

2023 Michigan State Wheat Performance Trials

Photo: Wheat Performance Trials, Monroe County by Amanda Noble



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2023 Michigan State Wheat Performance Trials

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Planting conditions last fall were near ideal for much of the state. Drier than normal conditions persisted allowing for timely soybean/dry bean harvest. As a result, 670,000 acres of wheat was planted in MI in fall of 2022, up 200,000 acres from the year before. Cooler than normal temperatures slowed wheat development in October and November. Despite early planting, wheat tiller development was not as advanced as many had planned on.

Spring conditions were fairly good for putting nitrogen, herbicides and fungicides on wheat. We had some cold temperatures that slowed herbicide application, but for the most part, spring applications went okay for most of the wheat crop. Crop ratings were very high through the flowering stage and near record yields were expected. In June, rainfall across most of the state nearly stopped for the entire month with most places receiving less than 1 inch of rain for the entire month. Light textured soils with low water holding capacity began to dry up prematurely, cutting the grain fill period abruptly. The central and southwest lower peninsula was the hardest hit by the flash drought which lowered yield potential significantly. The thumb and southeast regions of the state received enough rain to carry them through the drought with little or no impact on yield.

Crop quality began to be very high, with no reports of fusarium head blight (vomitoxin). Frequent rainfall near harvest caused some problems with preharvest sprout. There were reports of falling number below 225 from some areas of the state. Other areas were above 250. Test weights varied widely. Despite the dryness of June, wheat stayed green and enjoyed an extended grain fill period delaying wheat harvest for many. The extended grain fill period was in part due to lower overnight temperatures and relatively cool days.

Temperatures were similar to a year ago across most of the region. In Pigeon and Mason, 8 days were above 90 F in 2023. There were less days above 85 F at all three locations reported. Rainfall at Pigeon was 25% lower in May only. Richville had 40% and 30% lower rainfall in May and June respectively. Mason had about a third of the rainfall in May and June compared to 2022. Much of lower peninsula was on the drought monitor in late May and June. Even though MI is still listed abnormally dry (D0), recent rains have alleviated the severe drought conditions experienced earlier in the summer.

Figure 1. Number of days above 90 F, 85 F and rainfall data from Michigan Automated Weather Station Network, MSU for three of the MSU Wheat Variety Trial Locations for the 2021, 2022 and 2023 growing seasons. 2023 data was reported through July 25, 2023.

	2021			2022			2023		
	Pigeon	Richville	Mason	Pigeon	Richville	Mason	Pigeon	Richville	Mason
Above 90 F	2	4	2	5	5	2	8	4	8
Above 85 F	15	16	19	22	24	22	16	15	21
April (in)	1.8	0.7	1.5	2.19	2.4	4.03	3.39	3.06	3.65
May (in)	1.2	1.2	2.6	2.13	1.64	3.85	1.6	0.98	1.25
June (in)	1.9	4.9	7	1.58	2.15	2.43	1.63	1.51	0.79
July (in)	2.5	1	1.5	0.93	2.27	2.26	4.1	3.53	1.92

Choosing Varieties

Variety selection is best made using at least three years of data. Varieties selected using data across all locations and multiple years will likely perform well under a wide range of conditions; although, performance of a given variety will vary based on testing location. In selecting varieties for a specific location, it is important to identify varieties that perform well near the location where the variety will be grown. Table 1 provides information on which varieties are top performers in each of the seven trial locations in 2021 through 2023. Selection and planting of two or more varieties is recommended. As an example, planting varieties that differ in flowering date can allow for staggering of management applications, specifically, fungicides to control Fusarium head blight. When selecting varieties, look at disease resistance as well as yield potential.

Disclaimer: *MSU makes no endorsement of any wheat variety or brand.*

Experimental Design

The 2023 State Wheat Performance Trial entries were planted in 7 counties: Isabella, Hillman, Ingham, Huron, Montcalm, Sanilac and Tuscola. Appendix A (below) presents information on each of these sites. Each plot contained 6 rows with 7.5" row spacing and was planted to a length of 18 feet. Plots were trimmed to a length of 12 feet long in the spring for harvesting purposes. Sites were designed as Alpha Lattice with three replications. All seed was treated, but the chemicals and rates used varied according to the preferences of the originating organization. Seeding rates per linear foot of row were standardized to the rate that would equate with a stand of 1.6 million seeds per acre in a solid stand planted in 7.5" rows. Fall fertilizer application varied with cooperator practice. Spring nitrogen was applied as urea (90 lbs/acre actual N) at green-up and Talinor was used for weed control at all sites.

All sites were coordinated under high management with the exception of additional conventionally managed trials at Tuscola and Isabella Counties. Under high management, an additional 30 pounds of nitrogen was applied using streamer nozzles and 28% UAN. Quilt Xcel fungicide was applied at Feekes 9. Miravis Ace fungicide was applied to control late season fungal diseases with application coinciding with the average flowering date of the trial location.

All plots within a location were harvested on a single day. Yield was calculated using the entire area of the plot including the wheel tracks between plots leading to an underestimation of yield. For data reported on a 0-9 scale 0 is the best possible score.

Seven of our experimental sites are on private farmland. We are extremely grateful to those growers for accommodating our work and all of the associated inconveniences. Funding for the high-management trial inputs was provided by the Michigan Wheat Program. Questions and comments regarding the research reported here should be directed to Dennis Pennington at pennin34@msu.edu or (269) 832-0497. This report and previous reports, may also be accessed through the Web at <http://www.varietytrials.msu.edu/wheat>.

Multi-Year Performance Summary

The full trial included 102 entries (51 of which were experimental lines) from 11 organizations, including Michigan State University, and data analyses were conducted using all of these entries. Attached to this narrative is a list of the names and contact information for those organizations. Each row in these tables has data for a single entry. The columns contain averages for a given trait and time period. Data for all of the entries in this trial are not presented here. However, the averages and statistical parameters in this report are based on the entire set of evaluated materials. **Comparisons among entries are only valid within a column.** Tables 1 and 2 are sorted first by grain color, and then in descending order by overall yield for 2023. Tables 3, 4 and 5 are sorted in alphabetic order by company and entry name. In some instances (e.g. yield), data columns to the right of the 2023 data columns are multi-year averages. Only data for entries included in all of the relevant years' tests are found here. Not all entries have been tested in all years, so the tables have several blank cells. Note that the Sanilac location was not reported in 2022 due to water damage, so multi-year averages are not reported. See the section titled 'Experimental Design' for details on how the trials were conducted and for more detail on what the data in each column represents.

At the bottom of most columns in the tables is the trial average (mean), LSD (least significant difference), and CV (coefficient of variation) for data in that column. LSD values vary among traits and data sets (combinations of sites and years). Differences between the means for two entries that are greater than the LSD for that column are very likely to reflect a genuine difference between the two varieties. If the difference between two means is smaller than the LSD for that column, one should conclude that there is **no evidence that those entries are different for that trait** in the years and sites considered.

Table 1 contains yield data. This data was acquired electronically on the plot combine at the time of harvest. Yield data is standardized to 13.5% moisture. The 2023 yield data contains the multi-site yield averages of only the high management sites and does not include the conventionally managed yield data from Tuscola and Isabella Counties. The conventionally managed data can be found in Table 4 in the conventional vs. high management results.

Table 2 contains test weight and percent moisture for all locations along with the overall average across locations.

Table 3 contains data on resistance to Fusarium Head Blight (FHB, scab). The 2022 deoxynivalenol (DON, VOM) numbers are reported. Once 2023 data from the lab are back, this report will be updated. Scab data were obtained from heavy disease pressure in an inoculated scab screening nursery. FHB infected grain is spread to provide inoculum and artificial misting provides disease-promoting conditions throughout the entire flowering period. 2023 grain samples will be submitted for DON analysis and will be reported later. **Preharvest sprouting (PHS)** samples were collected from Ingham County and subjected to misting in the greenhouse for three days and rated for the degree of sprouting. PHS ratings were conducted using at 0-9 scale with 0 having no sprouting and 9 having fully emerged radicle and roots from over 80% of the spike.

The **flowering date** indicates the average number of days past January 1st that a given entry reached the point where ½ of its heads were flowering. **Physiological maturity** was recorded as the date when 50% of the peduncles in a plot were turning yellow. **Plant height** is reported as the distance in inches from the ground to the tip of average heads in a plot.

FHB Resistance Traits

Severity: The average percent of infected spikelets in each head.

Incidence: The percent of all spikes in a plot showing infection.

FHB index: The overall infection considering severity and incidence.

DON: Levels of mycotoxin (ppm) present in grain. DON data is from the 2020 crop year.

Levels of DON and severity are the most reliable traits to be used in selecting FHB-resistant varieties.

High Management vs. Conventional Management Performance

Table 4 provides a comparison of variety performance under intensive management and conventional management practices. Data on yield, test weight, grain moisture at harvest are provided from conventional management and high management trials at Tuscola and Isabella Counties. Conventional management received 90 pounds of N per acre only. The high management received an additional 30 pounds of N per acre applied at Feekes 6 plus Quilt Xcel fungicide at Feekes 9.0, followed by Miravis Ace fungicide applied at Feekes 10.5.1. The last two columns presents the yield advantage of high management in bushels per acre as well as a ranking of the response. A positive number indicates a yield response to high management. A negative number indicates the higher management actually produced a lower yield. Overall means were 7.9 and 5.7 bushels per acre higher for the high management treatment at Tuscola and Isabella respectively.

Milling and Baking Quality

Table 5 contains data for milling and baking quality. Quality data are from the 2022 harvest season and prior. Data were generated by the USDA Eastern Soft Wheat Quality Laboratory in Wooster, Ohio on grain harvested from the Michigan State Variety trial each year. Flour yield is the ratio of the weight of extractable flour to the weight of milled grain, expressed as a percentage. Percent protein in flour is adjusted at 14% moisture. Softness equivalent percent is the softness of the flour, with higher values indicating softer grained wheat. For cookie diameter, a larger diameter is better. Whole grain protein (%) and whole grain hardness are being reported with 0-100, and higher values indicating harder wheat. The quality lab test weight is not identical to the test weight at harvest due to grain drying and grain cleaning prior to quality laboratory test weight evaluation. Solvent Retention Capacity (SRC) can be conducted on flour using several different solvents and reflects different characteristics of flour quality. Soft wheat flour for cookies typically have a target of 95% or less when used by the US baking industry for biscuits and crackers. Sodium carbonate SRC increases as starch damage due to milling increases. Normal values for good milling soft varieties are 68% or less. Lactic acid measures gluten strength with “weak” soft varieties having values below 85% and strong gluten soft varieties having values, typically, above 105% or 110%.

Special thanks to Amelia Orr, Samantha Mitchell, Elizabeth Ross, Aaron Newberry, Sadie Finnegan, Mattie Pennington and Jhon Concepcion for their contributions and efforts to collect notes and data in the field.

2023 Michigan State University Wheat Performance Trials

Appendix A. Trial Site Descriptions for 2023 MSU Wheat Performance Trials.

	Isabella County		Monroe County		SANILAC COUNTY		TUSCULA COUNTY		INGHAM	HILLMAN
	FUSARIUM HEAD BUGHIT NURSERY	HUBON COUNTY	CONV. MANAGED	HIGH MANAGED	COUNTRY	COUNTRY	CONV. MANAGED	HIGH MANAGED		
COOPERATOR	Michigan State University	Darwin Sneller	Hauck Seed Farm		Brad Kamprath Farm	JGDM Farms	Saginaw Valley Research Center	Michigan State University	Todd Ablesinger	
NEAREST CITY	Lansing	Seabwing	Rosebush		Ida	Sandusky	Richville	Meridian TWP	Hillman	
PLANTING DATE	October 5, 2022	October 3, 2022	September 19, 2022		October 2, 2022	September 20, 2022	September 23, 2022	September 29, 2022	October 4, 2022	
HARVEST DATE	July 31, 2023	July 19, 2023	July 21, 2023		July 14, 2023	July 22, 2023	July 18, 2023	July 11, 2023	Not harvested	
SOL TYPE	Capac loam, 0 to 4 percent slopes & Colwood-Brookston loams	Tappan loam, 0 to 1 percent slopes	Filer loam, 0 to 4 percent slopes& Parkhill loam, 0 to 2 percent slopes & Gifford fine sandy loam, 0 to 2 percent slopes		Teckenink-Spinks loamy sands, 6 to 12 percent slopes	Conover loam, 0 to 3 percent slopes & Parkhill loam and clay loam, 0 to 1 percent slopes	Tappan-Londo loams, 0 to 3 percent slopes	Conover loam, 0 to 4 percent slopes	Ossineke fine sandy loam, 0 to 6 percent slopes	
PRE-PLANT FERTILIZER	100# 11-52-0 100#0-0-60	100# 11-52-0 50# 0-0-60	100# 11-52-0 100# 0-0-62		100# 46-0-0 100# 0-0-60	112.50# 12-40-0 10%S 1%Z 22.5# 46-0-0 90# 0-0-62	250# 6/20-31 5% S	245# 10-19-18 7.7% S	N/A	
COMMENTS	Inoculated / Misted Fusarium Head Blight Screening Nursery.	Additional 30 lbs. Nitrogen and Fungicides were applied	90 lbs. Nitrogen and no Fungicides were applied	Additional 30 lbs. Nitrogen and Fungicides were applied	Additional 30 lbs. Nitrogen Applied and Fungicides were applied	Additional 30 lbs. Nitrogen Applied and Fungicides were applied	90 lbs. Nitrogen and no Fungicides were applied	Additional 30 lbs. Nitrogen and Fungicides were applied	Additional 30 lbs. Nitrogen and Fungicides were applied	Not harvested due to drought damage
AVERAGE YIELD (BUSHELS / ACRE)	N/A	106.6	87.3	93.0	103.5	123.5	95.1	102.9	88.4	
AVERAGE TEST WEIGHT (LBS. / BUSHEL)	N/A	58.8	56.2	57.6	59.0	58.4	57.2	57.8	56.4	
AVERAGE PERCENT GRAIN MOISTURE AT HARVEST	N/A	14.1	15.5	15.3	15.5	16.1	15.9	15.2	14.4	
2023 DATA RECORDED (NUMBER OF REPS)	3	3	3	3	3	3	3	3	3	3
FLAG LEAF FUNGICIDE APPLICATION DATE	N/A	May 12, 2023	N/A	May 11, 2023	May 11, 2023	May 12, 2023	N/A	May 12, 2023	May 10, 2023	
FLOWERING FUNGICIDE APPLICATION DATE	N/A	N/A	N/A	June 2, 2023	June 1, 2023	June 5, 2023	N/A	June 2, 2023	May 31, 2023	N/A
GREEN-UP FERTILIZER	90lbs Nitrogen 20 lbs Sulfur	90lbs Nitrogen 20lbs Sulfur	90lbs Nitrogen 20 lbs Sulfur	90lbs Nitrogen 20 lbs Sulfur	90lbs Nitrogen 20lbs Sulfur	90lbs Nitrogen	90lbs Nitrogen	90lbs Nitrogen	90lbs Nitrogen	75lbs Nitrogen

2023 Michigan State University Wheat Performance Trials

Table 1 : Multi-Year Performance Summary (Note: Tables sorted by 2023 High Management Yield, while wheat's grouped before red)

Line	Company	Seed Treatment	Seed Color	Yield (Bu/A adjusted to 13.5% Moisture)				Huron				Ingham				Isabella				Monroe				Sanilac				Tuscola			
				Overall	Rank	2 Yr Avg	3 Yr Avg	Bu/A	Rank	2 Yr Avg	3 Yr Avg	Bu/A	Rank	2 Yr Avg	3 Yr Avg	Bu/A	Rank	2 Yr Avg	3 Yr Avg	Bu/A	Rank	2 Yr Avg	3 Yr Avg	Bu/A	Rank	2 Yr Avg	3 Yr Avg	Bu/A	Rank	2 Yr Avg	3 Yr Avg
DF 271 W	DF Seeds, LLC	Dfender	W	112.9	1	102.5	100.4	109.7	5	110.7	100.5	102.6	2	108.9	99.6	100.9	4	78.1	95.7	119.9	2	136.4	1	108.0	2	97.7	105.7	108.0	2	97.7	105.7
Jupiter	MCIA	Vibrance Extreme	W	111.8	2	103.4	99.4	108.2	6	112.0	102.0	106.9	1	108.0	96.7	99.5	6	85.7	97.3	120.9	1	125.9	4	109.6	1	94.7	101.6	94.7	1	94.7	101.6
M121W0040	MSU	Vibrance Extreme	W	108.6	3	-	-	111.5	2	-	-	101.7	3	-	-	97.6	7	-	-	112.6	5	129.7	2	98.5	15	-	-	-	-	-	-
KWS439	KWS	Cruiser Maxx Vibrance	W	108.1	4	-	-	102.4	13	-	-	88.5	8	-	-	107.5	2	-	-	117.2	4	125.8	5	107.0	3	-	-	-	-	-	-
KWS440	KWS	Cruiser Maxx Vibrance	W	106.8	5	-	-	109.9	4	-	-	89.6	7	-	-	104.6	3	-	-	110.0	7	121.4	9	105.6	7	-	-	-	-	-	-
AgriMAXX Mackinaw	AgriMAXX	PRIME ST	W	106.5	6	101.9	-	117.9	1	115.1	-	89.6	6	100.1	-	94.9	10	84.4	-	107.2	10	127.0	3	102.6	10	96.6	-	96.6	-	96.6	-
Whitehall	MCIA	Vibrance Extreme	W	105.1	7	94.3	93.2	102.0	14	107.0	95.3	84.7	13	93.6	86.1	107.7	1	75.3	94.6	108.2	8	122.1	8	105.9	6	89.6	96.9	89.6	96.9	89.6	96.9
ISF 1115	Irre Seed Farm	Shield	W	105.0	8	98.3	95.6	104.2	11	105.2	95.5	90.5	4	100.7	92.5	94.6	11	81.0	94.4	117.4	3	122.8	7	100.7	12	96.8	99.8	96.8	99.8	96.8	99.8
Dyna-Gro 9242W	Dyna-Gro	Foothold Virock with Awaken ST	W	103.3	9	95.3	92.1	105.6	9	103.6	92.2	89.9	5	97.1	87.7	95.3	9	75.9	91.5	102.0	15	120.9	10	106.0	4	94.6	96.9	94.6	96.9	94.6	96.9
KWS437	KWS	Cruiser Maxx Vibrance	W	102.3	10	-	-	97.0	17	-	-	84.0	14	-	-	100.8	5	-	-	108.0	9	119.7	12	104.2	8	-	-	-	-	-	-
M16W0133	MCIA	Vibrance Extreme	W	101.9	11	95.1	92.2	106.7	7	107.5	96.2	87.6	10	97.1	89.6	92.3	13	77.9	91.2	102.0	16	123.2	6	99.5	13	83.2	91.7	83.2	91.7	83.2	91.7
KWS435	KWS	Cruiser Maxx Vibrance	W	101.7	12	-	-	104.7	10	-	-	86.9	11	-	-	97.3	8	-	-	106.5	11	111.0	16	104.1	9	89.8	-	89.8	-	89.8	-
M12W0121	MSU	Vibrance Extreme	W	101.3	13	95.5	-	105.7	8	103.1	-	87.8	9	97.8	-	92.5	12	81.5	-	105.3	13	111.0	16	104.1	9	89.8	-	89.8	-	89.8	-
Ambassador	DF Seeds, LLC	Dfender	W	100.7	14	100.1	94.0	110.2	3	112.9	100.4	85.0	12	95.0	87.9	91.1	15	89.9	93.8	110.1	6	106.3	17	99.5	14	94.8	93.8	94.8	93.8	94.8	93.8
Dyna-Gro 9313W	Dyna-Gro	Foothold Virock with Awaken ST	W	100.2	15	-	-	102.6	12	-	-	82.7	15	-	-	91.4	14	-	-	105.8	12	112.9	14	106.0	4	-	-	-	-	-	-
Moonlight	MCIA	Vibrance Extreme	W	95.1	16	92.3	89.5	98.6	16	103.1	92.8	75.1	17	86.4	81.0	84.8	16	82.8	88.8	89.6	17	111.8	15	100.9	11	91.1	95.5	91.1	95.5	91.1	95.5
AgriMAXX Piston	AgriMAXX	PRIME ST	W	95.0	17	92.2	-	101.2	15	101.3	-	78.9	16	89.8	-	84.3	17	79.5	-	89.6	17	115.2	13	100.9	11	91.1	-	-	-	-	-
Dyna-Gro 9422	Dyna-Gro	Foothold Virock with Awaken ST	R	115.5	1	-	-	116.2	7	116.6	-	95.4	8	100.7	-	100.9	7	89.6	-	117.7	1	136.0	1	112.3	6	-	-	-	-	-	-
MCIA Barracuda	MCIA	Vibrance Extreme	R	110.9	2	103.2	-	109.2	24	112.3	100.9	97.9	1	101.9	91.9	103.5	2	88.0	99.9	105.8	18	129.0	12	116.3	3	100.6	104.4	100.6	104.4	100.6	104.4
MCIA MARLIN	MCIA	Vibrance Extreme	R	110.3	3	102.8	99.3	110.7	17	-	-	88.3	33	-	-	97.8	13	-	-	115.6	3	128.9	14	115.3	4	-	-	-	-	-	-
EXP 3210	Synergy Ag	Surestand	R	109.4	4	-	-	110.7	17	-	-	88.8	30	93.2	-	101.1	1	84.9	-	114.9	5	131.3	5	112.3	7	94.4	-	94.4	-	94.4	-
M12R0012	MSU	Vibrance Extreme	R	109.3	5	96.4	-	107.8	27	106.4	-	88.8	30	93.2	-	106.5	1	-	-	106.5	15	131.7	3	116.6	2	-	-	-	-	-	-
KWS490	KWS	Cruiser Maxx Vibrance	R	108.5	7	-	-	109.7	21	-	-	80.0	50	-	-	106.5	1	-	-	106.5	15	131.7	3	116.6	2	-	-	-	-	-	-
Loyer	Synergy Ag	Surestand	R	108.5	8	99.3	-	108.1	26	108.5	-	93.3	13	96.8	-	98.0	12	83.5	-	115.1	4	130.4	7	105.8	18	97.9	-	97.9	-	97.9	-
AgriMAXX 516	AgriMAXX	PRIME ST	R	108.1	9	97.6	95.4	107.1	29	108.1	96.5	88.2	34	99.7	89.4	98.6	11	80.6	95.7	112.7	8	131.6	8	110.3	9	89.4	99.9	89.4	99.9	89.4	99.9
M12R0013	MSU	Vibrance Extreme	R	107.8	10	100.5	-	114.6	10	113.2	-	91.4	20	98.4	-	98.7	10	82.9	-	107.3	14	130.0	8	104.6	24	96.7	-	96.7	-	96.7	-
MCIA Flipper	MCIA	Vibrance Extreme	R	107.6	11	105.0	97.7	123.6	1	116.5	99.7	96.3	4	103.5	93.1	89.8	37	85.4	94.6	105.7	20	123.9	30	106.0	17	104.9	103.5	104.9	103.5	104.9	103.5
W 322	Wellman Seeds, Inc.	Encase	R	107.3	12	100.1	97.8	118.2	43	106.4	95.8	88.8	40	81.2	92.7	88.8	40	81.2	92.7	104.2	22	125.3	25	127.6	1	99.6	110.0	99.6	110.0	99.6	110.0
Dyna-Gro 9151	Dyna-Gro	Foothold Virock with Awaken ST	R	106.5	13	98.1	95.2	113.4	5	112.7	97.1	88.9	29	97.0	90.1	100.1	9	79.7	95.1	105.2	21	121.3	39	105.4	21	89.7	98.6	89.7	98.6	89.7	98.6
AgriMAXX 505	AgriMAXX	PRIME ST	R	106.5	14	98.5	95.0	109.4	22	104.0	93.3	91.5	19	102.5	92.4	96.0	16	81.3	93.9	113.3	7	125.4	24	103.1	31	96.7	100.6	96.7	100.6	96.7	100.6
DF 112 R	DF Seeds, LLC	Dfender	R	106.5	14	100.8	97.4	115.2	8	113.7	102.1	91.4	21	99.1	89.2	102.7	4	85.2	97.8	91.2	51	127.2	17	111.1	8	93.7	100.6	93.7	100.6	93.7	100.6
MCIA 357	MCIA	Vibrance Extreme	R	106.4	16	100.8	-	123.1	2	115.9	-	89.2	28	97.1	-	89.6	39	79.1	-	100.8	35	128.2	15	107.5	13	99.9	-	99.9	-	99.9	-
Dyna-Gro 9172	Dyna-Gro	Foothold Virock with Awaken ST	R	106.4	17	99.7	95.3	109.3	23	105.8	92.3	91.0	22	101.2	91.6	96.1	15	86.2	96.5	111.1	10	129.0	13	101.7	35	98.3	100.8	98.3	100.8	98.3	100.8
801	Albert Lea Seed	Cruiser 250	R	105.6	18	-	-	112.6	13	-	-	95.2	9	-	-	94.9	18	-	-	101.6	30	126.4	22	102.7	32	-	-	-	-	-	-
MCIA Jonah	MCIA	Vibrance Extreme	R	105.3	19	98.9	94.4	110.0	19	-	-	89.9	36	102.9	93.1	89.9	36	83.0	92.1	102.9	27	122.2	36	102.2	33	-	-	-	-	-	-
DF 121 R	DF Seeds, LLC	Dfender	R	105.2	20	98.4	98.3	100.3	48	103.3	97.1	95.9	6	103.9	95.2	100.6	8	79.8	96.9	99.2	39	127.1	20	108.0	12	96.7	104.0	96.7	104.0	96.7	104.0
M121R0058	MSU	Vibrance Extreme	R	104.7	21	-	-	98.0	51	-	-	96.5	3	-	-	92.7	24	-	-	106.3	16	130.9	6	103.5	29	-	-	-	-	-	-
KWS477	KWS	Cruiser Maxx Vibrance	R	104.5	22	-	-	102.9	45	-	-	91.8	18	-	-	96.9	24	-	-	104.2	22	123.3	32	108.1	11	-	-	-	-	-	-
M16R0906	MCIA	Vibrance Extreme	R	103.7	28	97.0	95.4	102.9	49	103.1	90.0	83.9	45	99.4	91.8	9															

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Table 1 : Multi-Year Performance Summary (Note: Tables sorted by 2023 High Management Yield, white wheat's grouped before red)

Line	Company	Seed Treatment	Seed Color	Yield (bu/a, adjusted to 13.5% Moisture)			Huron			Ingham			Isabella			Monroe			Sanilac			Tuscola				
				2023 Overall Rank	2 Yr Avg 22-23	3 Yr Avg 21-23	2023 Bu/A Rank	2 Yr Avg 22-23	3 Yr Avg 21-23	2023 Bu/A Rank	2 Yr Avg 22-23	3 Yr Avg 21-23	2023 Bu/A Rank	2 Yr Avg 22-23	3 Yr Avg 21-23	2023 Bu/A Rank	2 Yr Avg 21-22	3 Yr Avg 20-22								
W305 KWS453 Dyna-Gro 9182 W300	Wellman Seeds, Inc. KWS Dyna-Gro Wellman Seeds, Inc.	Encase Cruiser Maxx Vibrance Foothold Virock with Awaken ST Encase	R	98.8	48	96.5	97.8	52	102.5	90.9	85.9	41	98.9	91.6	91.3	30	81.2	92.5	98.5	40	118.2	47	101.0	37	94.7	99.1
			R	98.3	49	-	106.6	31	-	-	84.5	43	-	-	85.6	44	-	88.7	53	122.0	40	103.5	29	-	-	
			R	97.8	50	96.5	104.4	38	105.4	95.1	88.5	31	95.7	88.1	86.6	42	79.2	90.1	93.0	49	118.8	45	95.8	45	97.7	96.0
KWS472 W300	Wellman Seeds, Inc. KWS	Encase Cruiser Maxx Vibrance	R	97.6	51	91.9	92.4	53	98.0	87.2	84.7	42	91.9	85.3	94.3	19	79.0	88.6	102.0	28	118.2	47	93.8	47	92.7	93.6
			R	94.6	52	-	99.6	50	-	-	87.9	35	-	-	79.3	46	-	92.8	50	115.7	49	92.5	48	-	-	
			R	93.2	53	-	101.1	46	-	-	76.0	52	-	-	74.3	47	-	97.9	42	118.4	46	91.8	49	-	-	
WSC3804	Williamstfield	*																								
Mean				102.9	98.3	94.8	106.6	53	108.0	96.0	88.4	41	98.2	90.2	93.0	30	82.5	93.5	103.5	42	123.5	46	102.9	37	95.0	99.7
CV				2.9	2.9	2.9	3.5		1.8	3.3	8.6		3.4	3.1	5.2		-	2.7	5.9		3.0		2.9		2.7	
LSD				3.5	3.2	2.3	5.9		6.0	5.2	12.3		5.4	4.5	7.9		-	5.0	9.8		6.0		4.8		4.5	

* Tebuconazole, Imidacloprid, Metazyl, Germate Plus

* Tebuconazole, Imidacloprid, Metazaryl, Germate Plus

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Table 2. Multi-Location Performance Summary for Test Weight and Percent Moisture.

Line	Seed Color	Overall		Huron		Ingham		Isabella		Monroe		Sanilac		Tuscola	
		% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW
AgriMAXX 498	Red	15.3	57.9	14.2	55.8	14.2	55.8	15.4	57.7	16.5	58.2	16.6	57.8	15.9	58.2
AgriMAXX 505	Red	14.4	59.7	12.7	57.5	12.7	57.5	15.3	59.3	14.7	60.9	15.6	59.2	15.2	59.7
AgriMAXX 513	Red	14.8	58.6	14.2	55.1	14.2	55.1	15.6	58.6	15.6	59.7	16.3	59.7	14.9	57.4
AgriMAXX 516	Red	15.2	58.5	15.6	57.1	15.6	57.1	15.6	57.5	15.4	59.1	16.2	58.8	15.7	58.6
AgriMAXX 525	Red	15.2	58.7	14.8	57.9	14.8	57.9	15.5	57.8	16.0	59.4	16.4	58.1	15.3	58.7
AgriMAXX Mackinaw	White	14.3	57.0	13.4	53.3	13.4	53.3	14.9	56.7	14.7	58.7	15.9	57.7	14.7	57.2
AgriMAXX Piston	White	14.9	57.2	14.2	56.1	14.2	56.1	14.9	56.3	15.6	58.0	16.7	57.0	15.1	57.5
801	Red	15.0	59.0	14.9	58.4	14.9	58.4	14.8	58.3	14.9	59.8	16.9	59.1	15.4	58.7
Ambassador	White	14.3	57.3	13.1	55.4	13.1	55.4	14.5	57.5	15.3	58.7	16.0	57.2	14.6	56.4
DF 112 R	Red	14.4	58.1	14.0	58.9	14.0	58.9	14.9	56.8	14.3	58.3	16.4	57.2	14.3	57.9
DF 119 R	Red	14.0	57.6	11.7	56.1	11.7	56.1	14.3	55.9	15.0	59.0	14.8	58.2	15.5	56.4
DF 121 R	Red	15.6	58.5	14.8	57.9	14.8	57.9	16.2	57.7	16.9	59.0	17.2	58.5	15.7	58.1
DF 131 R	Red	15.1	58.3	15.0	57.1	15.0	57.1	15.1	57.4	15.5	58.6	16.3	58.2	15.8	58.0
DF 271 W	White	14.3	57.8	14.0	55.7	14.0	55.7	14.6	57.3	14.9	58.7	14.8	58.2	14.9	57.3
Dyna-Gro 9151	Red	14.9	60.4	14.5	61.2	14.5	61.2	15.5	59.6	15.3	60.3	16.2	59.7	14.7	59.6
Dyna-Gro 9172	Red	15.1	58.3	15.1	56.1	15.1	56.1	14.7	57.7	15.8	58.7	16.3	58.4	15.7	58.4
Dyna-Gro 9182	Red	14.9	58.5	14.0	55.9	14.0	55.9	15.9	58.4	15.4	59.2	15.3	59.0	15.7	58.4
Dyna-Gro 9422	Red	15.0	58.3	13.2	55.8	13.2	55.8	-	-	15.9	59.1	17.2	58.3	15.7	57.9
Dyna-Gro 9481	Red	14.4	58.2	13.3	55.3	13.3	55.3	-	-	15.1	58.7	15.8	58.2	15.1	58.3
Dyna-Gro 9242W	White	14.7	58.2	12.5	54.2	12.5	54.2	15.9	58.3	15.3	59.4	16.3	58.3	15.1	58.4
Dyna-Gro 9313W	White	14.6	57.5	14.2	52.9	14.2	52.9	14.5	57.4	15.4	57.7	16.4	58.2	14.5	58.3
WX23444	Red	15.9	58.3	16.6	57.6	16.6	57.6	-	-	16.9	58.8	16.5	57.9	16.1	57.8
ISF 1115	White	14.4	57.2	13.9	54.8	13.9	54.8	15.3	56.6	14.7	58.6	15.6	57.5	14.5	57.3
KWS435	White	14.6	58.3	14.3	57.9	14.3	57.9	15.4	57.4	15.0	58.8	15.6	57.8	14.5	57.7
KWS437	White	14.7	56.6	16.1	56.2	16.1	56.2	13.6	55.2	15.4	57.7	15.8	57.2	15.2	55.9
KWS439	White	15.0	56.9	14.4	57.2	14.4	57.2	15.1	56.1	16.3	58.1	16.7	56.2	14.5	55.9
KWS440	White	15.0	58.0	15.4	55.5	15.4	55.5	15.3	57.9	15.3	58.6	16.2	57.5	14.8	57.7
KWS453	Red	14.9	59.0	14.6	58.2	14.6	58.2	16.2	57.9	16.0	59.2	15.5	59.3	14.3	58.5
KWS472	Red	14.7	58.7	14.2	58.4	14.2	58.4	15.1	57.1	14.9	59.6	16.4	58.5	15.0	58.4
KWS477	Red	15.7	58.2	15.1	56.1	15.1	56.1	17.2	58.1	16.3	59.4	16.8	58.6	15.9	57.1
KWS482	Red	14.8	59.6	13.8	60.0	13.8	60.0	17.1	58.7	14.7	58.9	15.6	59.6	15.2	59.3
KWS490	Red	14.9	58.2	15.6	56.4	15.6	56.4	15.0	58.0	15.4	58.9	15.3	58.1	15.7	58.0
KWS495	Red	14.7	58.3	14.3	56.4	14.3	56.4	15.8	57.0	14.8	59.5	15.4	59.2	15.4	58.2
Jupiter	White	14.7	57.9	14.2	54.8	14.2	54.8	14.6	57.6	15.7	59.5	16.1	58.4	15.3	58.3
MCIA .357	Red	14.8	57.7	14.3	54.3	14.3	54.3	15.5	57.2	14.9	58.9	16.3	58.1	14.9	58.2
MCIA Barracuda	Red	15.1	57.8	12.9	60.3	14.0	56.3	15.6	56.4	15.8	58.4	16.3	58.3	16.0	57.1
MI16R0906	Red	14.7	57.8	13.3	59.6	13.9	55.3	14.3	57.0	15.4	59.1	15.8	57.9	15.4	57.8
MCIA 2004	Red	15.0	58.9	15.5	57.1	15.5	57.1	15.0	58.5	15.3	59.8	16.6	58.8	14.6	58.9
MCIA Flipper	Red	15.1	57.6	12.8	53.4	12.8	53.4	15.6	57.4	16.2	59.3	17.4	57.6	15.4	57.4
MCIA Jonah	Red	15.2	57.9	16.0	56.7	16.0	56.7	15.1	57.4	15.9	59.1	15.4	57.3	15.7	57.7
MCIA MARLIN	Red	15.3	58.4	15.3	57.0	15.3	57.0	16.6	58.4	15.4	58.5	16.7	59.0	14.7	57.6
MCIA Wharf	Red	14.6	56.5	14.8	54.1	14.8	54.1	15.5	56.1	14.4	58.6	16.2	56.4	14.0	56.7
MI16W0133	White	14.7	57.1	15.2	57.0	15.2	57.0	14.6	55.7	15.3	57.4	15.9	57.7	14.7	55.8
Moonlight	White	14.0	56.8	13.6	54.6	13.6	54.6	14.3	57.5	14.6	58.1	14.6	56.5	14.4	55.8
Sunburst	Red	15.0	60.3	15.9	59.9	15.9	59.9	15.3	59.5	15.3	61.2	16.0	60.8	15.0	58.9
Whitetail	White	14.4	57.8	14.8	57.7	14.8	57.7	14.2	57.6	15.2	58.6	15.3	57.7	14.3	56.9
MI16R0720	Red	15.2	57.1	14.7	56.1	14.7	56.1	16.0	56.2	15.4	58.1	16.4	57.2	15.8	57.2
MI20R0011	Red	14.4	57.5	13.8	57.7	13.8	57.7	14.4	56.5	15.4	58.6	16.0	56.4	14.4	56.9
MI20R0012	Red	15.6	59.5	17.0	58.2	17.0	58.2	15.7	59.4	15.5	60.3	16.7	59.4	15.8	59.3
MI20R0013	Red	15.3	58.6	14.9	57.7	14.9	57.7	15.8	58.0	15.3	58.9	16.6	58.8	15.9	57.9
MI20R0096	Red	14.2	57.3	14.3	55.0	14.3	55.0	13.6	56.2	14.9	58.3	15.3	58.6	14.7	56.6

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Table 2. Multi-Location Performance Summary for Test Weight and Percent Moisture.

Line	Seed Color	Overall		Huron		Ingham		Isabella		Monroe		Sanilac		Tuscola	
		% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW	% Moist	TW
MI20R0210	Red	15.1	57.4	16.4	56.6	16.4	56.6	14.9	56.6	15.6	58.0	15.8	57.5	15.3	57.0
MI20W0121	White	15.3	58.6	14.1	54.8	14.1	54.8	15.7	58.9	16.6	59.6	15.9	59.2	16.1	58.4
MI21R0051	Red	15.5	58.4	17.2	56.7	17.2	56.7	14.3	58.2	16.6	58.8	16.4	58.6	15.2	57.5
MI21R0058	Red	14.9	57.8	15.3	56.7	15.3	56.7	14.8	57.3	15.4	58.4	15.9	58.3	15.5	58.0
MI21R0089	Red	15.8	59.9	15.3	59.7	15.3	59.7	16.9	59.6	15.9	60.0	18.2	59.1	15.8	59.7
MI21W0040	White	14.8	58.2	15.1	58.9	15.1	58.9	15.4	57.3	14.9	59.1	15.2	58.4	15.2	57.2
EXP 3210	Red	14.5	58.0	13.7	56.8	13.7	56.8	14.6	56.7	15.6	58.7	15.3	58.3	15.2	57.7
EXP 3218	Red	15.0	58.3	14.5	56.5	14.5	56.5	16.3	58.2	15.4	58.5	15.5	58.7	15.5	58.6
EXP 3232	Red	13.7	58.5	13.8	57.1	13.8	57.1	-	-	14.9	59.2	-	-	-	-
Loyer	Red	15.4	58.0	15.2	57.9	15.2	57.9	15.6	57.0	15.4	58.8	16.8	58.1	16.0	57.2
W 300	Red	14.3	58.4	14.0	57.3	14.0	57.3	15.2	57.9	14.7	59.2	15.5	58.2	14.2	59.0
W 305	Red	15.0	58.9	13.8	58.6	13.8	58.6	15.0	58.5	15.8	59.4	16.1	58.9	16.0	57.4
W 313	Red	15.4	58.5	15.1	57.7	15.1	57.7	15.4	58.1	15.8	59.0	17.5	58.5	15.1	58.3
W 314	Red	15.1	58.3	15.6	55.7	15.6	55.7	16.0	57.2	15.5	58.7	15.5	59.5	15.5	58.4
W 318	Red	13.9	57.4	13.3	53.8	13.3	53.8	-	-	15.9	58.6	-	-	-	-
W 322	Red	14.3	57.9	12.3	52.7	12.3	52.7	15.9	58.2	15.3	59.5	14.8	59.7	14.7	56.9
W 324	Red	14.7	58.3	14.0	58.3	14.0	58.3	14.3	57.6	15.4	58.7	16.2	58.2	15.3	57.5
WSC 3804	Red	15.2	59.9	14.0	59.1	14.0	59.1	16.5	58.9	15.7	60.5	17.0	60.1	15.3	59.5
WSC 3906	Red	15.0	58.8	13.9	58.3	13.9	58.3	16.1	57.9	15.1	60.0	16.7	59.0	15.4	57.3
Mean		14.9	58.1	14.4	56.4	14.4	56.4	15.3	57.6	15.5	59.0	16.1	58.4	15.2	57.8
CV		3.9	1.1	11.3	4.2	11.3	4.2	6.8	0.6	3.7	0.5	7.3	0.7	4.5	1.4
LSD		0.4	0.6	2.6	3.9	2.6	3.9	1.7	0.5	0.9	0.5	1.9	0.7	1.1	1.3

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Table 3. Fusarium Head Blight Resistance, lodging, pre-harvest sprouting, plant height and flowering data.

Line	Seed Color	Awn	Chaff Color	Fusarium Head Blight					Preharvest Sprouting (0-9)**	Plant Height (inches)	Flowering Date Days past Jan. 1	Physiological Maturity Days past Jan. 1	Grain Fill Period # of days
				Severity 2023	Incidence 2023	Index 2023	DON ppm 2022	FHB Rating*					
AgriMAXX 498	Red	Awnless	White	19.0	15.0	3.5	49.8		1.7	34.3	151	180	29
AgriMAXX 505	Red	Awned	White	10.0	17.0	1.7	30.2		1.3	35.2	153	178	25
AgriMAXX 513	Red	Awned	White	5.0	12.0	0.6	28.8		0.8	34.2	151	176	25
AgriMAXX 516	Red	Awned	White	8.3	7.0	0.6	48.9		1.0	33.4	152	178	26
AgriMAXX 525	Red	Awned	White	6.5	10.0	1.1	-		0.8	33	152	180	28
AgriMAXX Mackinaw	White	Awnless	White	18.3	20.0	2.7	41.3		4.7	30.5	151	178	27
AgriMAXX Piston	White	Awnless	White	16.7	20.0	3.7	31.4		5.2	33.1	152	179	27
801	Red	Awned	White	-	-	-	34.2		1.7	33.7	153	178	25
Ambassador	White	Awnless	White	53.3	47.0	25.0	76.8		4.7	34.5	152	178	26
DF 112 R	Red	Awned	White	16.7	22.0	4.8	45.7		0.7	32.5	150	178	28
DF 119 R	Red	Awnletted	White	16.7	17.0	3.8	34.7		0.7	36.6	152	178	26
DF 121 R	Red	Awned	White	6.7	18.0	1.0	40.5		0.7	31.5	152	180	28
DF 131 R	Red	Awned	White	13.3	12.0	1.7	28.5		1.3	32.8	152	178	26
DF 271 W	White	Awnletted	White	6.7	14.0	1.1	48.0		6.7	32.4	152	181	29
Dyna-Gro 9151	Red	Awned	White	13.3	15.0	1.9	51.1		2.3	33.5	152	178	26
Dyna-Gro 9172	Red	Awned	White	6.7	13.0	0.8	45.3		1.7	32.9	152	179	27
Dyna-Gro 9182	Red	Awnless	White	5.0	12.0	0.6	36.1		1.3	34.6	152	178	26
Dyna-Gro 9422	Red	Awned	White	15.0	18.0	2.6	-		3.0	34.4	152	179	27
Dyna-Gro 9481	Red	Awnless	White	16.7	15.0	3.3	-		2.7	33.7	151	178	27
Dyna-Gro 9242W	White	Awnless	White	11.7	8.0	1.4	60.0		5.7	36.8	152	181	29
Dyna-Gro 9313W	White	Awned	White	6.7	5.0	0.3	-		4.8	33.2	152	180	28
WX23444	Red	Awnless	White	24.3	24.0	6.3	-		0.7	36.2	151	179	28
ISF 1115	White	Awnless	White	5.0	7.0	0.3	36.8		5.2	32.4	151	179	28
KWS435	White	Awnless	White	5.0	18.0	0.9	-		6.8	33.6	152	180	28
KWS437	White	Awnless	White	13.3	20.0	3.2	-		6.5	32.8	152	184	32
KWS439	White	Awnless	White	5.0	10.0	0.5	-		7.5	31.5	152	181	29
KWS440	White	Awnless	White	11.7	17.0	3.2	-		6.0	32.4	152	180	28
KWS453	Red	Awnletted	White	5.0	5.0	0.3	-		2.2	32.4	151	180	29
KWS472	Red	Awned	White	5.0	5.0	0.3	-		0.5	32.1	152	180	28
KWS477	Red	Awnless	White	8.3	17.0	1.3	-		1.7	34.4	151	179	28
KWS482	Red	Awned	White	5.0	7.0	0.3	-		0.3	34	151	178	27
KWS490	Red	Awned	White	6.4	8.0	1.3	-		0.7	31.5	152	178	26
KWS495	Red	Awned	White	5.0	7.0	0.3	-		1.2	33.1	151	178	27
Jupiter	White	Awnless	Bronze	36.7	22.0	7.3	49.6		5.0	34.9	151	188	37
MCIA .357	Red	Awnless	White	20.0	33.0	6.6	45.9		0.7	30	150	177	27
MCIA Barracuda	Red	Awned	White	9.0	22.0	2.6	53.7		2.7	32	152	180	28
MI16R0906	Red	Awnletted	White	31.7	30.0	9.5	50.7		6.2	30.7	151	179	28
MCIA 2004	Red	Awned	White	11.7	8.0	1.0	48.4		0.3	34.5	152	178	26
MCIA Flipper	Red	Awnless	White	26.7	27.0	8.3	32.9		1.0	33.4	151	176	25
MCIA Jonah	Red	Awnless	White	16.7	18.0	5.5	34.6		0.3	35.7	151	183	32
MCIA MARLIN	Red	Awnless	White	18.3	32.0	7.3	38.4		1.2	33.9	151	177	26
MCIA Wharf	Red	Awnletted	White	6.5	17.0	1.5	29.9		2.2	29.7	151	180	29
MI16W0133	White	Awned	White	31.7	18.0	6.3	58.9		6.0	32.1	151	180	29
Moonlight	White	Awnless	White	33.3	42.0	14.3	49.3		1.8	34.6	152	175	23
Sunburst	Red	Awnless	White	21.7	20.0	4.2	55.9		1.0	31.5	152	178	26
Whitetail	White	Awnletted	White	30.0	33.0	10.0	44.5		5.3	33.8	151	179	28
MI16R0720	Red	Awnless	White	30.0	28.0	10.3	-		1.0	31.8	149	176	27
MI20R0011	Red	Awnless	White	31.7	28.0	9.0	41.7		1.7	37.2	151	177	26
MI20R0012	Red	Awned	White	14.0	22.0	3.2	39.3		0.8	34.5	151	183	32
MI20R0013	Red	Awnless	Bronze	30.0	42.0	12.7	29.2		1.0	36.2	152	184	32
MI20R0096	Red	Awnless	White	6.5	22.0	1.7	-		0.7	33.1	152	183	31
MI20R0210	Red	Awned	White	18.3	32.0	6.6	45.9		1.5	32.9	151	179	28
MI20W0121	White	Awnletted	White	21.7	25.0	6.9	43.1		4.5	36.9	152	179	27
MI21R0051	Red	Awnless	White	6.5	12.0	1.2	-		0.3	34.9	151	180	29
MI21R0058	Red	Awnless	White	21.7	20.0	6.8	-		2.2	35.2	151	180	29
MI21R0089	Red	Awnless	White	21.7	17.0	4.6	-		1.3	37.3	151	176	25
MI21W0040	White	Awnletted	Bronze	40.0	32.0	12.8	-		4.3	34.3	150	178	28

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Table 3. Fusarium Head Blight Resistance, lodging, pre-harvest sprouting, plant height and flowering data.

Line	Seed Color	Awn	Chaff Color	Fusarium Head Blight					Preharvest Sprouting (0-9)**	Plant Height (inches)	Flowering Date Days past Jan. 1	Physiological Maturity Days past Jan. 1	Grain Fill Period # of days
				Severity 2023	Incidence 2023	Index 2023	DON ppm 2022	FHB Rating*					
EXP 3210	Red	Awne	White	5.0	18.0	0.9	-		2.2	33.8	152	179	27
EXP 3218	Red	Awnless	White	5.0	12.0	0.6	-		2.8	34.6	151	178	27
EXP 3232	Red	Awnless	White	15.0	17.0	3.1	-		0.7	33.6	152	181	29
Loyer	Red	Awnless	White	6.7	12.0	0.7	30.0		1.7	33.8	151	180	29
W 300	Red	Awne	White	6.7	7.0	0.4	26.9		0.3	33.6	152	177	25
W 305	Red	Awnless	White	4.3	14.0	0.5	16.5		0.7	33.5	152	179	27
W 313	Red	Awnless	White	6.7	9.0	0.7	27.0		1.3	34.1	151	177	26
W 314	Red	Awne	White	5.0	18.0	0.9	-		1.2	32.5	153	179	26
W 318	Red	Awne	White	5.0	5.0	0.3	18.9		2.7	36.2	151	179	28
W 322	Red	Awne	White	5.0	12.0	0.6	37.1		1.5	34.7	151	178	27
W 324	Red	Awne	White	5.0	12.0	0.6	31.1		1.3	31.8	152	178	26
WSC 3804	Red	Awnletted	White	13.3	8.0	1.3	-		2.0	34.9	152	179	27
WSC 3906	Red	Awne	White	13.3	25.0	4.3	-		1.3	31.8	150	177	27
Mean				15.1	18.0	3.8					33.7	151.0	179.0
CV				53.9	57.0	97.6					3.0	0.4	1.2
LSD				13.1	17.0	6.0					2.0	1.0	4

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Table 4. Conventional (Conv.) vs High Management (HM) Yield Results.

Line	Seed Color	Tuscola			Tuscola			Tuscola		Isabella			Isabella			Isabella	
		High Management			Conventional Management			HM - Conv.		High Management			Conventional Management			HM - Conv.	
		Bu/A	% Moist	TW	Bu/A	% Moist	TW	Difference	Rank	Bu/A	% Moist	TW	Bu/A	% Moist	TW	Difference	Rank
AgriMAXX 498	Red	104.7	15.9	58.2	99.0	15.5	57.5	5.8	50	90.1	15.4	57.7	85.4	16.1	55.8	4.7	35
AgriMAXX 505	Red	103.1	15.2	59.7	99.1	16.2	59.4	4.0	58	96.0	15.3	59.3	85.1	16.0	58.2	11.0	11
AgriMAXX 513	Red	103.6	14.9	57.4	99.5	15.2	58.6	4.1	57	95.3	15.6	58.6	86.5	14.8	57.4	8.9	20
AgriMAXX 516	Red	110.3	15.7	58.6	101.1	15.6	57.0	9.2	31	98.6	15.6	57.5	93.0	14.8	56.2	5.6	32
AgriMAXX 525	Red	97.6	15.3	58.7	91.7	16.1	57.5	5.9	-	91.7	15.5	57.8	93.0	15.5	56.4	-1.2	57
AgriMAXX Mackinaw	White	102.6	14.7	57.2	95.5	15.6	56.6	7.1	-	94.9	14.9	56.7	82.2	15.4	55.1	12.7	8
AgriMAXX Piston	White	100.9	15.1	57.5	93.3	16.8	56.1	7.6	-	84.3	14.9	56.3	81.1	14.4	55.3	3.2	43
801	Red	102.7	15.4	58.7	97.7	15.2	57.2	5.1	53	94.9	14.8	58.3	90.9	14.9	57.0	4.0	37
Ambassador	White	99.5	14.6	56.4	94.6	15.2	56.6	4.8	54	91.1	14.5	57.5	87.4	15.0	55.8	3.6	38
DF 112 R	Red	111.1	14.3	57.9	99.6	16.1	55.8	11.5	14	102.7	14.9	56.8	91.3	14.3	55.5	11.5	9
DF 119 R	Red	99.7	15.5	56.4	94.9	15.8	56.5	4.7	55	71.0	14.3	55.9	79.8	15.0	55.2	-8.9	64
DF 121 R	Red	108.0	15.7	58.1	93.9	16.2	56.7	14.1	10	100.6	16.2	57.7	92.5	15.7	56.2	8.1	22
DF 131 R	Red	106.4	15.8	58.0	99.4	16.1	56.4	7.0	43	89.8	15.1	57.4	87.5	15.8	55.6	2.3	48
DF 271 W	White	108.0	14.9	57.3	95.4	16.2	56.3	12.6	11	100.9	14.6	57.3	91.1	14.6	55.7	9.8	16
Dyna-Gro 9151	Red	105.4	14.7	59.6	98.7	15.7	58.7	6.6	45	100.1	15.5	59.6	90.6	15.1	58.0	9.4	18
Dyna-Gro 9172	Red	101.7	15.7	58.4	101.6	15.8	57.5	0.2	62	96.1	14.7	57.7	95.9	15.0	56.4	0.2	52
Dyna-Gro 9182	Red	95.8	15.7	58.4	90.1	15.4	57.5	5.7	51	86.6	15.9	58.4	75.9	16.0	56.0	10.7	13
Dyna-Gro 9422	Red	112.3	15.7	57.9	102.9	15.6	56.1	9.5	28	-	-	-	-	-	-	-	-
Dyna-Gro 9481	Red	103.9	15.1	58.3	100.0	15.7	57.8	3.9	59	-	-	-	-	-	-	-	-
Dyna-Gro 9242W	White	106.0	15.1	58.4	97.1	15.5	57.0	8.9	34	95.3	15.9	58.3	92.9	16.5	56.8	2.4	47
Dyna-Gro 9313W	White	106.0	14.5	58.3	97.9	15.8	56.7	8.1	36	91.4	14.5	57.4	88.2	14.6	55.2	3.2	42
WX23444	Red	90.6	16.1	57.8	94.8	17.1	56.6	-4.2	67	-	-	-	-	-	-	-	-
ISF 1115	White	100.7	14.5	57.3	100.4	15.0	57.1	0.3	61	94.6	15.3	56.6	88.1	15.6	55.3	6.4	29
KWS435	White	96.6	14.5	57.7	86.7	15.3	57.0	9.8	25	97.3	15.4	57.4	90.8	14.5	55.6	6.5	28
KWS437	White	104.2	15.2	55.9	88.5	16.2	55.4	15.7	6	100.8	13.6	55.2	90.5	14.7	54.5	10.3	15
KWS439	White	107.0	14.5	55.9	96.5	14.9	54.0	10.5	21	107.5	15.1	56.1	96.7	15.4	54.2	10.8	12
KWS440	White	105.6	14.8	57.7	96.2	15.7	57.3	9.4	29	104.6	15.3	57.9	87.3	16.0	56.1	17.2	2
KWS453	Red	103.5	14.3	58.5	95.5	15.7	57.8	7.9	37	85.6	16.2	57.9	79.2	16.9	56.5	6.4	30
KWS472	Red	92.5	15.0	58.4	74.3	16.4	57.6	18.2	2	79.3	15.1	57.1	84.8	16.1	56.3	-5.5	62
KWS477	Red	108.1	15.9	57.1	99.1	16.8	58.3	9.0	33	96.9	17.2	58.1	97.1	16.1	57.7	-0.2	55
KWS482	Red	89.5	15.2	59.3	85.2	16.1	58.2	4.2	56	91.5	17.1	58.7	88.0	15.2	58.1	3.6	39
KWS490	Red	116.6	15.7	58.0	106.9	15.2	57.4	9.7	27	106.5	15.0	58.0	99.1	15.7	56.1	7.5	25
KWS495	Red	100.8	15.4	58.2	88.5	15.3	58.2	12.3	12	91.2	15.8	57.0	86.3	14.6	56.6	4.8	34
Jupiter	White	109.6	15.3	58.3	94.7	16.3	56.6	14.9	8	99.5	14.6	57.6	100.0	14.8	56.6	-0.5	56
MCIA .357	Red	107.5	14.9	58.2	90.7	15.8	56.9	16.8	4	89.6	15.5	57.2	91.7	16.2	56.4	-2.2	58
MCIA Barracuda	Red	107.2	16.0	57.1	99.3	15.3	56.7	7.9	38	100.9	15.6	56.4	98.3	14.7	55.7	2.6	44
MI16R0906	Red	110.1	15.4	57.8	100.3	15.6	56.6	9.8	26	90.9	14.3	57.0	90.6	15.3	55.5	0.3	51
MCIA 2004	Red	103.5	14.6	58.9	97.4	14.9	57.4	6.1	47	101.9	15.0	58.5	86.0	17.4	56.5	15.9	5
MCIA Flipper	Red	106.0	15.4	57.4	98.3	15.9	58.2	7.7	39	89.8	15.6	57.4	87.3	15.0	56.5	2.6	45
MCIA Jonah	Red	105.7	15.7	57.7	94.3	15.5	57.4	11.5	15	89.9	15.1	57.4	100.2	15.7	56.2	-10.3	65
MCIA MARLIN	Red	116.3	14.7	57.6	105.8	16.5	57.7	10.4	22	103.5	16.6	58.4	100.2	15.6	57.2	3.3	41
MCIA Wharf	Red	104.4	14.0	56.7	92.8	15.8	56.0	11.7	13	92.2	15.5	56.1	82.6	14.0	55.4	9.6	17
MI16W0133	White	99.5	14.7	55.8	103.3	14.5	56.5	-3.8	66	92.3	14.6	55.7	86.0	14.5	54.5	6.3	31
Moonlight	White	97.5	14.4	55.8	91.2	16.0	56.6	6.2	46	84.8	14.3	57.5	77.4	15.1	55.9	7.4	26
Sunburst	Red	104.9	15.0	58.9	96.1	15.7	58.8	8.8	35	93.5	15.3	59.5	85.8	16.2	57.8	7.8	24
Whitetail	White	105.9	14.3	56.9	95.2	15.7	56.3	10.7	20	107.7	14.2	57.6	85.1	14.6	56.0	22.6	1
MI16R0720	Red	102.2	15.8	57.2	95.1	16.3	56.3	7.1	41	92.1	16.0	56.2	92.4	15.5	55.0	-0.2	54
MI20R0011	Red	95.3	14.4	56.9	85.5	15.8	55.9	9.8	24	103.0	14.4	56.5	86.0	15.0	55.2	17.1	3
MI20R0012	Red	112.3	15.8	59.3	101.3	16.0	59.1	11.0	19	101.1	15.7	59.4	85.5	15.6	58.3	15.6	6
MI20R0013	Red	104.6	15.9	57.9	93.5	16.2	56.6	11.1	17	98.7	15.8	58.0	95.3	15.0	56.8	3.4	40
MI20R0096	Red	101.6	14.7	56.6	95.6	15.4	55.8	6.0	48	93.1	13.6	56.2	79.0	14.6	54.8	14.1	7
MI20R0210	Red	98.6	15.3	57.0	104.4	15.9	56.9	-5.8	68	92.6	14.9	56.6	76.4	15.5	55.3	16.1	4
MI20W0121	White	104.1	16.1	58.4	98.6	16.2	58.4	5.5	52	92.5	15.7	58.9	81.2	16.0	56.8	11.3	10
MI21R0051	Red	99.1	15.2	57.5	99.5	16.4	57.7	-0.4	63	93.9	14.3	58.2	88.7	16.9	56.4	5.2	33
MI21R0058	Red	103.5	15.5	58.0	104.6	16.0	57.9	-1.1	65	92.7	14.8	57.3	88.4	14.7	56.0	4.3	36
MI21R0089	Red	102.2	15.8	59.7	91.1	17.1	58.7	11.1	18	90.4	16.9	59.6	87.9	17.8	58.0	2.5	46
MI21W0040	White	98.5	15.2	57.2	88.3	15.7	57.0	10.1	23	97.6	15.4	57.3	96.8	14.8	56.6	0.7	49
EXP 3210	Red	115.3	15.2	57.7	99.3	15.7	56.7	16.0	5	97.8	14.6	56.7	104.7	15.8	55.7	-6.9	63
EXP 3218	Red	105.5	15.5	58.6	96.3	15.3	56.9	9.1	32	86.0	16.3	58.2	85.9	15.6	56.9	0.1	53
EXP 3232	Red	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loyer	Red	105.8	16.0	57.2	99.0	16.8	57.2	6.8	44	98.0	15.6	57.0	90.9	15.7	55.6	7.1	27
W 300	Red	93.8	14.2	59.0	76.2	15.6	57.6	17.5	3	94.3	15.2	57.9	83.8	15.2	56.6	10.6	14
W 305	Red	101.0	16.0	57.4	89.7	16.6	56.5	11.3	16	91.3	15.0	58.5	83.5	16.7	56.0	7.8	23

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Table 4. Conventional (Conv.) vs High Management (HM) Yield Results.

Line	Seed Color	Tuscola High Management			Tuscola Conventional Management			Tuscola HM - Conv.		Isabella High Management			Isabella Conventional Management			Isabella HM - Conv.	
		Bu/A	% Moist	TW	Bu/A	% Moist	TW	Difference	Rank	Bu/A	% Moist	TW	Bu/A	% Moist	TW	Difference	Rank
W 313	Red	107.3	15.1	58.3	92.5	15.7	57.1	14.8	9	84.3	15.4	58.1	83.7	15.3	56.5	0.7	50
W 314	Red	98.2	15.5	58.4	98.7	15.4	57.4	-0.5	64	91.3	16.0	57.2	93.7	16.0	56.4	-2.3	59
W 318	Red	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W 322	Red	127.6	14.7	56.9	99.7	15.9	57.9	27.9	1	88.8	15.9	58.2	93.5	15.2	57.3	-4.7	61
W 324	Red	113.2	15.3	57.5	98.2	16.2	57.1	14.9	7	94.2	14.3	57.6	85.7	15.4	55.5	8.5	21
WSC 3804	Red	91.8	15.3	59.5	82.5	16.1	59.0	9.3	30	74.3	16.5	58.9	78.0	15.6	57.8	-3.7	60
WSC 3906	Red	99.8	15.4	57.3	96.5	15.5	58.4	3.3	60	88.5	16.1	57.9	79.3	15.8	57.1	9.2	19
Mean		102.9	15.2	57.8	95.1	15.9	57.2			93.0	15.3	57.6	87.3	15.2	56.2		
CV		2.9	4.5	1.4	5.3	5.1	0.8			5.2	6.8	0.6	6.9	0.8	7.3		
LSD		4.8	1.1	1.3	8.1	1.3	0.8			7.9	1.7	0.5	9.7	0.7	1.8		

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Table 5. Milling and baking qualities.

Line	Seed Color	NIR Kernel Protein (at 12%)	SKCS Kernel Hardness	Adjusted Flour Yield (%)	Softness Equivalent (%)	Flour Protein (at 14%)	Lactic Acid SRC (%)	Sodium Carbonate SRC (%)	Cookie Diameter (cm)
AgriMAXX 498	Red	11.1	19.0	70.2	63.4	9.1	123.7	66.5	18.5
AgriMAXX 505	Red	10.7	17.2	67.9	60.3	8.7	137.4	75.1	17.8
AgriMAXX 513	Red	11.1	55.7	70.9	47.9	10.0	118.6	80.8	16.1
AgriMAXX 516	Red	10.6	20.6	70.2	62.3	8.8	123.8	69.3	18.5
AgriMAXX 525	Red	-	-	-	-	-	-	-	-
AgriMAXX Mackinaw	White	11.4	8.7	70.0	63.3	9.2	120.9	68.8	18.1
AgriMAXX Piston	White	10.6	16.5	69.7	57.3	9.1	130.0	67.8	17.9
801	Red	10.3	12.7	68.3	65.2	8.5	127.2	72.6	18.1
Ambassador	White	11.1	12.1	71.7	56.7	9.1	102.4	65.3	18.2
DF 112 R	Red	10.7	11.8	72.3	61.7	8.7	120.3	70.1	18.4
DF 119 R	Red	10.4	6.7	70.8	64.4	8.4	107.0	69.4	18.7
DF 121 R	Red	10.7	20.1	69.3	62.5	8.6	103.2	67.5	18.2
DF 131 R	Red	10.4	17.0	70.4	62.6	8.4	118.5	69.1	18.5
DF 271 W	White	10.5	10.2	70.4	62.9	8.5	115.8	68.4	18.6
Dyna-Gro 9151	Red	10.6	12.9	67.8	62.3	8.9	143.5	76.2	17.7
Dyna-Gro 9172	Red	10.1	13.7	70.5	65.0	8.2	120.4	67.9	18.9
Dyna-Gro 9182	Red	11.7	21.0	69.0	57.7	9.4	121.3	66.8	18.0
Dyna-Gro 9422	Red	-	-	-	-	-	-	-	-
Dyna-Gro 9481	Red	-	-	-	-	-	-	-	-
Dyna-Gro 9242W	White	10.3	22.8	68.2	60.4	8.6	105.6	66.6	18.7
Dyna-Gro 9313W	White	-	-	-	-	-	-	-	-
WX23444	Red	-	-	-	-	-	-	-	-
ISF 1115	White	10.6	8.8	70.3	61.1	8.6	118.0	66.2	18.8
KWS435	White	-	-	-	-	-	-	-	-
KWS437	White	-	-	-	-	-	-	-	-
KWS439	White	-	-	-	-	-	-	-	-
KWS440	White	-	-	-	-	-	-	-	-
KWS453	Red	-	-	-	-	-	-	-	-
KWS472	Red	-	-	-	-	-	-	-	-
KWS477	Red	-	-	-	-	-	-	-	-
KWS482	Red	-	-	-	-	-	-	-	-
KWS490	Red	-	-	-	-	-	-	-	-
KWS495	Red	-	-	-	-	-	-	-	-
Jupiter	White	11.3	20.7	69.0	57.9	9.2	107.6	69.7	18.9
MCIA .357	Red	10.8	20.2	70.7	56.7	8.4	101.4	65.0	19.1
MCIA Barracuda	Red	10.9	12.9	69.4	66.6	8.7	121.0	67.5	19.7
MI16R0906	Red	10.7	21.4	68.5	59.8	8.6	123.7	70.5	18.6
MCIA 2004	Red	10.3	9.6	69.9	67.2	8.3	112.7	69.9	19.3
MCIA Flipper	Red	10.2	16.3	72.1	61.2	8.1	98.9	65.8	18.9
MCIA Jonah	Red	10.3	13.4	71.3	61.4	8.4	113.7	67.0	19.7
MCIA MARLIN	Red	10.7	17.0	70.9	60.4	8.3	118.8	73.1	18.9
MCIA Wharf	Red	10.6	1.9	69.4	59.0	8.4	90.8	67.1	19.6
MI16W0133	White	11.1	25.4	68.8	58.4	8.9	112.5	70.5	18.8
Moonlight	White	11.3	14.0	69.7	56.6	9.2	99.5	66.2	18.5
Sunburst	Red	10.8	42.5	65.2	52.0	9.1	109.2	73.6	17.8
Whitetail	White	11.5	11.8	69.6	60.8	9.4	115.1	68.7	18.2
MI16R0720	Red	-	-	-	-	-	-	-	-
MI20R0011	Red	10.2	6.3	68.3	56.9	8.4	99.1	64.0	19.7
MI20R0012	Red	11.0	23.3	68.8	60.7	8.6	102.7	69.0	19.4
MI20R0013	Red	11.0	8.4	69.3	62.5	8.5	113.8	69.8	19.7
MI20R0096	Red	-	-	-	-	-	-	-	-
MI20R0210	Red	10.6	10.9	69.6	60.7	8.7	101.0	70.1	19.3
MI20W0121	White	11.4	19.2	67.3	60.5	9.1	96.3	67.4	18.8
MI21R0051	Red	-	-	-	-	-	-	-	-
MI21R0058	Red	-	-	-	-	-	-	-	-
MI21R0089	Red	-	-	-	-	-	-	-	-
MI21W0040	White	-	-	-	-	-	-	-	-
EXP 3210	Red	-	-	-	-	-	-	-	-
EXP 3218	Red	-	-	-	-	-	-	-	-

2023 Michigan State University Wheat Performance Trials

Table 5. Milling and baking qualities.

Line	Seed Color	NIR Kernel Protein (at 12%)	SKCS Kernel Hardness	Adjusted Flour Yield (%)	Softness Equivalent (%)	Flour Protein (at 14%)	Lactic Acid SRC (%)	Sodium Carbonate SRC (%)	Cookie Diameter (cm)
EXP 3232	Red	-	-	-	-	-	-	-	-
Loyer	Red	10.5	9.6	67.6	63.7	8.7	102.2	72.8	19.1
W 300	Red	10.2	23.7	72.1	57.3	8.9	100.2	63.8	19.5
W 305	Red	10.7	53.6	73.0	49.8	9.7	102.5	75.6	17.7
W 313	Red	11.8	21.7	68.9	55.6	9.6	118.2	67.5	18.6
W 314	Red	-	-	-	-	-	-	-	-
W 318	Red	10.4	8.2	69.1	66.8	8.5	124.1	73.2	18.7
W 322	Red	10.2	7.9	68.6	65.4	8.4	130.7	74.7	19.1
W 324	Red	10.3	17.0	70.8	61.7	8.4	121.8	70.4	18.7
WSC 3804	Red	-	-	-	-	-	-	-	-
WSC 3906	Red	-	-	-	-	-	-	-	-

Commercially Available Varieties entered in the 2023 Michigan State University Wheat Performance Trials

AgriMAXX Wheat Company

AgriMAXX 498
AgriMAXX 505
AgriMAXX 513
AgriMAXX 516
AgriMAXX 525
AgriMAXX Mackinaw
AgriMAXX Piston

Albert Lea Seeds

Viking 801

DF Seeds Inc.

DF 112 R
DF 119 R
DF 121 R
DF 131 R
DF 271 W

Dyna-Gro Seed

9151
9172
9182
9422
9481
9242W
9313W
WX23444

Irrer Seed Farm

ISF 1115

KWS Cereals

KWS435
KWS437
KWS439
KWS440
KWS453
KWS472
KWS477
KWS482
KWS490
KWS495

Michigan Crop Improvement Association

Jupiter
MCIA .357
MCIA Barracuda
MI16R0906
MCIA 2004
MCIA Flipper
MCIA Jonah
MCIA Marlin
MCIA Wharf
MI 16W0133
Moonlight
Sunburst
Whitetail

Michigan State University

MI16R0720
MI20R0011

MI20R0012
MI20R0013
MI20R0096
MI20R0210
MI20W0121
MI21R0051
MI21R0058
MI21R0089
MI21W0040

Synergy Ag

EXP 3210
EXP 3218
EXP 3232
Loyer

Wellman Seeds Inc.

W 300
W 305
W 313
W 314
W 318
W 322
W 324

Williamsfield Seed Company

WSC 3804
WSC 3906

Organizations Participating in the 2023 Michigan State University Wheat Performance Trials

AgriMAXX Wheat Company
7167 Highbanks Road
Mascoutah, IL 62258
Phone: 855-629-9432

Albert Lea Seed
1414 W. Main
PO Box 127
Albert Lea, MN 56007
Phone: 800-352-5247

D.F. Seeds, Inc.
P.O. Box 159
905 S. Jackson St.
Dansville, MI 48819
Phone: 517-623-6161

Dyna-Gro Seed
4648 S Garfield Rd
Auburn, MI 48611
Phone: 989-662-0000

Irrer Seed Farm
9621 Dexter Trail
Fowler, MI 48835
Phone: 517-719-5710

KWS Cereals
4101 Colleen Drive
Champaign, IL 61822
Phone: 330-439-3341

Michigan Crop Improvement
Association
2905 Jolly Road
Okemos, MI 48864
Phone: 517-332-3546

Synergy Ag
6150 N. Co Rd. 33
Tiffin, OH 44883
Phone: 419-355-6708

Wellman Seeds, Inc.
23778 Delphos Jennings Road
Delphos, OH 45833
Phone: 800-717-7333

Williamsfield Seed Company
257 E. Hail St.
Bushnell, IL 61422
Phone: 309-569-0008