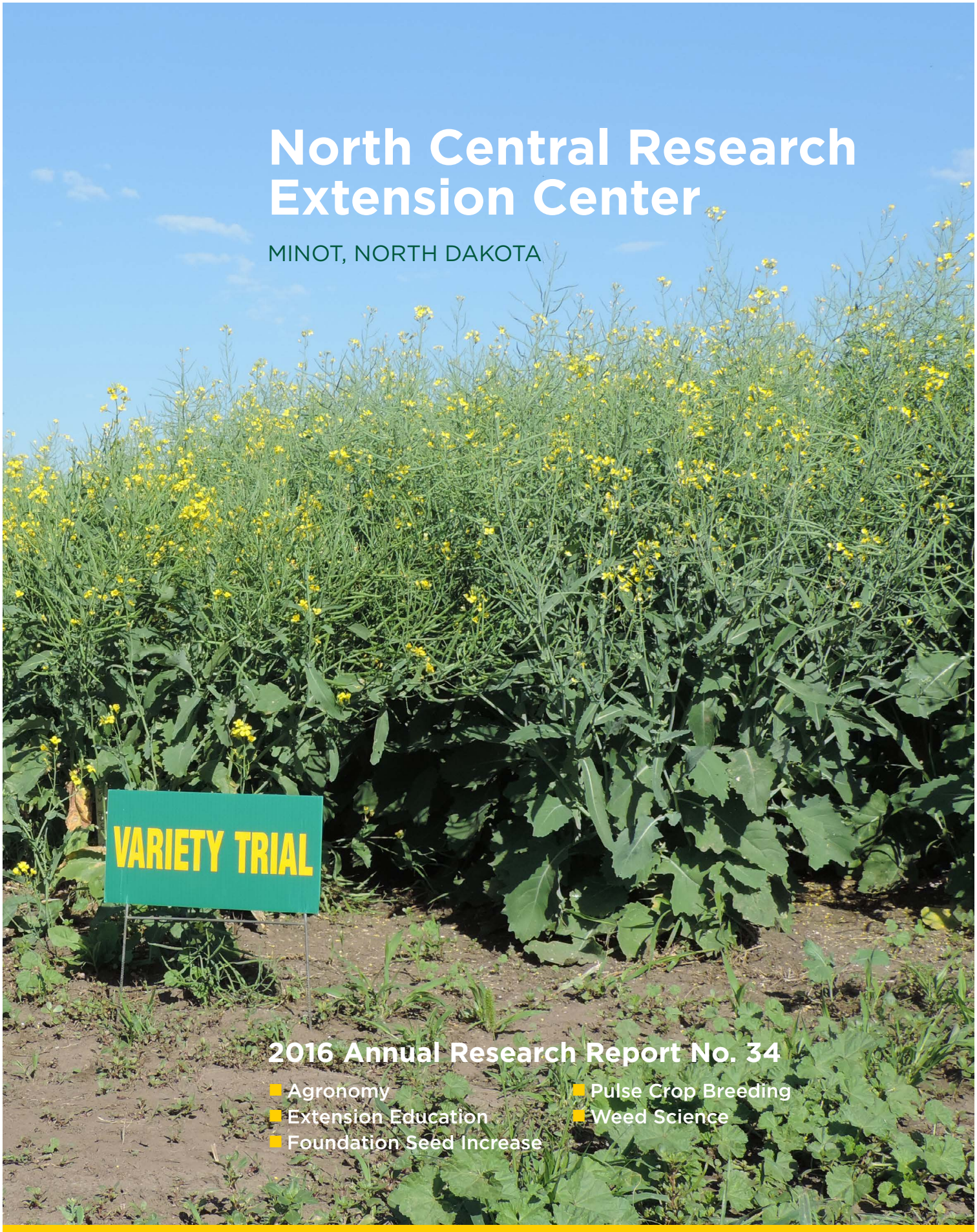


North Central Research Extension Center

MINOT, NORTH DAKOTA

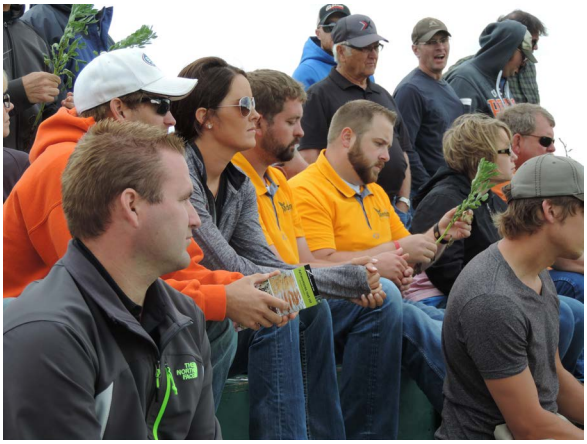
2016 Annual Research Report No. 34

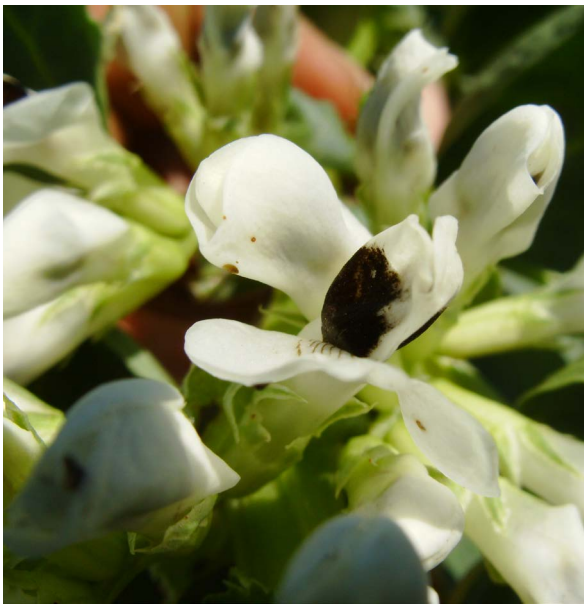
- Agronomy
- Extension Education
- Foundation Seed Increase
- Pulse Crop Breeding
- Weed Science

NDSU EXTENSION SERVICE

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION

Thank you, Jim Tarasenko, for 22 years of service at the North Central Research Extension Center.





North Central Research Extension Center

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Our goals at the North Central Research Extension Center (NCREC) 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 North Central Research Extension Center 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 Binstock Farm south 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.

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. In 2016, all crop production and variety trials were moved to a new permanent location directly west of the Research Center. Broadleaf crops were typically planted into small grain stubble and small grain crops were typically planted into soybean 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 "planted" prior to seeding or was applied in a mid-row band at seeding time. Monoammonium phosphate (11-52-0) was the primary source of phosphorous and was applied either directly in the seed row or in a mid-row 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 Bourgault coulter disc openers set at a 7 or 7 ½ -inch row spacing. Row crops were planted with a SRES small plot planter utilizing Great Plains no-till openers with Monosem singulation seed meters. 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.

The fall of 2015 was relatively moist, providing good conditions for winter wheat establishment. The winter of 2015/16 had modest snow cover and no prolonged periods of bitterly cold temperatures. Winter wheat fields for the most part had little winter kill. Warm temperatures in early March melted snow and removed soil frost. Small grain planting began in earnest in mid-April with few weather related interruptions. Spring temperatures were mild and May received little precipitation. There were reports of heavy flea beetle infestations in canola and wheat streak mosaic virus in spring wheat. Summer growing conditions were ideal for both cool and warm season crops, with timely rainfall and mild temperatures. Conditions for fusarium head blight were favorable and many durum growers had unmarketable crops despite timely fungicide applications. Most spring wheat farmers were able to stay ahead of this disease with a combination of genetic tolerance and timely fungicide applications. August was hot and dry, allowing small grain crops to mature and effectively dry down for harvest. These conditions did affect the soybean crop causing terminal pod abortion, but yields were still very good. Minot's fall remained frost free through October allowing row crops to fully mature. Row crop harvest was unimpeded through November.

Extension Education

The North Central Research Extension Center provides information and producer education through a number of Extension specialists located at the Center who work with county Extension agents and state specialists. Activities include consultations and presentations delivered through individual contacts and group meetings, workshops, schools, field days and tours on a variety of topics and issues associated with crop production, livestock production, and resource management. Producers and allied industry are welcomed to contact the NCREC at (701) 857-7682 to discuss issues or concerns with available Extension specialists.

Livestock: Low crop prices stimulated considerable interest in planting annual feed and forage crops including: corn for silage, small grains for hay, and cover crop mixtures for grazing. Limited experience for many, brought about inquiries and field tours on planting, harvesting and feeding. Another wet start to haying and the salvaging of hailed crops during unfavorable weather led to educational opportunities on haylage, baleage and haying technologies and techniques. The biggest challenge to cattlemen came with the summer and fall collapse of calf prices when expectations were for a year similar to last. Considerable interest in feeding calves to add weight and value was met with a state wide series of producer meetings on economics and feeding; along with popular press articles on the subject and web posted information and videos. Coinciding with the fall's interest in feeding was the prevalence of Vomitoxin in scab infested wheat and durum that is being rejected and severely discounted by grain buyers. This has created an opportunity for information and meeting presentations on its feed value and facilitation of movement to cattle feeders and feedlots. With considerable transition the extension positions in the state and area from retirements, I've had the pleasure of providing training and mentoring to new staff in regards to feed and water testing, ration formulation and cattle budgeting and economics on one to one basis, in-service workshops and county projects.

Crop Protection**:** Efforts centered on crop protection continued to focus on pest management among area crops. During the 2016 season, extension and research activities were focused on pest management and prevention. Research related activities investigated control of wireworm and flea beetle. Pest and disease pressure was monitored throughout North Dakota and reported with weekly contributed updates released through the publication of NDSU's Crop & Pest Report. Educational activities included producer attended meetings, summer field tours, and agent trainings. Field tours were well attended and focused on a variety of crop protection/cropping system topics. Youth education continues to serve as an on-going mission in the area with several presentations centered on area entomology and their relation to crop protection and cropping systems.

Cropping Systems: The responsibilities of this position are to provide leadership in the area of crop production for the region. This position provides crop and pest management and soil science information to county Extension agents, producers, and industry personnel. Educational efforts include field tours, meetings, news releases, and videos. They communicate with other Extension specialists to provide demonstration and applied research efforts to address the needs of clientele. This position also is responsible for collaborating with agencies, industry, crop organizations, and crop commodity groups to teach and provide cropping systems programming.

Soil Health: Activities at the NCREC continued to focus on soil salinity, fertility, and cover crops. County based workshops highlighted management of saline areas. Two saline management studies were planted and an evaluation of salinity reduction from drain tile was initiated this year. A five year cover crop project involving 39 farmers across North Dakota that evaluates late season cover crops is in its second year. Year one of a three-year soybean fertility recommendation project was completed. A shrub salinity tolerance study started this year. Several days were spent training county agents one-on-one regarding various soil science topics. A pipeline reclamation study is ongoing. Soil characteristics, soil amendments, and crop rotations are being monitored to determine effective pipeline reclamation practices.

Foundation Seed Increase

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 crops that are grown in the area.
The different crops and varieties that will be available for the 2016-2017 cropping season:
Barley – ND Genesis
Durum –Carpio, Joppa
Flax – Gold ND (DSS), Omega, York
HRSW - Barlow, Bolles, Elgin-ND, Glenn, Surpass
HRWW – Darrell, Decade, Ideal
Oat – Jury (DSS)
Soybean – Ashtabula, Cavalier, ND Henson

Pulse Crop Breeding
Pulse crop breeding research is conducted for the improvement of chickpea, dry pea, and lentil. The primary focus is on increased yield within the quality standards of the various market classes within these three species. Experiments are ongoing which will result in released varieties that have high yield and quality in the presence of several stress factors. The pulse program's first release, named ND Eagle, is a small green lentil. ND Eagle was approved for release in 2016. Some of these stresses are diseases such as Ascochyta blight in chickpea; powdery mildew, the virus complex, *Fusarium* species in pea; and Sclerotinia and Stemphylium blights in lentil. Trials are being conducted that evaluate or generate experimental lines at every step in the breeding cycle from the hybridization of selected parents, to the evaluation of advanced breeding lines.

Weed Science
Weed control studies are conducted in small grains, canola, carinata, fababean, sunflower, safflower, flax, dry bean, pea, lentil, chickpea, mustard, corn, and soybean. We are evaluating new herbicides/adjuvants or different uses of existing products in various crops. Other experiments involve evaluation of the impact of different cultural practices such as crop rotation and conventional tillage vs. no-till on crop yield, seed quality, weed control, and economic feasibility. We also conduct IR-4 residue trials to collect data for registration of pest control products in minor crops. We have studies that target specific weeds such as Canada thistle, wild oat, foxtails, biennial wormwood, kochia, common mallow, common milkweed, and others.

Interpreting Statistical Analysis

Field research involves the testing of one or more variables such as crop varieties, fertilizers, weed control methods, etc. Field testing of such variables are conducted in order to determine which variety, fertilizer, herbicide, etc. is best for the particular area of production. The main objectives of crop production research are to determine the best means of producing a crop and how to maximize yield and economic return from farming.

Agricultural researchers use statistics as a tool to help differentiate production variables so that real and meaningful conclusions can be drawn from a relatively large amount of data gathered from relatively small research plots.

One of these tools is the Coefficient of Variability (C.V.). This statistic gives an indication of the amount of variation in an experimental trial and is a measure of the precision or effectiveness of the trial and the procedures used in conducting it. Attempts are made to control human error and some environmental conditions such as soil variability by replicating the variable in question. For example, there were three plots (replications) of the variety Elgin ND grown in the Minot HRSW variety trial. The plots are mixed and dispersed throughout the trial to help eliminate differences that might be a result of soil, chaff rows or other variables. The numbers that you see in the tables are an average of all three replications. The C.V. for yield in the 2016 Minot HRSW variety trial was 10.5 meaning that there was a 10.5 percent average variation between high and low yields among replications. In summation, a trial with a C.V. of 6 is more precise and more can be concluded from it than a trial with a C.V. of 16.

Another important statistical tool is the Least Significant Difference or LSD. If the yield of variety A exceeds variety B by more than the LSD value, you can conclude that under like environmental conditions, variety A is expected to significantly out-yield variety B. The LSD value allows you to separate varieties, fertilizers, herbicides, or any other variable and determine whether or not they are actually different. The LSD .05 or 5% value is always larger and gives you more precision than the LSD .1 or 10% value. Little confidence can be placed in a variety or treatment unless the results differ by more than the LSD value.

Weather Conditions—Minot

	2016 Precipitation	110 Year Long Term Average	Departure from Average	2016 Average Degrees	110 Year Long Term Average	Departure from Average
	----------Inches----------			----------Fahrenheit----------		
January	0.6	0.6	0.0	13.9	7.4	+6.5
February	0.5	0.5	0.0	25.3	12.1	+13.2
March	0.7	0.7	0.0	34.5	24.4	+10.1
April	3.1	1.5	+1.6	40.4	40.7	-0.3
May	1.9	2.4	-0.5	57.7	53.3	+4.4
June	2.6	3.3	-0.7	65.4	62.7	+2.7
July	3.3	2.3	+1.0	68.5	68.4	+0.1
August	1.3	2.0	-0.7	68.3	66.7	+1.6
September	3.1	1.5	+1.6	57.6	56.2	+1.4
October	1.3	1.1	+0.2	45.0	43.9	+1.1
November	2.1	0.7	+1.4	38.9	27.3	+11.6
December	*	0.6	*	*	13.4	*
Total	20.5	17.2	+4.0	46.9	39.7	+4.8

**Data not available at time of printing.*

	2016	Long Term
Coldest Date	Jan 16	Feb 15, 1936
Coldest Temp	-21	-49
Days ≤ 0°	13	39
Days ≥ 90°	7	12
Highest Date	Jul 20	July 11, 1936
Highest Temp	94	109
Last Spring Frost	May 13	May 19
First Fall Frost	Oct 6	Sep 18
Frost Free Days	146	122
GDD for Corn (May 20-Oct 20)	2078	1994
GDD for Wheat (May 2-Aug 12)	3282	4047
GDD for Sunflower (Jun 6-Nov 4)	2682	2764

Hard Red Spring Wheat Variety Descriptions

Variety	Agent or Origin[1]	Year Rlsd	Height (in)	Straw Strgth	Days to Head[3]	Reaction to Disease[4] Stem Rust[5]	Leaf Rust	Stripe Rust	Tan Spot	Bact. Leaf	Head Scab
Barlow	ND	2009	35	6	62	R	MS	M	MS	MS/S	M
Bolles	MN	2015	32	4	66	R/MR	MR	MR	MR	S	M
Boost	**SD**	**2016**	**30**	**5**	**64**	**NA**	**NA**	**NA**	**NA**	**NA**	**MR**
Brennan	AgriPro	2009	30	4	62	R	MR	M	MS	S	MS
Duclair[6]	MT	2011	31	4	65	R	MR	NA	S	S	MS
Egan	MT	2014	35	NA	65	NA	NA	NA	NA	NA	NA
Elgin-ND	ND	2012	36	5	65	R	MS	M	MS	MS/S	M
Faller	ND	2007	35	5	65	R	S	S	MS	MS	M
Focus	SD	2015	35	5	60	R	MR/MS	MS	S	MS/S	MR
Forefront	SD	2012	37	5	61	R/MR	MR	MS	S	S	MR
Glenn	ND	2005	37	4	61	R	MS	M	MS	M/MS	MR
HRS 3361	Croplan	2013	33	3	65	NA	MR	MS	NA	NA	M
HRS 3378	Croplan	2013	32	4	64	NA	MR	MS	NA	NA	M
HRS 3419	Croplan	2014	32	2	68	NA	MR	R	NA	NA	MR
HRS 3504	Croplan	2015	31	2	67	NA	NA	NA	NA	NA	NA
HRS 3530	Croplan	2015	36	4	68	NA	MS	S	NA	NA	NA
HRS3616	**Croplan**	**2016**	**32**	**4**	**64**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Jenna	AgriPro	2009	32	4	66	R	MR	M	M	M/MS	M
LCS Albany	Limagrain	2008	32	5	67	R	MR	MS	R	MS	M
LCS Anchor	**Limagrain**	**2016**	**31**	**3**	**64**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
LCS Breakaway	Limagrain	2011	32	5	63	R	R	MS	MR	MS	M
LCS Iguacu	Limagrain	2014	33	3	66	R	MS	MS	R	MS/S	M
LCS Nitro	Limagrain	2015	32	4	65	R/MR	R	MR	R	M	M
LCS Powerplay	Limagrain	2011	33	5	65	R	MS	M	S	MS	M
LCS Prime	Limagrain	2015	33	4	61	NA	MS	NA	NA	NA	MR
LCS Pro	Limagrain	2015	32	5	66	R	MS	NA	S	S	M
Linkert	MN	2013	31	2	63	R	MR	R	MR	MS/S	M
Mott[6]	ND	2009	36	3	66	R	MS	MS	MS	S	MS
MS Chevelle	Meridian	2014	30	5	63	R	MR	MR	MS	MS	M
MS Stingray	Meridian	2013	35	3	67	R	MS	S	R	M	MR
ND901CLPLUS[7]	ND	2010	36	4	60	MR	MR/MS	NA	NA	NA	M
Prestige	Pulse-USA	2015	31	3	62	NA	MS	NA	NA	NA	NA
Prevail	SD	2014	31	4	64	R/MR/MS	MR	MR	MR	M/MS	M
Prosper	ND	2011	35	5	65	R	MS	S	MS	MS/S	M
RB07	MN	2007	32	5	62	R	MS	NA	MR	S	MR
Redstone	Pulse-USA	2014	32	3	67	NA	R	NA	NA	NA	NA
Rollag	MN	2011	32	3	63	R	MR/MS	R	R	M/MS	MR
Shelly	**MN**	**2016**	**34**	**5**	**65**	**NA**	**MR/MS**	**NA**	**NA**	**NA**	**M**
Surpass	**SD**	**2016**	**31**	**5**	**59**	**NA**	**MR/MS**	**NA**	**NA**	**NA**	**MR**
SY Ingmar	SA	2014	31	4	64	R	MR	MS	S	S	M
SY Rowyn	SA	2013	31	4	62	R	MR	M	R	M/MS	M
SY Soren	SA	2011	30	4	63	R	MR	MS	R	S	M
SY Tyra[6]	SA	2011	31	5	62	R	R	R	MS	S	S
SY Valda	SA	2015	31	4	64	R	R	MS	MS	S	MR
SY605CL[7]	SA	2009	34	7	62	R/MR	MR/MS	NA	MS	NA	S
TCG-Cornerstone	CG	2015	31	4	64	NA	MR/MS	NA	NA	NA	MS
TCG-Spitfire	CG	2015	36	4	66	NA	MS	NA	NA	NA	MS
TCG-Wildfire	CG	2015	37	5	64	NA	MS	NA	NA	NA	MS
Velva	ND	2011	35	4	63	R	MS	MS	R	M/MS	MS
WB9312	**WestBred**	**2016**	**30**	**4**	**63**	**NA**	**MR**	**NA**	**NA**	**NA**	**NA**
WB9507	WestBred	2013	32	5	61	R/MR	MR	S	MR	S	MR
WB9653	WestBred	2015	31	4	65	R/MR	MR	S	MS	S	M
WB-Mayville	WestBred	2011	30	4	63	R	R	MS	MS	S	S

[1] Refers to agent or developer: CG = 21st Century Genetics, MN = University of Minnesota, MT = Montana State University, ND = North Dakota State University, SA = Syngenta/AgriPro, 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.

[4] R = resistant, MR = moderately resistant, M = intermediate, MS = moderately susceptible, NA = Not adequately tested, S = susceptible.

[5] Fargo stem rust nursery inoculated with Puccinia graminis f.sp. Tritici races TPMK, TMLK, RTQQ, QFCQ and QTHJ.

[6] Solid stemmed or semisolid stem, imparting resistance to sawfly.

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

Source: NDSU Extension Bulletin A574-16

Hard Red Spring Wheat Variety Trial at Minot

Variety	Days to Head	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2014	2015	2016	---- Average ---- 2 year	3 year
	DAP[1]	inches	0-9[2]	lbs/bu	%	----------bu/A----------				
MS Stingray	60	33	0	55.5	12.2	75.1	84.9	99.1	92.0	86.4
LCS Nitro	56	31	0	60.4	13.3	64.6	83.3	109.1	96.2	85.7
Prosper	56	34	1	60.8	14.2	74.7	78.8	93.8	86.3	82.4
Faller	56	33	1	60.1	13.8	76.4	82.4	84.2	83.3	81.0
SY Ingmar	55	30	0	61.1	14.4	68.1	81.3	84.6	83.0	78.0
HRS3419	59	31	0	59.5	13.3	67.7	82.2	83.8	83.0	77.9
SY Rowyn	53	29	0	61.1	14.3	74.6	80.3	70.5	75.4	75.1
Duclair	54	33	2	59.6	14.6	66.6	72.5	84.4	78.4	74.5
WB9507	54	33	1	59.0	15.0	73.4	74.0	73.3	73.6	73.6
MS Chevelle	52	29	1	61.2	13.4	65.0	68.8	86.7	77.7	73.5
LCS Breakaway	52	31	1	61.9	15.0	63.1	70.2	86.9	78.5	73.4
RB07	52	32	1	61.1	15.0	61.1	73.5	85.4	79.4	73.3
Rollag	53	28	0	61.2	15.2	63.2	81.8	74.6	78.2	73.2
HRS3361	54	31	0	60.1	14.4	56.6	70.6	90.2	80.4	72.5
Elgin ND	54	37	1	60.6	14.9	62.3	72.5	80.0	76.2	71.6
Prevail	52	31	0	60.2	13.9	74.1	76.5	64.2	70.3	71.6
LCS Pro	53	36	1	61.6	14.9	64.2	69.1	81.2	75.2	71.5
LCS Iguacu	56	31	0	60.5	13.7	60.0	78.6	75.4	77.0	71.3
SY 605CL	52	33	1	62.0	14.7	60.4	78.3	73.3	75.8	70.7
Velva	53	34	0	59.1	14.4	66.2	65.7	80.0	72.9	70.6
Linkert	53	28	0	60.8	15.4	61.1	68.6	77.5	73.1	69.1
Mott	59	35	0	59.5	14.7	60.6	78.0	66.9	72.4	68.5
SY Soren	54	29	0	61.4	14.8	62.3	74.1	68.6	71.3	68.3
ND901CL+	53	34	0	60.7	16.6	59.9	74.7	69.9	72.3	68.2
Bolles	57	33	0	60.9	15.4	65.4	68.6	70.2	69.4	68.1
WB Mayville	52	27	0	59.6	14.9	66.6	66.2	69.7	67.9	67.5
Glenn	51	33	1	63.2	15.0	57.5	68.0	76.4	72.2	67.3
Barlow	53	34	1	61.9	14.8	62.2	68.5	63.6	66.1	64.8
SY Valda	54	29	0	57.4	14.0	--	88.3	77.1	82.7	--
HRS3530	54	33	1	60.5	14.2	--	90.2	73.5	81.9	--
Redstone	59	33	0	60.3	13.2	--	74.8	86.2	80.5	--
WB9653	55	28	0	60.5	14.0	--	73.0	87.5	80.2	--
HRS3504	55	29	0	60.1	14.5	--	74.1	83.6	78.8	--
LCS Prime	51	32	1	61.4	13.0	--	72.4	77.7	75.1	--
Surpass	52	32	0	61.0	13.9	--	78.9	68.6	73.8	--
Prestige	52	30	1	60.1	14.7	--	71.6	74.2	72.9	--
Shelly	58	28	0	61.0	14.0	--	74.3	71.2	72.8	--
Boost	55	33	0	59.6	15.2	--	69.1	66.0	67.5	--
TCG Spitfire	57	32	0	58.6	14.3	--	--	87.7	--	--
WB9312	53	28	0	61.3	12.8	--	--	77.3	--	--
HRS3616	55	31	0	60.9	15.4	--	--	75.6	--	--
SY Tyra	57	29	0	57.3	13.6	56.7	--	74.2	--	--
LCS Anchor	52	28	0	61.6	14.9	--	--	72.5	--	--
TCG Wildfire	55	33	0	59.8	14.9	--	--	71.5	--	--
Egan	56	33	1	57.9	15.8	--	--	71.0	--	--
Focus	53	34	1	60.6	14.3	60.7	--	65.3	--	--
TCG Cornerstone	55	30	0	61.5	14.8	.	--	60.7	--	--
Trial Mean	54	32	0	60.5	14.6	62.9	73.2	77.2	--	--
C.V.%	2.3	5.0	89	1.3	3.1	11.3	7.4	10.5	--	--
LSD 5%	2	3	1	1.3	0.7	10.0	7.5	13.1	--	--
LSD 10%	2	2	1	1.1	0.6	8.3	6.3	11.0	--	--

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

No-till planted on May 2 with a seeding rate of 1.25 million PLS/A and harvested on August 12.

Previous Crop: 2013 & 2015 = soybean, 2014 = flax.

Soil Type: Williams Loam

Hard Red Spring Wheat Variety Trial at Mohall

Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

					Grain Yield				
	Plant		Test					Average	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	3 Year
	inches	0-9*	lbs/bu	%	bu/A				
Faller	35	0	61.1	13.1	68.1	87.3	87.5	87.4	81.0
Prosper	35	0	61.5	13.3	67.8	80.4	87.7	84.1	78.6
Elgin ND	38	0	62.1	14.1	66.2	77.1	82.3	79.7	75.2
Glenn	35	0	64.4	14.5	53.1	71.5	79.2	75.3	67.9
SY Soren	31	0	62.4	13.5	53.4	69.4	80.0	74.7	67.6
Barlow	36	0	63.4	14.4	54.9	63.0	79.1	71.1	65.7
Redstone	36	0	61.3	13.1	--	71.8	96.9	84.3	--
LCS Nitro	34	0	61.2	11.8	--	80.5	85.8	83.1	--
SY Ingmar	31	0	63.1	14.3	--	72.6	82.2	77.4	--
Prestige	32	0	61.3	13.4	--	69.4	85.2	77.3	--
WB9507	35	0	60.3	13.3	--	72.4	81.8	77.1	--
LCS Pro	37	0	62.4	13.9	--	76.1	75.3	75.7	--
Bolles	33	0	61.2	15.9	--	76.6	74.2	75.4	--
HRS3530	35	0	61.8	13.3	--	--	84.7	--	--
SY Valda	32	0	62.2	12.8	--	--	84.2	--	--
Shelly	32	0	62.1	13.4	--	--	84.2	--	--
LCS Prime	34	0	62.9	12.1	--	--	82.9	--	--
HRS3419	33	0	61.4	13.6	--	--	80.0	--	--
Boost	35	0	62.0	14.2	--	--	76.5	--	--
Prevail	33	0	61.3	13.4	57.8	70.1	75.6	72.9	67.8
Linkert	30	0	61.7	15.4	--	--	69.1	--	--
Trial Mean	34	0	62.1	13.7	59.6	73.1	81.1	--	--
C.V.%	3.6	432	0.6	5.3	7.8	8.2	7.4	--	--
LSD 5%	2	NS	0.5	1.0	6.6	8.4	8.4	--	--
LSD 10%	1	NS	0.4	0.9	5.5	7.0	7.0	--	--

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

NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1.25 million PLS/A and harvested on August 16.

Previous Crop: 2013 = canola, 2014 = oat, 2015 = sunflower.

Tillage: minimum till

Soil Type: Barnes loam

Hard Red Spring Wheat Variety Trial at Rugby
Cooperators: Dave Teigen and the Pierce County Crop Improvement Association

					Grain Yield				
	Plant		Test					-- Average --	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	3 Year
	inches	0-9*	lbs/bu	%	----------	----------	bu/A	----------	----------
Prosper	38	2	61.7	13.8	65.1	81.6	82.5	82.1	76.4
Faller	36	1	61.5	13.8	72.0	74.8	81.8	78.3	76.2
Elgin ND	40	1	61.0	14.7	66.2	72.3	74.2	73.2	70.9
SY Soren	33	0	62.0	14.6	53.4	67.5	74.1	70.8	65.0
Prevail	36	1	60.9	13.9	58.3	69.9	66.4	68.1	64.9
Barlow	36	1	62.5	15.0	60.9	64.6	68.6	66.6	64.7
Glenn	37	1	63.8	15.0	58.9	67.9	66.0	66.9	64.3
LCS Nitro	33	0	61.1	12.9	--	81.7	78.3	80.0	--
Redstone	35	0	60.9	13.9	--	72.8	77.1	74.9	--
WB9507	35	1	60.1	14.6	--	73.8	75.0	74.4	--
SY Ingmar	33	1	61.7	14.7	--	72.7	74.1	73.4	--
LCS Pro	38	2	62.3	14.7	--	71.5	69.4	70.5	--
Bolles	34	0	61.0	15.6	--	71.9	68.4	70.2	--
Prestige	34	1	59.9	14.2	--	67.6	67.3	67.4	--
SY Valda	34	0	60.0	13.9	--	--	80.8	--	--
HRS3530	36	0	61.4	14.6	--	--	77.0	--	--
LCS Prime	35	2	61.6	13.0	--	--	75.6	--	--
HRS3419	35	0	60.4	14.1	--	--	72.9	--	--
Boost	37	2	60.9	14.5	--	--	68.8	--	--
Shelly	34	0	60.2	14.6	--	--	66.7	--	--
Linkert	32	0	61.2	15.1	--	--	66.4	--	--
Trial Mean	35	1	61.4	14.4	59.9	72.2	72.7	--	--
C.V.%	3.0	89	0.9	2.1	5.8	8.4	5.5	--	--
LSD 5%	2	1	0.8	0.4	4.9	8.6	5.6	--	--
LSD 10%	1	1	0.6	0.4	4.1	7.1	4.7	--	--

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

Planted on April 28 with a seeding rate of 1.25 million PLS/A and harvested on August 17.
Previous Crop: 2013 = wheat, 2014 = soybean, 2015 = wheat.
Soil Type: Gardena silt loam
Tillage: Minimum Till

Hard Red Spring Wheat Variety Trial at Garrison
Cooperator: Mike Zimmerman, Garrison

					Grain Yield				
	Plant		Test					--- Average ---	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	3 Year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Faller	28	0	61.3	13.0	66.1	52.4	65.1	58.8	61.2
Prosper	29	0	61.9	12.5	51.7	54.4	62.8	58.6	56.3
SY Soren	25	0	62.6	13.5	49.8	49.1	60.4	54.7	53.1
Elgin ND	31	0	62.4	13.0	44.5	48.8	60.6	54.7	51.3
Barlow	29	0	64.2	13.4	44.7	47.9	56.7	52.3	49.8
Prevail	27	0	61.7	13.3	43.4	43.7	60.6	52.2	49.2
Glenn	29	0	65.0	13.9	45.5	38.3	56.1	47.2	46.6
SY Ingmar	25	0	62.9	13.3	--	51.3	62.6	57.0	--
LCS Pro	31	0	63.4	12.5	--	48.9	64.2	56.6	--
Prestige	27	0	61.7	13.4	--	45.3	66.2	55.8	--
LCS Nitro	27	0	61.1	12.2	--	47.3	59.2	53.2	--
WB9507	28	0	60.2	13.1	--	46.4	58.0	52.2	--
Redstone	28	0	60.9	12.3	--	39.4	63.9	51.6	--
Bolles	30	0	61.8	13.6	--	36.0	61.1	48.5	--
SY Valda	25	0	62.4	12.6	--	--	69.4	--	--
LCS Prime	28	0	63.2	11.3	--	--	68.4	--	--
HRS3530	29	0	61.7	13.0	--	--	66.0	--	--
HRS3419	26	0	61.7	13.4	--	--	63.2	--	--
Shelly	24	0	62.0	12.8	--	--	62.2	--	--
Boost	29	0	62.2	13.1	--	--	59.4	--	--
Linkert	25	0	62.8	14.5	--	--	57.8	--	--
Trial Mean	28	0	62.4	13.1	49.4	45.8	62.0	--	--
C.V.%	5.1	0	0.5	5.7	9.0	7.7	8.8	--	--
LSD 5%	2	NS	0.4	1.1	6.3	5.0	7.7	--	--
LSD 10%	2	NS	0.3	0.9	4.9	4.2	6.5	--	--

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

Planted on May 5 with a seeding rate of 1.25 million PLS/A and harvested on August 10.
Previous Crop: 2013 = sunflower, 2014 = barley, 2015 = canola.
Soil Type: Williams Bowbells loam
Tillage: No Till

Hard Red Spring Wheat Variety Trial at Wilton
Cooperator: Rod Binstock, Baldwin

					Grain Yield				
	Plant		Test					----Average----	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	3 Year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Prosper	31	0	60.5	13.1	87.3	58.5	85.2	71.9	77.0
Faller	31	0	60.4	13.2	88.8	55.6	83.5	69.6	76.0
Prevail	31	0	60.0	13.8	77.1	62.0	79.4	70.7	72.8
Elgin ND	35	0	60.6	14.1	66.8	56.7	80.6	68.7	68.0
SY Soren	26	0	60.6	15.1	70.7	58.1	72.2	65.1	67.0
Barlow	32	0	62.1	14.0	65.0	56.2	74.3	65.3	65.2
Glenn	30	0	62.7	14.6	56.7	58.8	72.9	65.9	62.8
WB9507	31	0	59.2	14.5	--	63.3	81.6	72.4	--
SY Ingmar	28	0	61.9	14.8	--	63.1	80.2	71.6	--
LCS Pro	33	0	61.4	13.7	--	58.3	83.4	70.8	--
LCS Nitro	27	0	59.9	13.1	--	62.8	78.0	70.4	--
Redstone	30	0	60.8	12.8	--	53.9	85.2	69.5	--
Prestige	28	0	59.9	14.7	--	62.6	74.9	68.7	--
Bolles	31	0	60.2	14.8	--	49.2	74.1	61.6	--
LCS Prime	29	0	62.1	13.0	--	--	88.2	--	--
SY Valda	28	0	62.1	13.6	--	--	87.4	--	--
HRS3530	30	0	60.7	14.1	--	--	83.8	--	--
Shelly	28	0	60.3	13.8	--	--	83.1	--	--
Boost	31	0	61.6	14.5	--	--	79.1	--	--
Linkert	27	0	60.6	15.3	--	--	73.3	--	--
HRS3419	27	0	59.7	14.3	--	--	72.6	--	--
Trial Mean	30	0	60.9	14.1	76.4	58.0	79.2	--	--
C.V.%	5.6	395	0.5	3.6	4.2	6.8	5.5	--	--
LSD 5%	2	NS	0.4	0.7	3.8	5.5	6.2	--	--
LSD 10%	2	NS	0.4	0.6	3.2	4.6	5.2	--	--

**Lodging: 0 = none, 9 = lying flat on the ground.*
NS = No statistical difference between varieties.

Planted on May 5 with a seeding rate of 1.25 million PLS/A and harvested on August 15.
Previous Crop: 2013 = soybean, 2014 = spring wheat, 2015 = soybean.
Tillage: No-till *Soil Type: Williams Loam*

Late Planted Hard Red Spring Wheat Variety Trial at Minot

Variety	Days to Head	Plant Height	Test Weight	Protein	Grain Yield 2014	2015	2016	---- Average ---- 2 year	3 year
	DAP[1]	inches	lbs/bu	%	----------bu/A----------				
Linkert	43	26	56.4	16.4	63.9	40.6	50.9	45.8	51.8
Barlow	41	30	56.6	16.1	60.0	41.0	53.8	47.4	51.6
Velva	46	28	54.8	15.2	65.5	38.2	50.1	44.1	51.3
Prevail	44	29	54.5	15.7	61.8	40.8	49.8	45.3	50.8
Elgin ND	44	30	54.9	15.9	57.8	44.0	46.5	45.2	49.4
MS Stingray	47	29	54.5	12.7	57.9	40.2	49.2	44.7	49.1
SY Soren	43	24	56.6	16.8	61.8	40.1	44.0	42.0	48.6
Glenn	41	30	58.1	16.2	56.6	32.6	55.2	43.9	48.1
ND901CL+	43	29	55.7	17.0	63.7	37.6	42.3	40.0	47.9
RB07	45	27	53.7	16.7	57.1	45.6	40.3	42.9	47.7
Prosper	46	30	54.3	15.2	57.7	35.2	45.7	40.5	46.2
Mott	45	28	55.4	16.1	62.9	40.0	35.0	37.5	46.0
WB Mayville	42	24	55.9	16.9	56.6	37.5	43.3	40.4	45.8
Faller	46	30	53.4	14.9	58.2	35.4	41.5	38.4	45.0
LCS Iguacu	45	26	57.1	14.5	59.5	30.8	40.0	35.4	43.4
LCS Pro	42	30	56.0	16.3	--	41.6	50.4	46.0	--
Prestige	42	27	55.3	15.9	--	47.8	42.7	45.3	--
SY Rowyn	42	26	55.0	15.6	--	42.0	43.1	42.6	--
SY Ingmar	44	26	55.5	15.9	--	38.9	46.3	42.6	--
Bolles	45	27	54.4	17.7	--	38.2	41.4	39.8	--
WB9507	43	27	52.3	15.0	--	38.0	35.6	36.8	--
HRS3419	45	25	55.1	15.1	--	27.8	43.6	35.7	--
LCS Nitro	46	24	53.2	16.0	--	31.0	36.2	33.6	--
Redstone	50	28	52.0	14.8	--	32.0	34.0	33.0	--
SY Valda	44	26	57.0	15.2	--	--	52.1	--	--
LCS Prime	41	28	55.3	14.2	--	--	51.5	--	--
Boost	46	28	56.1	15.9	--	--	49.4	--	--
HRS3530	45	30	53.9	15.6	--	--	45.0	--	--
Shelly	45	27	54.6	14.8	--	--	44.8	--	--
MS Chevelle	42	27	54.6	15.1	--	--	42.9	--	--
Trial Mean	44	28	55.1	15.7	58.6	38.2	45.1	--	--
C.V.%	1.8	6.4	2.0	2.5	5.5	10.5	12.5	--	--
LSD 5%	1	3	1.8	0.6	4.6	5.6	9.2	--	--
LSD 10%	1	2	1.5	0.5	3.8	4.7	7.7	--	--

[1] *DAP = Days after planting.*

2016: No-till planted into soybean stubble on June 9 and harvested on September 14.
2015: No-till planted into flax stubble on June 9 and harvested on September 12.
2014: No-till planted into spring wheat stubble on June 10 and harvested on October 8.
Planting Rate: 1.25 million PLS/A *Soil Type: Williams Loam*

HRSW Yield Results from the North Central Region **Combined Means**

Variety	Days to Head	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2014	2015	2016	----average---- 2 Year	3 Year
	DAP[1]	inches	0-9[2]	lbs/bu	%	----------bu/A----------				
Faller	51	32	0	59.6	13.6	71.6	64.7	73.9	69.3	70.1
Prosper	51	33	1	60.1	13.7	67.4	64.8	76.3	70.6	69.5
LCS Nitro	51	29	0	59.5	13.2	64.6	64.4	74.4	69.4	67.8
SY Ingmar	49	29	0	61.0	14.6	68.1	63.3	71.7	67.5	67.7
WB9507	48	32	0	58.5	14.2	73.4	61.3	67.5	64.4	67.4
LCS Pro	48	34	1	61.2	14.3	64.2	60.9	70.6	65.8	65.3
Elgin ND	49	35	0	60.3	14.5	60.6	61.9	70.7	66.3	64.4
HRS3419	52	29	0	59.7	14.0	67.7	55.0	69.4	62.2	64.0
Prevail	48	31	0	59.8	14.0	62.1	60.5	66.0	63.3	62.9
Bolles	51	31	0	59.9	15.5	65.4	56.8	64.9	60.8	62.3
SY Soren	48	28	0	60.9	14.7	58.6	59.7	66.5	63.1	61.6
Linkert	48	28	0	60.6	15.4	62.5	54.6	65.8	60.2	61.0
Barlow	47	33	0	61.8	14.6	58.0	56.9	66.0	61.4	60.3
Glenn	46	33	0	62.9	14.9	54.7	56.2	67.6	61.9	59.5
SY Valda	49	29	0	60.2	13.7	--	88.3	75.2	81.7	--
HRS3530	50	32	0	60.0	14.1	--	90.2	71.7	80.9	--
LCS Prime	46	31	0	61.1	12.8	--	72.4	74.0	73.2	--
Shelly	51	29	0	60.0	13.9	--	74.3	68.7	71.5	--
Boost	51	32	0	60.4	14.6	--	69.1	66.5	67.8	--
Redstone	55	32	0	59.4	13.4	--	57.5	73.9	65.7	--
Prestige	47	30	0	59.7	14.4	--	60.7	68.4	64.6	--
# of Trials	2	6	5	6	6	6	6	6	12	18

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

Locations: Minot, Minot Late Seeded, Garrison, Mohall, Rugby, Wilton

Agriplier™ Seed Treatment in No-Till Spring Wheat at Minot

Trt	Product	Seedling Vigor[1]	Days to Head	Plant Height	Lodging	Test Weight	Grain Protein	Grain Yield
			DAP*	inches	0-9**	lbs/bu	%	bu/A
1	Untreated	1	51	33	0	60.3	14.6	72.0
2	Agriplier LTE	1	51	34	0	60.4	14.5	71.3
3	Agriplier ST	1	51	34	0	61.1	14.5	71.6
Trial Mean		1	51	34	0	60.6	14.5	71.6
C.V. %		0	1.4	2.3	263	0.9	1.1	4.1
LSD 0.05		NS	NS	NS	NS	0.7	NS	NS

[1] Seedling Vigor: 1 = Excellent, 2 = Fair, 3 = Poor. *Planting Date: May 3*

** DAP = Days after Planting.* *Variety: Barlow HRSW*

*** Lodging: 0 = none, 9 = lying flat on the ground* *Harvest Date: August 12*

NS = no statistical difference between treatments *Previous Crop: Soybean*

Seeding Rate: 1.25 million live seeds / acre *Soil Type: Williams loam*

Historic HRSW Variety Trial at Minot

Variety	Year Released	Origin	Fung* Days to Head DAP[1]	No fung Days to Head DAP[1]	Fung* Plant Height inches	No fung Plant Height inches	Fung* Lodging 0-9[2]	No fung Lodging 0-9[2]	Fung* Test Weight lbs/bu	No fung Test Weight lbs/bu	Fung* Protein %	No fung Protein %	Fung* 2016 Yield Bu/A	No fung 2016 Yield Bu/A	Fung* 2015 Yield Bu/A	Avg. Yield Bu/A
Marquis	1910	Ontario	60	61	43	43	3	3	59.7	58.0	15.1	14.8	58.1	49.3	41.0	49.5
Ceres	1926	ND	56	58	38	41	3	2	59.3	59.2	16.4	15.3	56.4	53.6	41.0	50.3
Thatcher	1935	MN	55	58	38	41	2	3	58.4	57.3	16.1	14.6	63.2	54.9	40.5	52.9
Pilot	1938	ND	57	59	38	41	3	3	58.7	58.3	16.1	14.3	59.7	52.4	40.1	50.7
Rushmore	1940	SD	56	56	39	41	2	2	58.4	57.5	15.7	15.5	56.8	51.6	42.5	50.3
Renown	1940	MB	65	65	44	45	2	1	55.3	52.9	15.2	14.3	49.8	39.5	--	--
Regent	1940	MB	54	56	37	41	4	4	58.1	56.8	16.3	15.0	55.8	46.8	32.9	45.2
Rival	1941	ND	60	60	42	44	2	2	58.2	58.5	15.5	14.7	52.4	48.3	--	--
Vesta	1942	ND	56	57	38	41	4	5	59.2	57.8	15.8	14.9	63.6	52.7	41.8	52.7
Mida	1945	ND	55	57	41	45	2	3	59.9	59.1	15.1	14.4	61.5	53.4	35.8	50.2
Lee	1950	MN	55	55	34	37	3	4	58.4	57.2	15.9	15.4	56.7	55.0	43.1	51.6
Selkirk	1953	MB	56	56	39	40	2	2	56.8	55.9	15.6	14.7	56.2	52.3	47.2	51.9
Conley	1960	ND	59	60	40	42	1	1	57.6	56.6	16.4	15.3	49.6	44.1	34.1	42.6
Pembina	1963	MB	57	59	36	40	3	3	57.2	55.7	14.9	14.3	58.0	47.3	45.5	50.3
Justin	1963	ND	57	60	42	41	1	1	58.9	57.4	16.4	16.3	56.6	48.9	34.1	46.5
Chris	1967	MN	55	58	40	40	3	4	59.2	58.6	15.6	15.7	59.6	55.3	40.8	51.9
Fortuna	1967	ND	55	56	39	41	4	5	59.5	57.0	14.8	14.4	59.9	52.9	39.0	50.6
Red River 68	1968	CA	55	58	38	40	3	3	58.6	57.4	15.8	15.4	70.5	55.5	--	--
Waldron	1969	ND	56	55	40	41	1	1	57.9	57.4	15.9	15.2	65.7	62.3	56.6	61.6
Polk	1971	MN	56	55	39	40	2	4	60.4	60.1	15.0	14.2	64.2	65.5	--	--
Era	1971	MN	57	58	31	31	0	0	59.7	57.5	13.2	12.8	77.9	65.8	69.7	71.1
Lark	1971	CA	55	56	29	28	0	1	59.2	57.5	14.4	14.0	64.3	56.2	45.2	55.3
Olaf	1973	ND	56	59	33	32	0	0	58.0	56.1	15.0	15.3	57.2	48.2	52.1	52.5
Wared	1974	WA	60	61	33	33	0	0	59.3	57.3	13.1	13.0	70.5	62.9	--	--
Kitt	1976	MN	57	59	31	30	0	0	56.5	55.9	15.3	14.9	70.3	62.4	--	--
Butte	1977	ND	52	53	35	37	1	2	61.7	60.1	14.9	14.3	74.2	62.8	54.6	63.9
Coteau	1978	ND	58	60	38	38	0	0	56.5	55.9	16.7	17.0	55.4	48.2	43.3	49.0
Len	1979	ND	56	59	33	31	0	0	58.8	57.0	15.4	15.3	68.1	57.5	63.7	63.1
Solar	1979	NB	60	61	31	31	0	0	57.9	56.4	13.4	13.4	72.3	58.9	--	--
Oslo	1981	CO	53	55	30	30	0	0	57.0	53.9	13.5	13.6	64.7	53.3	--	--

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Historic HRSW Variety Trial at Minot Continued

Variety	Year Released	Origin	Fung* Days to Head DAP[1]	No fung Days to Head DAP[1]	Fung* Plant Height inches	No fung Plant Height inches	Fung* Lodging 0-9[2]	No fung Lodging 0-9[2]	Fung* Test Weight lbs/bu	No fung Test Weight lbs/bu	Fung* Protein %	No fung Protein %	Fung* 2016 Yield Bu/A	No fung 2016 Yield Bu/A	Fung* 2015 Yield Bu/A	Avg. Yield Bu/A
Alex	1981	ND	57	59	37	39	1	1	58.7	57.8	15.2	14.8	61.4	55.2	49.3	55.3
2369	1982	Pioneer	54	54	31	31	0	0	60.0	58.5	14.8	14.6	69.6	65.2	60.0	64.9
Wheaton	1984	MN	55	54	29	30	0	0	56.9	54.9	13.3	13.4	67.6	62.0	--	--
Stoa	1984	ND	57	56	37	38	0	0	58.6	57.1	14.6	14.4	69.7	63.6	63.8	65.7
Marshall	1985	MN	56	58	30	31	0	0	59.4	58.2	14.4	13.8	69.5	64.6	54.5	62.9
Amidon	1988	ND	56	56	38	39	1	1	59.1	58.3	15.1	14.3	69.4	69.3	62.8	67.2
2375	1989	Pioneer	53	54	30	32	1	2	60.1	58.9	14.8	14.5	71.4	60.1	67.8	66.4
AC Barrie	1997	SK	57	56	38	36	1	1	60.0	58.9	15.9	14.9	78.1	73.5	--	--
Reeder	1999	ND	54	53	32	33	0	0	60.2	59.4	15.8	14.7	76.4	72.0	70.8	73.1
Alsen	2000	ND	54	55	33	33	0	0	61.3	61.1	15.5	15.6	67.9	64.5	66.0	66.1
Glenn	2005	ND	52	53	32	34	1	0	63.3	63.1	15.5	15.0	71.1	69.5	67.0	69.2
Faller	2007	ND	55	57	33	34	0	0	60.5	59.5	14.0	13.5	83.2	76.2	73.7	77.7
Elgin ND	2012	ND	55	55	35	36	0	0	60.9	60.3	15.3	14.9	80.2	78.4	--	--
Trial Mean			56	57	36	37	1	2	58.9	57.7	15.2	14.7	64.8	58.0	50.6	--
C.V.%			2.2	2.6	5.8	5.0	49	41	1.2	1.1	2.9	2.7	9.2	7.2	6.9	--
LSD 5%			2	2	3	3	1	1	1.1	1.0	0.7	0.6	9.7	6.8	4.9	--
LSD 10%			2	2	3	3	1	1	0.9	0.9	0.6	0.5	8.1	5.6	4.1	--

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

**Fungicide: 8 oz/A Headline SC with herb (May 30) and 8 oz/A Prosaro applied at flowering (July 3).*

Planting Date: May 2 *Planting Rate: 1.25 million PLS/A* *Harvest Date: August 15* *Previous Crop: 2014 = flax, 2015 = soybean*

Tillage: No-till *Soil Type: Williams Loam*

Effects of Nitrogen Fertility Levels on Grain Yield and Protein Content of "High Protein" Spring Wheat Varieties at Minot

Variety	N Fertility Level	Days to Head	NDVI	Plant Height	Lodging	Test Weight	Grain Protein	Grain Yield
	lbs/A[1]	DAP[2]	0-1	inches	0-9[3]	lbs/bu	%	bu/A
Bolles	50	58	0.65	33	0	58.9	14.9	52.0
Bolles	75	58	0.66	32	0	53.5	16.0	51.1
Bolles	100	58	0.68	33	0	57.7	16.8	58.2
Bolles	125	57	0.66	33	0	57.0	16.9	58.5
WB Vantage	50	59	0.58	32	0	57.8	15.4	48.1
WB Vantage	75	59	0.59	31	0	58.2	16.2	47.2
WB Vantage	100	57	0.59	32	0	58.1	16.2	52.0
WB Vantage	125	57	0.59	30	0	57.6	16.5	42.9
ND901CL+	50	56	0.60	35	0	58.2	16.1	54.4
ND901CL+	75	55	0.62	36	0	55.9	16.0	60.9
ND901CL+	100	56	0.61	35	0	57.5	16.4	52.9
ND901CL+	125	56	0.61	35	0	56.5	16.0	52.5
Glenn	50	52	0.55	33	0	60.9	14.8	54.9
Glenn	75	53	0.58	35	0	60.7	14.6	52.9
Glenn	100	53	0.61	34	0	60.2	15.2	62.3
Glenn	125	53	0.60	34	0	60.1	15.7	56.0
SY Soren	50	54	0.58	28	0	60.4	14.8	51.9
SY Soren	75	54	0.57	29	0	60.3	15.1	58.8
SY Soren	100	54	0.64	28	0	60.2	15.1	58.7
SY Soren	125	56	0.62	30	0	59.9	15.5	59.3
Prosper	50	55	0.63	33	0	58.9	13.6	62.5
Prosper	75	57	0.61	33	0	58.7	13.7	57.6
Prosper	100	57	0.67	33	0	59.3	13.6	66.7
Prosper	125	57	0.66	34	0	59.1	13.7	64.5
C.V.%		1.4	4.8	3.8	0	1.9	4.0	8.1
LSD 5%		1	0.05	2	NS	1.8	1.0	7.4

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Effects of Nitrogen Fertility Levels on Grain Yield and Protein Content of "High Protein" Spring Wheat Varieties at Minot Continued

Combined Means—N Fertility Levels

N Fertility Level	Days to Head	NDVI	Plant Height	Lodging	Test Weight	Grain Protein	Grain Yield
lbs/A[1]	DAP[2]	0-1	inches	0-9[3]	lbs/bu	%	bu/A
50	56	0.60	32	0	59.2	14.9	54.0
75	56	0.60	32	0	57.9	15.3	54.7
100	56	0.63	32	0	58.8	15.5	58.5
125	60	0.62	32	0	58.4	15.7	55.6
LSD 5%	NS	NS	NS	NS	NS	0.7	NS

[1] Soil N: Total lbs/A residual N (22 lbs) + applied N (urea) applied mid-row at planting.

[2] DAP = Days after planting.

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

NS = no statistical difference between fertility levels.

Planting Date: May 6 *Planting Rate: 1.25 million PLS/A*

Harvest Date: August 17

Tillage: No-till *Previous Crop: Soybean*

Soil Type: Williams Loam

Summary: The main objective of the trial was to limit nitrogen fertilizer inputs to spring wheat varieties that are known to produce high levels of grain protein while maintaining yields with acceptable protein levels. "High protein" varieties Bolles, WB Vantage and ND901CL+ were compared with popular varieties Glenn, SY Soren and Prosper under similar nitrogen fertility levels. As would be expected, NDVI levels (leaf greenest) and protein levels tended to increase with increasing levels of nitrogen, however, lodging and grain yields had no response. Nitrogen release from soybean residue was not taken into account and may explain the lack of yield response in this trial.

Sulfur by Nitrogen Fertility in No-Till Spring Wheat at Minot

	Applied Fertilizer[1]		Days to	Plant		Test	Grain	Grain
	Nitrogen	Sulfur	Head	Height	Lodging	Weight	Protein	Yield
	pounds per acre		DAP[2]	inches	0-9[3]	lbs/bu	%	bu/A
1	0	0	53	27	1	61.0	13.9	41.0
2	0	10	53	29	1	61.2	13.9	52.7
3	0	20	53	30	1	60.9	13.9	52.5
4	50	0	53	32	1	61.2	14.9	58.5
5	50	10	52	31	1	61.3	14.6	65.6
6	50	20	52	31	1	61.5	14.3	65.6
7	100	0	53	32	1	60.9	15.1	64.2
8	100	10	53	33	1	61.1	15.2	68.3
9	100	20	53	33	1	61.2	15.3	68.6
10	150	0	53	33	1	61.0	15.8	75.2
11	150	10	53	32	2	60.8	15.7	69.0
12	150	20	52	32	1	60.5	15.6	57.2
13	200	0	53	34	1	60.2	15.8	67.4
14	200	10	52	32	2	60.5	15.9	63.0
15	200	20	53	32	1	61.0	15.8	61.5
16	46*	0	53	31	2	60.7	14.9	62.2
17	46**	0	54	30	1	60.9	15.7	55.0
18	100***	10	53	32	2	60.3	15.3	62.7
Trial Mean			53	32	1	60.9	15.1	61.7
C.V. %			1.6	4.6	42	1.1	4.3	9.8
LSD 0.05			ns	2	ns	ns	0.9	8.6

[1] Pounds of N applied as Urea and S as AMS through a mid-row band at planting.

[2] Days after planting.

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

**broadcast at tillering (June 3)*

***broadcast at anthesis (July 4)*

****100 lbs/A N + 10 lbs/A S + 100 lbs/A Potash applied in a mid-row band at planting.*

ns = no statistical difference between treatments.

Planting Date: May 4
Variety = Barlow HRSW
Harvest Date: August 16
Seeding Rate: 1.25 million live seeds / acre
Previous Crop: Soybean
Soil Type: Williams loam
Soil Test (0-12"): N = 17 lbs/A, P = 28 ppm, K = 534 ppm, S = 463 lbs/A, Cl = 45 lbs/A
OM = 3.3%, pH = 6.1

Biological Inputs in No-Till Spring Wheat at Minot

Company	Product	Application Timing	Application Rate	Seedling Vigor[1]	Days to Head	Plant Height	Lodging	Test Weight	Grain Protein	Grain Yield
			oz/A	1 - 3	DAP[2]	inches	0-9[3]	lbs/bu	%	bu/A
	Untreated			1	45	34	0	61.7	15.0	70.8
Pathway Biologic	*Pathway Power Blend	Foliar - 4 lf	32	1	45	34	1	61.8	15.1	71.3
Gavilon	*Kelpak	Seed trt	8 oz/100 lbs	1	45	35	0	61.6	15.1	72.4
Gavilon	*Kelpak	Foliar - 4 lf	32	1	45	33	0	61.1	15.0	72.9
ATG	*FF-wheat / *Green Miracle	4 lf / flag lf	51 / 13.5	1	45	33	1	60.7	15.2	66.7
ATG	*FF-wheat + *Crop Booster / *Green Miracle	4 lf / flag lf	51 + 13.5 / 13.5	1	45	34	1	60.4	15.2	74.4
Trial Mean				1	45	34	0	61.4	15.1	71.6
C.V. %				0	1.1	4.8	95	1.3	1.2	7.9
LSD 5%				NS	NS	NS	NS	NS	NS	NS

**Pathway Power Blend is marketed by Pathway Biologic, LLC, Plant City, FL.*

**Kelpak is marketed by Gavilon Fertilizer, Moorhead, MN.*

**ATG Green Miracle, ATG FF-wheat and ATG Crop Booster are marketed by ASLE Technologies Group, Canada.*

[1] Seedling Vigor: 1 = Good, 3 = Poor.

[2] DAP = Days after Planting.

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

NS = no statistical difference between treatments.

Planting Date: May 3
Variety: Barlow HRSW
Harvest Date: August 12
Seeding Rate: 1.25 million live seeds / acre
Previous Crop: Soybean
Tillage: No-till
Soil Type: Williams loam

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	Bact. Leaf Streak	Head Scab
AC Commander	Can.	2002	32	5	68	R	R	MS	NA	NA
AC Napoleon	Can.	2001	40	5	68	R	R	S	NA	NA
AC Navigator	Can.	1999	32	5	66	R	R	M	NA	S
Alkabo	ND	2005	36	2	67	R	R	M	MS	MS
Alzada[5]	WB	2004	30	6	63	R	R	S	NA	VS
Belzer	ND	1997	39	5	66	R	R	M	NA	M
Ben	ND	1996	39	3	67	R	R	MR	MS	S[6]
Carpio	ND	2012	37	5	69	R	R	M	MS/S	M
CDC Verona	Can.	2010	38	4	69	R	R	MR	NA	S
DG Max	DGP	2008	38	5	66	R	MR	MR	NA	MS
DG Star	DGP	2007	37	4	64	R	R	M	NA	NA
Dilse	ND	2002	37	5	68	R	R	M	M	MS
Divide	ND	2005	38	5	68	R	R	M	MS/S	M
Grande D'Oro	WB/DGP	2005	37	4	68	R	R	M	NA	NA
Grenora	ND	2005	35	5	67	R	R	M	MS/S	MS
Joppa	ND	2013	39	5	68	R	R	M	MS	M
Kyle	Can.	1984	39	7	68	R	MR	M	NA	NA
Lebsock	ND	1999	37	3	67	R	R	M	MS	MS
Maier	ND	1998	37	5	67	R	R	M	NA	S[6]
Mountrail	ND	1998	37	5	68	R	R	M	MS	S[6]
MS-Dart	Meridian	2015	37	5	68	NA	NA	NA	NA	NA
Pierce	ND	2001	38	5	67	R	R	MS	MS	S
Plaza	ND	1999	29	7	68	R	R	M	NA	MS
Rugby	ND	1973	38	5	64	R	R	MR	NA	S[6]
Silver	MT	2012	31	5	62	NA	NA	NA	NA	NA
Strongfield	Can.	2004	37	6	68	R	R	MS	NA	S
Tioga	ND	2010	39	4	68	R	R	M	MS	MS
VT Peak	Viterra	2010	37	6	68	NA	NA	NA	NA	NA
Wales	WB	2008	36	3	67	R	R	M	NA	S[6]
WB-Belfield	WB	2011	30	2	62	R	R	S	NA	S
Westhope	WB	2009	36	3	67	R	R	MS	NA	S

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

[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 become available.

[3] Days to Heading = the number of days from planting to head emergence from the boot. Averaged from several locations and years.

[4] R = resistant, MR = moderately resistant, M = intermediate, MS = moderately susceptible, S = susceptible, VS = very susceptible, NA = Not adequately tested. Foliar Disease = reaction to tan spot and septoria leaf spot complex.

[5] Alzada has a disease-resistance package that make it more adapted to drier growing conditions (i.e. 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.

Source: NDSU Extension Bulletin A1067-16

Durum Variety Trial at Minot

Variety	Days to Head	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2014	2015	2016	---- Average ---- 2 year	3 year
	DAP[1]	inches	0-9[2]	lbs/bu	%	----------bu/A----------				
Alkabo	56	35	0	57.2	13.6	76.0	80.8	72.3	76.5	76.4
Joppa	56	38	2	57.5	13.7	66.1	77.3	78.3	77.8	73.9
Mountrail	58	34	1	57.2	14.1	70.5	78.1	72.5	75.3	73.7
VT Peak	56	36	0	59.0	14.4	69.6	73.4	77.4	75.4	73.5
Carpio	59	37	1	57.9	14.0	68.5	74.3	72.5	73.4	71.8
Lebsock	57	36	0	58.5	14.4	69.5	77.4	66.7	72.0	71.2
Grenora	56	33	0	56.5	15.0	65.8	74.0	69.1	71.6	69.6
Divide	59	33	0	57.5	14.5	66.8	77.3	64.2	70.7	69.4
Pierce	57	35	1	58.3	14.2	63.4	79.4	61.3	70.3	68.0
Maier	60	36	0	57.5	15.2	62.4	72.8	66.1	69.4	67.1
Ben	57	38	1	57.9	15.1	68.7	70.7	61.8	66.2	67.1
Tioga	60	38	0	55.1	14.7	66.3	73.3	51.7	62.5	63.8
AC Commander	57	29	0	56.3	14.6	58.8	71.0	61.1	66.0	63.6
Rugby	57	38	1	57.6	14.1	61.9	63.9	59.1	61.5	61.6
CDC Verona	60	37	0	56.3	15.4	58.1	62.1	59.7	60.9	60.0
Strongfield	60	35	0	54.1	15.6	65.8	65.5	45.7	55.6	59.0
AC Navigator	58	31	0	55.7	14.4	54.2	52.3	55.7	54.0	54.1
Alzada	53	30	3	57.4	13.7	53.0	46.4	60.9	53.6	53.4
Normanno	55	28	2	54.1	13.8	52.5	44.1	61.3	52.7	52.6
Plaza	57	31	0	56.2	13.3			74.8		
Trial Mean	58	36	1	57.4	14.3	65.1	70.9	70.9	--	--
C.V.%	1.9	3.3	65	1.1	1.8	6.0	9.0	6.7	--	--
LSD 5%	2	2	1	1.0	0.4	5.5	10.3	7.7	--	--
LSD 10%	1	2	1	0.8	0.3	4.6	8.6	6.4	--	--

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

No-till planted on May 3 with a seeding rate of 1.5 million PLS/A and harvested on August 22.

Previous Crop: 2013 & 2015 = soybean, 2014 = flax. *Soil Type: Williams Loam*

Durum Yield Results from the North Central Region **Combined Means**

Variety	Plant Height	Lodging	Test Weight	Protein	Grain Yield 2014	2015	2016	-----average----- 2 Year	3 Year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Joppa	36	2	60.3	13.0	58.7	61.9	76.5	69.2	65.7
Alkabo	34	0	60.5	12.9	62.4	63.1	71.5	67.3	65.7
Mountrail	35	1	60.2	13.0	57.7	64.8	73.6	69.2	65.3
Grenora	34	1	59.5	13.6	59.0	61.8	71.5	66.7	64.1
Divide	35	1	60.2	13.6	58.6	62.5	69.6	66.0	63.6
Carpio	36	2	60.5	13.1	58.8	57.9	73.1	65.5	63.3
# of Trials	5	5	5	5	5	5	5	10	15

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

Locations: Garrison, Minot, Mohall, Rugby, Wilton

Durum Variety Trial at Mohall

Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

					Grain Yield				
	Plant		Test					----- Average -----	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	2 Year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Joppa	38	2	61.6	13.1	60.8	66.0	93.8	79.9	73.5
Carpio	40	2	62.0	13.0	60.4	64.7	88.0	76.3	71.0
Alkabo	37	0	62.2	12.9	64.4	63.3	85.1	74.2	70.9
Grenora	38	0	60.7	13.3	60.8	64.7	87.2	75.9	70.9
Mountrail	39	2	61.5	12.1	56.7	67.2	87.0	77.1	70.3
Divide	39	1	61.9	13.4	60.7	64.0	85.7	74.8	70.1
Trial Mean	39	1	61.9	13.1	60.6	64.2	88.7	--	--
C.V.%	3.1	54	0.6	6.0	5.8	3.9	4.5	--	--
LSD 5%	2	1	0.5	NS	5.5	3.7	5.8	--	--
LSD 10%	1	1	0.5	NS	4.4	3.0	4.8	--	--

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

NS = no statistical difference between varieties.

Planted on April 27 with a seeding rate of 1.5 million PLS/A and harvested on August 16.

Previous Crop: 2013 = canola, 2014 = oat, 2015 = sunflower.

Tillage: minimum till

Soil Type: Barnes loam

Durum Variety Trial at Rugby

Cooperators: Dave Teigen and the Pierce County Crop Improvement Association

					Grain Yield				
	Plant		Test					---- Average ----	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	3 Year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Mountrail	39	3	59.8	13.1	46.2	73.7	76.0	74.9	65.3
Joppa	40	3	59.6	13.5	45.8	72.2	74.5	73.4	64.2
Grenora	38	2	58.9	14.1	43.9	75.6	72.9	74.2	64.1
Alkabo	39	2	60.7	13.4	40.7	76.2	71.9	74.0	62.9
Divide	41	2	60.2	14.2	43.5	71.0	69.7	70.4	61.4
Carpio	41	6	59.8	14.4	48.9	66.5	64.7	65.6	60.0
Trial Mean	40	3	60.1	13.8	44.9	71.8	73.1	--	--
C.V.%	3.0	27	0.8	2.0	5.0	4.0	3.5	--	--
LSD 5%	2	1	0.9	0.4	3.5	4.2	3.7	--	--
LSD 10%	1	1	0.6	0.3	2.8	3.4	3.1	--	--

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

Planted on April 28 with a seeding rate of 1.5 million PLS/A and harvested on August 17.

Previous Crop: 2013 = wheat, 2014 = soybean, 2015 = wheat.

Soil Type: Gardena silt loam

Tillage: Minimum Till

Durum Variety Trial at Garrison Cooperator: Mike Zimmerman, Garrison

					Grain Yield				
	Plant		Test					--- Average ---	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	3 Year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Divide	31	0	61.1	11.6	44.0	42.1	60.4	51.3	48.8
Alkabo	31	0	62.0	11.4	49.3	34.6	61.9	48.3	48.6
Grenora	29	0	61.4	11.7	45.8	36.3	56.8	46.6	46.3
Mountrail	32	0	61.8	10.9	34.2	41.1	60.1	50.6	45.1
Joppa	31	0	61.9	11.1	39.9	35.9	58.3	47.1	44.7
Carpio	32	0	61.8	10.8	39.0	31.0	63.5	47.2	44.5
Trial Mean	31	0	61.8	11.6	42.0	36.6	60.3	--	--
C.V.%	4.0	0	0.6	6.7	6.1	7.3	7.7	--	--
LSD 5%	2	NS	0.5	1.1	4.0	4.0	NS	--	--
LSD 10%	2	NS	0.4	0.9	3.2	3.2	NS	--	--

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

Planted on May 5 with a seeding rate of 1.5 million PLS/A and harvested on August 10.
Previous Crop: 2013 = sunflower, 2014 = barley, 2015 = canola.
Soil Type: Williams Bowbells loam
Tillage: No Till

Durum Variety Trial at Wilton Cooperator: Rod Binstock, Baldwin

					Grain Yield				
	Plant		Test					---- Average ----	
Variety	Height	Lodging	Weight	Protein	2014	2015	2016	2 Year	2 Year
	inches	0-9*	lbs/bu	%	----------bu/A----------				
Mountrail	29	0	60.7	14.7	80.8	63.8	72.2	68.0	72.3
Joppa	31	0	61.2	13.6	80.7	58.1	77.3	67.7	72.0
Grenora	29	0	60.0	13.9	78.6	58.4	71.7	65.0	69.6
Alkabo	29	0	60.4	13.5	81.6	60.4	66.3	63.4	69.4
Carpio	31	0	60.9	13.4	77.4	52.8	77.0	64.9	69.1
Divide	31	0	60.5	14.2	78.1	58.0	68.1	63.0	68.1
Trial Mean	30	0	60.8	13.9	79.5	58.5	74.2	--	--
C.V.%	3.9	600	0.5	2.9	5.8	3.8	6.9	--	--
LSD 5%	2	NS	0.5	0.6	NS	3.3	7.4	--	--
LSD 10%	1	NS	0.4	0.5	NS	2.6	6.2	--	--

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

Planted on May 5 with a seeding rate of 1.5 million PLS/A and harvested on August 15.
Previous Crop: 2013 = soybean, 2014 = spring wheat, 2015 = soybean.
Tillage: No-till *Soil Type: Williams loam*

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]	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	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													
AAC Synergy	M/F	S	2015	R	L	White	M.short	Strg.	M.late	MR	MR/R	MR	MR
ABI Balster	M/F	BARI	2015	R	L	White	M.short	Med.	Med.	NA	MR	NA	NA
ABI Growler	M/F	BARI	2015	R	L	White	M.short	M.strg.	Med.	NA	MS/S	NA	NA
AC Metcalfe	M	Can	1997	R	L	White	Med.	Med.	Late	S	MS	MS	S
CDC Copeland	M	Can	1999	R	L	White	Tall	Med.	Late	S	MS	MS	MR
CDC Meredith	M	Can	2008	R	L	White	Med.	Med.	Late	MR	MR	S	MS
Conlon[7]	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[8]	F	Can	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
LCS Genie	M	L		S	S	White	Short	V.strg.	Med.	NA	MS	NA	NA
LCS Odyssey	M/F	L		R	S	White	Short	Med.	Med.	NA	MS	NA	NA
Lilly	F	G	NA	R	L	White	Short	M.strg.	Late	S	MS/S	S	MR/R
ND Genesis	M/F	ND	2015	S	L	White	Med.	M.strg.	M.late	S	MR	MR	MS
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	G	1995	R	L	White	Short	Med.	Late	S	NA	S	MR
Sunshine	F	G	NA	R	L	White	Short	M.strg.	Late	S	S	S	MS
Specialty													
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 (hull-less).

[2] BARI = Busch Agricultural Resources Inc., Can = Canada, G = Germany, L = Limagrain, MN = University of Minnesota, MT = Montana State University, ND = North Dakota State University, S = Syngenta.

[3] R = rough, S = smooth, H = hull-less.

[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] Lower DON accumulations than other varieties tested.

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

Source: NDSU Extension Bulletin A1049-16

Barley Variety Trial at Minot

Variety	Days to Head	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2014	2015	2016	----Average---- 2 year	3 year
	DAP[1]	inches	0-9[2]	>6/64	<5/64	lbs/bu	%	bu/A				
6 Row Types												
Quest	55	30	3	92	1	49.8	13.5	99.5	74.7	101.1	87.9	91.8
Celebration	57	29	4	95	1	49.2	13.9	96.7	84.1	92.4	88.2	91.1
Innovation	54	28	3	98	0	50.5	13.1	90.2	86.7	94.0	90.4	90.3
Stellar-ND	55	30	4	96	1	48.9	12.9	97.5	75.6	96.0	85.8	89.7
Lacey	55	28	4	96	0	51.1	13.0	93.2	87.0	84.8	85.9	88.3
Tradition	56	27	4	95	0	50.3	13.0	87.9	73.3	89.0	81.2	83.4
2 Row Types												
ND Genesis	60	31	0	98	0	50.5	11.3	101.0	108.8	110.4	109.6	106.7
Conlon	56	25	2	98	1	52.1	13.3	93.7	95.0	93.5	94.2	94.1
Rawson	58	29	1	97	1	50.6	12.7	89.3	96.9	95.8	96.3	94.0
Pinnacle	56	29	1	98	1	51.7	10.9	94.4	79.6	104.7	92.1	92.9
CDC Meredith	63	29	1	95	1	49.2	12.1	--	96.5	110.2	103.3	--
LCS Odyssey	64	24	1	97	1	49.7	11.9	--	--	126.1	--	--
SY Sirish	63	26	1	97	1	50.9	13.0	--	--	118.4	--	--
AAC Synergy	63	30	1	97	1	50.2	12.7	--	--	114.5	--	--
ABI Balster	63	27	1	95	1	50.0	12.7	--	--	108.6	--	--
LCS Genie	64	24	1	96	1	50.6	12.4	--	--	107.5	--	--
ABI Growler	63	30	1	95	1	49.7	13.5	--	--	103.8	--	--
Trial Mean	59	28	2	96	1	50.3	12.7	97.1	86.5	103.3	--	--
C.V.%	2.0	6.8	48	0.9	49	1.0	3.8	5.7	5.7	7.4	--	--
LSD 5%	2	3	1	1	NS	0.8	0.8	6.9	7.0	12.7	--	--
LSD 10%	2	3	1	1	NS	0.7	0.7	5.7	5.8	10.6	--	--

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

NS = no statistical difference between varieties.

Planted on May 3 with a seeding rate of 1 million PLS/A and harvested on August 10.

Previous Crop: 2013 = soybean, 2014 = flax, 2015 = soybean.

Soil Type: Williams Loam

Barley Yield Results from the North Central Region **Combined Means**

Variety	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2014	2015	2016	---Average--- 2 Year	3 Year
	inches	0-9*	>6/64	<5/64	lbs/bu	%	bu/A				
6 Row Types											
Tradition	29	2	94	0	49.1	12.1	68.2	78.6	89.7	84.1	78.8
Lacey	29	3	95	0	49.7	12.3	67.6	77.4	83.7	80.5	76.2
2 Row Types											
ND Genesis	31	1	97	0	49.6	10.8	68.5	88.1	96.8	92.4	84.4
Pinnacle	29	2	96	0	49.7	10.8	69.0	89.3	92.8	91.0	83.7
Conlon	27	3	97	0	51.3	12.7	63.9	64.6	84.5	74.6	71.0
CDC Meredith	28	3	91	1	47.9	11.5	--	--	94.2	--	--
# of Trials	5	5	5	5	5	5	5	5	5	10	15

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

Barley Variety Trial at Mohall
Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

							Grain Yield				
	Plant		%	%	Test					----Average----	
Variety	Height	Lodging	Plump	Thin	Weight	Protein	2014	2015	2016	2 Year	3 Year
	inches	0-9*	>6/64	<5/64	lbs/bu	%	----------bu/A----------				
6 Row Types											
Tradition	33	2	93	1	48.7	13.0	70.2	79.3	83.9	81.6	77.8
Lacey	34	3	95	0	50.5	13.6	66.1	70.1	71.4	70.7	69.2
2 Row Types							--	--	--	--	--
ND Genesis	34	2	97	0	49.7	11.7	71.1	78.4	96.4	87.4	82.0
Pinnacle	33	3	96	0	49.9	11.5	77.3	84.3	84.0	84.2	81.9
Conlon	31	4	97	0	51.5	13.3	61.1	79.2	76.3	77.7	72.2
CDC Meredith	34	4	93	1	49.4	11.8	--	--	81.6	--	--
Trial Mean	33	3	95	0	49.9	12.5	68.5	78.4	82.3	--	--
C.V.%	3.9	31	1.4	96	1.4	3.0	3.9	6.2	6.4	--	--
LSD 5%	NS	1	2	NS	1.1	0.6	3.9	6.2	7.8	--	--
LSD 10%	2	1	2	NS	0.9	0.5	3.1	4.9	6.5	--	--

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

Planted on April 27 with a seeding rate of 1 million PLS/A and harvested on August 16.
Previous Crop: 2013 = canola, 2014 = oat, 2015 = sunflower.
Soil Type: Barnes loam
Tillage: Minimum Till

Barley Variety Trial at Rugby
Cooperators: Dave Teigen and the Pierce County Crop Improvement Association

							Grain Yield				
	Plant		%	%	Test					----Average----	
Variety	Height	Lodging	Plump	Thin	Weight	Protein	2014	2015	2016	2 year	3 year
	inches	0-9*	>6/64	<5/64	lbs/bu	%	----------bu/A----------				
6 Row Types											
Tradition	35	4	88	1	48.2	13.6	43.4	87.4	95.8	91.6	75.5
Lacey	34	5	90	1	48.9	13.8	45.8	77.9	87.0	82.4	70.2
2 Row Types											
Pinnacle	34	6	92	1	46.8	12.0	56.2	96.4	84.0	90.2	78.9
ND Genesis	36	3	94	0	48.6	11.3	49.4	80.0	88.1	84.0	72.5
Conlon	32	5	95	0	51.1	13.8	--	56.4	79.3	67.8	--
CDC Meredith	32	7	80	1	45.4	14.1	--	--	86.8	--	--
Trial Mean	34	5	90	1	48.2	13.1	51.7	79.6	86.8	--	--
C.V.%	4.8	21	3.4	55	1.6	3.2	7.3	3.5	4.7	--	--
LSD 5%	2	2	5	NS	1.2	0.6	5.7	4.1	6.1	--	--
LSD 10%	2	1	4	NS	1.0	0.5	4.5	3.3	5.0	--	--

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

Planted on April 28 with a seeding rate of 1 million PLS/A and harvested on August 17.
Previous Crop: 2013 = wheat, 2014 = soy, 2015 = wheat.
Soil Type: Gardena silt loam
Tillage: Minimum Till

Barley Variety Trial at Garrison Cooperator: Mike Zimmerman, Garrison

Variety	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2014	2015	2016	----Average---- 2 year	3 year
	inches	0-9*	>6/64	<5/64	lbs/bu	%	----------bu/A----------				
6 Row Types											
Tradition	25	0	97	0	49.2	10.4	58.4	57.6	89.8	73.7	68.6
Lacey	25	1	97	0	48.9	10.6	48.3	57.1	87.5	72.3	64.3
2 Row Types											
Pinnacle	23	0	98	0	50.1	9.9	43.8	89.6	95.7	92.6	76.4
ND Genesis	26	0	98	0	49.6	9.9	50.2	76.2	94.5	85.3	73.6
Conlon	23	2	99	0	51.0	11.5	54.8	37.3	86.7	62.0	59.6
CDC Meredith	21	2	94	1	47.7	9.8	--	--	96.3	--	--
Trial Mean	24	1	97	0	49.4	10.4	49.4	61.4	91.8	--	--
C.V.%	4.9	57	0.6	91	0.6	4.5	5.3	6.2	5.9	--	--
LSD 5%	2	1	1	NS	0.4	0.7	3.8	5.8	8.1	--	--
LSD 10%	1	1	1	NS	0.3	0.6	3.1	4.7	6.7	--	--

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

Planted on May 5 with a seeding rate of 1 million PLS/A and harvested on August 10.
Previous Crop: 2013 = sunflower, 2014 = barley, 2015 = canola.
Soil Type: Williams Bowbells loam
Tillage: No Till

Barley Variety Trial at Wilton Cooperator: Rod Binstock, Baldwin

Variety	Plant Height	Lodging	% Plump	% Thin	Test Weight	Protein	Grain Yield 2014	2015	2016	--- Average --- 2 year	3 year
	inches	0-9*	>6/64	<5/64	lbs/bu	%	----------bu/A----------				
6 Row Types											
Lacey	25	1	97	0	48.9	10.6	84.6	94.8	87.5	91.2	89.0
Tradition	25	0	97	0	49.2	10.4	81.3	95.6	89.8	92.7	88.9
2 Row Types											
Pinnacle	23	0	98	0	50.1	9.9	73.1	96.5	95.7	96.1	88.4
ND Genesis	26	0	98	0	49.6	9.9	70.6	96.9	94.5	95.7	87.3
Conlon	23	2	99	0	51.0	11.5	46.0	55.3	86.7	71.0	62.7
CDC Meredith	21	2	94	1	47.7	9.8	--	--	96.3	--	--
Trial Mean	25	1	96	0	49.9	12.5	77.1	89.3	78.4	--	--
C.V.%	5.8	69	1.3	88	1.5	3.3	6.0	5.5	6.9	--	--
LSD 5%	2	1	2	NS	1.1	0.6	7.0	7.4	8.1	--	--
LSD 10%	2	1	2	NS	0.9	0.5	5.6	6.1	6.7	--	--

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

Planted on May 5 with a seeding rate of 1 million PLS/A and harvested on August 15.
Previous Crop: 2013 = soybean, 2014 = spring wheat, 2015 = soybean.
Soil Type: Williams loam
Tillage: No Till

Evaluation of Trinexapac-ethyl (Palisade) on Barley at Minot

Variety	Treatment	Days to Head	Plant Height	Lodging	% Plump	% Thin	1000 KWT	Test Weight	Protein	Grain Yield
		DAP[1]	inches	0-9[2]	>6/64	<5/64	g	lbs/bu	%	bu/A
Celebration	untrt	58	32	4	92	1	39	48.2	14.6	94.9
Celebration	Palisade	62	29	0	85	1	36	46.9	15.0	92.9
Pinnacle	untrt	57	32	0	95	1	55	48.7	12.3	96.9
Pinnacle	Palisade	61	26	0	94	1	53	47.8	12.6	89.2
Trial Mean		60	30	1	91	1	46	47.9	13.6	93.5
C.V.%		1.8	2.2	51	2.3	28	6.5	0.7	2.6	5.8
LSD 0.05		2	1	1	4	NS	6	0.6	0.7	NS

Combined Means

Treatment	Days to Head	Plant Height	Lodging	% Plump	% Thin	1000 KWT	Test Weight	Protein	Grain Yield
	DAP[1]	inches	0-9[2]	>6/64	<5/64	g	lbs/bu	%	bu/A
untrt	58	32	2	94	1	47	48.5	13.5	95.9
Palisade	62	28	0	89	1	45	47.3	13.8	91.0
LSD 0.05	1	2	NS	NS	NS	NS	0.7	NS	NS

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

NS = no statistical difference between treatments.

Planting Date: May 3 *Planting Rate: 1 million PLS/A*

Palisade treatments were applied at 14 oz/A during stem elongation (June 7).

Harvest Date: August 10 *Previous Crop: soybean*

Tillage: No-till *Soil Type: Williams Loam*

Summary: Palisade treatments significantly reduced plant height of both varieties. Lodging was not an issue with the variety Pinnacle but the Palisade treatment completely eliminated lodging on Celebration. On average, Palisade treatments delayed heading by 4 days and decreased test weight by more than a pound per bushel. Palisade treatments also tended to reduce % plump, kernel weight and grain yields but not significantly.

Barley Seeding Rate Trial at Minot

Seeding Rate	Plant Stand	Days to Head	Plant Height	Lodging	% Plump	% Thin	1000 KWT	Test Weight	Protein	Grain Yield		
										2016	2015	Avg
1000's/A	plants/A	DAP[1]	inches	0-9[2]	>6/64	<5/64	g	lbs/bu	%	bu/A	bu/A	bu/A
500	470171	61	V3	0	97	1	58	48.2	11.6	96.9	91.4	94.2
750	655474	60	31	0	96	1	55	49.0	11.3	102.6	103.0	102.8
1000	771634	60	V3	0	97	1	55	48.8	11.1	110.1	98.4	104.2
1250	898857	61	30	0	97	1	52	49.4	11.3	108.1	99.9	104.0
1500	1015017	61	V3	0	97	1	53	49.4	11.3	113.3	103.7	108.5
1750	1161600	59	30	1	98	1	51	49.6	11.0	111.7	116.1	113.9
Trial Mean	828792	60	V3	0	97	1	54	49.1	11.3	107.1	102.1	--
C.V.%	10.8	1.1	3.9	156	0.7	87	1.8	0.8	2.8	4.2	7.8	--
LSD 0.05	162474	1	V3	NS	NS	NS	2	0.7	NS	8.1	11.8	--

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

NS = no statistical difference between varieties.

Variety: ND Genesis
Planting Date: May 3
Harvest Date: August 10
Previous Crop: 2014 = flax, 2015 = soybean
Tillage: No-till
Soil Type: Williams Loam

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.	n[5]
AAC Justice	AAFC/MN	2015	White	Tall	Strong	L	S	R	NA	Good	NA
Assiniboia	AAFC	1997	Red	Med	Strong	L	S	S	T	Good	M/L
AC Kaufman	AAFC	2000	Yellow	Tall	Strong	L	S	S	MT	V.good	M/L
AC Pinnacle	AAFC	1999	White	Tall	Med.	L	S	S	S	V.good	L
Beach	ND	2004	White	Tall	M.strg.	M/L	S	MR/MS	MS	V.good	M
Buff	SD	2002	less	Med.	M.strg.	L	S	MR/MS	MT	Good	H
CDC Dancer	Sask.	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 Weaver	Sask.	2005	Yellow	Med.	M.strg.	L	S	S	S	Good	M
Deon	MN	2013	Yellow	Tall	Strong	L	S	R	T	V.good	
Furlong	AAFC	2003	Red	Tall	M.strg.	L	S	S	T	V.good	M
Goliath	SD	2013	White	Tall	Med.	L	NA	MR/MS	NA	Good	M
Hayden	SD	2015	White	Med	Med.	M	S	MR/MS	MT	V.good	M
HiFi	ND	2001	White	Tall	Strong	L	MR/MS	S	T	Good	M
Horsepower	SD	2012	White	Short	Strong	E/M	MS	S	MT	V.good	M/H
Hytest	SD	1986	White	Tall	M.strg.	E	S	MS	S	V.good	H
Jury	ND	2012	White	Tall	M.strg.	M	R	S	MT	V.good	M
Killdeer	ND	2000	White	Med.	Strong	M	S	MS	MT	Good	M
Leggett	AAFC	2005	White	Tall	Strong	L	MR	R	S	Good	M
Loyal	SD	2000	Ivory	Tall	M.strg.	L	S	MR	T	Good	M/H
Maida	ND	2005	Yellow	Med.	Strong	M	R	S	MS	V.good	M/H
Morton	ND	2001	White	Tall	V.strg.	L	S	S	MT	V.good	M
Newburg	ND	2011	White	Tall	Med.	L	R	S	MT	Good	M
Otana	MT	1977	White	M.tall	M.weak	L	S	S	S	V.good	M/L
Paul	ND	1994	less	V.tall	Strong	L	R	MR/MS	T	Good	H
Rockford	ND	2008	White	Tall	Strong	L	S	S	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	S	NA	V.good	NA
Souris	ND	2006	White	Med.	Strong	M	MS	S	MS	V.good	M
Stallion	SD	2006	White	Tall	Med.	L	S	MR	NA	V.good	M
Stark	ND	2004	less	Tall	M.strg.	L	R	MR/MS	T	V.good	M
Streaker	SD	2008	less	Tall	M.weak	M	S	R/MR	NA	V.good	M/H
Summit	AAFC	2008	White	Med.	Strong	L	S	S	MT	Good	M

[1] AAFC = Agriculture & Agri-Food Canada, MN = University of Minnesota, MT = Montana State University, ND = North Dakota State University, SD = South Dakota State University, Sask. = Saskatchewan.

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

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

[4] Barley Yellow Dwarf Virus: S = susceptible, MS = moderately susceptible, MT = moderately tolerant, T = 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.

Source: NDSU Extension Bulletin A1049-16

Oat Variety Trial at Minot

Variety	Days to Head	Plant Height	Lodging	Test Weight	Grain Yield 2014	2015	2016	---- Average ---- 2 year	3 year
	[1]DAP	inches	[2]0-9	lb/bu	bu/A				
CDC Minstrel	59	40	0	39.4	157.4	137.2	159.6	148.4	151.4
Beach	55	41	1	42.2	159.3	149.0	144.4	146.7	150.9
Furlong	55	43	1	40.0	143.1	142.4	152.7	147.6	146.1
CDC Dancer	54	40	5	37.8	147.2	143.2	140.1	141.6	143.5
Stallion	55	35	1	38.0	174.1	134.7	121.6	128.2	143.5
Deon	56	43	1	41.5	159.9	102.7	164.8	133.7	142.5
AC Pinnacle	57	41	1	40.3	132.8	130.4	150.9	140.6	138.0
Hytest	55	42	1	41.4	142.6	118.9	144.2	131.5	135.2
Leggett	60	41	0	39.2	148.5	118.8	136.8	127.8	134.7
Goliath	55	42	0	40.8	115.8	137.1	150.2	143.7	134.4
Newberg	54	39	2	41.3	144.3	108.2	147.6	127.9	133.4
HiFi	53	43	3	38.9	111.7	128.6	154.2	141.4	131.5
Jury	54	39	1	39.9	136.3	118.5	136.4	127.5	130.4
Souris	55	41	1	40.9	135.8	98.2	145.7	122.0	126.6
Killdeer	53	40	1	40.6	129.6	120.4	129.2	124.8	126.4
Otana	52	40	2	40.0	120.1	109.8	136.3	123.0	122.1
Rockford	56	47	1	42.2	123.9	107.9	128.7	118.3	120.2
Paul	58	42	1	45.0	111.8	121.0	102.0	111.5	111.6
Haydon	55	39	0	41.6			160.6		
Trial Mean	55	41	1	40.0	137.8	123.9	145.7	--	--
C.V.%	1.7	3.9	99	1.8	6.4	9.9	8.8	--	--
LSD 5%	2	3	1	1.2	12.4	17.2	21.0	--	--
LSD 10%	1	2	1	1.0	10.3	14.3	17.5	--	--

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

Planted on May 4 with a seeding rate of 1 million PLS/A and harvested on August 8.

Previous Crop: 2013 = soybean & 2015, 2014 = flax.

Soil Type: Williams Loam

Hard Winter Wheat Variety Descriptions

			Reaction to Disease[1]							
Variety	Agent or Origin[2]	Year	Stripe Rust	Leaf Rust	Stem Rust	Scab	Maturity[3]	Straw[4] Strength	Height[5] (inches)	Winter[6] Hardiness
AAC Gateway	A.Can.	2012	R/MR	MR/MS	R	MS	0	3	30	3
Accipiter	CDC	2008	R/MR	MS	R	S	0	4	36	2
Art	Agripro	2008	R	R	R	MS	-6	4	33	8
Boomer	WB	2009	MS	MR	R	S	-2	4	34	3
Broadview	A.Can.	2008	MR/MS	R	R	S/VS	-2	5	32	4
Carter	WB	2010	S	NA	NA	S	-2	4	32	6
CDC Chase	CDC	2013	R	R	R	MS	-2	6	37	4
CDC Falcon	WB	2000	R	MS	NA	S	-2	5	34	4
Colter	MT	2013	MR	S	R	S	-1	3	36	5
Darrell	SD	2006	NA	S	R	MS	-4	4	35	6
Decade	MT/ND	2010	S	VS	R	VS	-4	4	35	2
Emerson	A.Can.	2011	R	MS	R	MR	-2	4	33	3
Flourish	A.Can.	2010	R/MR	MS	MS	S	-4	5	35	2
Hawken	Agripro	2007	S	MR	MR	S	-5	4	28	7
Ideal	SD	2011	MR/MS	R	MR	S	-3	5	33	5
Jerry	ND	2001	S	MR	R	S	0	4	37	3
Loma	**MT**	**2016**	**R**	**NA**	**R**	**S**	**0**	**2**	**34**	**3**
Lyman	SD	2008	MR/MS	R	R	MR	-4	7	35	5
McGill	ARS-NE	2010	MS	MS	MR	MS	-5	4	36	4
Moats	A. Can.	2010	R	R	R	MR	0	5	38	2
Northern	MT	2015	R	S	R	S	+1	NA	35	6
Overland	NE	2006	MR	MR/R	MR	S	-4	4	35	5
Peregrine	CDC	2008	R	MR	R	MS	+1	4	39	2
Radiant[7]	A. Can.	2001	R	S	S	S	+1	2	36	2
Redfield	SD	2013	MR/MS	MS	S	MR	-3	R	33	5
Ruth	**NE**	**2016**	**MS**	**MS**	**MR**	**MS**	**-3**	**3**	**32**	**5**
Smoky Hill	WB	2007	S	R	R	S	0	5	35	7
Striker	WB	2009	MS	MR	R	S	-4	4	32	5
SY Monument	Agripro	2014	MR	MR	NA	MS	-1	4	32	4
SY Sunrise	Agripro	2015	MR	NA	NA	MS	-4	5	31	5
SY Wolf	Agripro	2010	MR	MR	R	MS	-4	4	33	6
WB-Grainfield	WB	2013	MS	MS	NA	S	-5	6	33	6
WB- Matlock	WB	2010	MS	MS	R	MS	+1	4	36	2
WB4614	WB	2013	R	NA	NA	S	0	5	35	3
Wesley	NE/SD/WY	2000	MR	MS	R	S	-5	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] A.Can. = Agriculture and Agri-Food Canada, CDC = Crop Development Centre:University of Saskatchewan, WB = WestBred, SD = South Dakota State University, MT = Montana State University, ND = North Dakota 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 environments, 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.

Source: NDSU Extension Bulletin A1196-16

Hard Red Winter Wheat Variety Trial at Minot

							Grain Yield				
	Spring	Heading	Plant		Test	Grain				--Average--	
Variety	Stand	Date	Height	Lodging	Weight	Protein	2013	2014	2016	2 year	3 year
	%	June	inches	0-9*	lbs/bu	%	---------- bushels per acre ----------				
AC Broadview	97	5	32	1	59.9	12.4	115.0	72.5	85.6	79.1	91.0
WB Matlock	98	6	33	1	60.4	13.0	111.8	73.9	85.7	79.8	90.5
Ideal	97	5	30	0	60.4	12.3	115.4	68.4	84.0	76.2	89.3
Peregrine	93	7	34	2	60.7	11.2	113.9	69.7	83.5	76.6	89.0
Accipiter	91	8	30	1	61.1	11.7	115.9	68.9	79.2	74.0	88.0
Decade	82	4	30	0	60.7	14.4	112.0	69.8	82.0	75.9	87.9
Moats	83	7	33	1	60.6	12.0	116.8	64.7	79.3	72.0	86.9
Redfield	96	4	28	1	60.2	13.4	119.4	62.6	75.0	68.8	85.7
Flourish	96	5	31	1	60.0	13.3	112.9	64.8	78.2	71.5	85.3
Jerry	94	6	31	1	59.1	12.8	103.4	64.3	84.9	74.6	84.2
Lyman	99	2	30	1	60.4	13.9	102.9	68.2	81.5	74.8	84.2
SY Wolf	96	4	30	0	61.3	13.3	111.7	62.8	77.1	69.9	83.9
Overland	94	3	30	1	59.9	13.6	102.9	61.1	68.3	64.7	77.4
AC Emerson	97	7	32	1	60.7	13.2	--	65.8	82.2	74.0	--
AC Gateway	96	4	28	0	60.3	13.3	--	59.0	83.7	71.3	--
Colter	85	7	28	1	57.8	12.9	--	64.2	65.5	64.9	--
Loma	96	7	26	1	60.0	12.9	--	--	95.2	--	--
SY Monument	99	4	28	1	60.0	12.1	--	--	85.4	--	--
Northern	95	7	30	0	59.8	12.5	--	--	84.6	--	--
CDC Chase	92	5	35	1	60.5	11.7	--	--	82.1	--	--
Ruth	98	3	28	1	60.3	13.4	--	--	75.8	--	--
WB4614	92	5	27	0	57.8	11.8	--	--	73.9	--	--
SY Sunrise	84	3	27	0	61.0	12.8	--	--	68.2	--	--
Trial Mean	92	5	31	1	60.0	13.1	109.0	64.7	77.9	--	--
C.V. %	11.9	12.5	4.8	87	0.8	2.7	6.8	11.6	5.3	--	--
LSD 0.05	15	1	2	1	0.7	0.5	11.2	8.5	5.9	--	--
LSD 0.10	13	1	2	1	0.6	0.4	9.1	7.1	4.9	--	--

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

Planting Date: September 23, 2015
Harvest Date: July 29, 2016
Seeding Rate: 1.3 million live seeds / acre
Previous Crop: 2012 = durum, 2013 = prevent plant, 2015 = spring wheat
Soil Type: Williams loam

Winter Rye Variety Trial at Minot

Variety	Winter Survival	Heading Date	Plant Height	Lodging	Test Weight	Grain Yield 2012	Grain Yield 2016	Grain Yield 2 yr avg
	%	May	inches	0-9*	lbs/bu	---- bushels per acre ----		
ND Dylan	99	29	50	2	54.4	71.6	95.2	83.4
Dacold	98	31	54	2	53.4	69.8	80.6	75.2
Hancock	99	27	52	2	54.8	69.0	78.3	73.6
Spooner	98	28	51	3	54.5	55.7	79.3	67.5
Aroostok	99	26	54	3	53.7	48.5	59.0	53.8
Muskateer	97	28	54	4	55.0	--	81.9	--
Rymin	99	27	49	2	54.8	--	77.5	--
Trial Mean	98	28	52	3	54.3	60.9	77.5	--
C.V. %	1.0	2.0	2.3	33.4	0.8	5.3	4.6	--
LSD 0.05	1	1	2	1	0.6	3.9	5.2	--
LSD 0.10	1	1	1	1	0.5	3.1	4.3	--

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

Planting Date: September 23, 2015
Harvest Date: July 29, 2016
Seeding Rate: 1 million live seeds / acre
Previous Crop: 2011 & 2015= soybean
Soil Type: Williams loam

Proso Millet Variety Trial at Minot

Variety	Days to Head	Plant Height	Test Weight	Seed Yield
	DAP[1]	inches	lbs/bu	lbs/A
Horizon	56	42	54.3	2463
Sunrise	57	47	53.7	2299
Earlybird	57	48	53.9	2219
Huntsman	57	47	53.9	2084
Dawn	48	45	52.7	1896
Plateau	47	41	51.0	1886
Trial Mean	54	45	53.2	2141
C.V.%	0.9	3.7	1.0	10.3
LSD 5%	1	3	1.0	400
LSD 10%	1	2	0.8	325

[1] *Days after Planting*

Planting Date: June 9
Harvest Date: September 14
Seeding Rate: 30 lbs/A
Previous Crop: soybean
Tillage: No-till
Soil Type: Williams Loam

Grain Corn Variety Trial using Twin-Row Spacing at Minot

Company	Hybrid	Relative Maturity	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield
		days	DAP**	inches	%	lbs/bu	bu/A
NuTech	5N-183	83	63	42	22	53.2	187
NuTech	X5G-8001	80	62	40	19	57.4	113
NuTech	X5B-8403	84	66	39	24	53.2	158
NuTech	5N-886	86	65	40	22	53.7	157
NuTech/G2 Genetics	5F-781	81	65	47	21	51.9	155
NuTech/G2 Genetics	5F-775	75	61	41	20	56.0	137
NuTech/G2 Genetics	5F-379	79	63	42	18	52.2	155
Integra	2803 VT2PRIB	78	62	43	19	56.4	134
Integra	3142 VT2PRIB	81	64	37	18	55.4	102
Integra	3236 VT2PRIB	82	66	41	20	53.0	111
Integra	3537 VT2PRIB	85	65	41	23	53.0	130
Legacy	L-1814 VT2PRO	79	63	39	19	57.2	135
Legacy	L-2213 VT2PRO	80	62	40	19	56.2	145
Legacy	L-2245 VT2PRO	82	63	40	23	57.8	130
Legacy	L-2314 VT2PRO	83	63	43	21	51.9	152
Syngenta	N07H 3110	77	63	37	18	55.7	156
Syngenta	N08L 3010	78	61	37	22	58.1	131
Syngenta	N15J 3110	82	65	40	20	52.5	143
Syngenta	N17R 3010A	84	65	36	27	55.9	132
Latham	LH 2937 VT2Pro	79	62	39	19	58.4	139
Latham	LH 3032 RR	80	64	41	18	54.8	139
Latham	LH 3397 VT2 Pro	83	62	37	20	53.2	106
REA Hybrids	1B790-RIB	79	62	40	18	58.2	142
REA Hybrids	1B820-RIB	82	63	41	21	55.9	129
REA Hybrids	2B840-RIB	84	66	39	19	51.1	150
Proseed	1280 VT2P	80	63	38	22	54.6	114
Proseed	1480 VT2P	80	63	39	20	57.5	141
Proseed	1383 VT2P	83	64	36	20	53.1	126
Proseed	1283 VT2P	83	62	39	22	58.2	145
Proseed	1483 VT2P	83	62	40	23	54.2	144
Wensman	W80761VT2RIB	76	60	37	20	56.8	106
Wensman	W80809VT2RIB	80	62	42	19	57.8	134
Wensman	W80818VT2PRO	81	64	40	21	51.3	114
Wensman	W80827VT2RIB	82	64	42	20	54.5	134
Wensman	W8083VT2RIB	82	64	40	20	54.2	141
Peterson Farms Seed	PFS21N78	78	62	39	18	54.9	124
Peterson Farms Seed	PFS71C80	80	62	38	21	54.5	119
Peterson Farms Seed	PFS71D83	83	63	38	20	55.9	139
Hefty Seed	H2802	78	64	40	18	55.0	123
Hefty Seed	H2602	76	62	37	24	57.1	109
Hefty Seed	H3202	82	63	40	20	54.9	136
Hefty Seed	H3302	83	62	42	22	52.7	147
Trial Mean			63	40	20	55.0	135
C.V.%			1.9	6.0	10.7	3.1	10.8
LSD 5%			2	4	4	2.8	24
LSD 10%			2	3	3	2.3	20

***DAP = Days after planting.*

Planting Date: June 3
Harvest Date: November 9
Plant Population: 28,000 Plants/A
Row Spracing: 30" Twin-Row
Soil Type: Williams Loam
Previous Crop: soybean
Note: Test weights and yields are adjusted to 15.5% moisture.

Grain Corn Variety Trial using Strip Tillage* at Minot

Company/Brand	Hybrid	Relative Maturity	Days to Silk	Ear Height	Harvest Moisture	Test Weight	Grain Yield 2014	2015	2016	--Average-- 2 year	3 year
		days	DAP**	inches	%	lbs/bu	bu/A				
NuTech	5N-183	83	65	42	24	59.0	168	167	202	185	179
NuTech	X5G-8001	80	63	38	21	60.9	--	--	141	--	--
NuTech	X5B-8403	84	66	38	21	57.6	--	--	181	--	--
NuTech	5N-886	86	66	39	25	60.3	--	--	173	--	--
NuTech/G2 Genetics	5F-781	81	65	46	23	57.6	--	152	185	168	--
NuTech/G2 Genetics	5F-775	75	63	43	19	57.0	--	131	153	142	--
NuTech/G2 Genetics	5F-379	79	63	41	21	58.6	--	135	185	160	--
Integra	2803 VT2PRIB	78	65	43	20	59.7	140	122	140	131	134
Integra	3142 VT2PRIB	81	64	44	21	59.3	155	121	160	140	145
Integra	3236 VT2PRIB	82	66	46	24	60.5	--	--	175	--	--
Integra	3537 VT2PRIB	85	67	44	24	58.9	--	163	169	166	--
Legacy	L-1814 VT2PRO	79	65	43	24	61.7	147	129	167	148	148
Legacy	L-2213 VT2PRO	80	63	37	21	60.2	163	143	135	139	147
Legacy	L-2245 VT2PRO	82	65	44	20	59.4	--	--	184	--	--
Legacy	L-2314 VT2PRO	83	65	44	21	59.0	145	150	147	149	147
Syngenta	N07H 3110	77	66	45	21	60.9	--	--	193	--	--
Syngenta	N08L 3010	78	63	43	20	58.9	--	--	155	--	--
Syngenta	N15J 3110	82	67	44	24	60.3	--	--	187	--	--
Syngenta	N17R 3010A	84	68	40	27	60.7	--	--	159	--	--
Latham	LH 2937 VT2Pro	79	65	45	23	60.9	--	141	175	158	--
Latham	LH 3032 RR	80	64	43	23	59.0	--	--	167	--	--
Latham	LH 3397 VT2 Pro	83	64	37	21	58.6	--	135	128	132	--
REA Hybrids	1B790-RIB	79	66	45	22	60.6	145	134	148	141	142
REA Hybrids	1B820-RIB	82	64	44	22	59.4	146	132	152	142	143
REA Hybrids	2B840-RIB	84	65	43	25	58.5	--	147	195	171	--
Proseed	1280 VT2P	80	65	41	20	59.0	135	120	146	133	134
Proseed	1480 VT2P	80	65	44	22	58.5	--	133	127	130	--
Proseed	1383 VT2P	83	65	40	22	57.6	155	114	171	142	147
Proseed	1283 VT2P	83	64	38	22	60.6	126	103	160	132	130
Proseed	1483 VT2P	83	65	43	24	59.4	--	--	137	--	--

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Grain Corn Variety Trial using Strip Tillage* at Minot Continued

							Grain Yield				
		Relative	Days to	Ear	Harvest	Test				--Average--	
Company/Brand	Hybrid	Maturity	Silk	Height	Moisture	Weight	2014	2015	2016	2 year	3 year
		days	DAP**	inches	%	lbs/bu	----------bu/A----------				
Wensman	W80761VT2RIB	76	62	40	20	60.3	--	--	121	--	--
Wensman	W80809VT2RIB	80	65	43	21	60.3	148	140	178	159	155
Wensman	W80818VT2PRO	81	65	40	20	57.8	--	--	176	--	--
Wensman	W80827VT2RIB	82	65	44	21	58.8	138	129	178	154	148
Wensman	W8083VT2RIB	82	65	45	22	60.7	152	149	174	162	158
Peterson Farms Seed	PFS21N78	78	65	42	23	60.2	--	128	143	136	--
Peterson Farms Seed	PFS71C80	80	65	38	20	60.1	--	--	150	--	--
Peterson Farms Seed	PFS71D83	83	64	38	21	60.2	134	132	142	137	136
Hefty Seed	H2802	78	64	44	20	59.1	--	--	170	--	--
Hefty Seed	H2602	76	62	43	22	61.6	--	--	167	--	--
Hefty Seed	H3202	82	64	41	21	59.3	--	--	155	--	--
Hefty Seed	H3302	83	64	43	22	58.8	--	--	174	--	--
Trial Mean			65	42	22	59.5	141	132	163	--	--
C.V.%			1.3	6.3	9.1	2.4	5.4	8.2	12.6	--	--
LSD 5%			1	4	3	2.3	11	15	33	--	--
LSD 10%			1	4	3	1.9	9	13	28	--	--

**Spring strip till created with a Dawn Equipment Pluribus system.* ***DAP = Days after planting.*

Planting Date: May 20 *Harvest Date: October 20*
Plant Population: 28,000 Plants/A *Row Spracing: 30"*
Soil Type: Williams Loam *Previous Crop: 2013 = Barley, 2014 & 2015 = soybean*
Note: Test weights and yields are adjusted to 15.5% moisture.

Silage Corn Variety Trial at Minot

Company	Hybrid	Relative Maturity	Days to Silk	Plant Height	Harvest Moisture	Crude Protein	TDN	Yield 65% moist
			DAP[1]	inches	%	%	%	tons/A
REA	4B302-RHDS	93	87	118	67	5.7	70	13.87
REA	5A981-RIB	98	85	128	65	4.4	67	13.50
REA	4V970-RHDS	96	89	120	68	4.6	69	15.31
REA	5R780-HDS	102	88	124	69	4.5	67	13.00
Wensman	W8285VT2RIB	98	84	121	67	5.2	69	15.75
Wensman	W80928VT2RIB	92	83	125	64	5.0	69	16.12
Wensman	W80880VT2RIB	88	80	123	62	5.5	72	13.25
Wensman	W80874VT2PRO	87	80	115	63	4.3	72	13.83
Trial Mean			85	122	66	4.9	69	14.30
C.V.%			1.9	3.3	2.3	--	--	7.5
LSD 5%			3	7	3	--	--	1.88
LSD 10%			2	6	2	--	--	1.54

[1] *DAP = days after planting*

Planting Date: May 20
Harvest Date: September 22
Plant Population: 28,000 plants/A
Row Spacing: 30"
Tillage: Strip till
Previous Crop: soybean
Soil Type: Williams Loam

Yellow Mustard Variety Trial at Minot

Variety	Days to 1st Flower	Days to Last Flower	Days to Maturity	Plant Height	Lodging	Test Weight	Seed Yield
	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	lbs/bu	lbs/A
Tilney	40	69	81	30	1	52.7	1628
Andante	42	71	81	34	1	54.6	1604
Trial Mean	41	70	81	32	1	53.6	1616
C.V.%	0.0	0.6	0.0	1.6	49	3.0	11.0
LSD 5%	1	1	NS	2	NS	NS	NS
LSD 10%	1	1	NS	1	NS	NS	NS

[1] *DAP = Days after planting.* [2] *Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.

Trial was planted on May 16 at 9 lbs/A and harvested on September 1.
Previous Crop: soybean
Tillage: No-till
Soil Type: Williams Loam

Roundup Ready Canola Variety Trial at Minot

Company	Variety	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Lodging	Oil Content	Seed Yield 2014	2015	2016	--Average-- 2 year	3 year
		DAP[1]	days	DAP[1]	inches	0-9[2]	%	pounds / acre				
CROPLAN	HyCLASS 930	41	21	86	44	0	49.8	2606	2338	3234	2786	2726
CROPLAN	HyCLASS 955	40	21	84	48	1	47.8	2886	2270	3111	2690	2756
CROPLAN	HyCLASS 970	42	19	89	49	0	47.6	--	2657	3684	3170	--
CROPLAN	HyCLASS 972	43	22	86	53	1	46.0	--	2442	3090	2766	--
Nuseed	GT50	40	22	86	43	2	44.3	--	--	3076	--	--
Nuseed	NCH13G046	41	23	86	47	4	42.6	--	--	3256	--	--
Cargill	V12-1	44	20	89	49	2	46.7	2461	2363	3092	2728	2639
Cargill	V12-3	43	21	90	50	1	46.7	--	--	3156	--	--
Cargill	V22-1	43	22	89	48	2	44.6	--	2166	2484	2325	--
DL Seeds	H1509	41	22	89	50	3	45.0	--	1831	3211	2521	--
DL Seeds	H1614	41	20	84	47	1	45.8	--	--	3071	--	--
DL Seeds	H1620	42	22	87	47	1	45.2	--	--	3116	--	--
BrettYoung	6074 RR	42	23	89	48	2	47.5	--	2444	3106	2775	--
BrettYoung	6080 RR	41	22	87	44	1	45.6	--	--	3435	--	--
BrettYoung	BY16-768	42	21	88	46	1	47.5	--	--	2125	--	--
BrettYoung	BY15-754	42	20	87	44	2	46.0	--	--	3151	--	--
Dekalb	DKL70-07	42	20	87	47	0	46.6	2610	2455	2984	2720	2683
Dekalb	DKL70-10	42	21	89	49	1	45.0	--	2551	3603	3077	--
Dekalb	DKL70-50CR	42	21	88	51	1	47.2	--	2775	3477	3126	--
Dekalb	DKL71-14BL	40	22	88	48	2	48.4	--	--	3017	--	--
Dekalb	DKL38-48	41	21	88	49	3	46.2	2671	2381	3766	3074	2939
Dekalb	DKL30-20	41	19	84	53	2	47.5	--	2352	2895	2624	--
Proseed	300 Mag	41	21	86	48	2	48.3	2885	2640	3604	3122	3043
Proseed	PS 5000	41	21	87	47	2	45.5	--	2519	2779	2649	--
Canterra	CS2000	42	21	88	47	1	46.6	--	--	3162	--	--
Canterra	CS2100	42	21	88	46	1	46.5	--	--	3515	--	--
Integra	7150RR	41	21	87	49	1	48.3	--	2027	3245	2636	--
Integra	7257RR	41	22	82	45	1	46.2	--	--	3400	--	--
Dyna-Gro	DG533G	42	24	86	51	1	45.7	--	--	3923	--	--
Dyna-Gro	DG531G	41	21	83	50	1	46.3	--	--	2868	--	--
Mycogen	1012RR	46	19	92	56	3	44.9	2503	1826	3090	2458	2473
Mycogen	1020RR	44	21	91	48	2	45.1	--	1777	2613	2195	--
Mycogen	1022RR	46	20	92	52	4	45.3	--	1720	2629	2174	--
Trial Mean		42	21	88	48	2	46.3	2549	2324	3148	--	--
C.V.%		1.9	4.8	2.6	5.9	86	2.4	10.7	7.2	9.5	--	--
LSD 5%		1	2	4	5	2	1.8	388	234	487	--	--
LSD 10%		1	1	3	4	2	1.5	322	196	407	--	--

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

Trial was planted on May 9 with a seeding rate of 9 lbs/A and harvested on August 17.

Previous Crop: 2014 = soybean, 2013 = spring wheat, 2012 = durum.

Soil Type: Williams Loam

Oil content and seed yields are adjusted to 8.5% moisture.

Non-Roundup Ready Canola Variety Trial at Minot

Company	Variety	Herbicide System	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Lodging	Oil Content	Seed Yield 2014	2015	2016	----Average---- 2 year	3 year
			DAP*	days	DAP*	inches	0-9**	%	---------- lbs/A ----------				
Cibus	C1511	SU	43	24	86	47	0	41.4	--	2070	2293	2182	--
Cibus	C1516	SU	44	23	86	45	0	44.0	--	1874	2582	2228	--
Cibus	C5507	SU	43	21	86	45	0	46.1	--	--	2601	--	--
Cibus	C5522	SU	43	23	88	44	0	45.4	--	--	2439	--	--
Cibus	C5513	SU	43	24	85	46	0	44.6	--	--	2301	--	--
Croplan	XCEED 121CL	CL	39	30	85	50	0	35.0	--	--	1440	--	--
Canterra	CS2200 CL	CL	43	25	86	46	0	46.5	--	--	2747	--	--
Dyna-Gro	DG200CL	CL	44	23	86	48	1	45.4	--	--	3390	--	--
Dyna-Gro	XCEED X122CL	CL	36	27	84	39	0	36.6	--	--	1841	--	--
Mycogen	2020CL	CL	44	23	87	43	1	46.3	1994	2095	2497	2296	2195
Mycogen	2022CL	CL	43	21	87	44	0	45.1	--	--	2624	--	--
Mycogen	CL3701975H	CL	41	22	86	42	0	46.2	--	--	2745	--	--
Bayer	InVigor L140P	LL	41	21	85	45	1	44.5	2770	2412	3133	2772	2772
Bayer	InVigor L130	LL	43	22	87	47	1	43.2	2344	1967	2891	2429	2401
Bayer	InVigor L157H	LL	43	23	87	46	1	45.1	--	--	2687	--	--
Bayer	InVigor L230	LL	41	20	84	43	0	44.8	--	--	2986	--	--
Bayer	InVigor L233P	LL	43	21	86	45	0	45.9	--	--	3198	--	--
Bayer	InVigor L252	LL	44	21	86	47	0	47.9	2345	2141	2939	2540	2475
Trial Mean			42	23	86	45	0	44.1	2403	2033	2611	--	--
C.V.%			2.1	4.4	1.1	5.7	116	2.5	7.7	6.2	7.5	--	--
LSD 5%			1	2	2	4	NS	1.8	149	150	326	--	--
LSD 10%			1	1	1	4	NS	1.5	182	183	271	--	--

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

NS = no statistical difference between varieties.

Trial was planted on May 16 with a seeding rate of 9 lbs/A and harvested on August 26.

Previous Crop: 2013 = spring wheat, 2014 & 2015 = soybean

Soil Type: Williams Loam

Oil content and seed yields are adjusted to 8.5% moisture.

Biological Products on Canola at Minot

Product*	Application Rate	Application Timing	Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	Lodging	Oil Content	Seed Yield
	per acre		[a]DAP	Days	[a]DAP	inches	[b]0-9	%	lbs/A
Untreated	--	--	41	21	83	46	1	49.2	3030
*Pathway Power Blend	32 oz	4 leaf	41	21	83	45	1	49.1	3091
*Kelpak - seed treatment	8 oz/kwt	seed	41	21	84	46	2	49.2	2850
*Kelpak - foliar treatment	32 oz	4 leaf	41	21	83	48	2	49.7	2852
*ATG FF Canola / *ATG Green Miracle	51 oz / 14 oz	4 leaf / bolting	42	20	84	46	2	48.4	3114
*ATG FF Canola + *ATG Crop Booster / *ATG Green Miracle	51 oz + 14 oz / 14 oz	4 leaf / bolting	41	21	83	43	2	49.8	3480
Trial Mean			41	21	83	46	2	49.3	3024
C.V.%			1.8	4.0	0.8	2.4	51	1.3	8.4
LSD 5%			NS	NS	NS	1	NS	NS	308
LSD 10%			NS	NS	NS	1	NS	0.4	254

**Pathway Power Blend is marketed by Pathway Biologic, LLC, Plant City, FL.*

**Kelpak is marketed by Gavilon Fertilizer, Moorhead, MN.*

**ATG Green Miracle, ATG FF Canola and ATG Crop Booster are marketed by ASLE Technologies Group, Canada.*

[a] *Days after Planting*

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

NS = no statistical difference between treatments.

Planting Date: May 9
Harvest Date: August 17
Soil Type: Williams Loam

Variety: HyCLASS 947
Previous Crop: wheat
Tillage: Minimum Till

Agriplier™ Seed Treatment on No-Till Spring Canola at Minot

Treatment	Seedling Vigor	Days to 10% Bloom	Days to 90% Bloom	Days to Maturity	Plant Height	Lodging	Oil Content	Seed Yield
	1-3*	DAP**	DAP**	DAP**	inches	0-9***	%	lbs/A
Untreated	2.5	40	61	84	42	1	50.6	3591
Agriplier ST	2.5	40	61	84	41	1	49.6	3410
Agriplier LTE	2.5	40	61	84	44	1	50.0	3510
Trial Mean	2.5	40	61	84	42	1	50.1	3503
C.V.%	20.7	0.7	1.0	1.1	3.3	0.0	1.9	5.9
LSD 5%	NS	NS	NS	NS	2	NS	NS	NS

**Seedling Vigor:1 = Poor, 2 = Good, 3 = Excellent*
***DAP = Days after planting.*
****Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between treatments.

Planting Date: May 9
Variety: HyCLASS 930
Harvest Date: August 17
Seeding Rate: 8 lbs / acre
Previous Crop: Spring Wheat
Soil Type: Williams loam
Oil content and seed yields are adjusted to 8.5% moisture.
Seedling Emergence: May 20 for all treatments.

Carinata Variety Trial at Minot

Variety	Days to Bloom	Bloom Duration	Days to Maturity	Plant Height	Lodging	Yield
	DAP[1]	days	DAP[1]	inches	0-9[2]	lbs/A
AAC A120	50	27	95	44	1	2449
20.111	51	25	94	37	0	2499
3A22.1	50	23	90	29	0	2200
5223	49	27	94	37	0	1991
M-01	50	27	94	33	0	1942
Canola L140P	43	25	89	41	1	3272
Trial Mean	49	26	93	37	0	2392
C.V.%	1.0	8.6	2.0	5.5	140	5.3
LSD 0.05	1	NS	3	4	NS	229
LSD 0.1	1	3	3	3	NS	186

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.*
NS = no statistical difference between varieties.
Trial was planted on May 16 with a seeding rate of 8 lbs/A and harvested on September 2.
Previous Crop: soybean.
Soil Type: Williams Loam

Seeding Rate Interactions with Row Spacing in Carinata at Minot

This trial was designed to investigate interactions between various seeding rates and row spacing of carinata in order to define optimal production practices with these variables.

Interactions

Row Spacing	Seeding Rate	Plant Stand	Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	Yield
	pls/A	plants/A	DAP*	days	DAP*	inches	lbs/A
10"	200,000	171,336	47	23	87	55	2450
	400,000	159,720	46	23	88	51	2378
	600,000	261,360	46	24	88	51	2171
	800,000	270,072	46	24	88	54	2501
20"	200,000	89,298	47	24	88	52	1754
	400,000	156,816	47	23	87	53	2119
	600,000	182,226	47	23	87	53	2049
	800,000	183,678	46	24	86	52	1960
30"	200,000	155,364	47	25	89	52	1824
Twin Row	400,000	213,444	46	24	88	53	2105
	600,000	258,456	47	24	89	52	1880
	800,000	278,784	47	25	89	55	2221
C.V. %		12.9	1.3	3.0	1.5	6.5	12.8
LSD 5%		36,861	NS	NS	NS	NS	389

Row Spacing Comparisons

Row Spacing	Plant Stand	Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	Yield
	plants/A	DAP*	days	DAP*	inches	lbs/A
10"	215,622	46	23	88	53	2375
20"	153,004	46	23	87	53	1970
30" Twin	226,512	47	24	88	53	2007
LSD 5%	38,400	NS	NS	NS	NS	203

Seeding Rate Comparisons

Seeding Rate	Plant Stand	Days to Bloom	Duration of Bloom	Days to Mature	Plant Height	Yield
pls/A	plants/A	DAP*	days	DAP*	inches	lbs/A
200,000	138,666	47	24	88	53	2009
400,000	176,660	46	24	87	53	2201
600,000	234,014	46	23	88	52	2033
800,000	244,178	46	24	88	54	2228
LSD 5%	37,131	NS	NS	NS	NS	NS

**DAP = days after planting.*
NS= no statistical difference.
Planting Date: June 2
Harvest Date: September 19
Variety = AAC A120
Soil Type: Williams Loam
Previous Crop: spring wheat
Tillage: Minimum Till

Summary: B. carinata is a new crop being developed as a renewable biofuel feedstock. Row spacing and planting rates have primarily been based on experience with canola and have not been studied in North Dakota. This trial was sown with a SRES precision planter using adjustable row units and seed singulation technologies. This initial study showed a significantly higher yield with 10 inch rows than with 20 inch rows or twin rows. Seeding rates appear to be self-limiting with the number of live plants remaining fairly constant despite increasing rates. There was no direct relationship between seeding rates and yield with this study. Results of this study should be viewed with caution and not as recommendations for production practices without further verification.

Carinata Fertility Trial at Minot

Applied Fertilizer*		Days to	Duration	Days to	Plant		Grain
Nitrogen	Sulfur	Bloom	of Bloom	Mature	Height	Lodging	Yield
pounds per acre		DAP**	DAP**	DAP**	inches	0-9***	lbs/A
25	0	51	28	93	33	1	1420
50	0	51	28	93	37	1	1942
100	0	51	28	93	35	1	1894
150	0	51	28	94	35	1	2032
26	5	50	29	93	35	1	1594
50	5	52	27	93	37	1	1493
100	5	51	28	93	42	1	1980
150	5	51	28	93	42	1	2261
31	10	50	29	93	39	1	2214
50	10	50	29	92	40	1	2480
100	10	51	28	93	40	1	1728
150	10	50	29	93	36	1	1965
39	20	51	28	93	38	1	1751
50	20	52	27	94	39	1	1805
100	20	51	28	93	35	1	2049
150	20	51	28	94	35	1	2027
Trial Mean		51	28	93	37	1	1915
C.V. %		2.0	3.6	1.3	8.8	19	15.7
LSD 5%		NS	NS	NS	NS	NS	503
LSD 10%		NS	NS	NS	5	NS	418

Combined Means: Nitrogen

*Total	Days to	Duration	Days to	Plant		Grain
Nitrogen	Bloom	of Bloom	Mature	Height	Lodging	Yield
lbs/A	DAP**	DAP**	DAP**	inches	0-9***	lbs/A
25	51	28	93	37	1	1745
50	51	28	93	39	1	1930
100	51	28	93	38	1	1913
150	51	28	94	37	1	2071
LSD 5%	NS	NS	NS	NS	NS	302

Combined Means: Sulfur

*Applied	Days to	Duration	Days to	Plant		Grain
Sulfur	Bloom	of Bloom	Mature	Height	Lodging	Yield
lbs/A	DAP**	DAP**	DAP**	inches	0-9***	lbs/A
0	51	28	93	35	1	1822
5	51	28	93	39	1	1832
10	51	28	93	39	1	2097
20	51	28	93	37	1	1908
LSD 5%	NS	NS	NS	3	NS	NS

**Total pounds of residual soil N + applied N from Urea and AMS, and total pounds of S from AMS applied in a mid-row band at planting.*
***Days after planting.*
****Lodging: 0 = none, 9 = lying flat on the ground.*

Planting Date: May 4
Variety = AAC A120
Previous Crop: Soybean
Soil Type: Williams loam
Soil Test (0-24"): N = 22 lbs/A, S = 146 lbs/A
Harvest Date: August 26
Seeding Rate: 6 lbs / acre
Tillage: No-till

Safflower Variety Descriptions

Variety	Origin[1]	PVP[2]	Hull Type[3]	Oil Type[4]	Irrigated Yield[5]	Dryland Yield[5]	Test Weight[5]	Oil[5]	Maturity	Tolerance[6] Alt	Tolerance[6] BB
Cardinal	MSU/NDSU	yes	N	high lino	v good	v good	high	fair	med	T	MT
Finch	MSU/NDSU	no	N	lino	good	v good	v high	fair	m early	MS	T
Hybrid 1601	STI	yes	STP	high oleic	v good	v good	med	good	m late	MT	MT
Hybrid 9049	STI	yes	N	high oleic	v good	v good	v high	fair	med	MT	MT
MonDak	MSU/NDSU	yes	N	high oleic	good	v good	high	fair	m early	T	MT
Montola 2000	MSU/NDSU	yes	N	high oleic	m good	good	med	good	early	MS	MS
Montola 2001	MSU/NDSU	yes	STP	high oleic	good	fair	med	good	med	MT	MT
Montola 2003	MSU/NDSU	yes	N	high oleic	v good	v good	m high	good	m early	MT	MT
Montola 2004	MSU/NDSU	yes	N	high oleic	good	good	m high	good	m early	MS	MT
Morlin	MSU/NDSU	yes	STP	high lino	v good	good	med	good	m late	T	T
Nutrasaff	MSU/NDSU	yes	RED	lino	good	good	med	high	med	T	MT

[1] *MSU = Montana State University, NDSU = North Dakota State University, STI = Safflower Technologies International*

[2] *PVP = Plant Variety Protection. "yes" indicates the variety is protected and the seed may be sold for planting purposes only as a class of certified seed (Title V option).*

[3] *STP = striped, N = normal, RED = reduced.*

[4] *Lino = linoleic.*

[5] *Relative ratings of yield, test weight and oil will vary under conditions of moderate-severe disease infestation.*

[6] *Alt = Alternaria leaf spot disease, BB = bacterial blight, S = susceptible, MS = moderately susceptible, MT = moderately tolerant, T = tolerant.*

Safflower Variety Trial at Minot

Variety	Days to Bloom	Plant Height	Test Weight	Oil Content	Seed Yield 2014	Seed Yield 2015	Seed Yield 2016	Seed Yield ----Average---- 2 Year	Seed Yield ----Average---- 3 Year
	DAP[1]	inches	lbs/bu	%	pounds per acre				
Linoleic Types									
Cardinal	70	23	44.6	33.3	893	2185	2228	2207	1769
Finch	69	24	44.5	35.4	686	2085	2378	2231	1716
NutraSaff	69	25	36.9	42.7	703	1834	1545	1689	1361
Oleic Types									
Hybrid 1601	69	25	39.7	34.3	693	2969	3213	3091	2292
Montola 2003	71	22	40.8	35.5	1143	2685	2194	2440	2007
MonDak	70	24	38.3	35.7	832	2074	2269	2171	1725
Trial Mean	69	24	40.6	34.7	833	2265	2305	--	--
C.V.%	1.2	7	3.1	2.4	8.4	6.7	5.1	--	--
LSD 5%	1	NS	1.8	1.9	105	220	175	--	--
LSD 10%	1	2	1.5	1.6	85	183	144	--	--

[1] *Days after Planting* *NS = no statistical difference between varieties.*

Planting Date: May 17 *Harvest Date: September 14*

Seeding Rate: 300,000 PLS/A (approx. 20 lbs/A)

Previous Crop: 2013 = durum, 2014 = soybean, 2015 = hrsw

Tillage: Minimum till

Soil Type: Williams Loam

Flax Variety Descriptions

Variety[1]	Origin[2]	Year Released	Relative Maturity	Seed Color	Plant Height	Wilt[3]
Bison	ND	1926	Med.	Brown	Med.	MR
Carter	ND	2004	Med.	Yellow	Med.	MS/MR
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 Neela	Can.	2013	Med. late	Brown	Med.	MR
CDC Plava	Can.	2015	Med.	Brown	Med.	MR
CDC Sanctuary	Can.	2012	Med.	Brown	Med.tall	MR
CDC Sorrel	Can.	2007	Med.late	Brown	Med.tall	MR
Gold ND	ND	2014	Med.	Yellow	Med.tall	MR/R
Hanley	Can.	2002	Med.early	Brown	Med.	R
Lightning	Can.	2002	Late	Brown	Med. tall	R
Linott	Can.	1966	Med.early	Brown	Med.	MS/MR
McGregor	Can.	1980	Late	Brown	Med.tall	MR
Neche	ND	1988	Med.	Brown	Med.	MR/R
Nekoma	ND	2002	Late	Brown	Med.	MR
Omega	ND	1989	Med.	Yellow	Med.	MS/MR
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
TAM F-201	TX	1974	Med. late	Yellow	Med. tall	NA
Webster	SD	1998	Late	Brown	Tall	MR
York	ND	2002	Late	Brown	Med.	MR/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, NA = not available.

Source: NDSU Extension Bulletin A1105-16

Flax Variety Trial at Minot

Variety	10% Bloom	Test Weight	Oil Content	Seed Yield 2013	2014	2016	----Average---- 2 year	3 year
	DAP[1]	lbs/bu	%	bushels per acre				
Gold ND	55	54.3	45.0	25.0	26.0	27.6	26.8	26.2
CDC Sorrel	55	53.3	44.3	26.8	24.9	26.6	25.8	26.1
CDC Sanctuary	54	53.2	43.9	26.6	24.8	26.7	25.8	26.0
Rahab 94	53	52.3	43.7	27.1	25.2	25.3	25.3	25.9
Carter	53	53.8	42.9	21.4	25.5	30.7	28.1	25.9
Nekoma	52	53.1	44.2	26.2	22.1	28.8	25.5	25.7
Prairie Thunder	53	53.7	43.0	26.1	23.6	26.1	24.8	25.3
Webster	55	53.8	44.2	23.3	23.9	28.0	26.0	25.1
CDC Glas	55	52.3	43.8	21.6	26.2	26.9	26.6	24.9
Pembina	54	53.1	44.5	32.6	15.1	26.3	20.7	24.7
Omega	52	53.2	42.9	22.7	22.3	23.8	23.0	22.9
Shape	49	53.1	44.2	20.4	24.2	22.4	23.3	22.3
York	52	53.5	43.4	19.0	23.7	23.9	23.8	22.2
CDC Bethume	52	54.0	43.7	17.3	23.8	24.3	24.0	21.8
Prairie Grande	50	51.6	44.2	21.0	21.5	21.7	21.6	21.4
Prairie Blue	54	52.3	43.6	23.7	18.4	20.1	19.3	20.7
Prairie Sapphire	50	50.8	44.1	22.4	20.1	15.7	17.9	19.4
CDC Neela	55	53.1	43.8	--	21.8	25.6	23.7	--
Bison	50	53.7	44.5	--	25.3	21.6	23.5	--
CDC Plava	50	52.9	44.3	--	--	19.2	--	--
Trial Mean	53	53.1	43.9	24.2	23.6	24.9	--	--
C.V.%	1.7	1.0	1.3	18.0	12.5	12.4	--	--
LSD 5%	2	0.9	0.9	7.1	4.1	5.0	--	--
LSD 10%	1	0.7	0.8	5.9	3.4	4.2	--	--

[1] *Days after Planting*

Planting Date: May 17 *Harvest Date: August 29*

Seeding Rate: 2.5 million PLS/A

Previous Crop: 2012 = summer fallow, 2013 & 2015 = spring wheat

Tillage: minimum-till

Soil Type: Williams Loam

Oil Type Sunflower Variety Trial at Minot

Company/Brand	Hybrid	Days to Bloom	Days to Mature	Stalk Lodging	Root Lodging	Plant Height	Oil	Test Weight	Yield 2014	Yield 2016
		DAP*	DAP*	%	%	inches	%	lbs/bu	----- lbs/A -----	
Syngenta	SY7717	66	112	9	6	56	40.9	33.2	2216	2689
Syngenta	NX64288	70	111	3	24	48	46.7	34.1	--	3493
Syngenta	NX64189	66	110	22	18	52	39.8	33.7	--	2419
Mycogen Seeds	8N270CLDM	63	102	26	16	50	39.2	34.4	--	2707
Mycogen Seeds	MY8H456CL	69	113	15	13	58	46.5	30.9	--	2499
Mycogen Seeds	8H449CLDM	69	110	11	29	55	47.0	33.3	1966	2969
Mycogen Seeds	8H288CLDM	65	106	18	24	52	44.7	34.0	2526	3029
Mycogen Seeds	8D310CL	69	110	2	8	59	34.9	30.8	2369	3259
Proseed	E-50061CL	68	113	34	22	60	40.0	32.0	--	2636
Proseed	12G25 CL	67	109	33	23	57	45.6	35.5	--	3361
Proseed	E-31 CL	68	112	13	17	59	38.7	31.8	2156	3694
Proseed	12G04	68	107	27	23	58	43.5	32.9	--	2634
Nuseed	Talon	65	104	16	18	53	39.7	31.3	1977	3176
Nuseed	Cobalt II	66	115	10	9	51	42.3	31.3	1928	3212
Nuseed	Camaro II	68	108	8	25	52	41.5	32.6	2456	2409
Nuseed	Hornet	70	109	25	24	54	42.3	32.3	2586	3054
Nuseed	N4HM354	65	105	27	28	52	40.9	34.8	--	3278
Nuseed	Falcon	68	112	10	18	56	43.2	36.2	1840	3083
Nuseed	Badger DMR	66	106	11	14	57	34.8	31.2	2281	3142
Nuseed	N5LM307	65	104	11	15	52	36.9	29.1	--	2825
Nuseed	Daytona	68	112	8	22	53	41.8	30.6	--	2886
Long Term Check	Hybrid 894	66	104	42	37	50	38.1	31.1	1672	2636
Check	Honeycomb NS	59	100	56	7	52	36.7	32.2	--	1821
Check	559CL	70	115	8	7	55	43.1	32.5	--	2863
Check	8N270CLDM	63	104	21	14	54	40.7	33.7	--	2474
Trial Mean		67	108	19	18	54	41.2	32.6	2166	2890
C.V.%		1.6	3.8	63.0	58.0	6.0	2.7	3,3	11.0	11.3
LSD 5%		2	7	19	17	5	3.2	1.8	278	538
LSD 10%		1	6	16	15	4	2.7	1.5	232	449

**DAP = Days after planting.*

Planting Date: June 6
Planting Population: 28,000 plants/A
Row Spracing: 30"
Harvest Date: November 4
Previous Crop: spring wheat
Tillage: No-till
Soil Type: Williams loam
Note: Yield, test weight and oil content are adjusted to 10% moisture.

Non-Oil Type Sunflower Variety Trial at Minot

Company/Brand	Hybrid	Days to 50% Flower	Days to Maturity	Plant Height	Lodging		Test Weight	Seed Over Screen			Seed Yield				
														---Average---	
					Stalk	Root		>22/64	>20/64	>18/64	2014	2015	2016	2 year	3 year
		DAP[1]	DAP[1]	inches	%	%	lb/bu	----------%----------			---------- lbs/A ----------				
CHS Royal Hybrid	RH609CLP	66	109	59	10	1	26.7	81	93	100	2309	1673	1888	1780	1957
CHS Royal Hybrid	15EXP01	69	117	56	1	1	22.1	91	97	100	--	2208	1755	1981	--
CHS Royal Hybrid	16EXP01	70	118	63	1	2	23.6	86	95	100	--	--	1912	--	--
CHS Royal Hybrid	15EXP02	71	115	64	4	3	23.8	85	95	100	--	--	1916	--	--
Nuseed	Panther DMR	62	102	57	13	3	26.8	65	85	100	2073	1456	1934	1695	1821
USDA check	Hybrid 924	66	108	57	10	1	27.0	26	64	100	1429	1747	1332	1539	1503
Trial Mean		67	112	59	6	2	25.0	72	88	100	2254	1749	1789	--	--
C.V.%		0.6	1.0	4.2	73	178	1.3	9.7	5.9	0.0	9.4	12.3	6.7	--	--
LSD 5%		1	2	4	9	NS	0.6	13	9	NS	152	310	219	--	--
LSD 10%		1	2	4	7	NS	0.5	10	8	NS	126	258	178	--	--

[1] *Days After Planting*

Planting Date: June 6

Plant Population: 18,000 plants/A

Row Spacing: 30"

Harvest Date: November 4

Previous Crop: 2013 & 2014 = spring wheat, 2015 = soybean

Tillage: No-till

Soil Type: Williams Loam

Roundup Ready Soybean Variety Trial at Minot

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating 1-5[a]	Maturity Date Sept	Plant Height inches	Lodging 0-9[b]	Protein %	Oil %	Test Weight lbs/bu	Yield 2015 bu/A	Yield 2016 bu/A	Yield Avg. bu/A
Integra	20090	RR	00.9	1.7	16	30	0	33.9	15.6	57.9	45.4	49.4	47.4
Integra	20097	RR	00.9	2.0	16	33	1	33.6	16.3	57.7	--	50.4	--
Integra	20215	RR	0.1	2.5	20	25	0	34.1	15.2	57.6	57.6	48.3	52.9
Integra	20126	RR	0.1	2.2	16	32	0	31.8	16.4	56.7	--	52.6	--
Peterson Farms Seed	17X009	Xtend	00.9	1.8	19	30	1	34.1	14.9	57.7	--	50.7	--
Peterson Farms Seed	16R008N	RR	00.8	2.0	10	29	0	34.7	15.6	56.6	55.8	45.4	50.6
Peterson Farms Seed	16R01	RR	0.1	1.8	15	33	1	33.1	16.5	57.1	47.9	51.4	49.7
Syngenta	S006-W5	RR	00.6	2.5	8	28	0	34.1	16.7	56.2	--	45.3	--
Syngenta	S007-Y4	RR	00.5	2.0	11	28	0	32.9	16.7	57.1	--	43.5	--
Syngenta	S02-R2	RR	0.2	2.1	15	25	0	33.6	15.3	57.8	--	50.1	--
Syngenta	S04-D3	RR	0.4	2.4	17	25	0	33.5	15.3	57.8	--	41.2	--
Dairyland Seed	DSR-C918/R2Y	RR	00.9	2.1	14	23	0	34.7	15.0	57.2	63.6	47.7	55.7
Dairyland Seed	DSR-0225/R2Y	RR	0.2	2.3	12	35	1	32.4	16.9	57.6	--	52.2	--
REA Hybrids	R00727	RR	00.7	1.8	13	33	0	32.1	16.2	57.0	--	45.2	--
REA Hybrids	R0216	RR	0.2	1.5	16	34	0	32.2	16.7	57.2	59.4	51.1	55.3
Mycogen Seeds	5B033R2	RR	0.3	2.1	19	31	1	33.9	15.7	57.5	--	57.2	--
Mycogen Seeds	5B024R2	RR	0.2	1.7	16	32	0	34.0	15.5	58.1	59.4	46.9	53.2
Mycogen Seeds	5B013R2	RR	0.1	2.3	12	36	1	32.3	16.7	57.1	--	53.5	--
Mycogen Seeds	5G009R2	RR	00.9	1.9	16	32	0	32.9	15.5	58.3	61.1	51.4	56.2
Mycogen Seeds	5G007R2	RR	00.7	1.9	13	25	0	33.7	15.4	57.2	--	47.6	--
Proseed	XT6007	Xtend	00.7	1.7	9	29	0	33.7	15.4	58.4	--	46.7	--
Proseed	XT6009	Xtend	00.9	1.8	17	32	0	33.6	15.1	58.0	--	50.7	--
Proseed	XT603	Xtend	0.3	2.0	17	33	1	32.9	15.7	57.5	--	43.9	--
Proseed	20-30	RR	0.3	2.1	16	27	0	33.5	16.0	57.2	75.9	51.3	63.6
Proseed	30-20	RR	0.2	1.9	24	30	1	34.0	15.5	57.8	63.8	50.0	56.9
Proseed	10-08	RR	00.8	1.9	12	32	1	33.2	15.5	57.9	59.7	43.1	51.4
Hefty Seed	H007X7	Xtend	00.7	2.1	9	26	0	33.4	15.7	58.3	--	37.2	--
Hefty Seed	H006R7	RR	00.6	1.8	9	27	0	32.8	16.5	57.4	--	42.0	--
Hefty Seed	H008R3	RR	00.8	1.5	14	27	0	32.5	17.0	56.4	56.0	39.1	47.5
Hefty Seed	H008R6	RR	00.8	2.3	15	28	1	33.3	16.0	56.7	51.3	43.0	47.2
Hefty Seed	H009R3	RR	00.9	2.6	18	25	1	33.0	15.9	57.6	58.0	47.1	52.5
Hefty Seed	H009R5	RR	00.9	1.5	14	31	1	31.8	17.5	56.4	43.9	34.5	39.2
Hefty Seed	H00R6	RR	0.0	--	15	31	1	32.8	16.7	57.2	--	44.4	--
Hefty Seed	H01R4	RR	0.1	2.1	17	27	0	33.6	15.9	57.6	--	40.8	--
Hefty Seed	H02R3	RR	0.2	2.3	19	29	1	33.1	15.7	57.2	--	44.3	--

continued on next page

Roundup Ready Soybean Variety Trial at Minot Continued

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating	Maturity Date	Plant Height	Lodging	Protein	Oil	Test Weight	Yield 2015	Yield 2016	Yield Avg.
				1-5[a]	Sept	inches	0-9[b]	%	%	lbs/bu	bu/A	bu/A	bu/A
Hefty Seed	H009X7	Xtend	00.9	2.0	11	30	0	32.6	15.6	58.1	--	45.5	--
Hefty Seed	H02X7	Xtend	0.2	2.0	15	34	0	32.7	16.1	57.4	--	45.6	--
Hefty Seed	H03X7	Xtend	0.3	2.0	18	27	1	33.6	15.9	57.3	--	47.8	--
Hefty Seed	H05X7	Xtend	0.5	2.2	20	31	1	33.2	15.4	58.4	--	50.1	--
Wensman	W30099R2	RR	00.9	1.6	16	30	0	32.5	16.1	57.6	--	41.3	--
Wensman	W1016RX	Xtend	0.1	1.6	17	33	0	33.5	15.0	58.1	--	51.0	--
Wensman	W30085NR2	RR	00.8	2.0	13	28	0	34.4	15.8	57.0	53.5	44.9	49.2
Wensman	W3024R2	RR	0.2	2.0	10	25	0	32.9	15.7	57.7	55.3	42.1	48.7
Prairie Brand	PB-00727R2	RR	00.7	1.7	15	26	0	33.2	15.9	57.5	--	41.2	--
Prairie Brand	PB-00856R2	RR	00.8	2.3	13	28	0	33.8	15.6	56.5	53.7	43.9	48.8
Prairie Brand	PB-0146R2	RR	0.1	2.2	15	35	1	33.2	16.6	57.4	64.6	51.1	57.8
Prairie Brand	PB-0441R2	RR	0.4	2.2	19	29	0	34.1	15.9	57.5	71.7	50.7	61.2
Legacy Seeds	LS-0334 RR2	RR	0.3	1.5	22	29	1	34.7	15.4	57.4	61.5	52.8	57.1
Legacy Seeds	LS-0135 RR2	RR	0.1	2.2	18	35	1	33.7	16.3	57.3	60.0	54.3	57.1
Legacy Seeds	LS-0214 RR2	RR	0.2	2.0	14	31	0	34.2	15.8	57.0	62.9	52.1	57.5
Legacy Seeds	LS-00835N RR2	RR	00.8	2.3	15	30	0	35.1	15.0	56.4	53.7	49.4	51.6
Legacy Seeds	LS-0337N RRXT	Xtend	0.3	2.0	16	30	0	33.6	15.9	57.6	--	47.8	--
Legacy Seeds	LS-00834 RR2	RR	00.8	2.2	11	25	0	32.6	15.4	57.3	--	42.7	--
Dyna-Gro Seed	S006RY97	RR	00.6	2.0	9	27	0	33.7	16.1	56.9	--	42.5	--
Dyna-Gro Seed	S009RY56	RR	00.9	2.1	12	26	0	34.5	15.4	57.1	58.7	49.0	53.8
Dyna-Gro Seed	S01RY86	RR	0.1	2.4	17	30	1	33.4	16.2	57.3	--	48.3	--
Dyna-Gro Seed	S03RY36	RR	0.3	1.9	19	26	0	34.9	15.2	57.5	67.0	44.8	55.9
NorthStar Genetics	NS 0052R2	RR	00.5	1.9	11	34	1	34.0	15.9	57.1	--	47.7	--
NorthStar Genetics	NS 0072R2	RR	00.7	1.7	16	30	0	33.9	15.6	57.2	--	46.7	--
NorthStar Genetics	NS 0080R2	RR	00.6	1.6	16	28	0	34.6	15.2	57.8	57.9	53.0	55.4
NorthStar Genetics	NS 0081NR2	RR	00.8	2.1	13	30	0	35.2	15.3	57.1	51.4	55.5	53.5
NorthStar Genetics	NS 0090R2	RR	00.9	2.0	17	26	1	32.8	15.5	57.0	--	47.0	--
NorthStar Genetics	NS 0111R2	RR	0.1	1.9	10	34	1	33.8	16.5	57.2	--	47.7	--
Trial Mean				2.0	15	30	0	33.5	15.8	57.4	56.3	47.2	--
C.V.%				--	9.6	5.9	130	1.7	2.5	0.7	8.7	7.7	--
LSD 5%				0.3	2	3	NS	0.9	0.7	0.6	5.7	5.9	--
LSD 10%				0.2	2	2	NS	0.8	0.5	0.5	6.8	4.9	--

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

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

NS = no statistical difference between varieties.

Planting Date: June 2
Planting Rate: 100,000 PLS/A
Row Spacing: 15"
Soil Type: Williams Loam
Tillage: Minimum Till
Harvest Date: October 19
Previous Crop: Wheat
Note: Oil, protein and yield are adjusted to 13% moisture.

Soybean Variety Trial at Mohall

Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

Company/Brand	Variety	Maturity Group	IDC Rating 1-5[a]	Plant Height inches	Lodging 0-9[b]	Protein %	Oil %	Test Weight lbs/bu	Yield 2015 bushels/acre	Yield 2016 bushels/acre	Yield Avg bushels/acre
Integra	20090	00.9	1.7	29	0	32.6	15.6	57.6	61.0	57.8	59.4
Integra	20087	00.8	2.3	25	0	33.7	15.3	57.0	--	52.8	--
Integra	20097	00.9	2.0	30	0	33.1	16.4	56.8	--	46.7	--
Integra	20215	0.1	2.5	26	0	34.3	14.8	57.8	76.7	52.2	64.4
Peterson Farms Seed	17X009	00.9	1.8	32	0	32.9	14.9	57.7	--	51.8	--
Peterson Farms Seed	16R008N	00.8	2.0	29	1	33.1	15.5	57.1	69.6	48.2	58.9
Syngenta	S006-W5	00.6	2.5	28	0	34.1	16.4	57.0	--	53.1	--
Syngenta	S007-Y4	00.5	2.0	28	0	32.9	16.5	56.7	--	50.5	--
Syngenta	S02-R2	0.2	2.1	28	1	32.5	15.6	57.8	--	57.4	--
Syngenta	S04-D3	0.4	2.4	32	0	33.7	14.8	57.5	--	60.0	--
REA Hybrids	R00727	00.7	1.8	29	0	32.3	16.1	56.6	--	54.1	--
REA Hybrids	R0216	0.2	1.5	33	1	32.8	16.2	57.0	59.7	56.2	57.9
Mycogen Seeds	5B013R2	0.1	2.3	32	0	32.7	16.4	57.2	--	55.4	--
Mycogen Seeds	5G009R2	00.9	1.9	31	0	32.5	15.8	57.1	65.1	51.2	58.2
Mycogen Seeds	5G007R2	00.7	1.9	25	0	32.4	15.8	57.4	--	44.1	--
Proseed	XT6007	00.7	1.7	28	0	31.8	15.9	57.8	--	49.3	--
Proseed	XT6009	00.9	1.8	34	1	32.9	15.0	58.0	--	52.2	--
Proseed	10-08	00.8	1.9	32	1	32.4	15.6	57.0	64.8	50.5	57.7
Hefty Seed	H006R7	00.6	1.8	27	0	32.4	16.2	56.3	--	46.0	--
Hefty Seed	H008R3	00.8	1.5	31	0	32.4	16.2	57.2	67.8	53.1	60.4
Hefty Seed	H008R6	00.8	2.3	30	2	33.4	15.2	56.8	64.1	43.3	53.7
Hefty Seed	H009R3	00.9	2.6	27	0	33.3	15.2	58.2	78.6	54.9	66.7
Hefty Seed	H009R5	00.9	1.5	28	0	33.5	16.1	57.4	62.6	48.3	55.4
Hefty Seed	H00R6	0.0	--	31	0	32.5	16.4	57.3	--	51.7	--
Hefty Seed	H01R4	0.1	2.1	26	0	33.7	15.0	57.8	--	48.1	--
Hefty Seed	H02R3	0.2	2.3	30	0	33.5	15.3	57.7	--	50.8	--
Hefty Seed	H02X7	0.2	2.0	32	1	32.2	15.6	57.1	--	50.4	--
Hefty Seed	H03X7	0.3	2.0	28	0	33.0	15.6	56.8	--	54.1	--
Hefty Seed	H05X7	0.5	2.2	30	0	33.2	14.8	57.9	--	53.7	--
Wensman	W10063NRX	00.6	1.7	27	0	32.2	15.7	58.1	--	53.6	--
Wensman	W1016RX	0.1	1.6	33	1	33.9	14.4	57.7	--	60.9	--
Wensman	W30065NR2	00.6	1.9	27	0	32.1	16.3	57.5	--	47.4	--
Wensman	W30085NR2	00.8	2.0	29	1	33.8	15.3	56.9	70.2	54.0	62.1
Wensman	W3024R2	0.2	2.0	28	0	33.4	14.9	57.8	80.1	53.5	66.8
Prairie Brand	PB-00727R2	00.7	1.7	27	1	32.8	15.8	57.1	--	59.2	--
Prairie Brand	PB-00856R2	00.8	2.3	29	1	33.6	15.4	56.8	68.7	54.4	61.6
Prairie Brand	PB-0146R2	0.1	2.2	36	1	33.6	15.9	57.5	74.0	61.9	68.0
Prairie Brand	PB-00950R2	00.9	1.7	30	1	33.1	15.6	57.7	63.7	57.7	60.7
Legacy Seed	LS-0135 RR2	0.1	2.2	34	1	33.5	16.1	57.2	64.8	57.7	61.2
Legacy Seed	LS-0214 RR2	0.2	2.0	31	0	33.7	15.7	57.2	69.1	56.4	62.8
Legacy Seed	LS-00835N RR2	00.8	2.3	31	0	33.1	15.6	57.4	69.2	53.1	61.2
Legacy Seed	LS-00834 RR2	00.8	2.2	25	0	33.4	15.6	57.2	--	48.9	--

continued on next page

Soybean Variety Trial at Mohall Continued

Cooperators: Dean Schoenberg and the Renville/Bottineau Ag Improvement Association

Company/Brand	Variety	Maturity Group	IDC Rating	Plant Height	Lodging	Protein	Oil	Test Weight	Yield 2015	Yield 2016	Yield Avg
			1-5[a]	inches	0-9[b]	%	%	lbs/bu	bushels/acre		
Dyna-Gro Seed	S006RY97	00.6	2.0	27	0	33.3	16.1	56.9	--	51.3	--
Dyna-Gro Seed	S009RY56	00.9	2.1	31	1	33.9	15.3	56.9	--	53.5	--
NorthStar Genetics	NS 0012R2	00.1	2.4	27	0	32.2	16.6	56.5	--	49.2	--
NorthStar Genetics	NS 0052R2	00.5	1.9	28	1	33.4	15.9	57.2	--	42.9	--
NorthStar Genetics	NS 0072R2	00.7	1.7	28	1	33.7	15.8	56.7	--	42.8	--
NorthStar Genetics	NS 0080R2	00.6	1.6	31	0	32.1	15.7	57.3	66.2	52.2	59.2
NorthStar Genetics	NS 0081NR2	00.8	2.1	30	0	32.8	15.5	56.7	60.7	51.1	55.9
NorthStar Genetics	NS 0090R2	00.9	2.0	28	0	33.4	15.4	57.1	--	50.4	--
See-Co	IS00818	00.8	--	31	0	30.6	16.5	57.1	--	52.6	--
See-Co	IS0386	0.3	--	32	0	34.1	15.1	58.2	--	51.2	--
Nutech	NT6048	0.4	1.7	29	0	33.2	15.7	57.6	--	47.6	--
Trial Mean			2.0	29	0	33.0	15.7	57.3	65.1	52.1	--
C.V.%			--	8.9	212	3.3	2.8	0.9	7.0	6.6	--
LSD 5%			0.3	4	NS	1.5	0.6	0.7	6.4	4.8	--
LSD 10%			0.2	3	NS	1.2	0.5	0.6	5.4	4.0	--

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

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

Planting Date: June 3 *Planting Rate: 100,000 PLS/A*

Harvest Date: October 14 *Row Spacing: Solid Seeded (7" rows)*

Previous Crop: 2014 = oat, 2015 = sunflower *Soil Type: Barnes loam*

Note: Protein, oil, test weight and yield are adjusted to 13% moisture.

Soybean Variety Trial at Garrison Cooperator: Mike Zimmerman, Garrison

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating	Plant Height	Test Weight	Protein	Oil	Yield 2015	Yield 2016	Yield Avg.
				1-5[a]	inches	lbs/bu	%	%	--------- bu/A ---------		
Integra	20215	RR	0.1	2.5	23	57.6	33.0	15.3	33.5	35.6	34.5
Integra	20126	RR	0.1	2.2	23	56.9	32.9	16.0	49.9	33.7	41.8
Integra	20300	RR	0.3	2.3	22	57.7	33.1	15.6	38.2	34.1	36.2
Integra	20468	RR	0.4	1.8	25	57.8	33.0	15.4	--	36.9	--
Peterson Farm	16R01	RR	0.1	1.8	27	57.5	32.4	16.6	36.1	32.8	34.4
Peterson Farm	17X04N	Xtend	0.4	1.8	22	57.5	32.4	16.3	--	36.0	--
Syngenta	S006-W5	RR	00.6	2.5	21	56.1	33.9	16.6	--	37.5	--
Syngenta	S007-Y4	RR	00.5	2.0	22	57.0	32.5	16.9	--	32.4	--
Syngenta	S02-R2	RR	0.2	2.1	23	57.9	33.5	15.4	--	37.1	--
Syngenta	S04-D3	RR	0.4	2.4	24	57.8	31.9	16.0	--	34.7	--
REA Hybrids	R0216	RR	0.2	1.5	26	57.4	32.1	16.6	41.2	36.2	38.7
REA Hybrids	64G94	RR	0.4	1.6	23	57.6	31.6	16.8	39.5	39.4	39.5
Proseed	XT6007	Xtend	00.7	1.7	22	57.5	32.2	16.1	--	31.3	--
Proseed	XT6009	Xtend	00.9	1.8	24	57.7	32.4	15.7	--	32.6	--
Proseed	XT603	Xtend	0.3	2.0	28	57.3	31.5	16.6	--	35.0	--
Proseed	30-20	RR	0.2	1.9	25	56.6	32.9	16.2	29.9	38.1	34.0
Proseed	10-08	RR	00.8	1.9	27	57.7	33.4	15.7	32.7	36.2	34.5
Hefty	H006R7	RR	00.6	1.8	22	56.6	32.1	16.7	--	32.6	--
Hefty	H008R3	RR	00.8	1.5	21	56.7	32.0	16.4	28.6	31.8	30.2
Hefty	H008R6	RR	00.8	2.3	24	57.3	32.0	16.2	30.4	34.7	32.6
Hefty	H009R3	RR	00.9	2.6	22	58.1	32.8	15.8	24.7	38.8	31.7
Hefty	H009R5	RR	00.9	1.5	22	56.6	32.4	16.9	21.4	31.1	26.2
Hefty	H00R6	RR	00	--	29	57.7	32.1	16.9	--	35.2	--
Hefty	H01R4	RR	0.1	2.1	22	57.8	32.6	15.4	--	36.3	--
Hefty	H02R3	RR	0.2	2.3	24	57.9	32.1	15.7	--	42.0	--
Hefty	H009X7	Xtend	00.9	2.0	27	57.9	32.1	15.9	--	36.6	--
Hefty	H02X7	Xtend	0.2	2.0	29	57.6	31.4	16.7	--	36.4	--
Hefty	H03X7	Xtend	0.3	2.0	23	57.2	31.5	16.5	--	37.4	--
Hefty	H05X7	Xtend	0.5	2.2	24	58.3	31.4	15.6	--	38.2	--
Wensman	W30099R2	RR	00.9	1.6	23	57.7	31.1	16.7	--	32.5	--
Wensman	W1016RX	Xtend	0.1	1.6	24	57.8	31.8	15.8	--	38.4	--
Wensman	W1037RX	Xtend	0.3	1.8	27	57.6	32.4	16.3	--	33.4	--
Wensman	W3024R2	RR	0.2	2.0	22	57.4	32.3	15.9	34.7	31.6	33.2
Prairie Brand	PB-00856R2	RR	00.8	2.3	24	56.6	32.7	16.1	--	29.8	--
Prairie Brand	PB-0146R2	RR	0.1	2.2	27	57.4	32.1	17.0	--	38.5	--
Prairie Brand	PB-0397R2	RR	0.3	2.1	25	57.7	32.4	15.7	--	38.0	--
Prairie Brand	PB-0441R2	RR	0.4	2.2	24	57.4	32.4	15.3	--	37.4	--
Legacy Seed	LS-0334 RR2	RR	0.3	1.5	23	57.3	32.3	15.9	41.4	41.0	41.2
Legacy Seed	LS-0135 RR2	RR	0.1	2.2	26	57.1	32.2	16.6	30.9	37.3	34.1
Legacy Seed	LS-00835N RR2	RR	00.8	2.3	24	57.0	33.3	15.9	38.7	34.4	36.5
Legacy Seed	LS-0337N RRXT	Xtend	0.3	2.0	22	57.2	31.3	16.5	--	34.6	--
NorthStar	NS 0081NR2	RR	00.8	2.1	23	56.8	33.3	15.8	--	30.8	--
NorthStar	NS 0090R2	RR	00.9	2.0	20	57.3	32.9	15.8	--	30.4	--
NorthStar	NS 0111R2	RR	0.1	1.9	29	57.1	32.3	16.8	--	36.3	--
NorthStar	NS 0200NR2	RR	0.2	1.6	27	58.0	32.5	15.4	--	38.3	--
NorthStar	NS 0318R2	RR	0.3	2.1	24	57.7	32.6	15.3	--	42.1	--
NuTech	NT 6048	RR	0.4	1.7	24	58.0	33.1	15.9	--	36.9	--
Trial Mean				2.0	24	57.4	32.4	16.1	33.0	35.6	--
C.V.%				--	8.0	0.7	2.5	1.9	12.1	12.2	--
LSD 5%				0.3	3	0.5	1.1	0.4	5.6	6.1	--
LSD 10%				0.2	2	0.4	1.0	0.4	4.7	5.1	--

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

Planting Date: June 2 *Planting Rate: 100,000 PLS/A* *Row Spacing: Solid Seeded (7" rows)*

Harvest Date: October 13 *Note: Protein, oil, test weight and yield are adjusted to 13% moisture.*

Soil Type: Williams Bowbells loam *Previous Crop: 2014 - barley, 2015 = canola*

Soybean Variety Trial at Wilton Cooperator: Rod Binstock, Baldwin

Company/Brand	Variety	Herbicide System	Maturity Group	IDC Rating	Plant Height	Lodging	Protein	Oil	Yield 2015	Yield 2016	Yield Avg.
				1-5[a]	inches	0-9[b]	%	%	-------	bu/A	-------
Integra	20215	RR	0.1	2.5	28	0	33.3	15.5	49.7	48.7	49.2
Integra	20300	RR	0.3	2.3	29	0	32.9	15.7	50.4	53.3	51.9
Integra	20468	RR	0.4	1.8	30	0	32.9	15.6	--	47.7	--
Integra	50098R2X	Xtend	0.4	1.8	33	1	33.1	15.2	--	49.0	--
Syngenta	S006-W5	RR	00.6	2.5	28	0	34.1	16.5	--	50.0	--
Syngenta	S007-Y4	RR	00.5	2.0	25	0	32.6	16.7	--	48.6	--
Syngenta	S02-R2	RR	0.2	2.1	31	1	34.4	15.2	--	54.5	--
Syngenta	S04-D3	RR	0.4	2.4	30	0	32.9	15.7	--	52.9	--
REA Hybrids	R0216	RR	0.2	1.5	33	1	33.1	16.8	--	46.3	--
REA Hybrids	64G94	RR	0.4	1.6	32	1	31.6	16.9	--	54.8	--
Mycogen Seeds	5B033R2	RR	0.3	2.1	28	0	32.3	16.3	58.3	52.8	55.6
Mycogen Seeds	5B024R2	RR	0.2	1.7	32	0	33.2	15.6	41.1	41.5	41.3
Mycogen Seeds	5B040R2	RR	0.4	2.4	28	0	32.6	15.7	--	53.3	--
Mycogen Seeds	5N078R2	RR	0.7	2.2	30	0	33.7	15.1	--	52.4	--
Proseed	XT6007	Xtend	00.7	1.7	28	0	33.1	15.8	--	44.1	--
Proseed	XT6009	Xtend	00.9	1.8	33	0	33.1	15.5	--	45.6	--
Proseed	XT603	Xtend	0.3	2.0	35	0	32.7	16.1	--	52.5	--
Proseed	20-30	RR	0.3	2.1	28	0	33.3	15.5	--	58.3	--
Proseed	30-80	RR	0.8	2.3	31	1	34.0	15.8	--	52.5	--
Proseed	10-08	RR	00.8	1.9	30	1	33.8	15.6	--	49.6	--
Hefty	H006R7	RR	00.6	1.8	26	0	32.8	16.4	--	43.0	--
Hefty	H008R3	RR	00.8	1.5	28	1	32.3	16.3	36.7	49.6	43.1
Hefty	H008R6	RR	00.8	2.3	29	1	33.8	15.6	43.0	38.5	40.7
Hefty	H009R3	RR	00.9	2.6	26	0	33.0	15.5	52.4	50.0	51.2
Hefty	H009R5	RR	00.9	1.5	31	2	33.7	16.3	30.0	44.2	37.1
Hefty	H00R6	RR	0.0	--	32	1	33.4	16.5	--	45.6	--
Hefty	H01R4	RR	0.1	2.1	27	0	33.3	15.3	--	49.1	--
Hefty	H02R3	RR	0.2	2.3	30	0	32.5	15.6	49.1	53.3	51.2
Hefty	H009X7	Xtend	00.9	2.0	32	0	32.7	15.4	--	46.9	--
Hefty	H02X7	Xtend	0.2	2.0	35	0	32.5	16.3	--	51.6	--
Hefty	H03X7	Xtend	0.3	2.0	29	1	32.3	16.2	--	47.8	--
Hefty	H05X7	Xtend	0.5	2.2	31	0	32.9	15.2	--	54.8	--
Wensman	W1016RX	Xtend	0.1	1.6	33	0	33.3	15.2	--	48.4	--
Wensman	W1037RX	Xtend	0.3	1.8	35	0	32.2	16.3	--	49.9	--
Wensman	W3024R2	RR	0.2	2.0	28	0	33.4	15.7	--	40.6	--
Wensman	W3031NR2	RR	0.3	1.8	36	1	33.1	15.1	--	47.7	--
Legacy Seed	LS-0334 RR2	RR	0.3	1.5	29	0	33.4	15.7	56.0	58.8	57.4
Legacy Seed	LS-0135 RR2	RR	0.1	2.2	36	1	33.4	16.6	44.9	49.0	47.0
Legacy Seed	LS-00835N RR2	RR	00.8	2.3	29	0	33.8	15.8	36.4	47.1	41.8
Legacy Seed	LS-0337N RRXT	Xtend	0.3	2.0	29	1	32.4	16.0	--	49.9	--
NorthStar	NS 0111R2	RR	0.1	1.9	35	1	33.3	16.7	--	49.3	--
NorthStar	NS 0200NR2	RR	0.2	1.6	37	1	32.7	15.2	--	48.6	--
NorthStar	NS 0318R2	RR	0.3	2.1	31	0	32.6	15.6	--	51.7	--
NorthStar	NS 0480NR2	RR	0.4	1.9	30	0	33.2	15.1	--	55.3	--
NuTech	NT6048	RR	0.4	1.7	32	1	34.0	15.7	--	50.9	--
Trial Mean				2.0	31	0	33.1	15.8	46.4	49.4	--
C.V.%				--	6.3	167	1.6	2.0	8.9	8.2	--
LSD 5%				0.3	3	1	0.7	0.4	5.8	5.7	--
LSD 10%				0.2	2	1	0.6	0.4	4.9	4.7	--

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

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

Planting Date: June 2 *Planting Rate: 100,000 PLS/A* *Row Spacing: Solid Seeded (7" rows)*

Harvest Date: September 30 *Previous Crop: 2014 - spring wheat, 2015 = soybean*

Soil Type: Williams loam *Note: Protein, oil and yield are adjusted to 13% moisture.*

Roundup Ready Soybean Yield Results from the North Central Region **Combined Means**

Company	Variety	Maturity Group	IDC Rating	Seed Yield				4 Location
				Garrison	Mohall	Minot	Wilton	Average
			1-5[a]	bushels/acre				
Syngenta	S02-R2	0.2	2.1	37.1	57.4	50.1	54.5	49.8
Wensman	W1016RX	0.1	1.6	38.4	60.9	51.0	48.4	49.7
Legacy Seed	LS-0135 RR2	0.1	2.2	37.3	57.7	54.3	49.0	49.6
Hefty	H05X7	0.5	2.2	38.2	53.7	50.1	54.8	49.2
Hefty	H009R3	00.9	2.6	38.8	54.9	47.1	50.0	47.7
Hefty	H02R3	0.2	2.3	42.0	50.8	44.3	53.3	47.6
REA Hybrids	R0216	0.2	1.5	36.2	56.2	51.1	46.3	47.4
Syngenta	S04-D3	0.4	2.4	34.7	60.0	41.2	52.9	47.2
Hefty	H03X7	0.3	2.0	37.4	54.1	47.8	47.8	46.8
Syngenta	S006-W5	00.6	2.5	37.5	53.1	45.3	50.0	46.5
Integra	20215	0.1	2.5	35.6	52.2	48.3	48.7	46.2
Legacy Seed	LS-00835N RR2	00.8	2.3	34.4	53.1	49.4	47.1	46.0
Hefty	H02X7	0.2	2.0	36.4	50.4	45.6	51.6	46.0
Proseed	XT6009	00.9	1.8	32.6	52.2	50.7	45.6	45.3
Proseed	10-08	00.8	1.9	36.2	50.5	43.1	49.6	44.9
Hefty	H00R6	0.0	--	35.2	51.7	44.4	45.6	44.2
Syngenta	S007-Y4	00.5	2.0	32.4	50.5	43.5	48.6	43.7
Hefty	H01R4	0.1	2.1	36.3	48.1	40.8	49.1	43.6
Hefty	H008R3	00.8	1.5	31.8	53.1	39.1	49.6	43.4
Proseed	XT6007	00.7	1.7	31.3	49.3	46.7	44.1	42.9
Wensman	W3024R2	0.2	2.0	31.6	53.5	42.1	40.6	42.0
Hefty	H006R7	00.6	1.8	32.6	46.0	42.0	43.0	40.9
Hefty	H008R6	00.8	2.3	34.7	43.3	43.0	38.5	39.9
Hefty	H009R5	00.9	1.5	31.1	48.3	34.5	44.2	39.5
Integra	20090	00.9	1.7	--	57.8	49.4	--	--
Integra	20087	00.8	2.3	--	52.8	--	--	--
Integra	20097	00.9	2.0	--	46.7	50.4	--	--
Peterson Farms Seed	17X009	00.9	1.8	--	51.8	50.7	--	--
Peterson Farms Seed	16R008N	00.8	2.0	--	48.2	45.4	--	--
REA Hybrids	R00727	00.7	1.8	--	54.1	45.2	--	--
Mycogen Seeds	5B013R2	0.1	2.3	--	55.4	53.5	--	--
Mycogen Seeds	5G009R2	00.9	1.9	--	51.2	51.4	--	--
Mycogen Seeds	5G007R2	00.7	1.9	--	44.1	47.6	--	--
Wensman	W10063NRX	00.6	1.7	--	53.6	--	--	--
Wensman	W30065NR2	00.6	1.9	--	47.4	--	--	--
Wensman	W30085NR2	00.8	2.0	--	54.0	44.9	--	--
Prairie Brand	PB-00727R2	00.7	1.7	--	59.2	41.2	--	--
Prairie Brand	PB-00856R2	00.8	2.3	29.8	54.4	43.9	--	--
Prairie Brand	PB-0146R2	0.1	2.2	38.5	61.9	51.1	--	--
Prairie Brand	PB-00950R2	00.9	1.7	--	57.7	--	--	--
Legacy Seed	LS-0214 RR2	0.2	2.0	--	56.4	52.1	--	--
Legacy Seed	LS-00834 RR2	00.8	2.2	--	48.9	42.7	--	--
Dyna-Gro Seed	S006RY97	00.6	2.0	--	51.3	42.5	--	--
Dyna-Gro Seed	S009RY56	00.9	2.1	--	53.5	49.0	--	--

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RR Soybean Yield Results from the North Central Region Continued **Combined Means**

Company	Variety	Maturity Group	IDC Rating	Seed Yield				4 Location
				Garrison	Mohall	Minot	Wilton	Average
			1-5[a]	----------bushels/acre----------				
NorthStar Genetics	NS 0012R2	00.1	2.4	--	49.2	--	--	--
NorthStar Genetics	NS 0052R2	00.5	1.9	--	42.9	47.7	--	--
NorthStar Genetics	NS 0072R2	00.7	1.7	--	42.8	46.7	--	--
NorthStar Genetics	NS 0080R2	00.6	1.6	--	52.2	53.0	--	--
NorthStar Genetics	NS 0081NR2	00.8	2.1	30.8	51.1	55.5	--	--
NorthStar Genetics	NS 0090R2	00.9	2.0	30.4	50.4	47.0	--	--
See-Co	IS00818	00.8	--	--	52.6	--	--	--
See-Co	IS0386	0.3	--	--	51.2	--	--	--
NuTech	NT6048	0.4	1.7	--	47.6	--	50.9	--
Integra	20126	0.1	2.2	33.7	--	52.6	--	--
Peterson Farms Seed	16R01	0.1	1.8	32.8	--	51.4	--	--
Dairyland Seed	DSR-C918/R2Y	00.9	2.1	--	--	47.7	--	--
Dairyland Seed	DSR-0225/R2Y	0.2	2.3	--	--	52.2	--	--
Mycogen Seeds	5B033R2	0.3	2.1	--	--	57.2	52.8	--
Mycogen Seeds	5B024R2	0.2	1.7	--	--	46.9	41.5	--
Proseed	XT603	0.3	2.0	35.0	--	43.9	52.5	--
Proseed	20-30	0.3	2.1	--	--	51.3	58.3	--
Proseed	30-20	0.2	1.9	38.1	--	50.0	--	--
Hefty Seed	H007X7	00.7	2.1	--	--	37.2	--	--
Hefty	H009X7	00.9	2.0	36.6	--	45.5	46.9	--
Wensman	W30099R2	00.9	1.6	32.5	--	41.3	--	--
Prairie Brand	PB-0441R2	0.4	2.2	37.4	--	50.7	--	--
Legacy Seed	LS-0334 RR2	0.3	1.5	41.0	--	52.8	58.8	--
Legacy Seed	LS-0337N RRXT	0.3	2.0	34.6	--	47.8	49.9	--
Dyna-Gro Seed	S01RY86	0.1	2.4	--	--	48.3	--	--
Dyna-Gro Seed	S03RY36	0.3	1.9	--	--	44.8	--	--
NorthStar	NS 0111R2	0.1	1.9	36.3	--	47.7	49.3	--
Integra	20300	0.3	2.3	34.1	--	--	53.3	--
Integra	20468	0.4	1.8	36.9	--	--	47.7	--
Peterson Farm	17X04N	0.4	1.8	36.0	--	--	--	--
REA Hybrids	64G94	0.4	1.6	39.4	--	--	54.8	--
Wensman	W1037RX	0.3	1.8	33.4	--	--	49.9	--
Prairie Brand	PB-0397R2	0.3	2.1	38.0	--	--	--	--
NorthStar	NS 0200NR2	0.2	1.6	38.3	--	--	48.6	--
NorthStar	NS 0318R2	0.3	2.1	42.1	--	--	51.7	--
NuTech	NT 6048	0.4	1.7	36.9	--	--	--	--
Trial Mean			2.0	35.6	52.1	47.2	49.5	--
C.V.%			--	12.2	6.6	7.7	8.2	--
LSD 5%			0.3	6.1	4.8	5.9	5.7	--
LSD 10%			0.2	5.1	4.0	4.9	4.7	--

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

Non-Roundup Ready Soybean Variety Trial at Minot

Company/ Brand	Variety	Maturity Group	Herbicide System	IDC Rating	Maturity Date	Plant Height	Lodging	Protein	Oil	Test Weight	Seed Yield 2014	2015	2016	----Average---- 2 year	3 year
				1-5[a]	Sept.	inches	0-9[b]	%	%	lbs/bu			--		
Hefty	H008L3	00.8	LL	2.0	17	31	3	34.3	15.6	56.8	--	45.9	40.3	43.1	--
Hefty	H03L7	0.3	LL	2.0	26	33	3	35.8	14.6	56.1	--	--	49.2	--	--
NDSU	ND Henson	0.0	Conv.	2.2	16	31	2	35.4	15.4	57.2	51.3	53.4	48.9	51.2	51.2
NDSU	Ashtabula	0.4	Conv.	2.1	18	35	2	32.4	16.2	56.6	51.7	53.4	48.2	50.8	51.1
NDSU	Sheyenne	0.7	Conv.	2.0	23	35	1	34.5	14.5	56.5	39.5	61.1	47.1	54.1	49.2
NDSU	ND Bison	0.7	Conv.	2.0	22	30	1	30.1	15.9	57.6	36.9	55.1	41.0	48.0	44.3
RR Check	AG 00932	00.9	RR	1.4	18	33	2	34.7	14.1	57.2	38.0	46.3	42.4	44.4	42.2
RR Check	AG 0832	0.9	RR	1.9	29	36	2	36.2	14.2	56.2	--	59.7	43.0	51.4	--
RR Check	AG 00632	00.6	RR	--	19	34	1	33.6	14.6	56.4	--	45.6	35.8	40.7	--
RR Check	AG 0732	0.6	RR	2.0	27	32	1	35.5	14.1	56.4	--	--	45.2	--	--
Trial Mean				2.1	20	32	2	34.5	15.3	56.8	41.7	52.6	42.3	--	--
C.V.%				--	9.3	8.6	73	2.1	2.2	0.9	8.8	5.4	10.9	--	--
LSD 5%				0.2	3	5	NS	1.2	0.6	0.8	5.3	4.0	7.6	--	--
LSD 10%				0.2	3	4	NS	1.0	0.5	0.7	4.4	3.3	6.3	--	--

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

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

NS = no statistical difference between varieties.

Planting Date: June 2
Harvest Date: October 19
Soil Type: Williams Loam
Planting Rate: 100,000 PLS/A

Conventional Soybean Variety Trial at Rugby

Cooperators: Dave Teigen and the Pierce County Crop Improvement Association

Variety	Maturity Group	IDC Rating	Plant Height	Lodging	Protein	Oil	Test Weight	Yield 2015	Yield 2016	Yield Avg.
		1-5*	inches	0-9**	%	%	lbs/bu			
Sheyenne	0.7	2.0	32	0	33.1	15.5	57.4	45.6	68.9	57.2
ND Bison	0.7	2.0	28	0	33.5	15.3	57.4	51.2	62.6	56.9
ND Henson	0.0	2.2	28	0	34.5	16.1	58.5	40.6	65.3	53.0
Ashtabula	0.4	2.1	29	0	32.8	16.4	57.1	39.4	55.6	47.5
Trial Mean		2.1	29	0	33.7	15.8	57.4	41.9	62.4	--
C.V.%		--	0.7	490	0.7	1.2	0.5	6.7	4.7	--
LSD 5%		NS	2	NS	0.3	0.3	0.4	4.0	4.5	--
LSD 10%		NS	2	NS	0.3	0.2	0.3	3.3	3.7	--

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

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

NS = no statistical difference between varieties.

Planting Date: May 24

Planting Rate: 150,000 PLS/A

Row Spacing: Solid Seeded (7" rows)

Harvest Date: October 14

Previous Crop: 2014 = corn, 2015 = wheat

Soil Type: Gardena silt loam

Tillage: Minimum Till

Note: Oil, protein, test weight and yield are adjusted to 13% moisture.

Seeding Rate Interactions with Row Spacing in Soybean at Minot

Interactions

Spacing	Seeding Rate	Plant Stand	Maturity Date	Plant Height	Lodging	Test Weight	Protein	Oil	Yield
	pls/A	plants/A	Sept.	inches	0-9*	lbs/bu	%	%	bu/A
10"	75,000	72,600	17	29	1	59.1	33.2	15.1	37.7
	100,000	103,092	17	29	0	59.0	31.7	15.6	43.3
	125,000	113,256	16	28	0	59.0	31.4	15.8	49.0
	150,000	132,132	17	31	0	59.2	33.1	15.1	52.7
20"	75,000	60,258	17	29	0	58.7	32.9	15.3	32.0
	100,000	65,340	16	29	0	59.1	32.4	15.5	33.5
	125,000	72,600	15	30	0	59.0	32.0	15.6	33.5
	150,000	95,106	16	31	0	58.5	31.5	15.8	35.8
30"	75,000	55,902	17	33	1	58.7	31.8	15.7	41.8
Twin Row	100,000	63,888	16	34	1	58.0	31.1	15.7	39.6
	125,000	78,408	15	34	0	58.4	30.1	16.0	35.1
	150,000	98,736	16	36	1	58.9	30.9	15.8	39.9
C.V. %		12.1	10.7	8.4	153	0.7	3.4	3.1	15.5
LSD 5%		14,621	NS	4	NS	0.6	1.7	NS	8.8

Row Spacing Comparisons

Row Spacing	Plant Stand	Maturity Date	Plant Height	Test Weight	Protein	Oil	Yield
	plants/A	Sept.	inches	lbs/bu	%	%	bu/A
10"	105,270	17	29	59.1	32.3	15.4	45.7
20"	73,326	16	30	58.8	32.2	15.5	33.7
30" Twin	74,233	16	34	58.5	31.0	15.8	39.1
LSD 5%	14,738	NS	2	0.3	0.9	0.3	4.8

Seeding Rate Comparisons

Seeding Rate	Plant Stand	Maturity Date	Plant Height	Test Weight	Protein	Oil	Yield
pls/A	plants/A	Sept.	inches	lbs/bu	%	%	bu/A
75,000	62,920	17	30	58.8	32.6	15.4	37.2
100,000	77,440	16	31	58.7	31.7	15.6	38.8
125,000	88,088	15	31	58.8	31.2	15.8	39.2
150,000	108,658	16	32	58.9	31.9	15.6	42.8
LSD 5%	15,855	NS	NS	NS	NS	NS	NS

**Lodging: 0 = none, 9 = lying flat on the ground.* *NS= no statistical difference.*

Planting Date: June 6 *Harvest Date: October 12*
Variety = Asgrow 0231 *Soil Type: Williams Loam*
Previous Crop: spring wheat *Tillage: Minimum Till*

Summary: Planting soybeans into 20 and 30 inch rows is a common practice in Eastern and Southern areas of the State, while solid seeding into 10 inch or narrower rows is common in the North Central and Western "no-till" areas of the State. This trial showed a strong correlation between row spacing and yields. Solid seeding produced more surviving plants which tended to be shorter in height and provided for higher yields than the wider rows. There was a significant yield response to seeding rates of 125,000 and 150,000 with 10 inch rows but no statistical difference between seeding rates for the 20 inch and twin row spacing. Row spacing also had a slight impact on test weight, protein and oil content. Agronomic and seed quality factors were not impacted by seeding rates.

Strip Tilled Soybean Trial at Minot

Tillage System	Variety	Days to Emerge	Maturity Date	Plant Height	Test Weight	Protein	Oil	Yield
		DAP[a]	Sept	inches	lbs/bu	%	%	bu/A
Strip Till	PS30-80	9	27	26	57.3	30.1	16.2	35.1
No Till	PS30-80	9	26	26	57.5	31.0	16.2	41.5
Strip Till	AG00932	9	15	25	57.2	31.0	15.7	29.0
No Till	AG00932	9	14	25	56.9	30.7	16.1	30.4
Trial Mean		9	20	25	57.2	30.7	16.0	34.0
C.V.%		0.0	4.8	8.0	0.9	2.9	2.1	15.2
LSD 5%		NS	1	NS	NS	NS	0.3	5.4

Combined Means

Tillage System	Days to Emerge	Maturity Date	Plant Height	Test Weight	Protein	Oil	Yield
	DAP[a]	Sept	inches	lbs/bu	%	%	bu/A
Strip Till	9	20	26	57.3	30.5	15.9	32.1
No Till	9	20	25	57.2	30.8	16.1	35.9
LSD 5%	NS	NS	NS	NS	NS	NS	NS

[a] *DAP = days after planting.* *NS = no statistical difference between tillage systems.*

Planting Date: June 7
Planting Rate: 100,000 PLS/A
Row Spacing: 15"
Harvest Date: October 16
Previous Crop: wheat
Soil Type: Williams Loam
Strip Till Machine: Dawn Equipment Pluribus system
Note: Oil, protein, and yield are adjusted to 13% moisture.

Summary: Strip tillage is a common farming practice in many areas of the country but not in North Dakota. The concept of strip tillage is to create a tilled seed bed while maintaining untilled soil between rows. This trial was the initial year of this study and although statistical differences between strip till and no till were not observed, final conclusions should be reserved following additional trials.

Foliar Applied Products on Soybean at Minot

Product*	Type of Product	Application Rate	Application Timing	Maturity Date	Plant Height	Protein	Oil	Test Weight	Yield 2015	Yield 2016
		per acre		Sept	inches	%	%	lbs/bu	-- bu/A ------	
Untreated	--	--	--	20	30	28.9	16.5	57.5	44.3	29.2
ATG Green Miracle fb	biologic	14 oz	V3							
ATG FF Pulse	biologic	51 oz	R3	20	27	29.7	16.6	57.3	--	27.6
ATG Green Miracle fb	biologic	14 oz	V3							
ATG Crop Booster + ATG FF Pulse	biologic	14 oz + 51 oz	R3	20	23	30.0	16.7	57.6	--	26.9
Kelpac fb	biologic	32 oz	V3							
Kelpac	biologic	32 oz	R1	21	22	29.2	16.7	57.5	--	29.7
Pathway Power Blend	biologic	32 oz	V3	21	30	29.7	16.2	57.4	--	36.4
Ascend PGR	hormone	6.4 oz	R3	21	28	30.4	16.2	57.8	49.3	28.8
Nachurs FB21 fb	fertilizer	32 oz	V3							
Nachurs Finish Line	fertilizer	32 oz	R1	21	28	29.6	16.3	57.1	--	29.2
Nachurs Finish Line	fertilizer	32 oz	V3	20	27	29.5	16.4	57.6	50.1	28.8
Nachurs Finish Line fb	fertilizer	32 oz	V3							
Nachurs Finish Line	fertilizer	32 oz	R1	21	27	28.8	16.4	57.6	--	30.2
Urea	fertilizer	100 lbs	V3	21	27	30.6	16.1	57.5	--	32.5
Urea	fertilizer	100 lbs	R1	22	35	29.1	16.3	57.0	52.7	39.7
Urea	fertilizer	100 lbs	R3	21	28	28.9	16.8	57.6	--	28.3
Trial Mean				20	28	29.5	16.4	57.5	49.4	30.7
C.V.%				5.0	12.6	3.8	2.8	0.8	8.9	7.3
LSD 5%				NS	5	NS	NS	NS	5.2	3.2
LSD 10%				1	4	NS	NS	NS	4.3	2.7

**ATG Green Miracle, ATG FF Pulse and ATG Crop Booster are marketed by ASLE Technologies Group, Canada.*

**Kelpac is marketed by Gavilon Fertilizer, Moorhead, MN.*

**Pathway Power Blend is marketed by Pathway Biologic, LLC, Plant City, FL.*

**Ascend Plant Growth Regulator is marketed by WinField United, Minneapolis, MN.*

**Nachurs FB21 and Nachurs Finish Line are marketed by Nachurs Alpine Solutions, Marion, OH.*

NS = no statistical difference between treatments.

Planting Date: June 7
Row Spacing: Solid Seeded (6" rows)
Harvest Date: October 16
Soil Type: Williams Loam
Note: Oil, protein, test weight and yield are adjusted to 13% moisture.

Variety: Asgrow AG0231
Previous Crop: 2014 = Soybean, 2015 = wheat
Tillage: Minimum Till

Dry Pea Variety Trial at Minot

Variety	Days to Flower	Days to Maturity	Seeds/ Pound	1000 Seed Weight	Test Weight	Seed Yield 2014	2015	2016	2 Year	3 Year
	DAP[1]	DAP[1]		grams	lb/bu	bu/A				
Yellow Cotyledon										
LGPN4906	51	89	2005	227	63.1	--	--	60.2	--	--
LGPN4243	51	90	1790	255	61.9	--	--	57.2	--	--
Salamanca	52	89	1821	251	63.1	24.7	44.5	56.6	50.6	41.9
Abarth	53	89	1720	264	62.9	--	--	55.8	--	--
Agassiz	52	90	1999	228	63.2	40.0	51.9	55.7	53.8	49.2
AC Earlystar	52	88	2323	197	63.5	30.6	53.0	55.4	54.2	46.3
DS Admiral	50	87	1925	236	63.5	30.1	48.0	55.0	51.5	44.4
CDC Saffron	54	89	1902	240	64.1	--	59.4	54.9	57.2	--
LGPN4903	50	90	1937	235	62.6	--	--	53.3	53.3	--
LGPN4902	51	89	2365	192	63.3	--	--	52.7	52.7	--
Majestic	54	90	1753	259	63.6	--	--	50.7	--	--
PP-0667	52	89	2245	203	64.1	--	53.6	49.3	51.4	--
CDC Amarillo	55	91	2034	224	63.9	--	54.7	49.2	51.9	--
LGPN4244	52	89	1917	237	63.5	--	--	48.5	--	--
Hyline	52	90	1973	231	63.7	26.3	58.0	47.0	52.5	43.8
Jetset	50	87	1808	251	63.2	31.8	52.3	46.9	49.6	43.7
Bridger	50	89	1972	230	64.1	28.8	--	46.9	37.8	--
Vegas	51	88	1874	242	63.3	31.6	50.2	44.9	47.6	42.3
Navarro	48	89	1624	285	62.6	29.7	51.0	44.1	47.6	41.6
AAC Carver	53	87	1827	249	64.2	--	58.2	44.0	51.1	--
Midas	52	90	2216	206	63.3	--	--	43.8	--	--
LGPN4907	52	90	1579	294	63.1	--	--	43.3	--	--
Spider	54	93	2100	217	63.4	25.5	60.5	41.4	50.9	42.5
Green Cotyledon										
LGPN1904	56	91	1987	229	63.1	--	--	64.5	--	--
Bluemoon	52	88	1850	246	64.1	25.4	58.7	52.1	55.4	45.4
CDC Raezer	51	89	1972	230	63.4	--	--	50.1	--	--
CDC Striker	51	88	2174	209	62.9	31.3	52.2	49.5	50.8	44.3
Arcadia	51	86	2057	221	62.0	28.8	--	47.1	37.9	--
CDC Patrick	53	90	2439	189	63.9	--	--	46.0	--	--
LGPN1905	52	89	1861	244	63.6	--	--	45.7	--	--
LN1123	53	88	2007	226	64.0	29.4	--	43.8	36.6	--
LGPN1903	53	91	2138	213	62.6	--	--	43.6	--	--
Cruiser	53	89	2167	210	63.0	29.9	52.4	43.0	47.7	41.8
Viper	51	88	1960	233	62.5	27.2	--	39.6	33.4	--
Trial Mean	52	89	1983	232	63.3	29.5	53.1	49.2	--	--
CV	2.8	1.7	6.3	6.2	1.4	20.3	10.5	26.5	--	--
LSD 5%	2	2	147	17	1.0	10.5	6.55	14.9	--	--
LSD 10%	1	1	114	13	0.8	6.9	5.09	11.6	--	--

[1] *Days after planting*

Planted: April 30, 2016; Harvested: Aug. 13, 2016

Previous crop: hard red spring wheat

Lentil Variety Trial at Minot

Variety	Days to Flower	Days to Maturity	Seeds/ Pound	1000 Seed Weight	Test Weight	Seed Yield
	DAP[1]	DAP[1]		grams	lb/bu	lb/A
Small Brown						
Pardina	52	98	12360	37	62.6	952
Large Green						
CDC Greenland	55	100	7766	59	58.1	1465
Pennell	53	99	7631	60	57.9	1372
Riveland	52	100	6804	67	57.5	1197
Medium Green						
CDC Richlea	53	99	10209	45	60.3	1701
Avondale	53	98	9998	46	60.5	1387
Small Green						
ND Eagle	51	99	12135	38	61.9	1852
CDC Viceroy	53	100	14217	32	62.2	1671
Eston	52	99	14265	32	62.2	1292
CDC Lemay	54	100	12865	35	62.4	1204
Small Red						
CDC Rouleau	55	99	13556	34	61.4	2200
CDC Red Rider	56	101	9962	46	61.8	1674
CDC Redberry	54	101	11322	40	61.8	1616
CDC Rosetown	57	98	16665	27	63.1	1256
Trial Mean	53	99	11546	41	61.4	1406
CV	2.6	2.0	4.5	4.8	0.9	17.7
LSD 5%	2	2	611	2	0.7	294
LSD 10%	1	2	474	2	0.5	228

[1] *Days after planting*

Planted: April 30, 2016; Harvested: Aug. 15, 2016
Previous crop: hard red spring wheat

Clearfield Lentil Variety Trial at Minot

Variety	Market Class	Seeds/ Pound	1000 Seed Weight	Test Weight	Seed Yield		
					2015	2016	2 Year Avg
			grams	lbs/bu	----------lb/A----------		
CDC Maxim-CL	Small Red	12198	37.5	62.3	2010	2335	2172
CDC Imvincible-CL	Small Green	13851	32.9	61.9	2106	2068	2087
CDC Impress-CL	Med Green	9641	47.1	60.0	--	1653	--
CDC Impala-CL	Extra Small Red	15084	30.1	62.7	2004	1444	1724
CDC Imigreen-CL	Med Green	8340	54.5	59.6	1692	1272	1482
Trial Mean		11991	39.2	61.5	1950	1830	--
CV		5.8	5.3	0.5	18.6	14.8	--
LSD 5%		1026	3.1	0.5	582	399	--
LSD 10%		849	2.5	0.4	533	330	--

Planted: April 30, 2016; Harvested: Aug. 15, 2016
Previous crop: hard red spring wheat

Chickpea Variety Trial at Minot

Variety	Market Class	Leaf Type	Days to Flower	Days to Maturity	----------mm---------- > 10	> 9	> 8	< 8	1000 Seed Weight	Seeds/ Pound	Test Weight	Seed Yield
			DAP[1]	DAP[1]	%	%	%	%	grams		lb/bu	lb/A
CDC Orion	Kabuli	Compound	52	109	65.7	21.8	7.3	5.1	375	1213	58.9	2315
B-90	Kabuli	Compound	58	113	1.2	23.1	47.3	28.3	244	1868	61.1	1667
CDC Frontier	Kabuli	Compound	56	110	35.0	36.6	16.2	12.1	302	1515	60.1	1422
CDC Luna	Kabuli	Compound	53	114	34.3	32.1	18.3	15.3	273	1641	60.2	1014
CDC Anna	Desi	Compound	55	109	0.4	4.4	31.3	63.9	167	2753	59.2	1011
Sawyer	Kabuli	Simple	56	109	40.6	32.4	14.8	12.3	324	1410	58.6	965
Trial Mean			55	110	41.9	24.0	17.5	16.6	304	1568	59.7	1433
CV			2.8	2.5	11.4	16.4	17.2	30.6	10.6	12.3	2.0	45.2
LSD 5%			2	3	5.8	4.8	3.7	6.2	39	235	1.5	785
LSD 10%			2	3	4.5	3.7	2.8	4.7	30	180	1.1	604

Planted: April 31, 2016; Harvested: Sept. 11, 2016
Previous crop: hard red spring wheat
[1] *Days after planting*

Dry Bean Variety Descriptions

Class and Cultivar	Origin	RM[1]	Plant Type[2]
Pinto			
Buster	Seminis	ME	UV
Centennial	Colorado State Univ.	L	UV
Cowboy	Provita	--	--
Croissant	CSU	L	V
Durango	Provita	E	V
El Diablo Fu	GenTec	ME	USV
Eldorado	MSU	L	USV
Galeena	Provita	L	V
GTS-904	GenTec	L	UV
GTS-907	GenTec	M	UV
La Paz	Provita	L	USV
Lariat	NDSU	L	USV
Long's Peak	CSU	L	USV
Marmot	Meridian Seeds	E	V
Maverick	NDSU	ME	V
Monterrey	Provita	ME	USV
ND Palomino	NDSU	ML	USV
ND-307	NDSU	M	UV
Odyssey	Idaho Seed Bean	ME	V
Othello	USDA-Prosser	E	V
Radiant	Provita	ML	USV
Roughrider	Seminis	--	--
Santa Cruz	Provita	M	USV
Santa Fe	MSU	M	USV
Sequoia	Idaho Seed Bean	ML	USV
Sinaloa	Provita	ML	USV
Sonora	Provita	E	V
Stampede	NDSU	M	USV
SV6139GR	Seminis	--	--
Torreon	Provita	M	USV
Vibrant	Provita	E	USV
Windbreaker	Seminis	M	UV
Navy			
Alpena	MSU	ME	USV
Avalanche	NDSU	ME	USV
Blizzard	Provita	M	USV
Bolt	Ag. Can.	M	USV
Cascade	Idaho Seed Bean	M	USV
CDC Whitecap	U. Sask	M	USV
DS105W0	Dow AgroSciences	--	--
Ensign	ADM-Seedwest	M	USV
Fathom	U of Guelph	ML	USV
HMS Medalist	Provita	M	UV
HY 4181	Hyland	**E**	**USV**
Indi	ADM-Seedwest	M	USV
Light House	U. of Guelph	M	USV
Lightning	U. of Guelph	M	UV
Merlin	Provita	M	USV
Mist	Ag. Can.	M	USV
Nautica	Ag. Can.	ML	USV
Norstar	NDSU	ME	USV
OB-1723-03	GenTec	--	--
Portage	Ag. Can.	ME	USV
Regent	Ag. Can.	ME	UV
Reliant	GenTec	ME/M	USV
Rexeter	U. of Guelph	L	USV
Seabiskit	ADM	ME	USV
SV1893GH	Seminis	--	--
T9903	Hyland	ME	USV
T9905	Hyland	M	USV
Vigilant	Provita	ME	USV
Viscount	GenTec	L	USV
Vista	Ag. Can.	ML	USV
Small Red			
Merlot	MSU	ME	USV
Rio Rojo	NDSU	ME	USV
Ruby	Provita	M	USV
Viper	Provita	M	USV
Black			
Black Cat	Provita	ME	USV
Blackhawk	MSU	L	USV
Carman Black	Ag. Can.	E	USV
Eclipse	NDSU	M	USV
GTS-1103	GenTec	M	USV
Jet	U. Sask.	E	USV
Knight Rider	Meridian	ME	USV
Loreto	Provita	M	USV
Obsidian	Seminis	--	--
Super Jet	U. Sask.	ME	USV
T-39	U. Calif.	M	USV
Zenith	MSU	M	USV
Zorro	MSU	L	USV

continued on next page

Dry Bean Variety Descriptions Continued

Class and Cultivar	Origin	RM[1]	Plant Type[2]
Pink			
Floyd	Rogers	ML	V
Rosetta	MSU/ARS	M	USV
Sedona	MSU/ARS	M	USV
Yellow			
Canario	U.C. Davis	L	V
Flor de Junio			
Desert Song	MSU	M	V
Flor de Mayo			
Gypsy Rose	MSU	ML	V
Light Red Kidney			
Big Red	Provita	-	-
Blush	WSU/USDA	ML	B
California Early (CELRK)	U. Calif.	E	B
Chinook 2000	MSU	M	B
Clouseau	Seminis	M	B
Foxfire	Rogers	ME	B
OAC Inferno	U. of Guelph	ML	B
OAC Lyrik	U. of Guelph	ME	B
Pink Panther	Seminis	M	B
Rosie	NDSU	L	B
Ronnie's Red	Provita	ML	B
Dark Red Kidney			
Cabernet	Seminis	ML	B
Chaparral	Provita	ML	B
Dynasty	U. of Guelph	ML	B
GTS-104	GenTec	M	B
Majesty	Ag. Can.	ML	USV
Montcalm	MSU	ML	B

Class and Cultivar	Origin	RM[1]	Plant Type[2]
Cranberry			
Bellagio	MSU	ML	V
Red Rover	Seminis	ME	B
Redhawk	MSU	M	B
Talon	NDSU	M	B
Otebo			
Fuji	MSU	E	B
Samurai	MSU	ML	UV
White Kidney			
Beluga	MSU	M	B
Silver Cloud	WSU/USDA	E	B
Snowdon	MSU	ME	B
Yeti	U. of Guelph	ML	B
Great Northern			
Aries	Provita	ME	USV
Beryl	Rogers	M	V
Coyne	U. Nebraska	ML	V
Draco	Provita	M	USV
Gemini	Provita	E	V
Matterhorn	MSU	ME	USV
Orion	Provita	E	V
Powderhorn	MSU	M	USV
Taurus	Kelly Bean Co.	L	USV
Cranberry			
Bellagio	MSU	ML	V
Otebo			
Fuji	MSU	E	B
Samurai	MSU	ML	UV

[1] *RM = Relative Maturity, E =Early, ME =Medium Early, M = Medium, ML = Medium Late, L = Late.*

[2] *B = Bush, V = Vine, UV = Upright Vine, USV = Upright Short Vine.*

Source: NDSU Extension Bulletin A654-16

Dry Edible Bean Variety Trial at Minot

Variety	Market Type	Days to Mature	Plant Height	Lodging	Test Weight	100 Seed wt.	Seed Yield 2014	2015	2016	---Average--- 2 year	3 year
		DAP*	inches	0-9**	lbs/bu	grams	---------- pounds per acre ----------				
Lariat	Pinto	95	31	4	56.4	39	1440	3293	3024	3158	2586
Windbreaker	Pinto	95	24	6	55.7	41	1437	3002	2922	2962	2454
LaPaz	Pinto	95	26	3	57.8	40	1574	2940	2554	2747	2356
Stampede	Pinto	95	30	1	56.5	39	1416	2222	2731	2477	2123
Maverick	Pinto	92	27	7	55.8	39	1085	2474	2648	2561	2069
Palomino	Pinto	98	29	5	55.5	41	--	--	2519	--	--
Monterrey	Pinto	94	29	4	58.2	37	--	--	2986	--	--
Ensign	Navy	98	25	5	60.2	21	1367	2108	2639	2374	2038
T9905	Navy	103	29	4	60.1	22	1153	2066	2582	2324	1934
Vista	Navy	99	21	5	59.6	19	1185	2412	2131	2272	1909
Medalist	Navy	100	28	5	60.2	19	1083	1817	2167	1992	1689
Eclipse	Black	95	26	1	59.8	19	--	2430	2759	2595	--
Zerro	Black	95	25	1	61.1	19	--	2443	2356	2399	--
Loreto	Black	96	25	3	60.6	18	--	2239	1803	2021	--
Merlot	Small Red	97	25	6	58.3	38	--	2109	2627	2368	--
Rosetta	Pink	100	25	4	58.9	33	--	--	2087	--	--
Rosie	Lt Red Kidney	104	24	2	57.8	47	--	2057	1785	1921	--
Pink Panther	Lt Red Kidney	104	20	1	55.5	61	--	1442	2318	1880	--
Talon	Dk Red Kidney	103	20	3	56.3	54	--	1940	1677	1808	--
Montcalm	Dk Red Kidney	105	21	2	56.1	50	--	1302	1785	1543	--
Trial Mean		98	26	4	57.9	35	--	--	2427	--	--
C.V. %		2.5	14.6	47	1.3	6.5	--	--	9.0	--	--
LSD 5%		4	6	3	1.2	4	--	--	359	--	--
LSD 10%		3	5	2	1.0	3	--	--	299	--	--

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

NS = no statistical difference between varieties

Planting Date: June 2
Harvest Date: September 19
Seeding Rate: 100,000 live seeds / Acre
Row Spacing: 15"
Previous Crop: 2013 = barley, 2014 & 2015 = spring wheat
Tillage: Minimum till
Soil Type: Williams Loam

Faba Bean Variety Trial at Minot

Variety	Seedling Emergence	Plant Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield		
	DAP[1]	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	2016	2015	Avg
												---- pounds per acre ----		
Boxer	13	4.5	43	74	106	44	1	14	21.8	60.9	516	6100	4837	5468
FanFare	13	4.9	45	73	103	40	0	13	23.2	61.1	537	5537	5045	5291
Tabasco	13	4.6	44	75	106	46	0	17	22.5	61.8	535	5330	3952	4641
Laura	13	3.9	44	74	106	44	0	15	21.7	60.3	462	6084	--	--
Vertigo	13	4.4	42	74	103	46	0	13	23.0	61.8	572	5887	--	--
Fabelle	13	6.7	44	73	102	44	1	14	24.1	61.9	543	4462	--	--
Snowdrop	13	4.3	45	75	102	41	0	15	21.5	60.6	543	4415	--	--
Trial Mean	13	4.8	44	74	104	44	0	14	22.5	61.2	530	5402	4359	--
C.V.%	0.0	15	4.0	1.8	2.3	3.8	162	36	4	0.7	2.2	3.4	6.0	--
LSD 5%	NS	1.3	NS	NS	NS	3	NS	NS	1.7	0.8	21	324	395	--
LSD 10%	NS	1.1	NS	NS	NS	2	NS	NS	1.4	0.6	17	265	325	--

[1] *DAP = Days after planting.*

NS = no statistical difference between varieties.

Trial was planted on May 6 with a seeding rate of 200,000 pls/A and harvested on August 31.
Previous Crop: Spring wheat
Tillage: Minimum Till
Soil Type: Williams Loam

Faba Bean Seeding Date Trial at Minot

Seeding Date	Variety	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield
		DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A
April 22	Tabasco	17	5.4	3.5	50	84	111	33	0	11	24.4	58.6	463	4030
May 6	Tabasco	13	4.8	3.4	44	73	100	39	0	12	25.6	59.8	503	3911
May 17	Tabasco	10	5.2	3.9	42	73	93	38	0	13	24.0	58.7	416	3657
June 3	Tabasco	9	4.8	3.2	39	66	98	33	0	14	24.8	57.6	570	2057
April 22	Boxer	17	5.7	4.0	48	84	105	30	0	10	26.1	57.2	522	4818
May 6	Boxer	13	5.1	3.8	44	73	99	37	0	11	25.2	58.7	512	4439
May 17	Boxer	10	4.6	3.7	41	72	93	41	0	12	25.7	59.2	500	4071
June 3	Boxer	9	5.1	3.5	35	66	97	39	0	15	26.6	57.4	618	3467
Trial Mean		12	5.1	3.6	43	74	100	36	0	12	25.3	58.4	513	3806
C.V.%		0.0	16.3	16.2	3.2	0.6	2.6	3.0	0	15.3	2.2	1.4	3.0	9.5
LSD 5%		1	NS	NS	1	1	3	2	NS	NS	1.0	1.4	27	634
LSD 10%		1	NS	NS	1	1	3	2	NS	3	0.8	1.2	22	521

Combined Means

Seeding Date	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield	Harvest Date
	DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A	
April 22	17	5.6	3.7	49	84	108	31	0	10	25.2	57.9	493	4424	Aug 31
May 6	13	4.9	3.6	44	73	100	38	0	12	25.4	59.3	508	4175	Aug 31
May 17	10	4.9	3.8	42	72	93	39	0	12	24.8	59.0	458	3864	Aug 31
June 3	9	4.9	3.3	37	66	98	36	0	14	25.7	57.5	594	2762	Sept 29
LSD 5%	1	NS	NS	2	1	3	3	NS	2	NS	1.1	43	725	--

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.* *NS = no statistical difference between treatments.*

Planting Rate: 175,000 PLS/A Row Spacing: 7.5" *Previous Crop: Spring wheat*

Soil Type: Williams Loam *Tillage: Minimum Till*

Note: Grain protein, test weight and seed yield have been adjusted to 16% moisture.

Summary: Faba beans are a cool season legume that are known to tolerate cold soils and frost. The objectives of this trial were to observe and document agronomic characteristics, seed quality and seed yield of two varieties that were planted at 2 week intervals over a period of a month and a half. As would be expected, statistically significant genetic by environmental interactions were recorded on most characteristics observed with the exception of lodging and grain protein. Although seedling emergence took 17 days for the first seeding date, this delay did not result in any more seed mortality compared to other seeding dates. Plants tended to initiate flowering sooner as seeding date was delayed and had a shorter duration of flowering which probably contributed to the declining yield trend. Plants tended to grow taller as planting dates were delayed and the first seed pod was higher off the ground as well. Statistical differences between seeding dates were also noted for test weight and kernel weight but there was not a clear trend for these characteristics. There was a declining trend for seed yield with delayed seeding although the first three dates produced statistically similar yields.

Faba Bean Seeding Rate Trial at Minot

Variety	Seeding Rate	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield
	Seeds/sq ft	DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A
Tabasco	3	13	4.1	3.7	45	75	102	30	1	10	23.5	61.4	401	3816
Tabasco	4	13	5.3	3.6	45	74	104	32	0	8	22.9	60.4	395	2857
Tabasco	5	13	4.9	3.6	44	73	100	33	1	8	23.6	60.1	370	3437
Tabasco	6	13	6.6	4.2	45	73	107	32	1	9	22.3	60.4	426	3994
Boxer	3	13	3.9	4.2	42	75	100	37	1	10	25.7	59.7	470	6198
Boxer	4	13	5.3	4.4	41	73	102	36	0	13	25.8	60.3	493	5644
Boxer	5	13	6.1	4.1	41	73	102	38	1	15	25.8	59.5	480	7183
Boxer	6	13	6.2	5.0	41	73	103	37	0	14	25.6	60.1	489	5819
Trial Mean			5.3	4.1	43	74	102	34	1	11	24.4	60.2	441	4868
C.V.%			18.5	18.6	1.3	1.1	2.0	2.9	69	20.9	3.6	1.2	3.5	5.3
LSD 5%			1.7	NS	1	1	4	2	NS	4	1.6	NS	27	451
LSD 10%			1.1	NS	1	1	3	1	NS	3	1.3	NS	22	370

Combined Means

Seeding Rate	Seedling Emergence	Seedling Stand	Harvest Stand	Days to 10% Blm	Days to 90% Blm	Days to Mature	Plant Height	Lodging	Height of 1st Pod	Grain Protein	Test Weight	1000 KWT	Seed Yield
Seeds/sq ft	DAP[1]	# / sq ft	# / sq ft	DAP[1]	DAP[1]	DAP[1]	inches	0-9[2]	inches	%	lbs/bu	g	lbs/A
3	13	4.0	4.0	43	75	101	34	1	10	24.6	60.5	436	5007
4	13	5.3	4.0	43	74	103	34	0	10	24.4	60.4	444	4250
5	13	5.5	3.9	43	73	101	35	1	12	24.7	59.8	425	5310
6	13	6.4	4.6	43	73	105	34	1	11	23.9	60.3	457	4906
LSD 5%	NS	1.1	NS	NS	1	3	NS	NS	NS	NS	NS	NS	NS

[1] DAP = Days after planting. *[2] Lodging: 0 = none, 9 = lying flat on the ground.* *NS = no statistical difference between treatments.*

Planting Date: May 6 *Harvest Date: August 31* *Row Spacing: 7.5"*

Previous Crop: Spring wheat *Tillage: Minimum Till* *Soil Type: Williams Loam*

Note: Grain protein, test weight and seed yield have been adjusted to 16% moisture.

Summary: Faba beans are large seeded crop, requiring a large volume of seed to be planted, thus restricting the planting speed and number of acres that can be planted in a day. Results of this trial would indicate that higher seeding rates do not have a direct impact on seed yields. Small but statistically significant interactions between seeding rates and the number of days to the end of flowering and days to mature were observed.

Roundup Ready Alfalfa Variety Trial at Minot

			----- 1st cutting ---------		2nd cutting ----					
		Plant	Harvest		Harvest		---------- Total Yield ----------			
Company	Variety	Stand*	Moisture	Yield	Moisture	Yield	2015	2016	Avg	% Vernal
		%	%	tons/A**	%	----------tons/A**----------				%
Pioneer	54QR04	99	74	1.07	75	0.96	0.59	2.03	1.31	104
Monsanto	DKA 44-16	99	75	1.27	76	0.84	0.46	2.11	1.29	102
Common	Vernal	99	74	1.18	76	0.78	0.56	1.96	1.26	100
Legend	MegaMaxx	99	74	1.18	76	0.79	0.51	1.97	1.24	98
Monsanto	DKA 40-51	99	75	1.13	76	0.87	0.45	2.00	1.22	97
Croplan	Stratica	99	74	1.06	76	0.72	0.57	1.78	1.17	93
Integra	8444	99	74	1.07	75	0.70	0.54	1.78	1.16	92
Croplan	Presteez	99	74	1.14	76	0.69	0.41	1.83	1.12	89
Allied	428	99	74	1.04	75	0.74	0.43	1.78	1.10	88
Trial Mean		99	74	1.13	76	0.79	0.5	1.91	--	--
C.V.%		0.0	2.2	11.9	1.8	15.4	17.6	9.3	--	--
LSD 0.05		NS	NS	NS	NS	NS	0.13	NS	--	--

**Plant Stand: Visual estimation of winter survival.* ***Yields are stated on a 0% moisture basis.*

NS = no statistical difference between varieties.

Alfalfa Variety Trial at Minot

			----- 1st cutting ---------		2nd cutting ----					
		Plant	Harvest		Harvest		---------- Total Yield ----------			
Company	Variety	Stand*	Moisture	Yield	Moisture	Yield	2015	2016	Avg	% Vernal
		%	%	tons/A**	%	----------tons/A**----------				%
Dow	CWA114030	99	76	1.29	76	1.04	0.67	2.33	1.50	112
Allied	FSG 329	99	76	1.23	76	1.01	0.71	2.24	1.47	110
Pioneer	54B66	99	74	1.14	75	0.97	0.68	2.11	1.40	104
Millborn	Phirst Extra Hyb	93	75	1.19	76	0.91	0.66	2.10	1.38	103
Millborn	Persist III	99	75	1.21	76	0.88	0.65	2.09	1.37	102
Allied	Ladak II	99	75	1.14	75	1.03	0.56	2.17	1.36	102
Common	Vernal	99	75	1.11	76	0.94	0.63	2.06	1.34	100
Dyna-Gro	DG4210	99	75	1.13	76	0.85	0.59	1.98	1.29	96
Integra	8420	97	75	1.20	76	0.84	0.52	2.04	1.28	96
Dow	HybriForce-3400	99	75	1.08	76	0.92	0.55	2.00	1.28	95
Pioneer	55V50	94	75	1.05	76	0.91	0.56	1.96	1.26	94
Dow	CW105006	99	75	1.12	75	0.79	0.60	1.91	1.25	94
Legend	Crave	99	75	1.12	76	0.82	0.57	1.94	1.25	94
Dow	4A420	99	75	1.19	76	0.73	0.55	1.92	1.23	92
Croplan	LegenDairy	98	76	1.07	76	0.80	0.52	1.87	1.19	89
Dow	CW103012	99	76	1.02	77	0.78	0.52	1.80	1.16	87
Pioneer	55Q27	99	75	1.03	77	0.73	0.54	1.77	1.15	86
Trial Mean		98	75	1.14	76	0.88	0.59	2.02	--	--
C.V.%		3.7	2.0	10.4	1.3	19.7	20.4	10.1	--	--
LSD 0.05		NS	NS	NS	NS	NS	0.17	0.29	--	--

**Plant Stand: Visual estimation of winter survival.* ***Yields are stated on a 0% moisture basis.*

NS = no statistical difference between varieties.

Planting Date: May 28, 2015

Harvest Date: 1st cutting = June 13, 2nd cutting = July 26

Soil Type: Williams Loam

Early Seeded Crop Demonstration at Minot

Crop	Variety	Seeding Rate	Flowering/ Heading	Plant Height	Lodging	Harvest Date	Yield	Test Weight	Protein
		lbs/A	date	inches	0-9*		bu or lbs	lbs/bu	%
HRSW	Prosper	120	13-Jun	34	2	11-Aug	67.8	59.1	13.0
Durum	Joppa	130	13-Jun	37	5	11-Aug	81.9	60.2	14.0
Barley	ND Genesis	100	6-Jun	37	1	11-Aug	106.0	49.5	--
Oat	Souris	100	13-Jun	39	4	11-Aug	93.2	42.5	--
HRWW	Decade	100	--	32	2	11-Aug	86.7	58.0	12.0
Lentil	CDC Redberry	50	3-Jun	15	4	11-Aug	1149	60.7	25.1
Faba	Tabasco	250	31-May	29	0	13-Sep	1842	60.9	21.3
Safflower	Cardinal	40	--	28	0	13-Sep	1819	--	--
Flax	Omega	40	13-Jun	Thin Stand - no yield			0	--	--
Spg Canola	HyCLASS 947	10	13-Jun	Thin Stand - no yield			0	--	--
Field pea	DS Admiral	120	3-Jun	Thin Stand - no yield			0	--	--
Mustard	Tilney	10	11-Jun	Thin Stand - no yield			0	--	--
SxW Canola	Springer	10	--	No Stand		--	0	--	--
W Canola	DKW 46-15	10	--	No Stand		--	0	--	--
Carinata	AAC A110	10	--	No Stand		--	0	--	--
Juncea	X121CL	10	--	No Stand		--	0	--	--

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

Summary: This is an unreplicated trial of cool season crops that were **seeded on March 11** into no-till canola stubble. All crops emerged during the week of April 17. Flax and brassica crops did not produce a harvestable stand. Small grains, safflower and legume crops had good tolerance to cold soils and produced a harvestable crop. Weed control was a production issue, especially with thin stands and with crops with limited post emergence herbicide options. There is considerable risk in seeding crops outside of their "normal" timing. This demonstration was not designed in a scientific manner, has little scientific merit and should not be interpreted as a guideline or recommendation.

Tile Drains Salinity Reduction Effects in North Central North Dakota

Chris Augustin, Area Extension Specialist/Soil Health

Subsurface/drain tile drainage lowers soil salinity by promoting leaching of water soluble salts and flushing the salts out of the soil profile (figure 2). The speed of soil salinity reduction is dependent on drain tile design, soil type, amount of water soluble salts, and weather. This project hopes to gain a better perspective of the speed of salinity reduction with drain tile in north central North Dakota. Five fields were sampled in this study. Each field has three different sample locations. Five samples were collected from each location at the zero to six inch depth. Sample locations are based on appearance. Extremely Saline (sample location 1, 4, and 7) are areas with no vegetative growth and are predominately white. Unaffected Areas (sample location 3, 6, and 9) are those areas close to the salt spot where plant growth appears to not be hindered. Somewhat Affected (sample location 2, 5, and 8) areas are roughly half the distance between the Extremely Saline and Unaffected Areas. Sample locations were recorded with a handheld G.P.S. All sites will be resampled every year. Soil salinity levels are being tested with a 1:1 dilution method. A soil is deemed saline when its saturated paste electrical conductance is 4 dS/cm or greater. The 1:1 test is the more common salinity test method. The 1:1 method has a dilution effect. To roughly correct for the dilution, multiply the 1:1 electrical conductance by two. So soils with an E.C. greater than 2 in Figure 1 are considered saline. Figure 1 shows the current soil salinity levels.

Figure 1. 2016 soil salinity levels at the 0-6 inch depth.

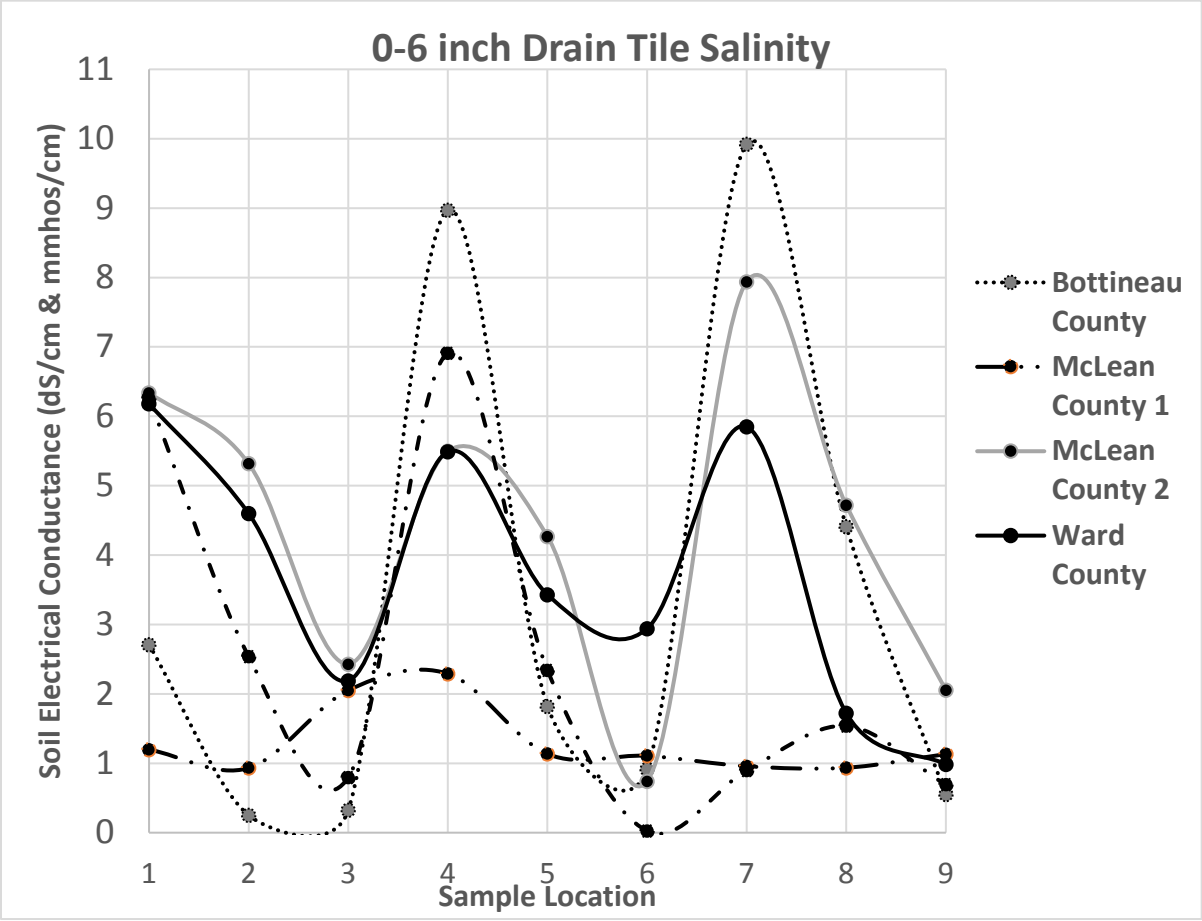

Figure 2. A saline site with installed drain tile. The flush of green extending from left to right between the white (saline areas) is directly above the drain tile.

Late Season Cover Crops Effects on Soil Compaction

Chris Augustin, Area Extension Specialist/Soil Health

Soil compaction reduces plant root growth and may reduce crop yields. Producers are interested in using cover crops to reduce soil compaction. Late season cover crops (planted after a cash crop) have reduced soil compaction. However, this has been in warmer and wetter climates. This study evaluates the effects of a radish/turnip cover crop, diverse cover crop, and fall tillage on soil compaction the following spring.

The site was summer fallowed during the 2015 growing season and tilled right before planting. Cover crops were planted on August 3, 2015. The fallow strips were tilled once more on October 16, 2015 for weed control. Weeds were not observed in the cover crops. Tillage treatments were completed with a tandem disc. The radish/turnip cover crop mix was planted at 2.5 lbs/ac radish and 2.5 lbs/ac turnips. The diverse cover crop planting rate was 25 lbs/ac barley, 5 lbs/ac sunflower, 10 lbs/ac field pea, 1 lb/ac turnips, and 1 lb/ac radish. Soil compaction was recorded with a penetrometer. This device records soil resistance pounds per square inch (PSI) and soil depth. There were four replications. Three profile readings were taken within each plot.

Results indicate that both cover crop treatments reduced soil compaction until a depth of five inches (Figure 1). The radish/turnip mix reduced soil compaction until seven inches. Radish and turnips reduce soil compaction more than the diverse cover crop mix from the three to six inch depth. After the five inch depth, the diverse cover crop and fallow treatments had similar soil penetrometer readings. Once the seven inch depth was met, all treatments had similar penetrometer readings to a depth of 18 inches. Plant root growth can be reduced when the soil resistance exceeds 200 PSI. No treatments exceeded this threshold before the eight inch depth. Below the eight inch depth all treatments had similar readings and were within 25 PSI of 200 PSI. The 200 PSI reading at eight inches likely reflects the accumulation of clays found at this depth and a decrease in organic matter.

Late season cover crops can reduce soil compaction. However, soil compaction reduction was only observed within the top six inches of the soil and no treatments were considered compacted. Taproot cover crops mixes are more effective at reducing soil compaction than cover crop mixes composed mainly of fibrous roots.

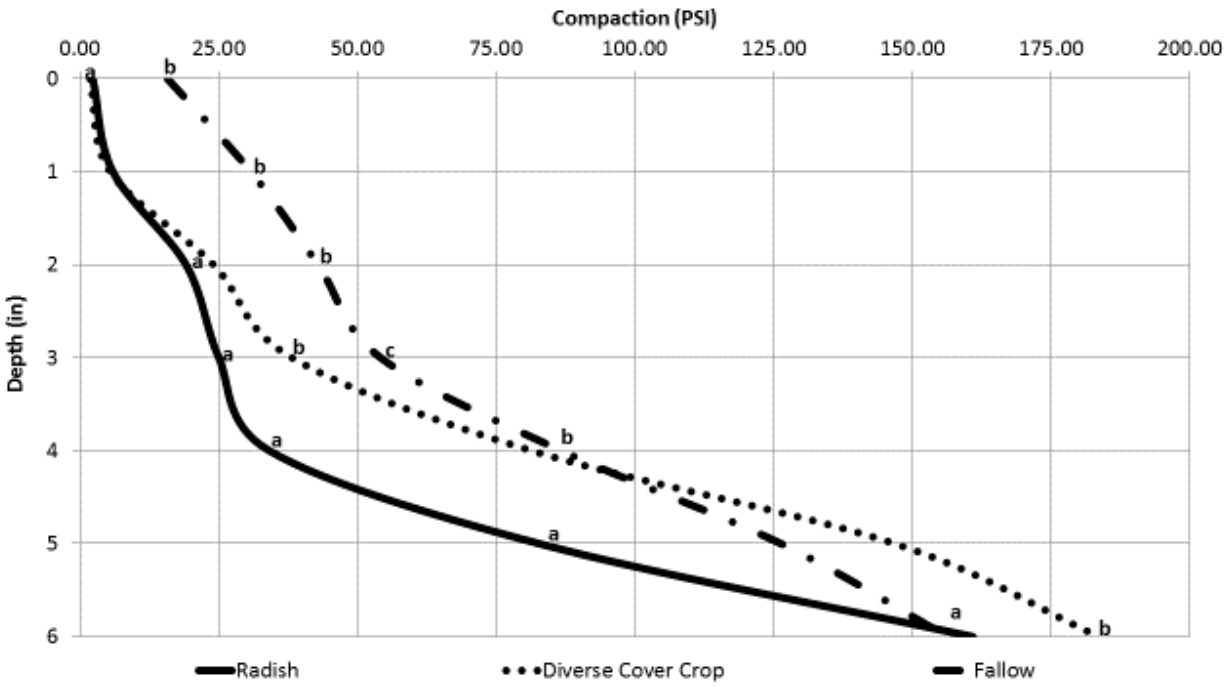

Figure 1. Soil penetrometer readings recorded to a depth of six inches. All treatments were similar below the seven inch depth. Same letters indicate similar results.

Soybean Fertility in north-central/northwestern North Dakota

Chris Augustin, Area Extension Specialist/Soil Health
Dr. David Franzen, State Extension Specialist/Soil Science

Soybean acreage in northwest/north-central North Dakota has greatly increased. NDSU soybean fertility recommendations (NDSU Extension publication Soybean Soil Fertility SF1164) are based off of data that does not represent the climate and soil types of north-central/northwestern North Dakota well. To address this, a three year two location soybean fertility study was initiated in 2016. Study sites are/will be in the Crosby/Noonan and Minot area. All sites will test low in nitrogen and phosphorus. The Crosby/Noonan area sites have high pH (excess of 7.5) and the Minot area site soil pH is 6 or less. All sites do have soybeans in their cropping history (within four years of study).

Soybeans were planted with a single-disc opener no-till planter and at a rate of 165,000 pure live seeds/ac. Granule fertilizer and beet lime treatments were hand applied right before planting. Liquid fertilizers were applied with the seed at planting. Foliar fertilizer was applied with a hand sprayer at their respective growth stages.

Minot site results (Table 1.) and Crosby results (Table 2) are summarized below. Inoculation yielded the most at Minot, (43.5 bu/ac) and 50 lbs/ac of urea yielded (34.8 bu/ac) the most in Crosby. However, no yield statistical difference was found at Crosby.

Table 1. Protein, oil, and yields of soybeans at the 2016 Minot site.

Treatment	Protein (%)	Oil (%)	Yield (bu/ac)
Check	34.5 abc	14.9 ab	39.5 ab
Inoculation	33.9 c	14.9 ab	43.5 a
50 lb/a urea	34.6 abc	14.6 b	39.7 ab
3 g/a 10-34-0	34.3 abc	15.2 a	39.9 ab
100 lb/a MAP	34.9 ab	14.6 b	38.4 ab
2 T/a Beet lime	34.5 abc	14.9 ab	35.3 ab
4 T/a Beet lime	34.5 abc	14.8 ab	40.3 ab
3 g/a 6-24-6	34 bc	15.0 ab	36.2 ab
Foliar 9-18-9 V5	34.8 abc	14.9 ab	32.8 ab
Foliar 9-18-9 R2	35.1 a	14.6 b	31.4 b
Foliar 9-18-9 + S V5	34.1 bc	14.9 ab	38.6 ab
Foliar 9-18-9 + S R2	34.4 abc	14.7 ab	33.8 ab
LSD			10.8

Table 2. Protein, oil, and yield of soybeans at the 2016 Crosby site.

Treatment	Protein (%)	Oil (%)	Yield (bu/ac)
Check	33.8	14.8 ab	33.2
Inoculation	33.3	14.7 ab	32.4
3 g/a 6-24-6	33.4	14.7 ab	34.4
Levesol	33.8	14.4 b	33.2
3 g/a 10-34-0	33.6	14.9 a	32.6
Foliar 9-18-9 V5	34.0	14.8 ab	31.6
Foliar 9-18-9 R2	33.3	14.9 a	31.9
Foliar 9-18-9+S R2	33.6	14.7 ab	33.5
50 lb/a urea	33.8	14.4 b	34.8
Foliar 9-18-9 + S V5	33.9	14.8 ab	32.3
Soygreen	33.3	14.8 ab	28.3
100 lb broadcast MAP	34.0	14.8 ab	33.8
	NS		NS

Simulated glyphosate and dicamba drift on dry pea

The objective of the study was to determine the impact of low rates (simulated drift) glyphosate and dicamba on dry pea. The study was conducted in 2014 and 2015. The dicamba rates were adjusted slightly in 2015 since no effect was observed at 0.005 and 0.05 oz in 2014. Two untreated treatments were included each year. Spartan + Prowl were applied PRE and Basagran + Select applied POST to control weeds.

In 2014, glyphosate and dicamba treatments were applied just prior to flowering on July 2 when dry peas were 16-19 inches tall. The first replication of the study was severely impacted by disease and therefore the data in Table 1 below is an average of two replications. Glyphosate and dicamba applied at the two lower rates did not cause visible crop injury and did not affect dry pea yield or test weight. Glyphosate and dicamba applied individually at the high rate caused some visible crop injury, but did not affect yield or test weight. However, glyphosate + dicamba applied as a tank mix at the high rate caused significant crop injury and reduced yield and test weight.

In 2015, glyphosate and dicamba treatments were applied just prior to flowering on June 23. No visible injury was observed with the glyphosate treatments and there was no effect on yield (Table 2). Slight visible injury was observed at 0.275 and 0.5 oz dicamba. There was a very slight yield reduction with 0.275 oz dicamba, but a more significant yield reduction at 0.5 oz. Very little injury was observed and no yield reduction with the low rate of glyphosate + dicamba combined. However, there was a significant yield reduction with the tank mix at the two higher rates.

In 2016, glyphosate and dicamba treatments were applied just prior to flowering on June 17. No visible injury or yield loss was observed with glyphosate applied alone (Table 3). Slight to moderate visible injury was observed at 0.275 and 0.5 oz dicamba. There was a yield reduction with 0.5 fl oz dicamba. There was moderate to severe injury and yield loss with the combination of glyphosate + dicamba at the two higher rates.

Thus, there appears to be a greater effect on dry pea when glyphosate and dicamba are tank mixed compared to either product applied alone.

Table 1. Simulated glyposate and dicamba drift on dry pea in 2014. (1409)						
		Dry pea				
		Injury		Height	Yield	Test wt.
Treatment[a]	Rate/A	Jul-11	Aug-08	Jul-18	Aug-19	Aug-19
		--------%--------		cm	lb/A	lb/bu
Untreated		0	0	76	3777	66.5
Glyphosate	0.01 oz	0	0	82	4201	66.3
Glyphosate	0.1 oz	0	0	78	3618	65.7
Glyphosate	1 oz	5	10	76	4054	65.9
Dicamba	0.005 oz	0	0	78	3673	65.9
Dicamba	0.05 oz	0	0	78	3982	66.0
Dicamba	0.5 oz	25	12	75	3814	65.2
Glyphosate + Dicamba	0.01 oz + 0.005 oz	0	0	76	3918	66.4
Glyphosate + Dicamba	0.1 oz + 0.05 oz	0	0	74	3907	65.7
Glyphosate + Dicamba	1 oz + 0.5 oz	40	50	71	651	58.4
Untreated		0	0	77	4441	66.2
LSD (0.05)		3.3	3.8	7.9	970.9	1.1
CV		30.6	33.8	6.1	12.0	0.7
[a]*All treatments applied Pre-flower July 2*						

Table 2. Simulated glyphosate and dicamba drift on dry pea in 2015. (1509)							
		Dry pea					
		Injury		Height		Yield	Test wt
Treatment	Rate	Jul-3	Jul-13	Jul-06	Jul-13	Aug-10	Aug-10
		-------%-------		-------cm-------		lb/a	lb/bu
Untreated		0	0	95	108	4067	63.8
Glyphosate	0.1 oz	0	0	91	108	4132	64.1
Glyphosate	0.55 oz	0	0	93	109	4077	63.7
Glyphosate	1 oz	0	0	92	108	4030	63.8
Dicamba	0.05 oz	1	0	96	113	4101	63.7
Dicamba	0.275 oz	4	4	91	107	3947	63.8
Dicamba	0.5 oz	8	6	92	109	3677	64.1
Glyphosate + Dicamba	0.1 oz + 0.05 oz	1	1	93	105	4516	64.2
Glyphosate + Dicamba	0.55 oz + 0.275 oz	14	7	96	109	3298	64.3
Glyphosate + Dicamba	1 oz + 0.5 oz	21	11	85	102	2851	64.3
Untreated		0	0	97	108	4583	63.7
LSD (0.05)		2.1	1.2	NS	NS	553	NS
CV		33.6	31.9	6.5	5.4	9.7	0.6
[a]*All treatments applied Pre-flower Jun 23*							

Table 3. Simulated glyphosate and dicamba drift on dry pea in 2016. (1609)

		Dry pea						
		Injury		Height		Protein	Yield	Test wt.
Treatment	Rate/A	Jun-27	Jul-7	Jul-1	Jul-7	Aug-18	Aug-16	Aug-16
	fl oz	-------%-------		-------cm-------		---%---	lb/A	lb/bu
Untreated		0	0	58	62	25.0	2868	66.2
Glyphosate	0.1	0	0	57	62	25.0	2805	66.0
Glyphosate	0.55	0	0	55	59	24.9	2726	67.0
Glyphosate	1	0	0	55	56	24.6	2731	66.2
Dicamba	0.05	1	1	58	64	24.7	2777	65.9
Dicamba	0.275	16	7	55	58	25.3	2702	66.6
Dicamba	0.5	32	14	54	54	26.1	2468	66.2
Glyphosate + Dicamba	0.1 + 0.05	4	2	55	62	25.1	2714	65.9
Glyphosate + Dicamba	0.55 + 0.275	29	16	56	58	25.2	2391	66.2
Glyphosate + Dicamba	1 + 0.5	59	34	49	54	26.5	1912	65.6
Untreated		0	0	56	61	24.4	2835	66.2
LSD (0.05)		5.3	4.7	4.3	5.1	1.03	420.8	0.94
CV		29.2	48.5	5.4	6.01	2.8	11.1	1.0

Evaluation of Quelex for preplant weed control in HRSW

Quelex was recently registered for postemergence use in small grains. This study evaluated Quelex for preplant weed control compared to other standard herbicides. Treatments were applied May 7 and wheat was planted May 12. No wheat injury was observed.

Durango (glyphosate) plus Sharpen or Aim (Group 14 herbicides) provided about 25% less dandelion control compared to Durango applied alone or Durango tank mixed with Quelex or Clarity (based on June 15 evaluation). All treatments provided good control of emerged wild buckwheat and lambsquarters.

Table. Evaluation of Quelex for preplant weed control in HRSW. (1614)

		Weed Control[b]							
		Dand			Wibw			Colq	
Treatment[ac]	Rate	May-12	May-24	Jun-15	May-12	May-24	Jun-15	May-24	Jun-15
		----------%----------							
Untreated		0	0	0	0	0	0	0	0
Durango	18 oz	20	93	86	17	97	82	100	83
Quelex + Durango	0.75 oz + 18 oz	17	93	88	23	100	86	100	87
Sharpen + Durango	1 oz + 18 oz	70	77	62	70	100	86	100	88
Clarity + Durango	4 oz + 18 oz	23	91	86	40	100	81	100	88
Aim + Durango	2 oz + 18 oz	52	74	63	57	100	81	100	77
LSD (0.05)		12.8	5.7	10.4	7.2	3.4	3.8	0	10.3

[a] *All treatments applied with AMS (2.5 gal/100 gal)*

[b] *Dand=Dandelion; Wibw=Wild buckwheat; Colq=Common lambsquarters*

[c] *Treatments applied May 7 and wheat planted May 12*

Faba bean tolerance to PRE and POST herbicides

The objective of the study was to evaluate faba bean tolerance to preemergence (PRE) and postemergence (POST) herbicides. Faba beans were planted May 2. PRE and POST treatments were applied May 4 and June 7, respectively. Faba beans were 4-5 inches tall at the POST application.

Basagran caused only slight crop injury soon after application. Raptor applied alone caused moderate to severe stunting, although plants recovered somewhat over time. In contrast, only slight injury was observed where Raptor was tank mixed with Basagran. Raptor applied alone resulted in reduced crop yield.

Table. Faba bean tolerance to PRE and POST herbicides. (1618)

			Faba bean					
			Injury				Yield	Test wt.
Treatment	Rate	Timing	May-24	Jun-16	Jul-2	Jul-29	Sep-16	Sep-16
			----------%----------				bu/A	lb/bu
Untreated			0	0	0	0	52	65.7
Sharpen	2 oz	PRE	0	5	3	1	51	66.0
Spartan	4 oz	PRE	0	2	2	0	57	65.2
Spartan + Sharpen	4 oz + 1 oz	PRE	0	5	3	1	61	66.2
Authority MTZ	12 oz	PRE	0	3	1	0	58	65.8
BroadAxe	25 oz	PRE	0	9	4	1	48	66.3
Metribuzin	0.5 lb	PRE	0	8	3	1	54	65.8
Prowl H2O	3 pt	PRE	0	0	0	0	54	65.4
Valor	2 oz	PRE	0	3	3	2	60	65.8
Fierce	3 oz	PRE	0	5	2	1	68	66.2
Prowl H2O / Basagran[a]	2 pt / 2 pt	PRE/POST	0	12	8	3	58	65.8
Prowl H2O / Raptor[b]	2 pt / 4 oz	PRE/POST	0	38	60	28	45	66.3
Prowl H2O / Basagran + Raptor[c]	2 pt / 1 pt + 4 oz	PRE/POST	0	12	10	4	58	65.9
Prowl H2O	1.5 pt	PRE	0	0	0	0	58	66.0
LSD (0.05)			NS	5.5	4.7	4.9	11.2	NS
CV			0	44.9	39.7	100	12	0.74

[a] *Applied with COC (1.5 pt)*

[b] *Applied with MSO + 28% N (1.5 pt + 2.5 gal/100 gal)*

[c] *Applied with MSO (1.5 pt)*

Broadleaf weed control with Talinor in HRSW

The objective of the study was to evaluate Talinor for weed control and crop safety. Talinor is a new Syngenta herbicide containing bicyclopyrone (Group 27) and bromoxynil (Group 6). Talinor controls many annual broadleaf weeds. Treatments were applied June 7 to 4-leaf wheat.

All treatments caused only slight crop injury. There was no significant difference in wheat yield between treatments. All three Talinor rates provided excellent control of redroot pigweed, lambsquarters, and volunteer canola. WideMatch applied alone provided only fair control of pigweed and lambsquarters and poor control of volunteer canola.

Table. Broadleaf weed control with Talinor in HRSW. (1620)

			Weed Control						Wheat					
			Rrpw		Colq		Vol canola		Injury			Moisture	Yield	Test wt.
Treatment	Rate	Timing	Jun-24	Jul-11	Jun-24	Jul-11	Jun-24	Jul-11	Jun-12	Jun-24	Jul-11	Aug-22	Sep-16	Sep-16
			----------%----------						----------%----------			---%---	bu/A	lb/bu
Untreated			0	0	0	0	0	0	0	0	0	14.2	71	64.4
Talinor + Coact+[a]	13.7 oz + 2.74 oz	POST	96	99	99	99	99	99	8	1	0	13.4	78	64.4
Talinor + Coact+[a]	16 oz + 3.2 oz	POST	97	99	99	99	99	99	9	0	0	13.6	71	64.5
Talinor + Coact+[a]	18.2 oz + 3.6 oz	POST	98	98	99	99	99	99	11	2	0	13.8	78	64.2
Huskie + NIS	11 oz + 0.25%	POST	99	99	99	99	99	99	8	0	0	15.0	72	64.2
WideMatch	1 pt	POST	53	72	40	72	43	30	4	0	0	13.7	69	64.1
Affinity TM + MCPA ester	0.6 oz + 0.75 pt	POST	96	99	96	99	96	99	12	2	0	13.8	71	64.1
Bronate	1 pt	POST	74	82	99	99	83	99	4	0	0	13.6	74	63.9
LSD (0.05)			9	6.6	12.3	6.4	14.7	0.5	1.5	NS	NS	NS	NS	0.35
CV			6.7	4.7	8.9	4.4	10.9	0.3	11.9	177.6	0	6.7	6.6	0.3

[a] *Applied with COC (1%)*

[b] *Rrpw=Redroot pigweed; Colq=Common lambsquarters; Vol canola=Volunteer canola*

Foxtail barley control with Varro tank mixes

The objective of the study was to evaluate fall and spring herbicides for foxtail barley control. Treatments included Glyphosate, Olympus, and Varro. Fall treatments were applied September 30, 2015. Glyphosate was applied to the entire study (except untreated) on May 17. Wheat was planted May 19. Postemergence treatments were applied June 13.

No crop injury was observed with any treatment. All treatments provided nearly 100% foxtail barley control.

Table. Foxtail barley control with Varro tank mixes. (1625)

			Wheat		Weed Control		
			Injury		Foxtail barley		
Treatment	Rate (oz)	Timing	Jun-13	Jul-9	May-16	Jun-13	Jul-9
			---------%---------		----------%----------		
Untreated			0	0	0	0	0
Gly[a] + Olympus[b]	24 + 0.2	Fall	0	0	100	100	100
Gly[a] + Olympus[b]	24 + 0.4	Fall	0	0	100	100	100
Gly[a] + Olympus[b] / Varro + Huskie + Olympus[b]	24 + 0.2 / 6.85 + 13.5 + 0.2	Fall / 4-leaf	0	0	100	100	100
Gly[a] + Olympus[b] / Varro + Huskie + Olympus[b]	24 + 0.4 / 6.85 + 13.5 + 0.2	Fall / 4-leaf	0	0	100	100	100
Gly[ab] / Varro + Huskie + Olympus[b]	24 / 6.85 + 13.5 + 0.2	Fall / 4-leaf	0	0	100	100	100
Gly[ab] / Gly[ab] / Varro + Huskie + Olympus[b]	24 / 24 / 6.85 + 13.5 + 0.2	Fall / PRE / 4-leaf	0	0	100	100	100
Gly[ab] / Varro + Huskie + Olympus[b]	24 / 6.85 + 13.5 + 0.2	PRE / 4-leaf	0	0	0	99	100
LSD (0.05)			NS	NS	0	0.4	0

[a] *Gly=Glyphosate*

[b] *Applied with AMS (1.47 gal/100 gal)*

Evaluation of Quelex for POST broadleaf weed control in HRSW

The objective of the study was to evaluate Quelex for postemergence (POST) broadleaf weed control in wheat compared to other standard herbicides. Treatments were applied June 15 at the 4-leaf wheat stage. Weed density was low (<1 plant per sq ft) in the study.

None of the treatments caused visible crop injury. All treatments provided excellent control of kochia, redroot pigweed, and volunteer soybean.

Table. Evaluation of Quelex + WideMatch for POST broadleaf weed control in HRSW. (1638)

			Wheat	Weed Control					
			Injury	Kochia		Volunteer soybean		Redroot pigweed	
Treatment	Rate	Timing	Jun-24	Jul-5	Jul-21	Jul-5	Jul-21	Jul-5	Jul-21
			----%----	----------%----------					
Untreated			0	0	0	0	0	0	0
WideMatch + Quelex[ab]	1 pt + 0.75 oz	4-leaf	0	95	98	88	99	96	96
WideMatch + Affinity TM[ab]	1 pt + 0.6 oz	4-leaf	0	95	97	96	99	92	95
WideMatch + Affinity BS[ab]	1 pt + 0.6 oz	4-leaf	0	97	94	96	99	96	96
WideMatch	1 pt	4-leaf	0	94	97	95	99	76	96
Starane Flex	13.5 oz	4-leaf	0	93	93	90	96	79	94
Huskie[a]	13.5 oz	4-leaf	0	99	100	99	99	99	100
Hat Trick	1 pt	4-leaf	0	98	97	98	99	96	94
LSD (0.05)			NS	2.4	2.5	8.4	1.6	15.8	1.3

[a] *Applied with AMS (2.5 gal/100 gal)*

[b] *Applied with Activator 90 (0.25%)*

Dry pea tolerance to Spartan plus Sharpen tank mixes

The objective of the study was to evaluate dry pea tolerance to Spartan plus Sharpen tank mixes applied preemergence (PRE). 'Blue moon' dry pea was planted May 4. All herbicide treatments were applied PRE on May 7.

Dry pea injury varied across the three replications (reps) due to soil variability. It was not uncommon to see minimal dry pea injury in one rep, but moderate injury in another rep. Soil variability also resulted in yield variability and a high coefficient of variation (CV). We know that dry pea will be more sensitive in lighter soils with high pH and low organic matter. Dry pea injury did increase with higher rates, but did not appear to increase excessively where Spartan and Sharpen were tank mixed. In other studies, we have observed better weed control with this tank mix. This tank mix was recently approved in a supplemental label.

Table. Dry pea tolerance to Spartan plus Sharpen tank mixes. (1639)

			Dry pea							
			Density	Height		Injury			Yield	Test wt.
Treatment[a]	Rate	Timing	Jun-9	Jun-20	Jul-19	Jun-10	Jun-25	Jul-19	Aug-16	Aug-16
			m of row	------cm------		----------%----------			lb/A	lb/bu
Untreated			10.8	31	58	0	0	0	2420	66.8
Glyphosate + Spartan[b]	22 oz + 3 oz	PRE	10.0	29	59	21	20	18	2440	67.0
Glyphosate + Spartan[b]	22 oz + 6 oz	PRE	10.3	31	57	28	26	23	2442	67.8
Glyphosate + Spartan + Sharpen[b]	22 oz + 3 oz + 1 oz	PRE	9.7	34	64	15	19	13	2631	67.9
Glyphosate + Spartan + Sharpen[b]	22 oz + 3 oz + 2 oz	PRE	10.8	31	59	19	24	16	2321	67.3
Glyphosate + Spartan + Sharpen[b]	22 oz + 6 oz + 2 oz	PRE	10.1	30	61	25	32	25	2334	67.9
Glyphosate + Spartan + Sharpen[b]	22 oz + 6 oz + 4 oz	PRE	10.0	25	59	34	39	25	2670	67.1
Glyphosate + Sharpen[b]	22 oz + 3 oz	PRE	9.7	35	57	17	28	18	2257	67.9
Glyphosate + Sharpen[b]	22 oz + 6 oz	PRE	9.3	34	59	24	39	23	2071	68.0
Glyphosate + Prowl H2O	22 oz + 2 pt	PRE	9.8	36	53	2	2	2	2002	67.4
LSD (0.05)			NS	NS	NS	15.9	NS	NS	NS	NS
CV			15.0	12.5	9.3	50.1	74.4	9.3	21.7	0.8

[a] *All treatments applied with AMS (2.5 gal)*

[b] *Applied with MSO (1.5 pt)*

Faba bean tolerance to herbicides

The objective of the study was to evaluate faba bean tolerance to preemergence (PRE) and postemergence (POST) herbicides. Faba beans were planted May 4. Treatments were applied PRE and POST on May 4 and June 7, respectively. Faba beans were about 4-6 inches tall at the POST application.

Very little crop injury was observed with Prowl or Sharpen applied PRE. Only slight crop injury was observed with Varisto applied POST. Sharpen and Varisto provided some horseweed suppression (56-85%).

Table. Faba bean tolerance to herbicides. (1641)

			Faba bean						Weed Control
			Injury				Yield	Test wt.	Horseweed
Treatment	Rate	Timing	May-24	Jun-16	Jun-27	Jul-29	Oct-14	Oct-14	Jul-29
			----------%----------				lb/A	lb/bu	------%------
Untreated			0	0	0	0	20	65.8	0
Prowl H2O	32 oz	PRE	0	0	0	0	19	65.8	0
Prowl H2O	48 oz	PRE	0	2	2	0	18	65.4	0
Sharpen	2 oz	PRE	0	0	0	0	19	65.6	62
Sharpen	4 oz	PRE	0	3	4	4	20	65.6	85
Varisto[a]	11 oz	POST	0	7	8	0	24	65.5	56
Varisto[a]	22 oz	POST	0	12	16	2	20	65.5	76
LSD (0.05)			NS	2.5	3.2	1.5	NS	NS	15.2
CV			0	40.1	42.1	104.4	18.7	0.8	21.4

[a] *Applied with MSO (1%) + AMS (2.5 gal)*

Safflower tolerance to Spartan

The objective of this study was to evaluate safflower tolerance to Spartan applied preemergence (PRE) at various rates. The study was conducted at two locations. At “Site 1”, safflower was planted on May 3 in the morning and herbicides were applied later that afternoon. Site 1 was irrigated as needed throughout the season. At “Site 2”, safflower was planted April 21 and herbicide treatments were applied PRE on May 3. Site 1 was conducted in a conventional tillage system, while Site 2 was conducted under a no-till system. A fungicide was sprayed at Site 2, but not at Site 1. Safflower yield and quality were reduced at Site 1 due to disease. At Site 2, safflower stand and development were hindered and injury increased where old wheat residue was heavy. Safflower injury was light to severe and increased with Spartan rate, but visible injury symptoms decreased over time. Yield was somewhat variable at both locations as indicated by the high coefficient of variation (CV).

Spartan is not currently registered for use in safflower; however, FMC is considering registering it for 2017. If registered, the label will carry an indemnification statement indicating growers will use the product at their own risk. We have observed that safflower tends to grow out of injury caused by Spartan, especially when rainfall is plentiful. Farmers must know their soil characteristics to identify the correct Spartan rate to use.

Table 1. Safflower tolerance to Spartan. (Site 1 - 1652)

			Safflower								
			Density	Injury				Height	Height	Yield	Oil
Treatment	Rate	Timing	Jun-2	Jun-3	Jun-17	Jul-15	Aug-30	Jun-22	Aug-1	Sep-27	Sep-27
			m of row	----------%----------				cm	cm	lb/A	---%---
Untreated			8.1	0	0	0	0	54.8	82.3	1680	26.1
Spartan	1 oz	PRE	9.8	10	7	0	0	56.1	84.0	1716	25.3
Spartan	2 oz	PRE	8.5	18	15	0	0	53.8	86.7	1486	25.5
Spartan	3 oz	PRE	8.2	25	24	1	1	46.3	81.9	1590	26.4
Spartan	4 oz	PRE	8.8	35	30	4	1	47.4	85.9	1611	25.6
Spartan	6 oz	PRE	8.8	54	54	5	3	42.4	84.5	1435	24.7
Prowl H2O	2 pt	PRE	10.3	10	6	0	0	55.0	80.3	1776	25.7
LSD (0.05)			NS	5.5	8.3	1.3	1.3	5.8	NS	NS	NS
CV			12.1	17.2	29.0	67.7	131.8	7.7	3.8	16.0	3.9

*Soil characteristics: Silty loam, pH 8.1, OM 2.3%

Table 2. Safflower tolerance to Spartan. (Site 2 - 1653)

			Safflower							
			Density	Injury				Height	Yield	Oil
Treatment	Rate	Timing	Jun-2	Jun-3	Jun-17	Jul-5	Jul-27	Jul-21	Sep-29	Sep-29
			m of row	----------%----------				cm	lb/A	----%----
Untreated			5.3	0	0	0	0	58.8	1420	33.9
Spartan	1 oz	PRE	6.0	7	5	2	0	60.0	1636	33.7
Spartan	2 oz	PRE	5.7	17	13	7	3	58.5	1709	34.1
Spartan	3 oz	PRE	5.4	25	20	11	7	62.3	2001	34.4
Spartan	4 oz	PRE	5.2	56	55	38	22	57.3	1653	34.7
Spartan	6 oz	PRE	6.3	51	44	30	19	58.0	1266	34.7
Prowl H2O	2 pt	PRE	5.8	7	5	1	0	57.3	1618	33.6
LSD (0.05)			NS	8.9	15.6	12.0	6.8	NS	NS	NS
CV			25.2	25.7	51.9	64.2	63.7	5.8	21.1	1.8

*Soil characteristics: Loam, pH 8.1, OM 2.5%

Preplant dandelion control with Glyphosate + Group 14 herbicides

The objective of the study was to evaluate preplant dandelion control with glyphosate alone compared to glyphosate tank mixed with Group 14 herbicides (Aim, Sharpen, Spartan, and Valor). All treatments were applied 5 days prior to planting. All treatments were applied May 7 and wheat planted on May 12. All treatments were applied with AMS and MSO.

Glyphosate applied alone or tank mixed with Express or 2,4-D provided approximately 87-90% dandelion control (based on June 15 evaluation). Glyphosate applied with Group 14 herbicides (Aim, Sharpen, Spartan, or Valor) provided only 50-70% dandelion control (based on June 15 evaluation). Thus, if dandelion is the primary weed to be controlled, it would be better to apply glyphosate by itself or with Express or 2,4-D. Glyphosate should be applied separate from Aim, Sharpen, Spartan, and Valor when targeting dandelion or other perennial weeds.

Table. Preplant dandelion control with Glyphosate + Group 14 herbicides. (1659)

			Weed Control		
			Dandelion		
Treatment	Rate	Timing	May-12	May-24	Jun-15
			----------%----------		
Untreated			0	0	0
Glyphosate[a]	22 oz	5 DPP	10	90	89
Aim + Glyphosate[ab]	1 oz + 22 oz	5 DPP	52	75	65
Sharpen + Glyphosate[ab]	1 oz + 22 oz	5 DPP	68	75	63
Sharpen + Glyphosate[ab]	2 oz + 22 oz	5 DPP	73	77	70
Spartan + Glyphosate[ab]	4 oz + 22 oz	5 DPP	30	57	55
Spartan Charge + Glyphosate[ab]	5 oz + 22 oz	5 DPP	58	77	66
Valor + Glyphosate[ab]	2 oz + 22 oz	5 DPP	45	65	50
Express + Glyphosate[ac]	0.25 oz + 22 oz	5 DPP	13	91	90
Glyphosate + 2,4-D ester[a]	22 oz + 0.5 pt	5 DPP	27	87	87
LSD (0.05)			6.9	8.9	12.7

[a] *Applied with AMS (2.5 gal/100 gal)*

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

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

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Yellow Toadflax
Listed noxious weed
Aggresive and displaces forage and species
difficult to control

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