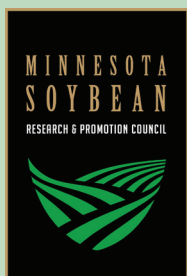


2018 Northwest Minnesota County Variety Research Trials



*2018 Soybean Variety Trial Booklet dedicated to the memory of Howard Person.
37 Years of dedicated service to people and agriculture in NW MN through the Extension Service - Retired 2015
April 11, 1955 - October 1, 2018*

**Variety Plot Trial Booklet
Funded by MSRPC
and the Soybean Checkoff**



Variety Trial Organizers & Participants:

- Marshall County Soybean-Corn Growers
- Pennington/Red Lake County Soybean-Corn Growers
- Polk County Soybean-Corn Growers

Special Thanks to:

- Bill Craig, Ag Service Director, Marshall & Pennington County, Project Lead
- Russ Severson, Crookston, MN, Project Support
- MN Wheat staff for statistical analysis, financial, plant/harvest and publication support

Minnesota Soybean Checkoff Funded Production Research Projects for FY18

Principal Investigator	Email	Project Title
Agronomic Research and Tech Transfer		
Andrew Lueck	andrew.lueck@nxtgenag.com	Glyphosate Resistant Waterhemp Control with Cost Effective Combinations of Pre-Emergent and Early Post Residual Herbicides
Axel Garcia	axel@umn.edu	Nitrogen Mineralization from Cover Crops Residue in Soybean Production
Dan Kaiser	dekaiser@umn.edu	Nutrient Management for Profitable Soybean Production in Minnesota
Dorian Gatchell	dhgatchell@mnagservices.com	Using Soil Health Cultural Practices to Manage Iron Deficiency Chlorosis in Soybeans
Jodi Dejong-Hughes	dejon003@umn.edu	Maximizing Soil Warming and Health Under Different Tillage Practices in a Corn-Soybean Rotation
Phil Glogoza	glogo001@umn.edu	NW Minnesota Soybean Research and Tech Transfer
Seth Naeve	naeve002@umn.edu	The Minnesota Challenge: Interactions Between SCN and IDC
Seth Naeve	naeve002@umn.edu	Nitrogen Management is Not All About the Corn Crop: etc
Seth Naeve	naeve002@umn.edu	Variable Rate Seeding: Impacts on Yield, Weeds, and White Mold
Bill Craig	craig030@umn.edu	Effects of Planting Rate, Planting Date, and Plant Type on Soybean Yield in Northwest Minnesota.
Melissa Wilson	wilso984@umn.edu	Sidedressing Swine Manure to Increase the Application Window for Farmers: Can it Work in Minnesota?
Disease & SCN Management		
Angie Peltier	apeltier@umn.edu	Minnesota SCN Sampling and Education Program: Awareness is the First Step Towards Effective Management
Cory Hirsch	cdhirsch@umn.edu	High-Throughput Hyperspectral Phenotyping to Understand Soybean Cultivar Response to Diseases
Dean Malvick	dmalvick@umn.edu	Optimizing Management of White Mold, SDS, and BSR in Minnesota
Damon Smith	damon.smith@wisc.edu	Improving Integrated Management Strategies for White Mold of Soybean
Jim Kurle	kurle001@umn.edu	Enhancing Phenotyping for Resistance to Sudden Death Syndrome of Soybean
Kathryn Bushley	kbushley@umn.edu	Development of Biocontrol Agents and Bio-Pesticides for Control of SCN and SDS
Marisol Berti	marisol.berti@ndsu.edu	Managing Soybean Cyst Nematode (SCN) Population with Cover Crops in Minnesota
Senyu Chen	chenx099@umn.edu	Study of SCN Resistance in Soybean and Its Impact on SCN Population
Insect Management		
Bob Koch	koch0125@umn.edu	Soybean Aphid Management (2018): Insecticide Resistance and Biological Control
Bruce Potter	bpotter@umn.edu	Understanding Spatial and Temporal Changes in Minnesota Soybean Pests (Year 3)
Soybean Breeding, Molecular Genetics and Functional Genomics		
Aaron Lorenz	lore0149@umn.edu	Advancing Varietal Resistance to Soybean Cyst Nematode in Minnesota
Aaron Lorenz	lore0149@umn.edu	Soybean Breeding and Genetics
Bob Stupar	stup0004@umn.edu	New Biotechnology for Soybean Improvement
Gary Muehlbauer	muehl003@umn.edu	Novel Traits for Soybean Improvement Through Mutagenesis and Germplasm Collections
Susan Gibson	gibso043@umn.edu	Field-Testing ELP Genes for Effects on Seed Composition and Yield (Year 2)
Susan Gibson	gibso043@umn.edu	Manipulating Primary Carbon Metabolism to Improve Seed Composition and Yield (Year 3)
Walid Sadok	msadok@umn.edu	Enhancing Canopy Conductance to Increase Soybean Yields and Tolerance to Multiple Stresses in Minnesota
Walid Sadok	msadok@umn.edu	Building Capacity for Measuring In-Field, Whole-Season Nitrogen Fixation to Enhance Soybean Yield, Seed Quality & Management

Coordinated County Variety Trials and Research Trials

The data presented here is part of a coordinated effort by Minnesota county soybean growers to expand the amount of research information that soybean growers have access to in northwest Minnesota. These trials are funded by entry fees paid by participating seed companies.

The trial results are published as an average of the three replications in a booklet available in print and online for use by soybean growers and seed company representatives. The information will also be disseminated in the On-Farm Cropping Trial booklet which will be available at the Prairie Grains Conference, December 13, 2018 and at county soybean association meetings, or by contacting Lorri Hartel at lhartel@prairieagcomm.com.

About This Variety Plot Trial

The County Soybean Variety Plots are randomized small plot trials. They utilized three replicated blocks in each location. The soybean plots were planted with a Haldrup small plot cone planter and harvested with a Zurn small-plot combine. For weed control, the plots were sprayed with glyphosate by the farmer-cooperator using commercial-sized equipment, utilizing driving lanes through the plots.

Interpreting the Data

Yield Differences: If the numerical yield difference between two varieties is greater than the least significant difference (LSD) value listed in the table, the yields are considered significantly different from one another. If the difference between two varieties is less than or equal to the LSD value, the yields are not statistically different and are considered to be the same.

For LSD (0.1), there is a 90% chance that a yield difference between two varieties that is greater than the LSD value was caused by the difference between the two varieties, and a 10% chance the difference was caused by something other than hybrid genetics. Likewise, for LSD (0.2), there is an 80% that a yield difference between two varieties that is greater than the LSD is due to varietal differences, and a 20% chance the difference in yield was caused by other factors like seed treatments, soil type or fertility, or other environmental factors.

Reliability of the Data: The LSD is also a measure of variability within a trial. A larger LSD value indicates there is more variability within a location compared to a location with a smaller LSD value.

The Coefficient of Variation (CV) indicates how much of the variability within the trial was caused by unknown factors (uneven seeding rate, emergence, insect damage, disease, soil type etc.). A CV of less than 15 indicates a very uniform trial site; therefore, differences in soybean yields are more likely the result of varietal differences rather than other external factors. A larger CV indicates that differences in yield are more likely to be influenced by external factors rather than variety.

Relative Maturity

Companies provided relative maturity ratings for each entry. These ratings consist of a number for the maturity group (MG) designations (000, 00, 0, 1, 2) followed by a decimal and another number, ranging from 0-9, which indicates a ranking within each MG. For example a 0.1 entry is an early group 0, while a 0.9 entry, is the late group 0. The greater the MG value the more time is needed to complete developmental milestones.

County Variety Trials and Plot Tours

In 2018 county soybean varietal trials were conducted in Marshall, Pennington/Red Lake, and Polk counties. The plots are conducted as random, replicated trials. This and university plot data can assist soybean producers to purchase top yielding varieties and improve soybean production and profitability within the region. County plot tours, sponsored by the University of Minnesota Extension and Minnesota Soybean Research & Promotion Council, were held in August. The plot tours allowed growers to view the plots and learn about soybean varieties from seed company representatives. Production updates were also presented by the University of Minnesota Extension researchers. Note: Varieties containing an X are Roundup Ready2Xtend® soybeans containing dicamba and glyphosate tolerant genetics.

County Collaborators

Bill Craig, Ag Services Director, Marshall & Pennington Counties & Russ Severson, Polk County Soybean Growers, Associate Director

Characteristics of Soybean Varieties and Variety Placement Across Zones

PHYTOPHTHORA ROOT ROT is a destructive soil borne disease that can cause soybean stand loss and reduced plant productivity. The primary means of managing this disease is to plant varieties that are resistant to the pathogen. This is a bit of a 'cat and mouse' game since there are more than 55 pathogen races and approximately 8 resistance genes, designated as *Rps* genes, that offer complete resistance only to specific races. Partial resistance is also available and offers a lower level of resistance to all pathogen races. The key to managing this disease is to know which *Rps* gene is used in each soybean field you plant and make an annual evaluation of how well it is performing. For example, if you plant in two fields a variety that has an *Rps* 1k gene and notice few symptoms of Phytophthora root rot in field A but severe symptoms in areas of field B, you will want to avoid selecting varieties expressing the *Rps* 1K gene in field B in future soybean years.

SOYBEAN CYST NEMATODE (SCN) is a highly damaging pest of soybean. Surveys indicate this pest is expanding its range in NW Minnesota and testing your soil is recommended. Crop rotation and planting SCN resistant varieties are the primary means for managing this microscopic roundworm.

IRON-DEFICIENCY CHLOROSIS (IDC) scoring is based on the 2018 NDSU Roundup Ready Soybean Iron-deficiency Chlorosis Trial (author T. Helms). Data was averaged across two test sites. Follow this link for the full trial report. <https://www.ag.ndsu.edu/varietytrials/fargo-main-station/2018-trial-results/2018-trial-results-roundup-ready-and-xtend-soybean-iron-deficiency-chlorosis-trial/view>

See charts below for reference numbers.

SEED TREATMENTS ¹ : 1-16: Fungicides / 17-19: Insecticides / 20: Inoculants / 21: Other						Phytophthora ²		SCN Trait ³	
Ref #	Treatment	Ref #	Treatment	Ref #	Treatment	Ref #	Gene	Ref #	Trait
1	Azoxystrobin	8	Mefenoxam	15	Trichoderma harzianum Rifai	1	Rps 1a	1	PI88788
2	Bacillus pumilus	9	Metalaxyl	16	Trifloxystrobin	2	Rps 1b	2	Peking
3	Bacillus subtilis	10	Pyraclostrobin	17	Clothianidin	3	Rps 1c	SUS	Susceptible
4	Captan ©	11	Streptomyces griseoviridis	18	Imidacloprid	4	Rps 1k	NG	No Gene
5	Fludioxonil	12	Streptomyces lydicus	19	Thiamethoxam	5	Rps 3	IDC Scoring ⁴	
6	Ipconazole	13	Thiabendazole	20	Bradyrhizobium japonicum	6	Rps 4	Ref #	
7	Mancozeb	14	Thiram©	21	Other	7	Rps 6	1	Green
						ng	No Gene	3	Yellow
								5	Dead

Seed Treatments, Phytophthora Genes & SCN Traits listed for each variety are as reported by the seed company.

Early Soybean Varieties - 00.9 and Earlier						
Company	Variety	Relative Maturity	Seed Treatment ¹	Phytophthora Gene ²	SCN Trait ³	IDC Scoring ⁴
Channel	00717R2X	0.07	9, 10, 18, 21	3	1	2.4
Dairyland Seed	DSR-C999/R2Y	0.09	5, 8, 19, 20	3		2.9
Dyna-Gro	S007XT59	0.07	5, 8, 13, 19, 21	4	1	2.2
Dyna-Gro	S009XT68	0.09	5, 8, 13, 19, 21	4		2.1
Golden Harvest	GH00866	0.08	8, 5, 19	NA	NA	not listed
Hefty Seed Co.	H008X8	.08	9, 5	4	1	2.5
Legend Seeds	LS 007X956N	.07	5, 8, 18, 20	4	3	2.2
Legend Seeds	LS 009X852N	.09	5, 8, 18, 20	4	3	2.3
NorthStar Genetics	NS 0064R2	00.6	5, 8, 19, 21	1	N/A	2.2
NorthStar Genetics	NS 60083NXR2	00.8	5, 8, 19, 21	4	1	not listed
NorthStar Genetics	NS 60092XR2	00.9	5, 8, 19, 21	4	N/A	2.4
Peterson Farms Seeds	18X008N	0.08	5, 9	4	1	2.5
Thunder Seed	39005 R2Y	00.5		1	N/A	2.2

Medium Soybean Varieties - 0.1 to 0.3						
Company	Variety	Relative Maturity	Seed Treatment ¹	Phytophthora Gene ²	SCN Trait ³	IDC Scoring ⁴
Channel	0218R2X	0.2	9, 10, 18, 21	5	1	1.8
Dairyland Seed	DSR-0225/R2Y	0.2	5, 8, 19, 20	3	1	2.6
Dairyland Seed	DSR-0305/R2Y	0.3	5, 8, 19, 20	4		2.2
Dyna-Gro	S03XT29	0.3	5, 8, 13, 19, 21	3	1	1.8
Golden Harvest	GH0145X	0.1	8, 5, 19	3	NA	2.5
Golden Harvest	GH0391	0.3	8, 5, 19	NA	1	2.0
Hefty Seed Co.	H02X9	0.2	9, 5	RPS 1C	PI88788	1.9
Integra	20468	0.2	5, 8, 19	NA	NA	1.7
Integra	50309N	0.3	5, 8, 19	4	1	1.8
Legacy Seeds	LS-0239N RR2X	0.2	9, 18	3	1	1.8
Legacy Seeds	LS-0337N RR2X	0.3	9, 18	5	1	2.2
Legacy Seeds	LS-0334 RR2	0.3	9, 18	4		2.3
Legend Seeds	LS 01X850	0.1	5, 8, 18, 20	4	3	1.8
Legend Seeds	LS 03X852N	0.3	5, 8, 18, 20	3	3	1.8
NorthStar Genetics	NS 60264N XR2	0.2	8, 5, 19, 21	3	1	2.0
Peterson Farms Seeds	19X03N	0.3	5, 9	RPS1C	PI88788	1.8
Prairie Brand	PB-00928R2	0.1	8, 19	3	None	not listed
Prairie Brand	PB-0240R2	0.2	8, 19	3	None	not listed
Prairie Brand	PB-0146R2	0.1	8, 19	3	1	not listed
Proseed	XT 80-20	0.2	9	3	1	1.8
Proseed	XT 7030	0.3				not listed
Thunder Seed	3601 R2Y	0.1		3	N/A	2.7
Thunder Seed	SB8903N	0.3		3	1	1.8

Late Soybean Varieties - 0.4 and later						
Company	Variety	Relative Maturity	Seed Treatment ¹	Phytophthora Gene ²	SCN Trait ³	IDC Scoring ⁴
Channel	0518R2X	0.5	9, 10, 18, 21	3,5	1	2.1
Dairyland Seed	DSR-0418/R2Y	0.4	5, 8, 19, 20	3	1	2.1
Dyna-Gro	S04XT77	0.4	5, 8, 13, 19, 21	5	1	2.3
Golden Harvest	GH0749X	0.7	8, 5, 19	3	1	2.7
Hefty Seed Co.	H04X8	0.4	9, 5	HRPS 3A	PI88788	2.8
Hefty Seed Co.	H06X8	0.6	9, 5	HRPS 1C	PI88788	2.7
Integra	20775N	0.7	5, 8, 19	3	1	2.4
Legacy Seeds	LS-0438 RR2X	0.4	9, 18	3		2.6
Proseed	XT 70-60	0.6	9	5	1	2.5
Thunder Seed	SB8906N	0.6		N/A	1	not listed

EARLY MATURITY 00.9 and Earlier

Company	Variety	Relative Maturity	Marshall County (bu/ac)	Pennington/ Red Lake County (bu/ac)	Polk County (bu/ac)	Combined (bu/ac)
Dairyland Seed	DSR-C999/R2Y	0.09	51.0	49.9	44.4	48.4
Channel	00717R2X	0.07	49.6	45.1	42.5	45.7
Dyna-Gro	S009XT68	0.09	51.0	44.2	39.6	44.9
NorthStar Genetics	NS 60083NXR2	00.8	47.7	44.8	41.1	44.5
Peterson Farms Seeds	18X008N	0.08	47.1	44.4	41.8	44.4
Dyna-Gro	S007XT59	0.07	40.6	47.7	43.2	43.9
Legend Seeds	LS 007X956N	0.07	47.7	42.1	40.7	43.5
Legend Seeds	LS 009X852N	0.09	46.9	42.4	39.8	43.0
Hefty Seed Co.	H008X8	0.08	45.4	40.3	41.5	42.4
NorthStar Genetics	NS 0064R2	00.6	37.7	43.8	43.4	41.6
Thunder Seed	39005 R2Y	00.5	42.8	41.0	41.0	41.6
Golden Harvest	GH00866	0.08	39.4	43.4	41.7	41.5
NorthStar Genetics	NS 60092XR2	00.9	43.7	37.6	39.8	40.4
Mean			45.4	43.6	41.6	43.5
CV			13.6%	7.3%	7.5%	10.1%
LSD (0.1)			NS	4.5	NS	NS
LSD (0.2)			NS	3.4	NS	3.1
Top 1/3			51.0 - 46.6	49.9 - 45.8	44.4 - 42.8	48.4 - 45.7
Mid 1/3			46.5 - 42.1	45.7 - 41.7	42.7 - 41.2	45.6 - 43.1
Bottom 1/3			42.0 - 37.7	41.6 - 37.6	41.1 - 39.6	43.0 - 40.4

Relative maturities listed in the tables are as reported by the seed company.

MEDIUM MATURITY 0.1 - 0.3

Company	Variety	Relative Maturity	Marshall County (bu/ac)	Pennington/ Red Lake County (bu/ac)	Polk County (bu/ac)	Combined (bu/ac)
Legend Seeds	LS 03X852N	0.3	49.7	42.7	49.1	47.7
Peterson Farms Seeds	19X03N	0.3	47.1	48.1	40.8	45.3
Integra	20468	0.2	51.6	43.8	39.9	45.1
Channel	0218R2X	0.2	46.7	45.3	43.1	44.5
Legacy Seeds	LS-0334 RR2	0.3	54.2	43.4	35.4	44.3
Hefty Seed Co.	H02X9	0.2	46.6	43.3	43.1	44.0
Legacy Seeds	LS-0337N RR2X	0.3	51.2	41.3	40.7	43.9
Dairyland Seed	DSR-0305/R2Y	0.3	45.9	46.3	39.6	43.7
Prairie Brand	PB-0240R2	0.2	45.0	42.6	42.4	43.5
Prairie Brand	PB-0146R2	0.1	47.3	43.2	39.9	43.5
Legacy Seeds	LS-0239N RR2X	0.2	50.9	40.9	41.9	43.4
NorthStar Genetics	NS 60264NXR2	0.2	45.8	40.7	42.9	43.1
Golden Harvest	GH0145X	0.1	38.3	43.7	46.4	43.0
Dairyland Seed	DSR-0225/R2Y	0.2	44.6	42.5	41.6	42.9
Legend Seeds	LS 01X850	0.1	43.6	45.3	37.9	42.5
Integra	50309N	0.3	44.7	43.0	38.4	42.1
Proseed	XT 80-20	0.2	44.1	43.0	39.3	41.8
Thunder Seed	3601 R2Y	0.1	43.1	39.7	41.8	41.5
Thunder Seed	SB8903N	0.3	43.2	42.3	35.6	40.4
Prairie Brand	PB-00928R2	0.1	33.4	40.0	44.4	39.6
Proseed	XT 7030	0.3	lost plot	40.8	42.9	N/A
Golden Harvest	GH0391	0.3	lost plot	41.2	39.0	N/A
Dyna-Gro	S03XT29	0.3	lost plot	40.1	38.3	N/A
Mean			45.8	42.7	41.1	42.9
CV			13.0%	9.7%	10.9%	11.1%
LSD (0.1)			NS	NS	NS	NS
LSD (0.2)			NS	NS	4.8	NS
Top 1/3			54.2 - 47.3	48.1 - 45.3	49.1 - 44.5	47.7 - 45.0
Mid 1/3			47.2 - 40.4	45.2 - 42.5	44.4 - 40.0	44.9 - 42.3
Bottom 1/3			40.3 - 33.4	42.4 - 39.7	39.9 - 35.4	42.2 - 39.6

LATE MATURITY 0.4 and later

Company	Variety	Relative Maturity	Marshall County (bu/ac)	Pennington/Red Lake County (bu/ac)	Polk County (bu/ac)	Combined (bu/ac)
Channel	0518R2X	0.5	Lost Plots	49.3	36.1	42.7
Dyna-Gro	S04XT77	0.4		42.7	41.1	41.9
Hefty Seed Co.	H06X8	0.6		43.6	39.8	41.7
Integra	20775N	0.7		44.7	38.6	41.7
Thunder Seed	SB8906N	0.6		44.3	38.5	41.4
Golden Harvest	GH0749X	0.7		46.3	35.0	40.6
Legacy Seeds	LS-0438 RR2X	0.4		38.4	40.2	39.3
Dairyland Seed	DSR-0418/R2Y	0.4		42.2	36.3	39.3
Hefty Seed Co.	H04X8	0.4		41.3	35.8	38.5
Proseed	XT 70-60	0.6		39.6	37.1	38.4
		Mean		43.2	37.8	40.5
		CV		11.9%	7.8%	10.3%
		LSD (0.1)		NS	NS	NS
		LSD (0.2)		NS	NS	NS
		Top 1/3		49.3 - 45.7	41.1 - 39.1	42.7 - 41.3
		Mid 1/3		45.6 - 42.0	39.0 - 37.0	41.2 - 39.8
		Bottom 1/3		41.9 - 38.4	36.9 - 35.0	39.7 - 38.4

FY 18 Soybean Production Projects Funded by the MN Soybean Research & Promotion Council

Mission: To help farmers turn discoveries from science into higher crop yields and enhance profit potential in the field.

Why it matters: Unbiased production research information is vital to farmers across Minnesota. Because fewer public dollars are spent on agricultural research and extension, projects supported by the Production action team make valuable management information and new soybean cultivars available to farmers across the state.

Research Funding: In 2018, the Production Action Team recommended 30 projects for funding. Checkoff dollars are leading the way to increasing soybean yield, enhancing environmental stewardship and managing pesticide resistance. Funded projects included developing genetic resistance to SCN, Soybean Aphid and Sudden Death Syndrome, interaction of plant diseases with crop nutrition, development of biological control for soybean pests (soybean cyst nematode, soybean aphid and Sudden Death Syndrome), enhancing soybean aphid management, optimizing soybean plant nutrition management and continued technology transfer program support for management of resistant pests, optimizing soybean pest (insect, weed and disease) management and improving soil health.

Wells Drainage Site: This 17-acre site, dedicated to soybean research, has been set up to investigate how large scale interactions of drainage with production practices will impact soybean yield and quality. Current studies being conducted include drainage interactions with tillage, soybean production practices, N management on corn and seed treatment on environmental impacts and soybean yield. Results from these cutting edge studies will be used to develop best management practices that will impact soybean profitability and environmental quality.

Conservation Tillage Conference and Soil Health Field Day: The Production Action Team co-sponsored the University of Minnesota Conservation Tillage Conference and the Soil Health Field Day, which demonstrated the impacts of conservation tillage, soil salinity and other agronomic practices on soil health. Farmers could see actual compaction following various tillage practices via soil pits excavated in the field. Agronomic practices were evaluated for crop and soil health responses. Several different equipment manufacturers demonstrated equipment to minimize tillage effects and provide in-furrow cover crop planting methods.

Production Project Breakout: (See list of projects on page 2.)

Plot Information

Marshall County Plot Cooperators:

Jim Potucek Farm, Warren, MN

Planting Date: May 16, 2018

Harvest Date: September 20, 2018

Pennington/Red Lake Counties:

Kyle Mehrkens, Thief River Falls, MN

Planting Date: May 15, 2018

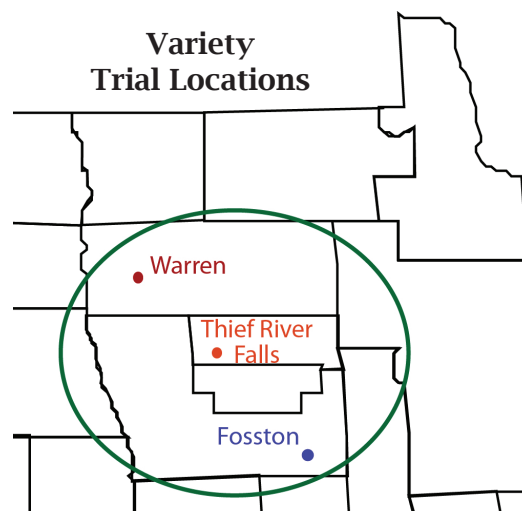
Harvest Date: September 19, 2018

Polk County:

Mike Theis, Fosston, MN

Planting Date: May 14, 2018

Harvest Date: September 18, 2018



**Thank you to the following companies for participating in the
2018 Soybean Variety Trials:**

Channel - channel.com ▪ **Dairyland Seed Company** - dairylandseed.com

Dyna-Gro Seed - dynagroseed.com ▪ **GoldenHarvest** - goldenharvestseeds.com

Hefty Seed Company - heftyseed.com ▪ **Integra Seeds** - integraseed.com

Legacy Seed - legacyseeds.com ▪ **Legend Seeds** - legendseeds.net

NorthStar Genetics - northstargenetics.com ▪ **Peterson Farms Seed** - petersonfarmsseed.com

Prairie Brand - prairiebrand.com ▪ **Proseed Inc.** - proseed.net

Thunder Seed - thunderseed.com