Release	6 +1	54	31	33.1	63.4	14.9	60.0
Trial Mean		55	32	33.2	63.4	15.0	59.2
C.V.%		2.2	4.4	3.5	2.8	1.8	5.5
LSD 10%		NS	NS	1.0	NS	NS	2.8

Variety: Barlow HRSW
Planting Date: May 15
Planting Rate: 1.25 million PLS/A
Harvest Date: September 5
Previous Crop: field pea
Soil Type: Williams loam

Flax Variety Descriptions

Variety[1]	Origin[2]	Year Released	Relative Maturity	Seed Color	Plant Height	Wilt[3]
AC Lightning	Can.	2002	Late	Brown	Med.tall	R
Carter	ND	2004	Med.	Yellow	Med.	R
Cathay	ND	1998	Med.	Brown	Med.	MR
CDC Arras	Can.	1999	Med.	Brown	Med.	MR
CDC Bethune	Can.	1999	Med.late	Brown	Med.tall	MR
CDC Glas	Can.	2012	Med.	Brown	Med.tall	MR
CDC Mons	Can.	2003	Med.late	Brown	Med.	MR
CDC Sanctuary	Can.	2012	Med.	Brown	Med.tall	MR
CDC Sorrel	Can.	2007	Med.late	Brown	Med.tall	MR
Hanley	Can.	2002	Med.early	Brown	Med.	R
Linott	Can.	1966	Med.early	Brown	Med.	MS/MR
McGregor	Can.	1980	Late	Brown	Med.tall	MR
Neche	ND	1988	Med.	Brown	Med.	R
Nekoma	ND	2002	Late	Brown	Med.	MR
Omega	ND	1989	Med.	Yellow	Med.	MS
Pembina	ND	1998	Med.	Brown	Med.	MR
Prairie Blue	Can.	2003	Med.late	Brown	Med.tall	MR
Prairie Grande	Can.	2008	Med.early	Brown	Med.	MR
Prairie Sapphire	Can.	2012	Med.	Brown	Med.	MR
Prairie Thunder	Can.	2006	Med.	Brown	Short	MR
Rahab 94	SD	1994	Med.	Brown	Med.	MR
Selby	SD	2000	Late	Brown	Tall	MR
Shape	Can.	2010	Med.	Brown	Med.	R
Webster	SD	1998	Late	Brown	Tall	MR
York	ND	2002	Late	Brown	Med.	R

[1] All varieties have resistance to prevalent races of rust, all have good oil yield and oil quality.

[2] Can. = Canada, ND = North Dakota State University, SD = South Dakota State University.

[3] R = resistant, MR = moderately resistant, MS = moderately susceptible.

Note: Published in NDSU publication A-1105 (revised).

Flax Variety Trial—Minot

Variety	10% Bloom	Plant Height	Test Weight	Oil[1]	Seed Yield 2012	2013	Avg.
	DAP[2]	inches	lb/bu	%	----- bushels per acre -----		
Pembina	50	23	56.2	40.2	32.4	32.6	32.5
Neche	50	23	56.7	39.2	30.9	31.6	31.2
Nekoma	48	21	55.7	40.6	35.3	26.2	30.7
Rahab 94	48	20	56.4	40.6	33.8	27.1	30.5
McGregor	49	23	56.7	40.4	26.3	31.8	29.1
Prairie Blue	49	21	56.9	42.0	28.4	23.7	28.4
Carter	49	21	56.2	41.0	34.9	21.4	28.2
CDC Sorrel	50	22	55.9	40.9	29.6	26.8	28.2
CDC Sanctuary	49	22	55.5	41.2	28.3	26.6	27.5
Prairie Thunder	49	22	55.3	39.7	28.9	26.1	27.5
Webster	48	21	53.2	40.8	31.2	23.3	27.3
Omega	52	21	56.6	39.9	30.4	22.7	26.6
Prairie Saphire	50	23	54.7	42.7	29.3	22.4	25.8
Lightning	49	22	53.2	40.6	30.3	21.0	25.7
Shape	49	22	56.2	42.7	30.7	20.4	25.5
Prairie Grande	47	22	55.1	41.2	29.0	21.0	25.0
CDC Arras	49	22	56.3	39.1	21.7	26.8	24.2
Linott	50	21	55.2	40.3	31.5	16.0	23.7
Hanley	49	23	56.2	40.1	25.0	20.3	22.7
CDC Bethune	50	23	56.1	39.7	27.7	17.3	22.5
CDC Glas	49	23	56.1	40.9	21.3	21.6	21.5
York	49	21	55.1	41.2	23.1	19.0	21.1
Trial Mean	49	22	55.7	40.8	30.0	24.2	--
C.V.%	1.7	6.3	2.2	1.0	11.2	18.0	--
LSD 10%	1	2	1.7	0.5	4.0	5.9	--

[1] *Oil adjusted to 9% moisture.* [2] *DAP = Days after planting.*

Planting Date: May 17
Harvest Date: September 17
Seeding Rate: 4 million PLS/A (approx. 40 lbs/A)
Previous Crop: 2011 = summer fallow, 2012 = durum
Soil Type: Williams loam

Soybean Roundup Ready Variety Trial—Minot

Company/Brand	Variety	Maturity Group	IDC Rating	Days to Mature	Lodging	Protein	Oil	Test Weight	--- Seed Yield --- 2012	2013	Avg
			1-5[a]	DAP[b]	0-9[c]	%	%	lbs/bu	bushels per acre		
Northstar Genetics	0080R2	00.7	2.3	135	7	36.6	14.1	58.4	--	50.7	--
Northstar Genetics	0057R2	00.5	2.1	136	3	37.6	13.6	59.8	54.8	41.4	48.1
Northstar Genetics	0096R2	00.9	2.2	136	3	35.5	14.9	58.2	57.8	55.9	56.8
Northstar Genetics	0108R2	0.1	2.9	138	2	37.7	13.7	58.6	--	46.4	--
Channel	00806R2	0.08	2.2	131	1	36.5	14.8	58.8	43.9	49.6	46.8
Channel	0205R2	0.2	1.8	135	4	37.0	14.1	59.5	--	45.4	--
Proseed	10-08	0.08	2.5	134	5	35.8	14.5	58.5	42.0	57.9	50.0
Proseed	20-08	0.08	1.8	135	7	36.6	14.5	58.1	48.6	46.5	47.6
Proseed	11-07	0.07	2.1	131	4	37.3	15.0	56.7	56.4	52.5	54.4
Proseed	10-20	0.2	2.3	133	4	36.4	14.3	59.0	36.7	48.9	42.8
Proseed	PX01	0.1	2.4	128	1	37.1	13.6	57.2	--	50.4	--
Proseed	PX02	0.2	2.6	137	3	37.3	14.1	58.4	--	49.9	--
Integra	20090	0.09	2.3	135	3	35.2	15.0	58.3	53.2	56.8	55.0
Integra	20107	0.1	2.9	136	1	37.1	14.1	58.0	--	45.8	--
Integra	20215	0.2	2.6	137	1	37.1	14.3	57.4	--	55.9	--
Integra	20300	0.3	2.5	141	2	36.7	14.1	58.7	67.5	51.2	59.4
Mycogen Seeds	5B005R2	00.5	2.1	128	3	36.4	15.2	57.2	57.1	45.1	51.1
Mycogen Seeds	5G009R2	00.9	2.4	135	3	36.2	14.7	57.6	53.4	50.1	51.8
Mycogen Seeds	5B012R2	0.1	2.2	135	4	37.7	14.1	57.8	--	46.8	--
Asgrow	AG00932	00.9	1.9	131	2	37.0	13.9	57.3	38.9	53.0	46.0
Asgrow	AG0231	0.2	2.2	138	2	36.7	14.3	59.7	45.4	49.5	47.4
Asgrow	AG0333	0.3	2.5	139	2	36.6	14.0	59.4	37.8	52.5	45.1
Dyna-Gro Seed	S008RY43	0.08	1.7	135	6	36.7	14.1	58.8	47.8	38.2	43.0
Dyna-Gro Seed	34RY03	0.3	--	136	1	37.2	15.4	60.2	--	47.9	--
Dyna-Gro Seed	S02RY74	0.2	2.6	131	1	37.1	14.0	56.6	--	57.9	--
Thunder Seed	32005R2Y	00.5	2.4	130	8	35.9	15.1	56.7	53.4	50.3	51.8
Thunder Seed	31009R2Y	00.9	2.3	130	4	36.1	14.6	56.9	49.1	59.9	54.5
Thunder Seed	33009R2YN	00.9	1.7	137	8	36.7	14.4	58.5	41.1	37.5	39.3
Thunder Seed	3201R2Y	0.1	2.3	136	3	36.5	15.0	58.4	47.9	47.9	47.9
Thunder Seed	3202R2Y	0.2	2.9	139	5	36.7	14.3	60.2	49.2	45.3	47.2
Peterson Farms Seed	PFS 14R008	00.8	2.2	128	2	36.5	14.5	57.5	--	54.6	--
Peterson Farms Seed	PFS 11R01	0.1	2.4	131	2	36.2	14.9	58.1	--	53.2	--
Peterson Farms Seed	PFS 14R02	0.2	2.4	137	1	37.9	13.4	57.8	--	49.6	--
Gold Country Seed	0053	00.5	2.4	129	3	37.8	13.7	57.1	--	52.6	--
NuTech/G2 Genetics	0090	0.09	2.2	130	6	37.7	15.1	57.3	45.3	44.6	45.0
NuTech/G2 Genetics	6021	0.2	--	136	1	38.0	14.1	58.0	--	44.0	--
NuTech/G2 Genetics	6043	0.4	2.9	139	1	36.4	14.5	58.0	--	50.0	--
NuTech/G2 Genetics	6052	0.4	1.9	137	3	36.4	15.0	58.6	--	51.7	--
Seeds 2000	0091RR2Y	0.09	--	127	2	39.8	14.6	58.8	43.0	41.8	42.4
Trial Mean				134	3	36.9	14.4	58.2	47.8	49.5	--
C.V.%				1.0	38	1.8	2.2	0.7	5.9	5.3	--
LSD 10%				2	2	0.9	0.4	0.6	3.3	3.6	--

[a] IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead [b] *DAP = days after planting.*

[c] *Lodging: 0 = none, 9 = lying flat on the ground NS = no statistical difference between varieties.*

Planting Date: May 17 *Planting Rate: 200,000 PLS/A*
Row Spacing: Solid Seeded (6" rows) *Harvest Date: October 26*
Previous Crop: 2012 = durum, 2011 = summer fallow *Soil Type: Williams loam*
Note: Oil, protein, test weight and yield are adjusted to 13% moisture.

Soybean Non-Roundup Ready Variety Trial—Minot

Company/Brand	Variety	Maturity Group	Herbicide System	IDC Rating	Days to Mature	Lodging	Protein	Oil	Test Weight	Seed Yield 2012	Seed Yield 2013	Seed Yield 2 yr Avg
				1-5[a]	DAP[b]	0-9[c]	%	%	lbs/bu	bushels per acre	bushels per acre	bushels per acre
Northstar Genetics	0095LL	00.9	LL	2.1	123	2	37.5	15.4	58.4	--	51.1	--
Integra	30080LL	0.08	LL	2.3	125	1	37.9	15.4	58.1	--	51.1	--
Integra	30300NLL	0.3	LL	2.4	130	2	37.3	15.4	58.2	51.0	47.3	49.2
Peterson Farms Seed	PFS L03-12N	0.3	LL	2.2	128	2	38.0	15.1	59.7	48.4	49.4	48.9
Peterson Farms Seed	PFS L01-14	0.1	LL	2.6	130	2	37.1	15.2	57.8	--	52.1	--
S.K. Foods	SK007	000.4	conv	2.7	119	2	39.2	15.4	58.2	--	35.5	--
S.K. Foods	SK923	0.0	conv	2.4	122	2	35.7	16.1	58.3	--	44.7	--
NDSU	ProSoy	0.8	conv	2.6	129	1	36.8	15.1	58.1	34.3	41.7	38.0
NDSU	Traill	0.0	conv	2.4	126	2	38.3	14.4	58.7	36.1	43.6	39.8
NDSU	Ashtabula	0.4	conv	2.4	127	2	39.3	14.7	57.8	44.1	39.3	41.7
NDSU	Sheyenne	0.7	conv	2.4	125	1	38.8	15.0	58.1	49.1	41.3	45.2
NDSU	Cavalier	00.9	conv	2.7	125	1	37.0	15.7	58.3	45.1	40.6	42.8
Trial Mean					126	2	37.9	15.1	58.4	42.3	45.8	--
C.V.%					3.1	41	1.3	2.4	1.0	6.3	4.7	--
LSD 10%					5	NS	0.6	0.4	0.7	3.1	2.6	--

[a]IDC rating = Iron deficiency chlorosis rating: 1-green, 3-yellow, 5-dead

[b] *DAP = days after planting.*

[c] *Lodging: 0 = none, 9 = lying flat on the ground.*

NS = no statistical difference between varieties.

Planting Date: May 17
Planting Rate: 200,000 PLS/A
Row Spacing: Solid Seeded (6" rows)
Harvest Date: October 26
Previous Crop: 2012 = durum, 2011 = summer fallow
Soil Type: Williams loam
Note: Oil, protein, test weight and yield are adjusted to 13% moisture.

Soybean Variety Trial—Garrison **Cooperator: Mike Zimmerman**

Company/Brand	Variety	Maturity Group	IDC Rating	Protein	Oil	Test Weight	Seed Yield
			1-5[a]	%	%	lbs/bu	bu/A
Northstar Genetics	0080R2	00.7	2.3	32.8	15.5	58.6	38.7
Northstar Genetics	0096R2	00.9	2.2	32.8	15.9	58.8	39.9
Northstar Genetics	0108R2	0.1	2.9	33.9	15.0	57.9	39.8
Channel	00806R2	0.08	2.2	34.4	15.5	58.5	24.2
Channel	0205R2	0.2	1.8	34.9	15.1	58.7	40.8
Proseed	10-08	0.08	2.5	33.3	15.5	58.4	42.1
Proseed	20-08	0.08	1.8	33.3	15.9	58.6	32.2
Proseed	11-07	0.07	2.1	33.8	16.5	58.2	32.1
Proseed	10-20	0.2	2.3	33.4	15.4	58.6	40.4
Proseed	PX01	0.1	2.4	34.0	14.9	58.3	36.8
Proseed	PX02	0.2	2.6	33.7	15.6	58.2	43.9
Integra	20107	0.1	2.9	33.8	15.1	58.9	40.7
Integra	20109	0.1	3.0	33.2	15.2	58.7	48.7
Integra	20215	0.2	2.6	33.1	15.3	58.6	42.7
Integra	20300	0.3	2.5	32.9	15.1	57.7	35.9
Mycogen Seeds	5G009R2	00.9	2.4	32.8	15.6	58.8	35.8
Mycogen Seeds	5B012R2	0.1	2.2	34.1	16.0	58.3	42.3
Asgrow	AG0231	0.2	2.2	33.4	15.2	59.1	35.1
Asgrow	AG0333	0.3	2.5	32.9	15.2	57.9	45.6
Thunder Seed	3202R2Y	0.2	2.9	35.2	14.7	57.1	35.9
Peterson Farms Seed	PFS 14R008	00.8	2.2	34.5	15.5	58.8	37.2
Peterson Farms Seed	PFS 11R01	0.1	2.4	32.9	16.1	58.9	39.0
Peterson Farms Seed	PFS 14R02	0.2	2.4	33.6	14.9	58.4	42.3
NuTech/G2 Genetics	0090	0.09	2.2	33.5	17.2	58.2	34.5
NuTech/G2 Genetics	6021	0.2	--	34.1	15.4	57.9	28.9
NuTech/G2 Genetics	6043	0.4	2.9	32.2	15.7	58.1	35.3
NuTech/G2 Genetics	6052	0.4	1.9	31.9	16.6	58.5	44.2
Seeds 2000	0091R2Y	0.09	--	31.9	16.2	59.1	26.1
Trial Mean				33.4	15.6	58.4	37.9
C.V.%				1.9	2.0	1.0	10.3
LSD 10%				0.7	0.4	0.7	4.6

[a] *IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead*

Planting Date: June 7
Planting Rate: 200,000 PLS/A
Row Spacing: Solid Seeded (6" rows)
Harvest Date: October 24
Previous Crop: corn
Soil Type: Williams-Bowbells loam
Note: Protein, oil, test weight and yield are adjusted to 13% moisture.

Soybean Variety Trial—Mohall **Cooperator: Dean Schoenberg**

Company/Brand	Variety	Maturity Group	IDC Rating	Protein	Oil	Test Weight	Seed Yield
			1-5[a]	%	%	lbs/bu	bu/A
Northstar Genetics	0080R2	00.7	2.3	34.2	14.4	58.5	47.5
Northstar Genetics	0057R2	00.5	2.1	36.2	13.4	58.8	43.5
Northstar Genetics	0096R2	00.9	2.2	34.0	14.9	58.9	38.9
Proseed	10-08	0.08	2.5	34.9	14.5	58.8	41.4
Proseed	20-08	0.08	1.8	34.8	14.6	58.8	37.4
Proseed	11-07	0.07	2.1	36.4	14.7	58.1	40.4
Proseed	10-20	0.2	2.3	34.2	14.5	58.6	31.1
Proseed	PX01	0.1	2.4	35.2	13.7	58.8	38.3
Proseed	PX02	0.2	2.6	35.5	14.4	58.4	42.8
Integra	20031	0.05	2.2	35.0	14.3	58.6	48.2
Integra	20085	0.08	2.1	36.0	14.3	58.7	39.8
Integra	20052	0.05	2.1	36.9	13.3	58.9	39.7
Integra	20090	0.09	2.3	34.8	15.0	59.3	46.2
Mycogen Seeds	5B005R2	00.5	2.1	36.0	14.8	58.4	40.1
Mycogen Seeds	5G009R2	00.9	2.4	34.6	14.6	59.0	45.1
Asgrow	AG00932	00.9	1.9	36.6	13.5	59.1	37.7
Peterson Farms Seed	PFS 14R008	00.8	2.2	36.0	14.8	58.6	38.7
Peterson Farms Seed	PFS 11R01	0.1	2.4	34.0	15.1	58.9	40.6
Peterson Farms Seed	PFS 14R02	0.2	2.4	35.4	13.4	58.5	37.8
NuTech/G2 Genetics	0090	0.09	2.2	35.4	15.2	58.6	30.7
NuTech/G2 Genetics	6021	0.2	--	36.6	14.1	58.2	38.3
Seeds 2000	0091 R2Y	0.09	--	34.6	14.5	59.2	46.8
Trial Mean				35.3	14.4	58.7	40.5
C.V.%				1.3	2.1	0.7	7.3
LSD 10%				0.5	0.4	0.5	3.5

[a] *IDC rating = Iron deficiency chlorosis rating: 1 - green, 3 - yellow, 5 - dead*

Planting Date: June 13
Planting Rate: 200,000 PLS/A
Row Spacing: Solid Seeded (6" rows)
Harvest Date: November 13
Previous Crop: winter wheat
Soil Type: Barnes loam
Note: Protein, oil, test weight and yield are adjusted to 13% moisture.

Canola Liberty Link Variety Trial—Minot

Company	Variety	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Oil Content	Seed Yield
		DAP[1]	days	DAP[1]	inches	%	lbs/A
Bayer CropScience	InVigor L130	46	23	99	37	41.7	2002
Bayer CropScience	InVigor L120	46	23	101	38	39.7	2109
Bayer CropScience	InVigor 5440	48	22	100	38	41.2	2179
Mean		46	23	100	37	40.8	2097
C.V.%		3.1	7.1	1.0	10.5	2.6	9.2
LSD 10%		NS	NS	1	NS	1.4	NS

[1] *DAP = Days after planting.*

Trial was planted on May 13 with a seeding rate of 685,000 pls/A and harvested on September 13.
Previous Crop: flax
Soil Type: Williams loam
Oil content and seed yields are adjusted to 8.5% moisture.

Canola Roundup Ready Variety Trial—Minot

Company/Brand	Variety	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Lodging	Oil Content	Seed Yield
		DAP[1]	days	DAP[1]	inches	0-9[2]	%	lbs/A
Proseed	CS1	44	29	107	44	3	43.0	2589
Proseed	CD2	45	31	107	41	3	43.5	2988
Cargill	V12-1	46	29	107	42	3	43.6	2965
Cargill	V12-2	46	23	105	44	3	43.9	2557
Cargill	v2045	45	24	107	42	3	42.1	2499
Cargill	v2170	49	23	106	43	2	44.1	2416
Integra	7150	43	28	106	39	3	44.4	2245
Integra	7152	44	28	106	37	4	44.4	2427
Dekalb	DKL30-42	43	27	105	36	5	45.4	2070
Dekalb	DKL38-48	45	25	106	36	3	43.2	2782
Dekalb	DKL55-55	44	28	106	35	3	45.6	2022
Dekalb	DKL70-07	45	26	106	40	3	45.0	2488
Dekalb	DKL72-40	45	26	107	45	3	44.9	2110
Mycogen Seeds	Nexera 1012 RR	50	26	109	47	2	42.2	2419
Mycogen Seeds	Nexera 1016 RR	47	24	107	41	2	42.3	2487
BrettYoung	6070RR	45	28	108	43	2	42.2	2746
BrettYoung	6044RR	45	27	106	40	2	45.0	2698
Croplan	HyCLASS 930	44	27	106	42	3	46.0	2453
Croplan	HyCLASS 955	46	25	106	38	4	45.2	2338
Croplan	HyCLASS 969	44	27	107	38	3	44.8	2533
Star Specialty Seed	Star 402	46	29	107	40	3	46.6	2570
Star Specialty Seed	Star 514	44	27	106	41	5	45.4	2286
Mean		46	26	106	41	3	43.9	2502
C.V.%		1.9	5.7	1.1	8.9	41	1.2	10.8
LSD 10%		1	2	1	4	1	0.6	318

[1] *DAP = Days after planting.*

[2] *Lodging: 0 = none, 9 = lying flat on the ground.*

Trial was planted on May 13 with a seeding rate of 685,000 PLS/A and harvested on September 6.
Previous Crop: durum
Soil Type: Williams loam
Oil content and seed yields are adjusted to 8.5% moisture.

Dry Pea Description of Selected Yellow and Green Cotyledon Varieties

Variety	Vine Length	Harvest Ease	Powdery Mildew Tolerance	Maturity	Seed Size	2010 Avg. Yield 14 locs[1]	2011 Avg. Yield 11 locs[2]	2012 Avg. Yield 15 locs[3]	2013 Avg. Yield 7 locs[4]
						----------bu/A----------			
Yellow Cotyledon Type									
Agassiz	Tall	Good	Good	Medium	Medium	51.3	42.5	50.3	56.3
CDC Golden	Medium	Good	Good	Medium	Medium	50	39.3	49.6	--
CDC Meadow	Medium	Good	NA[5]	Medium	Med. Small	--	--	--	51.6
DS Admiral	Medium	Good	Good	Early/Med.	Medium	45.7	42.9	49.3	47.6
Green Cotyledon Type									
CDC Striker	Medium	Good	Poor	Medium	Medium	44.2	38.3	51.4	46.1
Cruiser	Medium	Fair	Poor	Medium	Small	42.5	32.6	44.3	45.4
Majoret	Medium	Fair	Poor	Medium	Medium	45.3	40.2	44.3	48.4
Mean						46.5	39.3	48.2	49.2
CV %						--	9.7	7.9	9.1
LSD 0.10						--	2.7	2.3	4.1

[1] *These varieties appeared in all the locations reported in the 2010 publication.*

[2] *These varieties appeared in all the locations reported in the 2011 publication, except for Cathay organic and Nesson Valley irrigated.*

[3] *These varieties appeared in all the locations reported in the 2012 publication, except for Carrington Forage/Cover Crop.*

[4] *These varieties appeared in all the locations reported in this publication except Advanced Variety Trial & Western Regional Pea Trial (Williston REC).*

[5] *NA = not available.*

Field Pea Variety Trial—Minot

Brand	Variety	Days to Flower	Flower Duration	Days to Maturity	Protein	Seeds/ Pound	1000 Seed Weight	Test Weight	Seed Yield 2013	Seed Yield 3-yr. Avg.
		DAP[1]	(days)	(days)	%		g	lb/bu	bu/a	bu/a
Yellow Cotyledon Types										
Meridian Seeds	Agassiz	43	18	75	27.9	2233	204	67.0	37.0	50.4
Nodricks Norsask Seeds	CDC Treasure	43	18	73	26.3	2471	184	68.1	44.1	49.3
Pulse USA	DS Admiral	40	18	72	26.1	2149	211	66.7	31.7	48.6
Great Northern Ag.	Bridger	41	16	72	27.8	2836	160	66.0	30.1	48.5
Nodricks Norsask Seeds	CDC Meadow	41	17	74	26.1	2530	180	67.5	36.6	47.3
Great Northern Ag.	Spider	44	16	76	29.0	2123	215	67.8	41.9	43.2
Paulson Seeds	Gunner	43	17	75	27.3	2508	182	67.2	43.0	--
Pulse USA	Korando	37	20	76	28.6	1897	239	66.5	42.8	--
Legume Logic	Supreme	40	15	73	27.6	2472	184	66.3	41.1	--
Pulse USA	Nette	42	12	71	25.9	2779	164	66.9	39.7	--
Pulse USA	SW Midas	42	16	71	27.7	2595	175	66.9	39.3	--
Pulse USA	LN4206 Abarth	43	17	74	28.7	2566	177	67.4	38.0	--
Great Northern Ag.	Navarro	37	18	71	27.1	2218	206	66.6	36.3	--
Legume Matrix	Torch	45	11	73	29.8	2611	174	66.8	34.2	--
Legume Logic	Rainbow	43	10	71	26.1	2242	203	65.2	34.0	--
Legume Logic	Garrison	44	10	73	26.9	2284	199	66.3	33.3	--
Pulse USA	Mystique	44	17	75	28.2	2637	172	66.3	32.3	--
STI	SW Trapeze	40	16	74	29.0	2072	220	66.3	30.1	--
Great Northern Ag.	Salamanca	43	13	73	30.0	2443	186	65.7	27.9	--
JB Farms/Pulse USA	Vegas	43	15	72	30.2	3003	151	65.5	26.3	--

Continued on next page

2013 Field Pea Variety Trial—Continued

Brand	Variety	Days to Flower	Flower Duration	Days to Maturity	Protein	Seeds/ Pound	1000 Seed Weight	Test Weight	Seed Yield	Seed Yield 3-yr. Avg.
		DAP[1]	(days)	(days)	%		g	lb/bu	bu/a	bu/a
Green Cotyledon Types										
JB Farms/Pulse USA	Bluemoon	43	12	73	27.6	2408	189	66.3	33.6	46.1
Pulse USA	Majoret	44	14	74	28.2	2768	164	66.6	34.8	45.8
Nodricks Norsask Seeds	CDC Striker	41	13	72	26.8	2697	169	66.0	27.3	45.7
Pulse USA	Cruiser	43	17	74	27.4	2931	155	66.8	26.9	38.0
ProGene	Greenwood	41	14	74	25.3	2421	188	68.5	41.3	--
Pulse USA	Viper	39	14	73	28.6	2524	180	65.5	40.2	--
GNA/Pulse USA	SW Arcadia	42	13	72	26.9	2735	166	66.2	32.6	--
GNA/Pulse USA	K2	40	20	73	27.7	2820	161	66.5	29.5	--
Legume Matrix	Shamrock	48	13	76	29.2	2525	180	66.7	28.4	--
ProGene/Pulse USA	Aragorn	40	20	71	27.2	2776	164	65.8	27.8	--
Nodricks Norsask Seeds	CDC Raezer	44	12	72	24.9	2419	188	67.5	25.8	--
Mean		42	16	73	27.6	2516	209	66.6	34.5	--
CV %		1.8	8.8	2.4	2.8	3.8	3.9	0.6	18.1	--
LSD 0.05		1	2	2	1.1	111.4	10	0.6	7.3	--

[1] DAP = Days after planting

Planting Date: June 19
Planting Rate: 300,000 PLS/A
Harvest Date: October 2
Previous Crop: durum
Soil Type: Williams loam

Field Pea Variety Trial—Mohall **Cooperator: Dean Schoenberg**

Variety	Type	Test Weight	Grain Yield
		lbs/bu	bu/A
Agassiz	Yellow	64.7	19.2
DS Admiral	Yellow	62.4	31.4
Meadow	Yellow	63.0	21.8
Cruiser	Green	62.7	7.5
CDC Striker	Green	63.0	24.9
Majoret	Green	63.6	12.5
Trial Mean		63.2	19.6
C.V.%		0.8	17.6
LSD 10%		0.6	4.3

Planting Date: June 13
Planting Rate: 300,000 PLS/A
Harvest Date: October 10
Previous Crop: Winter wheat
Soil Type: Barnes loam
Note: Yields were adversly affected by late planting date and wet soil conditions.

Field Pea Variety Trial—Rugby **Cooperator: Dave Teigen**

Variety	Type	Plant Height	Test Weight	1000 KWT	Grain Yield
		inches	lb/bu	grams	bu/A
DS Admiral	Yellow	28	61.9	218	74.2
Meadow	Yellow	31	63.4	184	72.0
Agassiz	Yellow	29	62.5	210	65.4
Majoret	Green	26	62.7	188	70.5
CDC Striker	Green	26	62.2	197	69.2
Cruiser	Green	27	62.0	172	53.5
Trial Mean		28	62.4	195	67.5
C.V.%		9.3	0.8	1.1	5.4
LSD 10%		3	0.6	3	4.5

Planting Date: June 12
Planting Rate: 300,000 PLS/A
Harvest Date: September 30
Previous Crop: soybean
Soil Type: Gardena silt loam

Copper Fertilizer + Herbicide Applied to 4 leaf Spring Wheat at Minot, ND

Eric Eriksmoen, Research Agronomist

'Barlow' hard red spring wheat was seeded into no-till flax stubble on May 15. Treatments were applied on June 18 to 4 ½ leaf wheat with 74° F, 39% RH, sunny sky and S wind at 5 mph. Treatments were applied with a hand held CO_2 propelled boom delivering 10 gpa to 5 foot wide by 20 foot long plots. The soil is classified as a loam with a pH of 7.5, OM of 2.4% and copper level of 0.51 ppm. The trial was a randomized complete block design with four replications. Plots were evaluated for crop injury and weed control on July 3 and July 23. The trial was harvested on September 4.

			--------- July 3 --------			-------- July 23 --------			Crop	Grain	Test	Grain
	Treatment	Rate	Crop Inj	fxtl	bdlf*	Crop Inj	fxtl	bdlf*	ht	protein	weight	yield
		oz/A	%	%	%	%	%	%	cm	%	lbs/bu	bu/A
1	Huskie Complete	17.3	0	52	93	0	56	91	76	15.2	64.1	56.6
2	Huskie Complete + LPI-6405 + LI 700	17.3 + 32 + 16/100gal	0	71	96	0	85	98	79	15.3	63.1	59.1
3	Huskie Complete + LPI-6450 + LI 700	17.3 + 32 + 16/100gal	0	80	98	0	90	98	74	15.2	63.0	60.6
4	Huskie Complete + LPI-6404 + LI 700	17.3 + 32 + 16/100gal	0	86	97	0	78	94	77	15.4	63.4	60.0
5	Huskie Complete + N-Pact Cu + LI 700	17.3 + 128 + 16/100gal	0	81	98	0	86	97	78	15.2	63.3	59.7
	C.V. %		0	19	4	0	22	3	5	1.5	0.7	4.9
	LSD 0.1		NS	18	4	NS	22	4	NS	NS	0.5	3.6

* bdlf = RR pigweed, common lambsquarter and common mallow mix.
NS = no statistical difference between treatments.

Summary

Crop injury was not observed on any treatment during the growing season. Season long broadleaf weed control was very good for all treatments with no obvious antagonistic interactions with copper products. All copper product treatments tended to enhance both broadleaf weed and foxtail control. Treatments had no effect on grain protein or plant height. Minimal but significant effects were noted on some of the treatments for test weight and grain yield.

Hard Red Spring Wheat Scab Fungicidal Trial

Venkat R Chapara, Area Extension Specialist/Crop Protection

The objective of this study was to evaluate the efficacy of the commercially available fungicides to manage wheat scab caused by *Fusarium graminearum*

Location: NCREC, Minot, ND
Crop Variety: Spring Wheat "Barlow"
Planting date: 5/17/2013
Seeding Rate: 90lbs/ac
Herbicides:Application Date:6/19/13
Bromoxynyl@12oz/ac, Starane@6oz/ac @ axial XL 16 oz/ac

Crop stage at fungicide application: Feeks 10.5.1 (7/11/13) Except Aproach and aproach Prima, were applied at Feeks 9 stage.

Application Equipment Hand held co2 sprayer
Application Volume 10GPA
Nozzle size: XR Teejet 8001v8@ 40PSI
GPS Coordinates for test site N48.16795 W101.30897
Plot Size: 10*30ft
4 Replications (Randomized complete block design)
Harvest Date: 9/6/2013

Treatment	Rate (Fl Oz)/ac	[1]Scab Incidence%	[2]Scab Severity%	Yield(Bu/ac)
Non-treated Check	N/A	22.1a	29.8a	53.8a
Prosaro	6.5	1.9c	18.1a	56.3a
Aproach	6	13ab	7.1b	57.3a
Aproach Prima	5	7b	5b	60a
QuiltXcel	10.5	8.6ab	6b	56a
Priaxor	4	8.7ab	7.1b	54a
Stratego YLD	4	7.4b	7.9b	56.3a
LSD(0.05)		1.949	1.86	6.39
CV		20.47	17.99	7.66

[1]Scab Incidence: No of wheat heads infected with scab out of all heads evaluated (i.e. diseased and non-diseased)

[2]Scab Severity: Average surface area affected across all heads evaluated (i.e. diseased and non-diseased)

Means with in the same column followed by the same letter are not significantly different (P=0.05, Student-Newman-Keuls procedure)

Foxtail barley control with Pre-Pare and Everest 2.0.

The objective of the study was to evaluate preplant and postemergence herbicides for foxtail barley control. Preplant treatments were applied May 17 to 3- to 5-inch foxtail barley (3 per ft^2). Spring wheat was seeded May 29. Postemergence treatments were applied June 18 to 4-leaf wheat. All preplant treatments (except one) were applied with glyphosate at 11 fl oz. Preplant treatments provided only suppression of foxtail barley. We received over 4 inches of rain within three days after the preplant application, which may have affected residual control. Only two postemergence treatments provided at least fair foxtail barley control. Everest applied POST at 1 oz either alone or tank mixed with tribenuron+thifensulfuron (1:1) provided 67 to 73% control of foxtail barley.

Table. Foxtail barley control with Pre-Pare and Everest 2.0. (1301)

			Injury		Weed Control				
			HRSW		Foxtail barley				
Treatment[ab]	Rate	Timing[c]	Jun-19	Jul-3	Jun-7	Jun-19	Jul-3	Jul-18	Aug-1
			--------%-------		----------%----------				
Untreated			0	0	0	0	0	0	0
Pre-Pare + NIS	0.3 oz + 0.25%	PP	4	0	27	10	10	3	3
Gly	11 oz	PP	0	0	85	71	45	42	35
Gly + Pre-Pare	11 oz + 0.3 oz	PP	6	0	83	71	45	42	37
Gly + Olympus	11 oz + 0.2 oz	PP	11	0	89	85	62	55	45
Gly + Pre-Pare/ Everest 2.0 + BB	11 oz + 0.3 oz / 0.5 oz + 1%	PP/POST	8	0	85	70	68	60	57
Gly / Everest 2.0 + BB	11 oz / 1 oz + 1%	PP/POST	0	0	84	71	69	66	67
Gly / Everest 2.0 + ARY547 + BB	11 oz / 1 oz+ 0.4 oz + 1%	PP/POST	0	0	85	70	74	69	73
Gly / GoldSky + BB	11 oz / 1 pt + 1%	PP/POST	0	0	84	71	65	52	52
Gly / Huskie Complete	11 oz / 13.7 oz	PP/POST	0	0	85	69	72	62	63
LSD (0.05)			0.1	NS	2.2	5.2	4.8	11.0	10.0
CV			23.2	0.0	1.8	5.2	5.5	14.2	13.5

[a] *Gly=Glyphosate; BB=Basic Blend (Quad 7); ARY547=Triben:Thifen 1:1; PP=Preplant*

[b] *All treatments applied with AMS (2.94%)*

[c] *POST applied at 4-leaf wheat*

Alternatives to glyphosate for preemergence weed control.

The objective of the study was to evaluate possible alternatives to glyphosate for kochia control. Glyphosate-resistant kochia is known to exist in the state. In this study, we evaluated other herbicides that might be used in place of glyphosate for kochia control. No crop was planted in this field due to wet soil conditions. All treatments were applied June 18 (kochia 1.5-4 inch, lambsquarters 3-5 inch, seepweed 1-4 inch, prickly lettuce 4-6 inch). Authority MTZ and Express did not control kochia 10 days after treatment. Only Gramoxone, Spartan Charge, and Spartan + Sharpen provided excellent kochia control at the Aug 6 evaluation (7 weeks after treatment). Glyphosate, Sharpen, Liberty, and Authority MTZ provided significantly less kochia control on Aug 6. This lower level of control may be due in part to a later flush, but we believe that few new plants emerged after application. Gramoxone has no residual activity, yet provided 92% control on Aug 6. Most treatments provided excellent control of lambsquarters, seepweed, and prickly lettuce. The only exceptions were Authority MTZ and Spartan Charge, which provided poor prickly lettuce control.

Table. Alternatives to glyphosate for preemergence weed control. (1307)

		Weed Control								
		Kochia			Lambsquarters		Seepweed		Prickly lettuce	
Treatment[a]	Rate	Jun-28	Jul-16	Aug-6	Jun-28	Jul-16	Jun-28	Jul-16	Jun-28	Jul-16
		----------%----------			----------%----------		----------%----------		----------%----------	
Untreated		0	0	0	0	0	0	0	0	0
Glyphosate[b]	22 oz	90	83	57	96	100	89	93	93	94
Sharpen[bc]	1 oz	88	90	75	100	100	100	100	100	100
Gramoxone[d]	2 pt	99	97	92	100	100	100	100	100	100
Liberty[e]	29 oz	90	88	67	100	100	100	100	98	100
Express[d]	0.33 oz	20	17	3	83	99	91	98	89	99
Authority MTZ	11 oz	60	69	55	98	100	99	100	27	57
Spartan Charge[c]	5 oz	98	97	97	100	100	100	100	50	65
Spartan + Sharpen[bc]	4 oz + 1 oz	99	99	98	100	100	100	100	100	100
LSD (0.05)		8.8	9.3	14.0	2.0	0.3	6.1	6.9	7.1	5.4
CV		8.4	9.1	15.9	1.3	0.2	4.1	4.5	5.6	4.4

[a] *All treatments applied June 18 (no crop-prevent plant)*

[b] *Applied with AMS (2.5%)*

[c] *Applied with MSO (1%)*

[d] *Applied with NIS (0.25%)*

[e] *Applied with AMS (3 lb/A)*

Foxtail barley control with Huskie Complete and Olympus (spring applied).

The objective of the study was to evaluate preplant and postemergence herbicides for foxtail barley control. Preplant treatments were applied May 17 to 3- to 5-inch foxtail barley (1 per ft^2). Spring wheat was seeded May 29. Postemergence treatments were applied June 18 to 4-leaf wheat. All preplant treatments were applied with glyphosate at 16 fl oz. None of the treatments caused significant crop injury. We received over 4 inches of rain within three days after the preplant application, which may have affected residual control. Treatments containing Huskie Complete provided about 70% foxtail barley control. However, POST tank mixes containing Olympus or Rimfire Max provided 85-87% foxtail barley control. Olympus and Rimfire Max both contain propoxycarbazone, which is likely the component enhancing the foxtail barley control. Olympus applied preplant did not enhance control as it did POST.

Table. Foxtail barley control with Huskie Complete and Olympus (spring applied). (1315)

			Foxtail barley control			
Treatment[ab]	Rate	Timing[a]	Jun-7	Jun-19	Jul-9	Aug-1
			----------%----------			
Gly / Huskie[c]	16 oz / 11 oz	PP / POST	85	77	57	35
Gly / HC	16 oz / 13.7 oz	PP / POST	85	78	78	71
Gly / HC[c]	16 oz / 13.7 oz	PP / POST	85	78	79	70
Gly / HC + Oly + AMS	16 oz / 13.7 oz +0.2 oz + 5 %	PP / POST	86	79	85	85
Gly + Oly / HC[c]	16 oz + 0.2 oz /13.7 oz	PP / POST	86	81	79	72
Gly + Oly / HC + Oly[c]	16 oz + 0.2 oz / 13.7 oz + 0.2 oz	PP / POST	87	81	86	86
Gly / RM + Huskie[b]	16 oz / 3 oz + 11 oz	PP / POST	86	80	83	85
Gly + Oly / RM + Huskie[b]	16 oz + 0.2 oz / 3 oz + 11 oz	PP / POST	86	81	85	87
Gly / Ever 2.0 + Huskie[e]	16 oz / 1 oz + 11 oz	PP / POST	85	78	70	64
Gly + PreP / Ever 2.0 + Huskie[e]	16 oz + 0.3 oz / 0.5 oz + 11 oz	PP / POST	81	74	66	56
LSD (0.05)			2.2	NS	4.9	5.2
CV			1.9	3.9	3.7	5.2

[a] *Gly= Roundup WeatherMax (16 fl oz) applied preplant (PP) with AMS (5%)*

[b] *HC=Huskie Complete; Ever 2.0=Everest 2.0; RM=Rimfire Max; RU=Roundup; PreP=Pre-Pare; Oly=Olympus*

[c] *Applied with AMS (1.47%)*

[d] *Applied with MSO (1.3 pt)*

[e] *Applied with NIS (0.25%)*

Yellow foxtail control with Rimfire Max, Huskie Complete, and Varro.

The objective of the study was to evaluate foxtail control with three grass herbicides (Rimfire Max, Huskie Complete, and Varro). Huskie Complete is a combination of Huskie (broadleaf herbicide) and Varro (grass herbicide). All treatments were applied June 24 to 4-leaf wheat and 1-4 leaf foxtail. None of the treatments caused crop injury. Rimfire Max tank mixed with Huskie provided poor yellow foxtail control, while Rimfire tank mixed with Affinity provided good yellow foxtail control (89%). Historically, we haven't seen this level of enhanced foxtail control with Rimfire + Affinity. Normally, we have seen only 5-15% higher control with this tank mix over Rimfire alone. Varro, Huskie Complete, and Wolverine provided excellent yellow foxtail control.

Table. Yellow foxtail control with Rimfire Max, Huskie Complete, and Varro. (1326)

		Injury		Weed Control	
		Wheat		Yellow foxtail	
Treatment[ab]	Rate	Jul-3	Jul-18	Jul-18	Aug-8
		-----%-------		-------%-------	
Untreated		0	0	0	0
RM + Huskie + BB	3 oz + 11 fl oz + 1%	1	0	50	42
RM + Huskie + HSOC	3 oz + 11 fl oz + 0.75 pt	0	0	33	47
RM + Affinity + Starane Ultra + BB	3 oz + 0.6 oz + 0.27 pt + 1%	0	0	65	89
Varro + Bison Advanced	6.85 fl oz + 0.8 pt	0	0	83	93
Varro + Huskie	6.85 fl oz + 11 fl oz	0	0	87	97
Huskie Complete + AMS	13.7 fl oz + 1.47%	0	0	82	97
Wolverine	27.4 fl oz	0	0	69	93
LSD (0.05)		0.7	NS	23.3	10.6
CV		132.3	0.0	22.6	8.6

[a] *All treatments applied at 4-leaf wheat*

[b] *RM=Rimfire Max; Affinity=Affinity TankMix; BB=Basic Blend (Quad 7)*

False chamomile control with fall- and spring-applied herbicides

The objective of the study was to evaluate false chamomile control with fall-applied residual herbicides compared to glyphosate applied fall and/or spring. Fall treatments were applied October 1, 2012 to 4- to 8-inch rosettes and 12- to 14-inch flowering plants (up to 4 per sq ft). Glyphosate was applied with all fall treatments at 22 fl oz. In the spring, glyphosate was applied over all treatments on May 29 when chamomile was emerging to 14-inches tall (up to 8 per sq ft). No other herbicides were applied in the spring.

Glyphosate applied alone in the fall or spring provided 60-68% chamomile control at the July 26 evaluation. Tank mixes including Lorox and Metribuzin increased control slightly (74-75%). Treatments containing Valor at 2 or 3 oz provided excellent long-term control (93-97%).

Table. False chamomile control with fall- and spring-applied herbicides. (1329)

			False Chamomile Control					
			Old growth[c]		New growth[c]		Overall	
Treatment[a]	Rate	Timing[b]	May-29	Jun-25	May-29	Jun-25	May-10	Jul-26
			---------%--------		---------%--------		---------%--------	
Untreated / Gly	22 oz	Fall / Spring	0	80	0	64	0	60
Gly / Gly	22 oz / 22 oz	Fall / Spring	99	100	0	63	96	63
Gly + Lorox / Gly	22 oz + 2 lb / 22 oz	Fall / Spring	95	100	84	84	73	75
Gly + Lorox + Metri / Gly	22 oz + 1.25 lb + 3 oz / 22 oz	Fall / Spring	94	100	86	84	63	74
Gly + Lorox + Valor / Gly	22 oz + 1.25 lb + 2 oz / 22 oz	Fall / Spring	98	100	98	100	92	93
Gly + Lorox + Pursuit / Gly	22 oz + 1.25 lb + 2 oz / 22 oz	Fall / Spring	97	100	95	87	80	66
Gly + Valor / Gly	22 oz + 2 oz / 22 oz	Fall / Spring	98	100	93	100	95	95
Gly + Valor / Gly	22 oz + 3 oz / 22 oz	Fall / Spring	99	100	98	100	97	97
Gly	22 oz	Spring	0	77	0	67	0	68
Gly + Olympus / Gly	28.44 oz + 0.2 oz / 22 oz	Fall / Spring	99	100	33	64	97	72
LSD (0.05)			4.2	3.2	7.9	4.4	8.9	11.4
CV			4.2	2.8	9.3	3.2	7.6	10.3

[a] *Gly=Glyphosate; Metri=Metribuzin*

[b] *Fall treatments applied Oct 1, 2012. Spring glyphosate applied May 29, 2013.*

[c] *Old growth=plants emerged in the fall; New growth=plants emerged in the spring*

Foxtail barley control with Roundup, Olympus, Rimfire Max, and Huskie Complete tank mixes applied in the fall or spring.

The objective of the study was to evaluate fall- or spring-applied herbicides for foxtail barley control. Fall treatments were applied October 1, 2012 to 3- to 6-inch foxtail barley (up to 3 per sq ft). A blanket glyphosate application was made over the entire study on May 29, 2013. Postemergence treatments were applied June 27, 2013.

Glyphosate and Olympus applied in the fall provided good foxtail barley suppression (65-81%) at the June 1 evaluation. Fall treatments followed by spring treatments containing propoxycarbazone (Rimfire Max and Olympus) provided excellent foxtail barley control (99%).

Table. Foxtail barley control with Roundup, Olympus, and Huskie Complete tank mixes applied in the fall or spring. (1332)

			Weed Control		
			Foxtail barley		
Treatment[a]	Rate	Timing	Jun-1	Jul-10	Aug-1
			----------%----------		
Gly / Huskie[b]	28 oz / 13.5 oz	Fall/POST	68	83	68
Gly + Olympus / Huskie Complete[b]	28 oz + 0.2 oz / 13.7 oz	Fall/POST	66	97	89
Gly + Olympus / Rimfire Max + Huskie[c]	28 oz + 0.2 oz / 3 oz + 13.5 oz	Fall/POST	73	99	99
Gly + Olympus / Huskie Complete + Olympus[b]	28 oz + 0.2 oz / 13.7 oz + 0.2 oz	Fall/POST	76	99	99
Gly + Olympus / Huskie Complete[b]	28 oz + 0.4 oz / 13.7 oz	Fall/POST	76	99	96
Gly + Olympus / Rimfire Max + Huskie[c]	28 oz + 0.4 oz / 3 oz + 13.5 oz	Fall/POST	81	99	99
Gly + Olympus / Huskie Complete + Olympus[b]	28 oz + 0.4 oz / 13.7 oz + 0.2 oz	Fall/POST	81	99	99
Gly / Huskie Complete + AMS	28 oz / 13.7 oz + 5%	Fall/POST	70	96	87
Gly / Rimfire Max + Huskie[c]	28 oz / 3 oz + 13.5 oz	Fall/POST	65	97	99
Gly / Huskie Complete + Olympus[b]	28 oz / 13.7 oz + 0.2 oz	Fall/POST	65	99	99
LSD (0.05)			7.6	7.2	7.4
CV			7.3	5.1	5.5

[a] *Gly=Glyphosate applied with AMS (5.0%)*

[b] *Applied with AMS (1.47%)*

[c] *Applied with MSO (1.3 pt)*

ACCase-resistant wild oat control with Rimfire Max, Huskie Complete, and Varro.

The objective of this study was to evaluate Group 1-resistant wild oat control with Group 2 herbicides (Rimfire Max, Huskie Complete, and Varro). All treatments were applied postemergence on June 11 to 3- to 4-leaf wheat, 3-leaf wild oat, and 1- to 2-inch green foxtail. All three Group 2 herbicides provided good to excellent wild oat control. Wild oat control was slightly less Varro was tank mixed with Bison Advanced compared to Huskie. Wolverine provided very poor wild oat control because this wild oat population is resistant to some Group 1 herbicides such as Puma and Wolverine. Rimfire Max provided poor green foxtail control while Varro and Huskie Complete provided fair control.

Table. ACCase-resistant wild oat control with Rimfire Max, Huskie Complete, and Varro (1333)

		Injury			Weed Control[c]			
		HRSW			Wild oat			Grft
Treatment[ab]	Rate	Jun-21	Jul-05	Jul-31	Jun-21	Jul-05	Jul-31	Jul-31
		----------%----------			----------%----------			---%---
Untreated		0	0	0	0	0	0	0
RM + Huskie + BB	3 oz + 11 oz + 1%	0	0	0	86	96	99	35
RM + Huskie + HSOC	3 oz + 11 oz + 0.75 pt	0	0	0	82	94	93	38
RM + Affinity TM + SU + BB	3 oz + 0.60 oz + 0.27 pt + 1%	0	0	0	84	95	98	37
Varro + Bison Advanced	6.85 oz + 0.8 pt	0	0	0	81	89	88	65
Varro + Huskie	6.85 oz + 11 oz	0	0	0	81	90	93	63
Huskie Complete + AMS	13.7 oz + 1.47%	0	0	0	87	93	97	65
Wolverine	27.4 oz	0	0	0	23	20	18	--
LSD (0.05)		NS	NS	NS	16.3	11.8	11.9	9.0
CV		0	0	0	14.2	9.3	9.2	13.4

[a] *All treatments applied 3-4 leaf wheat*

[b] *RM=Rimfire Max; SU=Starane Ultra; BB=Basic Blend (Quad 7)*

[c] *Grft=Green foxtail*

Kochia control in soybean with soil-applied herbicides.

The objective of the study was to evaluate kochia control with soil-applied herbicides used in soybean. No crop was planted in this study due to excessively wet soil conditions. Herbicide treatments were applied June 18 when kochia was 2- to 7-inches tall with 3-10 plants per sq ft. All treatments were applied with glyphosate at 22 fl oz. At 4 weeks after treatment (WAT), all treatments provided ≥92% kochia control. At 8 WAT, only treatments containing metribuzin (0.66 lb/A) or sulfentrazone (Sonic, Authority MTZ, Authority Assist) provided >90% kochia control. Note that the metribuzin rate is very high, especially for light soils with high pH and low organic matter.

Table. Kochia control in soybean with soil-applied herbicides. (1338)

		Weed Control		
		Kochia		
Treatment[ab]	Rate	Jun-29	Jul-16	Aug-15
		----------%----------		
Gly + Zidua	22 oz + 3 oz	98	96	74
Gly + Zidua + Sharpen	22 oz + 3 oz + 1 oz	96	93	73
Gly + Zidua + Verdict	22 oz + 3 oz + 5 oz	98	95	81
Gly + Zidua + Verdict + Metribuzin	22 oz + 3 oz + 5 oz + 0.66 lb	99	100	99
Gly + Zidua + Sharpen + Metribuzin	22 oz + 3 oz + 1 oz + 0.66 lb	99	100	99
Gly + Verdict	22 oz + 5 oz	97	94	73
Gly + Verdict + Metribuzin	22 oz + 5 oz + 0.66 lb	99	100	98
Gly + Anthem	22 oz + 9 oz	96	92	68
Gly + Fierce	22 oz + 4.5 oz	98	97	85
Gly + Sonic	22 oz + 4 oz	97	98	94
Gly + Authority MTZ	22 oz + 14 oz	97	98	97
Gly + Authority Assist	22 oz + 6 oz	98	99	95
Gly + Zidua + Pursuit + Sharpen	22 oz + 3 oz + 2 oz + 1 oz	97	93	75
Gly		97	94	68
LSD (0.05)		NS	4	10.7
CV		1.4	2.5	7.6

[a] *All treatments applied to 2-7" Kochia (no crop-prevent plant)*

[b] *Gly=Glyphosate (PowerMax)*

Weed control in corn.

The objective of this study was to evaluate general weed control in corn with various soil-applied and postemergence herbicides. The study was conducted under conventional tillage. Corn (Mycogen 2K154) was planted May 14 followed by preemergence (PRE) herbicide applications on May 15. One treatment consisted of a split application of glyphosate applied at V3 followed by V4 to V5. All other treatments consisted of a PRE followed by a POST application at V4 to V5.

All treatments provided excellent wild oat control. Only two treatments provided greater than 80% yellow foxtail control (Balance fb Gly + Atrazine and Zidua fb Gly + Atrazine). Only four treatments provided greater than 90% wild buckwheat control (Acet fb Liberty + Atrazine; Acet + Clarity fb Gly + Atrazine; Sharpen + Outlook fb Gly + Atrazine; and Acet fb Capreno + Atrazine). It is likely that a new weed flush emerged after the POST application, which contributed to the lower weed control.

Table. Weed control in corn. (1345)

			Weed Control								
			Wild oat			Yellow foxtail			Wild buckwheat		
Treatment[a]	Rate	Timing	Jul-2	Aug-1	Aug-22	Jul-2	Aug-1	Aug-22	Jul-2	Aug-1	Aug-22
			----------%----------			----------%----------			----------%----------		
Untreated			0	0	0	0	0	0	0	0	0
Gly[b] / Gly[b]	22 oz / 22 oz	V3 / V4-5	100	100	100	99	78	77	92	77	78
Acet / Liberty + Atr + AMS	1.75 pt / 22 oz + 0.375 lb ai + 8.82%	PRE / V4-5	96	95	95	96	64	64	99	91	90
Acet / Gly + Atr[b]	1.75 pt / 22 oz + 0.375 lb ai	PRE / V4-5	99	100	100	95	69	71	88	88	87
Balance Pro / Gly + Atr[b]	2.5 oz / 22 oz + 0.375 lb ai	PRE / V4-5	99	100	100	98	93	94	87	76	77
Acet / SF + Clarity + Atr[c]	1.75 pt / 0.75 oz + 4 oz + 0.375 lb ai	PRE / V4-5	95	100	100	89	70	70	96	82	83
Acet / Option + Status[c]	1.75 pt / 1.5 oz + 5 oz	PRE / V4-5	95	100	100	89	68	66	96	85	82
Acet + Clarity / Gly + Atr[b]	1.25 pt + 0.5 pt / 22 oz + 0.375 lb ai	PRE / V4-5	98	100	100	93	68	68	87	91	91
Zidua / Gly + Atr[b]	3 oz / 22 oz + 0.375 lb ai	PRE / V4-5	99	100	100	99	84	84	90	93	89
Sharpen + Outlook / Gly + Atr[b]	3 oz + 12.5 oz / 22 oz + 0.375 lb ai	PRE / V4-5	97	100	100	86	72	73	96	96	96
Acet / Armezon + Atr + MSO[b]	1.75 pt / 0.75 oz + 0.375 lb ai + 1%	PRE / V4-5	94	100	98	95	65	68	89	56	57
Acet / Capreno + Atr + MSO[b]	1.75 pt / 3 oz + 0.375 lb ai + 1%	PRE / V4-5	95	91	91	98	82	79	98	93	92
LSD (0.05)			3.8	4.6	4.9	6.7	11.8	12.1	6.1	14.2	15.4
CV			2.5	3.0	3.2	4.6	10.3	10.6	4.2	10.8	11.9

[a] *Gly=Glyphosate; Acet=Acetochlor; Atr=Atrazine; SF=Steadfast*

[b] *Applied with AMS (2.5%)*

[c] *Applied with MSO (1.5 pt) and UAN (2 qt)*

Board of Visitors

Benson County	Tom Gilbertson, Maddock	Pierce County	John Fjellanger, Rugby
	Eric Jorgenson, Leeds		Todd Lysne, Rugby
Bottineau County	Pete Artz, Bottineau	Renville County	Jason Engeberg, Kenmare
	Matt Lodoen, Westhope		Brady Witteman, Mohall
Burke County	Ryan Aufforth, Bowbells	Rolette County	James Mongeon, Rolette
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	Ray Schepp, Stanley		

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Donna Arnott, Administrative Assistant
Cynthia Cross, Administrative Secretary
Phil Koapke, Information Coordinator

Agronomy

Eric Eriksmoen, Research Agronomist
Joseph Effertz, Ag Research Technician
Thomas Stefaniak, Assistant Pulse Crop Breeder
James Tarasenko, Research Specialist

Foundation Seed Increase

Chad Anderson, Seed Production Specialist
Jon Henderson, Ag Research Technician
Lee Novak, Ag Research Technician

Weed Science

Brian Jenks, Weed Scientist
Tiffany Walter, Research Specialist
Gary Willoughby, Research Specialist

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Venkat Chapara, Area Extension Specialist/Crop Protection
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Lori Scharmer, Interim Extension Family Economics Specialist
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Ducks Unlimited

Jason Riopel, Field Agronomist

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Amanda Beck	Dana Piesik
Emily Beck	Justin Schroeder
Shanna Demers	Kaleah Syverson
MeLisa Eriksmoen	Kalissa Syverson
Heather Flaten	Allison Walter
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