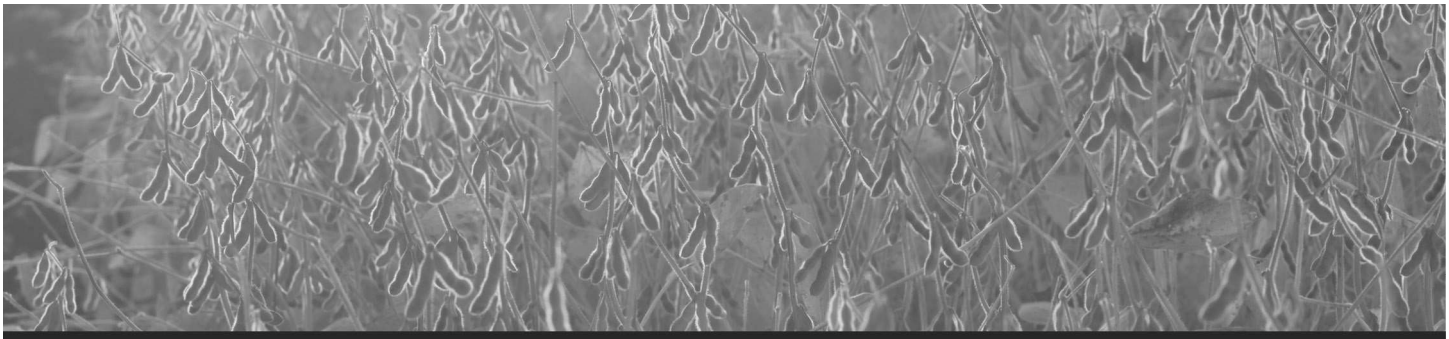

2023 Soybean Field Crop Trials Results

Minnesota Agricultural Experiment Station and the College of Food, Agricultural and Natural Resource Sciences

Each year Minnesota Agricultural Experiment Station scientists conduct performance tests of appropriately adapted public and private soybean entries. Companies are charged a fee for each entry they enter to partially cover the costs of conducting these tests. One of the stipulations of the testing program is that the company is marketing or intends to begin marketing the entry in the next growing season. This information is also available electronically at soybeans.umn.edu and varietytrials.umn.edu/soybean.

As ever, it is hard to generalize the weather for the growing season across the whole state. For the most part, 2023 started with ample moisture in the spring followed by dry and hot weather for most of the summer. Precipitation arrived for most places too late in the fall during harvest. We were able to get all of our testing locations planted in between rainfall events in May. We achieved good stand establishment, and the moisture available in the soil from the spring rainfalls helped our fields get off to a quick start, resulting in average to good yields at all locations. An exception was our Morris location which was lost due to poor stand establishment caused by excessively dry conditions at planting. Another item to note is that because of the lack of rainfall during much of the season, our Becker location was irrigated on a weekly basis. This amount of irrigation, particularly during seed fill, produced larger seeds, biasing the seed size of many of our small-seeded specialty varieties.

Tables 1 to 4 provide results from tests of available conventional, special purpose, and transgenic entries adapted to the far northern, northern, central, and southern production zones. The map shows test locations and zone boundaries. All of these tests were planted between May 6 and May 26 at planting rates listed below.

Herbicides were used as necessary for good weed control. Row spacings were 24 inches at Crookston, 6 inches at Roseau and 30 inches at all other locations. Plots were machine harvested using a small plot combine.

Locations of 2023 soybean trials.

Tables 5 to 10 provide characteristics and performance data from special-purpose soybean entry tests. These tests were conducted to provide reliable data for growers who are interested in producing special-purpose soybeans, which are typically grown under contract.

Location	Planting date	Seeding rate per acre	Harvest date	Latitude	Longitude	Soil type	Drainage	Previous crop
Becker	15-May	174,000	11-Oct	45.347142	-93.853407	Mosford sandy loam	Good to excellent	Corn
Crookston	19-May	221,000	13-Oct	47.818224	-96.613323	Hegne silty clay	Poor	Wheat
Glyndon	22-May	167,000	14-Oct	46.905200	-96.610010	Fargo silty clay	Good	Corn
Lamberton	24-May	174,000	18 & 21-Oct	44.239034	-95.307135	Normania loam	Good	Corn
Roseau	24-May	174,000	13-Oct	48.8475	-95.787222	Clay loam	Adequate	Soybean
Rosemount	6-May	174,000	3-Oct	44.706979	-93.101039	Waukegan silt loam	Good	Corn
Sleepy Eye	26-May	174,000	21-Oct	44.211213	-94.665582	Canisteo clay, Clarion Loam	Excellent	Corn
Shelly	21-May	174,000	14-Oct	47.426389	-96.831694	Beardon silt loam	Good	Corn
Thief River Falls	19-May	174,000	12-Oct	48.128273	-96.242684	NA	NA	Wheat
Waseca	22-May	174,000	5 & 11-Oct	44.077017	-93.536694	Nicollet clay loam	Adequate	Corn

Table 11 displays results from greenhouse tests conducted by the Nematology Laboratory at the University of Minnesota Southern Research and Outreach Center in Waseca, MN. All submitted entries were grown in soil inoculated with an HG type 7 (race 6) population of soybean cyst nematode in 2023. A subset of entries with non-88788 sources of resistance were tested using HG type 2 (race 1).

To better understand and use the data provided in these tables, please carefully read the following additional information.

Seed Treatments and Transgenic Traits

Entrants were allowed to enter treated seed in 2022. The type of seed treatment, as provided by the originator, is designated as follows:

AC = Acceleron
AMS = Agrishield Max + Saltro
CMV = Cruiser Maxx + Vibrance
EVSV = Equity VIP, Saltro, Vayantis
OPVRI = Obvius Plus, Poncho/Votivo, Relenya, ILEVO
PS = Peterson Select

Research indicates that under some conditions seed treatments can affect the final yield. The exact situations are not always clear but when comparing entries note if a seed treatment was used on the seed being tested.

In some tables the transgenic trait is indicated in a separate column using the following designations:

CV = conventional variety (non-transgenic)
E3 = Enlist E3 (glyphosate, glufosinate and 2,4-D tolerant)
LLGT27 = glyphosate, glufosinate, and HPPD/Group 27 herbicide tolerant
XF = Xtendflex (dicamba, glyphosate and glufosinate tolerant)

Relative Maturity and Calendar Dates of Maturity

Soybeans are photoperiod sensitive; that is, they respond to changing day length. The actual calendar date of maturity achievement is affected by latitude. Each entry has a narrow range (about 100 miles) of north-south adaptation. Soybean yield and quality are best achieved when physiological maturity occurs before a hard frost. Maturity is determined visually by noting the calendar date when 95 percent of the pods show their genetically programmed mature color. The dates for 2023 are provided in the tables under the column heading "Maturity Date". Harvest dates are typically 7 to 14 days later depending upon drying conditions. Almost all entries were essentially mature before a hard frost.

Relative maturity ratings are also provided for each entry. These ratings consist of a number for the maturity group designations (000, 00, 0, 1, 2) followed by a decimal and another number, ranging from 0-9, which indicates a ranking within each maturity group. For example the entry MN0101 indicates a 0.1, making it an early group 0, while MN0901, with a 0.9 rating, is the latest group 0. The values for public entries are developed after observing them for several years in many locations. Relative maturity ratings for private entries in these tables were provided by their originators and were developed in a similar manner.

Yield

Because maturity is a very important attribute, entries are ordered in the tables according to their actual 2023 calendar date of maturity for where maturity date data was available. Otherwise they are ordered by their reported relative maturity.

Later maturing entries usually can be expected to have higher yields than earlier maturing types. If you wish to compare yields, do so only between entries with similar calendar dates of maturity, usually within 3 to 5 days. More reliable comparisons can be made using yields from several consecutive years. All yield determinations were made from replicated tests harvested with a plot combine. Multi-location data are necessary for determining true differences between varieties, and therefore only multi-location averages are reported in this report, but data for individual locations can be found at https://varietytrials.umn.edu/soybean.

The yield information is presented as a percent of the mean of the test. The actual mean value is given at the bottom of each table. Values over 100 indicate the entry had a yield greater than the mean while those less than 100 have a yield less than the mean.

LSD values associated with data in these tables are measures of variability within the trials. The LSD numbers beneath the yield columns indicate whether the difference between yields is due to genetics or other factors, such as environmental variation and measurement error. If yield differences between two entries equals or exceeds the LSD value, the higher-yielding entry probably was superior in yield. A difference less than the LSD value is probably due to environmental and/or measurement variation. The LSD values are given on the percent of mean data, not the actual yields. A 25% level of significance is used in all tables contained in this report. This means that there is a 25% probability that yield differences exceeding the stated LSD are not true yield differences.

Chlorosis

Iron deficiency chlorosis (IDC) is a yield-limiting condition of soybeans grown in alkaline soils with high calcium carbonate or calcium sulfate ions present, making iron unavailable and causing soybean plants to turn

yellow. This yellowing is visually scored on a 1 to 5 scale, where 1 indicates no yellowing and 5 indicates severe yellowing and necrosis that may even include death of the plant.

Research has shown that for every unit increase in chlorosis, a 20% reduction in yield may occur. For example, a plot rated as a 3 may yield 20% less than a plot given a rating of 2. All IDC ratings in tables are from tests conducted on high lime (high pH) soils in Crookston, MN in 2023.

Comparing chlorosis scores of entries allows you to estimate how well they perform relative to each other. Actual chlorosis ratings can vary depending on the specific site, year of test, and location in the field. Because of this high level of variability, it is usually very difficult to identify the best performing entries. Varieties should be compared for IDC ratings relative to one another within a single trial only and not across trials. Producers with a known history of IDC problems should at least avoid entries with the most severe (4 or 5) IDC ratings. Different organizations may use different scales or descriptions. The below table provides some general rules for a trial with moderate stress able to produce ratings ranging from 1 to 5.

Numerical Score	Rating
1 to 2	Tolerant (T)
2.1 to 3	Moderately Tolerant (MT)
3.1 to 4	Moderately Susceptible (MS)
4.1 to 5	Susceptible (S)

Protein and Oil

Protein and oil values were determined from mature seed using near-infrared reflectance spectroscopy. **The tabled values are for the 2023 season only**. Protein and oil results are presented on a percent of the mean for each test. The actual mean values, expressed on a 13% moisture basis, are given at the bottom of each table. Values over 100 indicate the protein and/or oil contents of the entry are greater than the mean value while those less than 100 have protein and/or oil contents less than the mean. Absolute values of protein and oil can vary from year to year. The following formula is used to adjust the protein and oil values to another moisture basis.

$$\frac{\text{100-desired moisture}}{87} \times \text{protein or oil value given in the table}$$

The value of a bushel of soybeans (APV) based on its oil and protein content can be calculated by:

$$APV = 60\,[Po(X) + \frac{Pm(Y)}{.44}]$$

Where:

APV = Approximate value of a bushel of soybeans

Po = soybean oil price (in $ per pound)

Pm = price of 44% meal (in $ per pound)*

X = oil content at 13% moisture (in decimals)

Y = protein content at 13% moisture (in decimals)

And:

$$\frac{\text{*price of meal \$ / ton}}{2{,}000} = \text{\$ / pound}$$

The value of an acre of soybeans can be calculated by multiplying the APV by the yield in bushels per acre.

Phytophthora

Phytophthora root rot is a soil-borne disease that occurs in heavy wet soils. Infection generally occurs during germination. Phytophthora root rot can cause significant yield reductions if susceptible varieties are planted in poorly drained, infested fields. Variety selection is the best defense against this yield reducing pathogen. There are many known pathotypes (races) of this fungus, and therefore it is important to know which are present in a particular field. Genes can be incorporated into varieties to provide resistance to races present in a field. Soybean varieties that have specific resistance genes (or gene) provide some level of protection, but race-specific resistance genes do not guarantee protection against infection and yield loss because so many different races exist. Research indicates that Rps3a and Rps6 provide the broadest protection to Phytophthora races currently present in soybean fields in the Midwest.

Some published information refers to Phytophthora "tolerance" or "field resistance", which is not race-specific and should not be confused with race-specific resistance. It is possible that a certain level of field tolerance can provide yield protection even when the race-specific genes are not effective. Reliable tests for tolerance have not yet been fully developed.

Tables included in this report indicate which race-specific Phytophthora gene or genes is/are present in each entry. This information was provided by the originator. A "S" indicates a variety is expected to be susceptible to all races. A "--" indicates that a Phytophthora gene was not specified by the originator.

Soybean Cyst Nematode

Soybean Cyst Nematode (SCN) is a microscopic round worm that infects and reproduces in soybean roots. It was first identified in Minnesota in 1978 and is now known to occur in most Minnesota counties where soybeans are grown. Both the area of infestation and number of nematodes per unit of soil appear to be increasing. Several races of this pest are known to occur in Minnesota. When SCN numbers are high (> than 5,000 eggs/100 cc soil), significant yield losses can occur. Rotations to non-host crops and planting of resistant varieties can assist in reducing nematode populations as well as reducing the SCN's impact on yield.

The source for SCN resistance for each entry was provided by the originator. In Table 11 the resistance ratings were given based on a greenhouse bioassay with five replicates using an HG Type 7 (Race

6) SCN population. Each container (one plant) was inoculated with 4000 SCN eggs. After 30 days a female index (FI) was calculated for each entry using Lee 74 as the susceptible check. FI = (# of cysts on entry/# of cysts on Lee 74) x100. If the FI was < 10%, an entry was considered R. If the FI was 10 – 30%, it was considered MR. If the FI was 30-60%, it was considered MS, and greater than 60% S. These are fairly arbitrary cutoffs, and thus it is important to look at the actual FI values to judge the level of resistance. Comparison to varieties known to have a good level of resistance is also advisable.

For proper management of fields with SCN, it is recommended that entries with an R rating be planted. If the SCN population numbers are relatively low (<1500 eggs/100 cm3) an entry with an MR rating might be considered. Entries with S and MS ratings should not be considered for planting in fields where SCN is present at levels greater than 200 eggs/100 cm^3. Some entries are rated as tolerant, however no data from the northern United States has verified the usefulness of tolerant entries in maintaining yield and reducing SCN numbers.

Management information is available online at soybeans.umn.edu or from the Minnesota Soybean Research and Promotion Council, 1-507-388-1635, mnsoybean.org.

White Mold

White mold, also known as Sclerotinia stem rot, develops in infested fields when high relative humidity and moderate temperatures occur during soybean flowering. Planting less susceptible entries in wider row spacings or at lower populations is the most effective method of reducing the severity of white mold. Accurate ratings for resistance to white mold are difficult to obtain because both infection and disease development are dependent on weather conditions. Because of this variability, performance can change significantly among locations and years depending on the interaction of plant development, precipitation, relative humidity, and temperature. White mold severity also tends to be greater if lodging occurs. Growers concerned about performance in the presence of white mold should select varieties that show consistently less white mold during several years of testing.

Brown Stem Rot

Brown stem rot (BSR) is a fungal disease that can cause yield losses in certain situations. The disease occurs most frequently when soybeans follow soybeans but can occur where soybeans are planted every other year. Resistant entries, or longer rotations, assist in the management of this disease. Some information refers to “tolerance” or “field resistance.” Reliable tests for tolerance or field resistance have not yet been developed.

Special-Purpose Entries

There continues to be interest in producing soybeans with special characteristics important to specialty food product manufacturers, such as tofu, natto, miso, and soy milk. Soybean scientists previously developed some of these special-purpose entries, which were general releases, but more recently entries have been released under exclusive or nonexclusive licenses to specific companies who then contract with growers for production. For further information visit the Minnesota Crop Improvement Association website at mncia.org or telephone number 612-625-7766.

Authors and Researchers

Authors of this soybean report are: A. Lorenz, S. Naeve, and S. Bhusal.

Michael Leiseth, David Bundy, Gary Reid, Tom Hoverstad, Travis Vollmer, and Donn Vellekson supervised test plot establishment and management.

Special thanks are due to Chris Goblirsch of Riverton Research Inc. for planting, managing, and harvesting the Glyndon location.

We appreciate our farm cooperators who provided access to on-farm land. The farm cooperators in 2023 were Gabriel Carlson (Thief River Falls), David Swanson (Moorhead), David and Craig Swenson (Shelly), and Rob Goblirsch (Sleepy Eye).

Names and email addresses of seed company representatives that entered varieties into the 2023 trials.

Company	Rep Name	Contact Email
Albert Lea Seed/Viking Seed	Jake Hansen	jake@alseed.com
Anderson Seeds	Kelsey (Anderson) Henke	kelsey.anderson528@gmail.com
BASF/MS Technologies	Nick Weidenbenner	nick.weidenbenner@basf.com
Bayer Crop Science/Asgrow	Austin Carlson	Austin.carlson@bayer.com
Brushvale Seed, Inc.	Travis Meyer	travis@brushvaleseed.com
Dyna-Gro Seed	Tom Head	Tom.head@nutrien.com
GDM Seeds	Grant Schmieg	gschmieg@gdmseeds.com
LG Seeds	Tim Beninga	tim.beninga@lgseeds.com
Minnesota Ag Experiment Station (Minnesota AES)	Carl Anfinson	carl.anfinson@mncia.org
Peterson Farms Seed	Alex Amderson	alex@petersonfarmsseed.com
Proseed, Inc.	Karmen Hardy	karmen.hardy@proseed.net
Richland IFC, Inc.	Paul Meindl	paul@richlandifc.com

Table 1. Performance and characteristics of transgenic, conventional and special-purpose soybean entries evaluated in the far northern zone. Trials were conducted in Crookston, Thief River Falls, and Roseau.

Entry	Originator	Maturity Rating	Maturity Date	Yield % of Mean	% of Mean		Phyto. Gene	Chlorosis Score	Seed Treat.	Trans. Trait
				2023	Protein	Oil				
PXC00799	Proseed	00.7	9/11	91	111	90	S	2.3	CMV	CV
LGS0125XF	LG Seeds	0.1	9/12	101	97	105	Rps1c	2.0	AMS	XF
PXC00899	Proseed	00.8	9/12	81	104	99	Rps1c	2.3	CMV	CV
Hana	Peterson Farms Seed	00.9	9/13	78	108	94	S	2.3	PS	CV
LGS00719XF	LG Seeds	00.7	9/14	95	98	104	Rps1c	3.3	AMS	XF
XF 30-092N	Proseed	00.9	9/14	108	98	103	Rps1c	2.0	CMV	XF
LGS0139XF	LG Seeds	0.1	9/15	102	98	102	Rps1c	1.8	AMS	XF
XF 40-12N	Proseed	0.1	9/15	105	98	102	Rps1c	2.0	CMV	XF
XO 0213E	MS Technologies	0.2	9/18	96	98	102	Rps1a+Rps3a	2.0	OPVRI	E3
LGS00901E3	LG Seeds	00.9	9/19	115	98	101	Rps3a	2.3	AMS	E3
XO 0094E	MS Technologies	00.9	9/19	107	98	101	-	2.3	OPVRI	E3
XO 0234E	MS Technologies	0.2	9/20	108	99	100	Rps3a	2.0	OPVRI	E3
LGS0105E3	LG Seeds	0.1	9/22	117	98	101	Rps3a	1.8	AMS	E3
EL 40-093N	Proseed	00.9	9/22	100	101	96	Rps3a	2.0	CMV	E3
EL 40-13N	Proseed	0.1	9/26	95	96	100	Rps3a	2.0	CMV	E3
Mean			**9/17**	**44 bu/a**	**34.3%**	**18.9%**		**2.2**		
LSD 25%			**2.3d**	**7%**	**2%**	**2%**		**0.5**		

LSD numbers beneath yield columns indicate whether the difference between yield is due to genetics or other factors, such as variations in environment.
If a yield difference between two entries equals or exceeds the LSD value, the higher yielding entry probably was superior in yield.
A difference less than the LSD value is likely due to environmental factors.
–indicates "not specified".
Maturity date data collected from all locations.

Table 2. Performance and characteristics of transgenic, conventional and special-purpose soybean entries evaluated in the northern zone. Trials were conducted in Crookston, Shelly, and Glyndon.

Entry	Originator	Maturity Rating	Maturity Date	Yield % of Mean 2022	Yield % of Mean 2023	% of Mean Protein	% of Mean Oil	Phyto. Gene	Chlorosis Score	Seed Treat.	Trans. Trait
XO 0311E	MS Technologies	0.3	9/14	95	99	100	100	S	1.5	OPVRI	E3
S04K9	Syngenta	0.4	9/16		96	110	96	-	2.8	None	CV
M13-257047	Minnesota AES	0.5	9/16		94	103	103	Rps1a	2.5	None	CV
Viking I Blue River 0821N	Albert Lea Seed House	0.8	9/19		96	99	99	S	1.8	None	CV
LGS0444XF	LG Seeds	0.4	9/19		108	101	99	Rps1c	1.0	AMS	XF
LGS0323E3	LG Seeds	0.3	9/19		82	98	101	Rps3a	2.3	AMS	E3
LGS0550E3	LG Seeds	0.5	9/19	98	101	101	101	Rps3a	2.3	AMS	E3
LGS0405E3	LG Seeds	0.4	9/20		96	97	104	Rps1c	1.8	AMS	E3
M15-105140	Minnesota AES	0.5	9/20		97	100	99	Rps1c+Rps3a	1.3	None	CV
LGS0701XF	LG Seeds	0.7	9/21		113	100	98	Rps3a	2.5	AMS	XF
XO 0554E	MS Technologies	0.5	9/22		110	97	102	Rps1k+Rps3a	2.3	OPVRI	E3
M13-118036	Minnesota AES	0.8	9/22		111	99	98	S	2.0	None	CV
XO 0602E	MS Technologies	0.6	9/23	104	100	99	97	S	2.5	OPVRI	E3
XO 0993E	MS Technologies	0.9	9/24		92	95	104	Rps3a	2.8	OPVRI	E3
LGS0822E3	LG Seeds	0.8	9/25		102	101	99	Rps1c+Rps3a	1.8	AMS	E3
Mean			**9/20**	**58 bu/a**	**50 bu/a**	**33.5%**	**19.1%**		**2.1**		
LSD 25%			**1.1d**	**3%**	**6%**	**1%**	**1%**		**0.4**		

LSD numbers beneath yield columns indicate whether the difference between yield is due to genetics or other factors, such as variations in environment.
If a yield difference between two entries equals or exceeds the LSD value, the higher yielding entry probably was superior in yield.
A difference less than the LSD value is likely due to environmental factors.
–indicates "not specified"
Maturity date data collected from all locations.

Table 3. Performance and characteristics of transgenic, conventional and special-purpose soybean entries evaluated in the central zone. Trial was conducted in Becker and Rosemount.

Entry	Originator	Maturity Rating	UAS Mat. Date*	Yield % of Mean 2022	Yield % of Mean 2023	% of Mean Protein	% of Mean Oil	Phyto. Gene	Chloro-sis Score	Seed Treat.	Trans. Trait
M13-118036	Minnesota AES	0.8	9/07	96	99	100	98	S	2.0	None	CV
Viking 1223N	Albert Lea Seed House	1.2	9/08	92	108	96	102	S	3.3	None	CV
M13-250056	Minnesota AES	0.8	9/08	127	106	100	102	Rps1c	2.8	None	CV
VikingIBlue River 0821N	Albert Lea Seed House	0.8	9/09	113	97	99	100	S	1.8	None	CV
P11A50	Pioneer	1.1	9/11		94	104	101	-	2.5	None	CV
XO 0993E	MS Technologies	0.9	9/12	114	100	99	104	Rps3a	3.3	OPVRI	E3
AG11XF4	Asgrow	1.1	9/13		96	100	100	Rps1c	1.3	AC	XF
XO 1133E	MS Technologies	1.1	9/13		96	102	98	S	2.0	OPVRI	E3
M13-250046	Minnesota AES	1.6	9/13	115	99	103	99	Rps1c	1.5	None	CV
VikingIBlue River 1518N	Albert Lea Seed House	1.5	9/14	86	83	100	96	S	1.8	None	CV
AG09XF3	Asgrow	0.9	9/15	113	98	97	93	Rps1c	2.0	AC	XF
XO 1372E	MS Technologies	1.3	9/15	107	93	100	103	S	2.5	OPVRI	E3
NK14-W6E3	MS Technologies	1.4	9/15		102	100	102	-	3.0	-	-
XO 1761E	MS Technologies	1.7	9/15	115	101	101	99	Rps1k	2.5	OPVRI	E3
AG13XF4	Asgrow	1.3	9/16		94	98	104	Rps1c	2.3	AC	XF
CZ 1660 GTLL	MS Technologies	1.6	9/16	104	99	100	101	Rps1k	2.8	-	LLGT27
P17A87E	MS Technologies	1.7	9/16		110	101	98	-	2.0	-	-
XO 1632E	MS Technologies	1.6	9/16	124	107	98	102	Rps3a	3.0	OPVRI	E3
VikingIBlue River 1718N	Albert Lea Seed House	1.7	9/17	103	101	100	101	Rps1k	2.0	None	CV
XO 1404E	MS Technologies	1.4	9/17		105	104	97	Rps1c	2.0	OPVRI	E3
XO 1212E	MS Technologies	1.2	9/17	101	107	103	98	Rps1c	1.8	OPVRI	E3
Viking 2022N	Albert Lea Seed House	2.0	9/19		106	98	101	Rps1k	2.8	None	CV
Mean			**9/14**	**56 bu/a**	**70 bu/a**	**34.3%**	**19.8%**		**2.3**		
LSD 25%			**1.7d**	**6%**	**6%**	**2%**	**3%**		**0.4**		

LSD numbers beneath yield columns indicate whether the difference between yield is due to genetics or other factors, such as variations in environment.
If a yield difference between two entries equals or exceeds the LSD value, the higher yielding entry probably was superior in yield.
A difference less than the LSD value is likely due to environmental factors.
— indicates "not specified."
Maturity date data collected from all locations.

Table 4. Performance and characteristics of transgenic, conventional and special-purpose soybean entries evaluated in the southern zone. Trials were conducted in Lamberton, Waseca, and Sleepy Eye.

Entry	Originator	Mat. Rating	Mat. Date	Yield % of Mean		% of Mean		Phyto. Gene	Chlorosis Score	Seed Treat.	Trans. Trait
				2022	2023	Protein	Oil				
M13-250046	Minnesota AES	1.6	9/16	91	82	101	100	Rps1c	2.0	None	CV
NK14-W6E3	MS Technologies	1.4	9/17		101	100	102	-	2.8	-	-
S16EN42	Dyna-Gro Seed	1.6	9/20		112	101	99	Rps3a	2.5	EVSV	E3
XO 1632E	MS Technologies	1.6	9/21	104	100	100	100	Rps3a	2.8	OPVRI	E3
A151E3	Anderson Seeds	1.5	9/21	99	105	100	101	Rps3a	2.8	None	E3
MN1807CN	Minnesota AES	1.8	9/21	93	85	102	102	Rps1c	2.5	None	CV
XO 1404E	MS Technologies	1.4	9/22		104	104	98	Rps1c	2.0	OPVRI	E3
A172E3	Anderson Seeds	1.7	9/22	100	99	101	100	Rps1k	2.8	None	E3
P17A87E	MS Technologies	1.7	9/22		100	102	98	-	2.8	-	-
V1621	GDM Seeds	1.6	9/23		103	100	96	Rps1k	2.0	CMV	CV
NK18-J7E3	MS Technologies	1.8	9/23		98	99	101	-	2.3	-	-
XO 1822E	MS Technologies	1.8	9/23	107	105	101	99	Rps3a	3.0	OPVRI	E3
S21EN81	Dyna-Gro Seed	2.1	9/23		104	99	100	Rps1k	2.5	EVSV	E3
V1821	GDM Seeds	1.8	9/23		100	98	97	Rps1c	2.0	CMV	CV
XO 2181E	MS Technologies	2.1	9/23	103	100	101	99	Rps1k	3.3	OPVRI	E3
VikingIBlue River 1718N	Albert Lea Seed House	1.7	9/23	102	102	98	101	Rps1k	2.3	None	CV
XO 1971E	MS Technologies	1.9	9/23	102	100	100	99	S	3.0	OPVRI	E3
P21A53E	MS Technologies	2.1	9/23		100	97	103	-	3.5	-	-
Viking 2022N	Albert Lea Seed House	2.0	9/23	111	101	98	102	Rps1k	3.0	None	CV
V2122	GDM Seeds	2.1	9/24	108	99	103	102	S	2.0	CMV	CV
A182E3	Anderson Seeds	1.8	9/24	105	97	98	102	Rps1k	2.5	None	E3
A203E3	Anderson Seeds	2.0	9/24		103	101	103	Rps1a+Rps3a	2.8	None	E3
AG19XF3	Asgrow	1.9	9/24	104	104	99	102	Rps1c	2.3	AC	XF
A1923XF	Anderson Seeds	1.9	9/25		112	98	101	S	3.3	None	XF
M13-262053	Minnesota AES	1.9	9/25		99	98	101	Rps1a	2.0	None	CV
S20EN84	Dyna-Gro Seed	2.0	9/25		101	96	105	Rps1k	1.8	EVSV	E3
VikingIBlue River 2418N	Albert Lea Seed House	2.4	9/26	106	99	101	100	Rps1c	1.8	None	CV
AG20XF4	Asgrow	2.0	9/27		101	99	94	Rps1c	2.8	AC	XF
AG21XF2	Asgrow	2.1	9/27		100	103	96	Rps3a	2.8	AC	XF
XO 2282E	MS Technologies	2.2	9/27	102	94	99	101	S	2.8	OPVRI	E3
AG22XF3	Asgrow	2.2	9/27	103	99	102	99	Rps1c	3.3	AC	XF
Viking 2340KN	Albert Lea Seed House	2.3	9/27	105	96	98	99	Rps1k	2.3	None	CV
XO 2323E	MS Technologies	2.3	9/28	106	101	101	100	Rps1c	2.5	OPVRI	E3
XO 2444E	MS Technologies	2.4	9/28		97	101	100	Rps1a	2.5	OPVRI	E3
VikingIBlue River 2155N	Albert Lea Seed House	2.1	9/28	95	99	98	96	S	2.3	None	CV
Mean			**9/24**	**82 bu/a**	**78 bu/a**	**34.3%**	**19.8%**		**2.6**		
LSD 25%			**1.0d**	**3%**	**3%**	**2%**	**2%**		**0.5**		

LSD numbers beneath yield columns indicate whether the difference between yield is due to genetics or other factors, such as variations in environment.
If a yield difference between two entries equals or exceeds the LSD value, the higher yielding entry probably was superior in yield.
A difference less than the LSD value is likely due to environmental factors.
–indicates “not specified”
Maturity date data collected from all locations.

Table 5. Characteristics of special-purpose soybean entries evaluated in the northern zone. Trials were conducted in Crookston, Shelly and Glyndon.

Entry	Originator	Mat Rating	Mat Date	Special Characteristics	Hilum Color	Phyto. Gene	Seeds/lb	Trans. Trait
PXC00999	Proseed	00.9	9/08	Protein	Yellow	S	2,612	CV
Hana	Peterson Farms Seed	00.9	9/11	Protein	Yellow	S	2,722	CV
M15-220021	Minnesota AES	0.3	9/14	Soymilk	Yellow	S	3,636	CV
MK0249	Richland IFC	0.2	9/15	Natto	Yellow	S	4,413	CV
MK009	Richland IFC	00.9	9/15	Natto	Yellow	S	5,543	CV
M15-236022	Minnesota AES	0.3	9/17	Natto	Yellow	Rps1a	4,686	CV
BS01739	Brushvale Seed, Inc.	0.5	9/18	Soymilk	Yellow	S	3,157	CV
M13-171089	Minnesota AES	0.3	9/18	Natto	Yellow	Rps1a	5,754	CV
M13-172108	Minnesota AES	0.5	9/19	Natto	Yellow	S	4,888	CV
SB0512	SINNER BROS	0.5	9/19	Natto	Yellow	-	4,888	CV
PXC05992	Proseed	0.5	9/20	Protein	Yellow	Rps3a	2,250	CV
MK0603	Richland IFC	0.6	9/21	Sprouts	Yellow	S	5,051	CV
MK808CN	Richland IFC	0.8	9/22	Natto	Yellow	Rps1c	3,157	CV
PXC0899	Proseed	0.8	9/23	Protein	Yellow	Rps1c+Rps3a	2,568	CV

Table 6. Performance and characteristics of special-purpose soybean entries evaluated in the northern zone. Trials were conducted in Crookston, Shelly and Glyndon.

			% of Mean			Chlorosis
Entry	Originator	Mat Date	Yield	Protein	Oil	Score
PXC00999	Proseed	9/08	102	101	101	2.8
Hana	Peterson Farms Seed	9/11	104	107	97	3.0
M15-220021	Minnesota AES	9/14	104	101	106	1.5
MK0249	Richland IFC	9/15	90	95	104	1.8
MK009	Richland IFC	9/15	88	98	98	2.3
M15-236022	Minnesota AES	9/17	97	102	100	1.5
BS01739	Brushvale Seed, Inc.	9/18	100	104	97	2.0
M13-171089	Minnesota AES	9/18	92	99	101	2.0
M13-172108	Minnesota AES	9/19	103	100	100	2.0
SB0512	SINNER BROS	9/19	94	99	96	1.8
PXC05992	Proseed	9/20	109	104	98	1.8
MK0603	Richland IFC	9/21	96	98	97	2.0
MK808CN	Richland IFC	9/22	105	95	107	2.3
PXC0899	Proseed	9/23	114	99	98	2.0
Mean		**9/17**	**44 bu/a**	**34.1%**	**18.5%**	**2.1**
LSD 25%		**1.7d**	**4%**	**1%**	**2%**	**0.4**

LSD numbers beneath yield columns indicate whether the difference between yield is due to genetics or other factors, such as variations in environment.
If a yield difference between two entries equals or exceeds the LSD value, the higher yielding entry probably was superior in yield.
A difference less than the LSD value is likely due to environmental factors.
Maturity date data collected from all locations.

Table 7. Characteristics of special-purpose soybean entries evaluated in the central zone. Trials were conducted in Becker and Rosemount.

Entry	Originator	Mat Rating	Mat Date	Special Characteristics	Hilum Color	Phyto. Gene	Seeds/lb	Trans. Trait
MK41	Richland IFC	1.2	9/03	Tofu	Yellow	S	2,470	CV
MK1016	Richland IFC	1.0	9/06	Natto	Yellow	-	4,941	CV
MK0603	Richland IFC	0.6	9/08	Sprouts	Yellow	S	4,456	CV
MK1023	Richland IFC	1.0	9/08	Natto	Yellow	S	4,413	CV
MK808CN	Richland IFC	0.8	9/08	Natto	Yellow	Rps1c	2,674	CV
M15-236026	Minnesota AES	0.8	9/09	Natto	Yellow	Rps1a	3,666	CV
MN-Decker	Richland IFC	1.0	9/09	Black	Black	S	2,755	CV
M15-221092	Minnesota AES	1.2	9/09	Soymilk	Yellow	S	2,772	CV
MN-Sable	Richland IFC	1.2	9/10	Black	Black	S	2,539	CV
BS91614	Brushvale Seed, Inc.	1.0	9/11	Tofu	Yellow	S	2,627	CV
BS91615	Brushvale Seed, Inc.	1.2	9/11	Tofu	Yellow	S	2,554	CV
M13-172108	Minnesota AES	0.5	9/11	Natto	Yellow	S	4,209	CV
MK1423	Richland IFC	1.4	9/11	Natto	Yellow	S	4,288	CV
M14-250018	Minnesota AES	1.5	9/11	Soymilk\Tofu	Yellow	S	2,066	CV
MK9103	Richland IFC	1.3	9/12	Black	Black	S	1,976	CV
M13-170064	Minnesota AES	1.0	9/12	Natto	Yellow	S	4,500	CV
MK9102	Richland IFC	1.2	9/13	Black	Black	S	1,976	CV
Skyline	Sevita International	1.1	9/13	Tofu	Yellow	Rps1a+Rps3a	2,431	CV
MK146	Richland IFC	1.2	9/13	Tofu	Yellow	S	2,405	CV
VikingIBlue River 1700N	Albert Lea Seed House	1.7	9/17	Protein	Yellow	S	2,738	CV
MK373	Richland IFC	2.0	9/18	Tofu	Yellow	S	2,296	CV
MK9101	Richland IFC	1.1	9/19	Black	Black	S	2,095	CV

Table 8. Performance and characteristics of special-purpose soybean entries evaluated in the central zone. Trial wasconducted in Becker and Rosemount.

Entry	Originator	Mat Date	% of Mean			Chlorosis Score
			Yield	Protein	Oil	
MK41	Richland IFC	9/03	102	103	98	2.3
MK1016	RICHLAND	9/06	82	99	100	2.0
MK0603	Richland IFC	9/08	74	95	94	2.0
MK1023	Richland IFC	9/08	81	94	101	2.0
MK808CN	Richland IFC	9/08	116	96	106	2.3
M15-236026	Minnesota AES	9/09	92	99	103	2.0
MN-Decker	Richland IFC	9/09	89	103	94	1.0
M15-221092	Minnesota AES	9/09	115	101	99	1.3
MN-Sable	Richland IFC	9/10	79	101	98	1.3
BS91614	Brushvale Seed, Inc.	9/11	124	101	107	2.0
BS91615	Brushvale Seed, Inc.	9/11	119	99	102	2.5
M13-172108	Minnesota AES	9/11	96	96	104	1.8
MK1423	Richland IFC	9/11	103	91	103	2.8
M14-250018	Minnesota AES	9/11	110	104	101	2.0
MK9103	Richland IFC	9/12	101	105	96	2.0
M13-170064	Minnesota AES	9/12	86	101	99	2.3
MK9102	Richland IFC	9/13	101	101	100	1.3
Skyline	Sevita International	9/13	109	103	102	3.5
MK146	Richland IFC	9/13	112	102	101	2.3
VikingIBlue River 1700N	Albert Lea Seed House	9/17	115	101	99	3.0
MK373	Richland IFC	9/18	94	102	95	1.0
MK9101	Richland IFC	9/19	101	102	97	2.0
Mean		**9/17**	**44 bu/a**	**34.1%**	**18.5%**	**2.1**
LSD 25%		**1.7d**	**4%**	**1%**	**2%**	**0.4**

LSD numbers beneath yield columns indicate whether the difference between yield is due to genetics or other factors, such as variations in environment.
If a yield difference between two entries equals or exceeds the LSD value, the higher yielding entry probably was superior in yield.
A difference less than the LSD value is likely due to environmental factors.
Maturity date data collected from both locations.

Table 9. Characteristics of special-purpose soybean entries evaluated in the southern zone. Trials were conducted in Lamberton, Waseca and Sleepy Eye.

Entry	Originator	Mat Rating	Mat Date	Special Characteristics	Hilum Color	Phyto. Gene	Seeds/lb	Trans. Trait
MK41	Richland IFC	1.2	9/10	Tofu	Yellow	S	2,239	CV
M15-221092	Minnesota AES	1.2	9/14	Soymilk	Yellow	S	2,877	CV
Skyline	Sevita International	1.1	9/16	Tofu	Yellow	Rps1a+3a	2,307	CV
MK1423	Richland IFC	1.4	9/17	Natto	Yellow	S	4,836	CV
MK146	Richland IFC	1.2	9/18	Tofu	Yellow	S	2,431	CV
M14-250018	Minnesota AES	1.4	9/19	Soymilk\Tofu	Yellow	S	2,144	CV
Candor	Sevita International	1.9	9/20	Tofu	Yellow	Rps3a	1,863	CV
M13-266011	Minnesota AES	1.6	9/20	Soymilk	Yellow	S	2,250	CV
M14-122035	Minnesota AES	1.9	9/22	Soymilk	Yellow	S	2,612	CV
M13-172117	Minnesota AES	1.8	9/22	Natto	Yellow	Rps1a	4,413	CV
VikinglBlue River IAS19C3	Albert Lea Seed House	2.1	9/25	Protein	Yellow	S	2,738	CV
MK373	Richland IFC	2.0	9/25	Tofu	Yellow	S	1,976	CV
Viking e24Y002	Albert Lea Seed House	2.4	9/27	Protein	Yellow	Rps1k	2,554	CV

Table 10. Performance and characteristics of special-purpose soybean entries evaluated in the southern zone. Trials were conducted in Lamberton, Waseca, and Sleepy Eye.

			% of Mean			Chlorosis
Entry	Originator	Mat Date	Yield	Protein	Oil	Score
MK41	Richland IFC	9/10	98	103	98	2.5
M15-221092	Minnesota AES	9/14	97	101	101	1.0
Skyline	Sevita International	9/16	93	102	103	3.8
MK1423	Richland IFC	9/17	89	91	103	3.0
MK146	Richland IFC	9/18	101	103	100	2.5
M14-250018	Minnesota AES	9/19	97	103	101	1.5
Candor	Sevita International	9/20	106	102	98	3.3
M13-266011	Minnesota AES	9/20	106	101	100	1.8
M14-122035	Minnesota AES	9/22	106	97	105	1.3
M13-172117	Minnesota AES	9/22	91	96	98	2.0
VikinglBlue River IAS19C3	Albert Lea Seed House	9/25	114	97	101	1.2
MK373	Richland IFC	9/25	98	101	95	1.8
Viking e24Y002	Albert Lea Seed House	9/27	104	101	96	1.0
Mean		**9/20**	**70 bu/a**	**35.6%**	**19.2%**	**2.1**
LSD 25%		**1.1d**	**3%**	**1%**	**1%**	**0.4**

LSD numbers beneath yield columns indicate whether the difference between yield is due to genetics or other factors, such as variations in environment.
If a yield difference between two entries equals or exceeds the LSD value, the higher yielding entry probably was superior in yield.
A difference less than the LSD value is likely due to environmental factors.
Maturity date data collected from all locations.

Table 11. Results of soybean cyst nematode greenhouse bioassay performed on soybean entries grown in 2023.

			Greenhouse Test HG Type 7 (Race 6)		Greenhouse Test HG Type 2 (Race 1)	
Entry	Originator	SCN Resistance Source[1]	FI	SCN Rating[2]	FI	SCN Rating[2]
Viking 1223N	Albert Lea Seed House	PI 88788	9.3	R		
Viking 2022N	Albert Lea Seed House	PI 88788	8.5	R		
Viking 2340KN	Albert Lea Seed House	Peking	3.9	R	2.0	R
VikingIBlue River 0821N	Albert Lea Seed House	PI 88788	8.7	MR		
VikingIBlue River 1518N	Albert Lea Seed House	PI 88788	91.9	S		
VikingIBlue River 1718N	Albert Lea Seed House	PI 88788	21.5	MR		
VikingIBlue River 2155N	Albert Lea Seed House	PI 88788	86.8	S		
VikingIBlue River 2418N	Albert Lea Seed House	PI 88788	13.9	MR		
A151E3	Anderson Seeds	PI 88788	11.1	MR		
A172E3	Anderson Seeds	Peking	2.2	R	1.2	R
A182E3	Anderson Seeds	PI 88788	10.1	MR		
A1923XF	Anderson Seeds	PI 88788	9.2	R		
A203E3	Anderson Seeds	PI 88788	20.0	MR		
AG09XF3	Asgrow	PI 88788	0.0	R		
AG11XF4	Asgrow	PI 88788	0.0	R		
AG13XF4	Asgrow	PI 88788	0.3	R		
AG19XF3	Asgrow	PI 88788	0.1	R		
AG20XF4	Asgrow	PI 88788	0.0	R		
AG21XF2	Asgrow	PI 88788	0.0	R		
AG22XF3	Asgrow	PI 88788	0.0	R		
S16EN42	Dyna-Gro Seed	PI 88788	11.7	MR		
S20EN84	Dyna-Gro Seed	Peking	22.8	MR		
S21EN81	Dyna-Gro Seed	PI 88788	13.0	MR		
V1621	GDM Seeds	PI 88788	13.3	MR		
V1821	GDM Seeds	PI 88788	8.4	R		
V2122	GDM Seeds	None	77.8	S		
LGS00719XF	LG Seeds	None	74.0	S		
LGS00901E3	LG Seeds	PI 88788	19.4	MR		
LGS0105E3	LG Seeds	PI 88788	11.6	MR		
LGS0125XF	LG Seeds	PI 88788	13.0	MR		
LGS0139XF	LG Seeds	PI 88788	14.4	MR		
LGS0323E3	LG Seeds	PI 88788	13.0	MR		
LGS0405E3	LG Seeds	Peking	90.7	S	21.9	MR
LGS0444XF	LG Seeds	PI 88788	21.3	MR		
LGS0550E3	LG Seeds	PI 88788	17.4	MR		
LGS0701XF	LG Seeds	PI 88788	21.2	MR		
LGS0822E3	LG Seeds	PI 88788	14.3	MR		
XO 0094E	MS Technologies	-	0.9	R		
XO 0213E	MS Technologies	None	0.5	R		
XO 0234E	MS Technologies	PI 88788	0.2	R		
XO 0311E	MS Technologies	PI 88788	0.0	R		
XO 0554E	MS Technologies	PI 88788	0.0	R		
XO 0602E	MS Technologies	PI 88788	0.0	R		
XO 0993E	MS Technologies	Peking	0.0	R	0.1	R
XO 1133E	MS Technologies	PI 88788	0.2	R		
XO 1212E	MS Technologies	PI 88788	0.2	R		
XO 1372E	MS Technologies	PI 88788	0.0	R		
XO 1404E	MS Technologies	PI 88788	0.0	R		
XO 1632E	MS Technologies	PI 88788	0.1	R		
XO 1761E	MS Technologies	PI 88788	0.1	R		
XO 1822E	MS Technologies	PI 88788	0.0	R		
XO 1971E	MS Technologies	PI 88788	0.0	R		
XO 2181E	MS Technologies	PI 88788	0.1	R		
XO 2282E	MS Technologies	PI 88788	0.0	R		
XO 2323E	MS Technologies	PI 88788	0.0	R		
XO 2444E	MS Technologies	PI 88788	0.1	R		
Hana	Peterson Farms Seed	None	83.3	S		
EL 40-093N	Proseed	PI 88788	19.2	MR		
EL 40-13N	Proseed	Peking	13.6	MR	1.4	R
PXC00799	Proseed	None	129.7	S		
PXC00899	Proseed	PI 88788	57.2	MS		
XF 30-092N	Proseed	PI 88788	14.9	MR		
XF 40-12N	Proseed	None	14.9	MR		

[1] Resistance source provided by originator. - indicates SCN source not specified by provider.
[2] SCN resistance rating: R = resistant (FI less than or equal to 10%); MR = moderately resistant (FI 11-30%); MS = moderately susceptible (FI 31-60%); S = susceptible (FI greater than 60%).
Female index (FI) was calculated using Williams 82 as the susceptible check.