MCIA SPRING OAT & BARLEY VARIETY TRIAL – 2024 RESULTS

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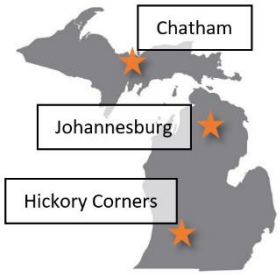

Michigan State University conducted spring oat and barley variety trials in 2024 with support from the Michigan Crop Improvement Association (MCIA). Locations included Chatham, MI at the MSU Upper Peninsula Research and Extension Center (UPREC), Hickory Corners, MI at the W.K. Kellogg Biological Station (KBS), and one commercial farm, Sklarczyk Seed Farm in Johannesburg, MI. Our project included a three-location strip trial designed to compare leading genetics for Michigan from field to glass at pilot scale and a small plot study at Chatham only. The strip trials included three elite two-row spring barley varieties and four white oat varieties. The small plot study included those MCIA entries plus 29 paid entries from three private seed companies (data not reported here). This research represents an expanded effort to understand oat and barley adaptability and performance in Michigan for both traditional markets and emerging opportunities in craft malting, milling, and distilling.

Temperature was near normal at Johannesburg, slightly above normal at Hickory Corners and slighlty below normal at Chatham from planting through harvest. Much of Michigan was abnormally dry heading into 2024 following a warm, dry winter. However, precipitation was 3-5 inches above normal at all three locations during the growing season. Lodging was observed in oats and barley at Hickory Corners, but not the other locations. Raw grain quality was analyzed at MSU-UPREC, with micro malting and malt quality analysis forthcoming from the USDA-ARS Cereal Crops Research Unit in Madison, WI. Craft maltsters at Great Lakes Malting Company, Mitten State Malt and/or Emergent Malt will also be malting small batches of grain from the Chatham and Johannesburg locations to share their observations with the project team and funders. Data were analyzed across locations using ANOVA (alpha = 0.05) and Tukey's HSD test in the Agricolae package for R. DON data was not replicated nor statistically analyzed.

Significant differences were observed among barley varieties for all parameters, except yield, percentage of thin kernels and germination energy (DON not replicated). Variety differences were marginally significant for grain test weight and plumps ($P < 0.10$). Mean yield was 75.1 bu/a with Esma and HudsonNY producing numerically higher yields than LCS Odyssey. Mean test weight was 45.8 lbs/bu with HudsonNY and northern locations showing significantly higher grain density. LCS Odyssey was later to head/mature than the other varieties. HudsonNY was notably taller than the other entries, which could benefit staw yield, but may also increase lodging risk. HudsonNY also had higher grain protein concentration than the other two varieties. LCS Odyssey and HudsonNY produced a greater percentage of plump kernels and higher germination capacity than Esma. Germination energy was low across varieties at Chatham, which stood out in contrast to much higher germination capacity numbers. Pre-harvest sprout (PHS) was observed in Esma and HudsonNY at all locations, while LCS Odyssey demonstated good PHS resistance. DON was low across varieties and locations. In general, our results indicate that HudsonNY and Esma are fairly comparable to LCS Odyssey, but likely lack suffecient PHS resistance for reliable malting barley production in Michigan.

Significant differences were observed among oat varieties for all parameters, except yield and the percentage of thin kernels (through a 0.064 inch seive). Variety differences were marginally significant for the percentage of plump kernels ($P < 0.10$). Mean yield was 93 bu/a with Rushmore and RC Amaze producing numerically higher yields than other entries. Mean test weight was 35.4 lbs/bu with Rushmore, AAC Reid and northern locations showing significantly higher grain density. Heading date varied across varieties with RC Amaze being earliest and AAC Reid latest. Rushmore and AAC Reid were notably taller than RC Amaze and AAC Basil. AAC Reid had the highest protein concentration, but also the most plump kernels. RC Amaze and Rushmore showed higher germination energy than AAC Basil. Oat germination capacity data should be treated with skepticism, as the GC protocol is not well suited to oats. DON was low across varieties and locations. In general, our results indicate that both RC Amaze and AAC Reid may be comparable to Rushmore and suitable for oat production in Michigan.

Drs. DeDecker and Wilke presented preliminary results of the project at the KBS Food Grade Grains field day in June 2024 and at the UPREC 125th Anniversary Celebration in August 2024. Dr. Wilke presented results of the project at the Michigan Crop Improvement Association annual meeting in February 2025. We would like to thank MCIA for supporting this research and all our cooperators for making it happen!

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TRIAL DETAILS

Design:

RCBD with three replications

Planting date:

- May 10th (barley) & 13th (oats) at Chatham
- April 26th at Johannesburg
- April 22nd at Hickory Corners

Seeded at 28 seeds/ft^2

Fertility:

- 60 lbs N, 30 lbs P, 78 lbs K/a (oats) & 69 lbs/a N (barley) at Chatham
- 66 lbs N, 36 lbs P, 60 lbs K/a at Johannesburg
- 60 lbs N, 1.4 lbs B/a at Hickory Corners

Herbicide:

- 1 pt/ac Broclean, plus 0.75 pt/ac MCPA at Chatham
- 12 oz/a Huskie at Johannesburg
- 0.75 oz/a Harmony Extra at Hickory Corners

Fungicide:

- 4 oz/a Priaxor (oats & barley), plus 8.2 oz/ac Prosaro (barley only) at Chatham
- 13.7 oz/a Miravis Ace, plus 8.2 oz/a Prosaro at Johannesburg
- 13.7 oz/a Miravis Ace at Hickory Corners

Harvest Date:

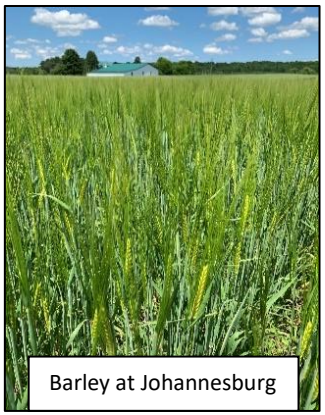
- August 21st (barley) & 22nd (oats) at Chatham
- August 20th at Johannesburg
- July 23rd at Hickory Corners

Table 1: Barley Yield and Quality Across Locations (Means followed by the same letter are not significantly different.)												
Location	**Variety**	**Yield (bu/a)**	**Test Wt. (lb/bu)**	**Heading Date**	**Height (in)**	**Protein (%)**	**Plump (%)**	**Thin (%)**	**Germ Energy 4ml (%)**	**Germ Capacity (%)**	**DON (ppm)**	**RVA (SN)**
Chatham (strip)	LCS Odyssey	76.4	46.0	17-Jul	21.3	11.6	96.5	0.36	75.5	95.0	0.27	117
Chatham (strip)	Esma	79.9	50.1	16-Jul	19.5	11.7	95.3	0.61	76.5	92.0	0.18	40
Chatham (strip)	HudsonNY	71.6	48.3	14-Jul	27.3	12.3	95.7	0.56	75.3	95.5	0.34	61
Chatham (strip)	**Average**	**76.0**	**48.1**	**15-Jul**	**22.7**	**11.9**	**95.8**	**0.50**	**75.8**	**94.2**	**0.26**	**73**
Chatham (small)	LCS Odyssey	89.5	43.8	15-Jul	29.3	13.2	83.6	2.4	93	94	0.37	127
Chatham (small)	Esma	114.9	46.0	10-Jul	27.3	13.4	86.1	1.5	89	92	0.31	17
Chatham (small)	HudsonNY	103.8	49.4	10-Jul	30.0	13.8	88.0	1.5	91	94	0.18	41
Chatham (small)	**Average**	**101.2**	**46.4**	**12-Jul**	**28.9**	**13.5**	**86.0**	**1.8**	**91**	**93**	**0.28**	**62**
Johannesburg	LCS Odyssey	NA	49.2	4-Jul	24.0	9.9	96.0	0.89	94.0	93.0	0.32	107
Johannesburg	Esma	NA	49.2	2-Jul	22.3	9.7	95.5	0.87	92.0	91.0	0.33	58
Johannesburg	HudsonNY	NA	49.7	30-Jun	30.0	10.0	95.5	0.78	95.0	94.0	0.34	65
Johannesburg	**Average**	**NA**	**49.4**	**1-Jul**	**25.4**	**9.9**	**95.7**	**0.80**	**93.7**	**92.7**	**0.33**	**77**
Hickory Corners	LCS Odyssey	49.7	42.6	NA	NA	12.7	95.6	0.40	97.3	96.3	0.30	133
Hickory Corners	Esma	49.9	39.0	NA	NA	12.7	88.4	1.35	95.0	90.3	0.31	72
Hickory Corners	HudsonNY	52.1	40.7	NA	NA	12.8	93.1	0.80	97.7	94.0	0.33	70
Hickory Corners	**Average**	**50.6**	**40.7**	**NA**	**NA**	**12.7**	**92.4**	**0.80**	**96.7**	**93.6**	**0.31**	**92**
Average	**LCS Odyssey**	**72.3** a	**44.7** b	**14-Jul** a	**24.6** b	**11.9** b	**94.7** a	**0.7** a	**86.8** a	**95.1** a	**0.30**	**123** a
Average	**Esma**	**77.7** a	**45.9** ab	**12-Jul** b	**22.8** b	**12.0** ab	**92.2** a	**1.0** a	**85.8** a	**91.3** b	**0.27**	**50** b
Average	**HudsonNY**	**75.4** a	**46.7** a	**11-Jul** b	**28.6** a	**12.4** a	**93.8** a	**0.8** a	**86.7** a	**94.7** a	**0.34**	**62** b
	Mean	**75.1**	**45.8**	**12-Jul**	**25.3**	**12.1**	**93.6**	**0.8**	**86.4**	**93.7**	**0.30**	**78**
	P-Value	**0.358**	**0.077**	**0.001****	**0.013***	**0.04***	**0.061**	**0.30**	**0.955**	**0.006****	**NA**	**<0.001****

Oat and barley small plots at Chatham

HudsonNY barley at Chatham

KBS Food Grade Grains Field Day



Barley at Johannesburg

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Table 2: Oat Yield and Quality Across Locations (Means followed by the same letter are not significantly different.)

Location	Variety	Yield (bu/a)	Test Wt. (lb/bu)	Heading Date	Height (in)	Protein (%)	Plump (%)	Thin (%)	Germ Energy 4ml (%)	Germ Capacity (%)	DON (ppm)
Chatham (strip)	Rushmore	51.2	38.1	9-Jul	34.8	12.1	75.0	0.52	94.5	75.0	0.23
Chatham (strip)	AAC Basil	63.0	35.3	10-Jul	30.3	11.5	71.1	0.44	88.5	73.8	0.33
Chatham (strip)	AAC Reid	69.2	38.3	12-Jul	35.3	12.3	74.4	0.31	93.3	94.8	0.36
Chatham (strip)	RC Amaze	61.7	37.1	3-Jul	28.8	11.9	81.0	0.49	92.5	84.8	0.25
Chatham (strip)	**Average**	**61.3**	**37.2**	**8-Jul**	**32.3**	**11.9**	**75.4**	**0.44**	**92.2**	**82.1**	**0.29**
Chatham (small)	Rushmore	167.2	36.3	8-Jul	36.7	NA	NA	NA	NA	NA	NA
Chatham (small)	AAC Basil	141.2	31.2	13-Jul	37.3	NA	NA	NA	NA	NA	NA
Chatham (small)	AAC Reid	137.9	34.2	15-Jul	37.7	NA	NA	NA	NA	NA	NA
Chatham (small)	RC Amaze	143.6	32.3	5-Jul	33.3	NA	NA	NA	NA	NA	NA
Chatham (small)	**Average**	**147.5**	**33.5**	**10-Jul**	**36.3**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Johannesburg	Rushmore	NA	42.9	29-Jun	33.0	10.0	53.8	0.26	94.0	46.0	0.26
Johannesburg	AAC Basil	NA	42.1	28-Jun	25.3	12.2	64.5	0.32	88.0	100.0	0.27
Johannesburg	AAC Reid	NA	41.1	3-Jul	27.0	11.6	57.6	0.26	92.0	66.0	0.30
Johannesburg	RC Amaze	NA	39.9	25-Jun	31.7	11.2	56.5	0.28	90.0	69.0	0.26
Johannesburg	**Average**	**NA**	**41.5**	**28-Jun**	**29.3**	**11.2**	**58.1**	**0.28**	**91.0**	**70.3**	**0.27**
Hickory Corners	Rushmore	87.7	33.0	NA	NA	12.9	59.5	0.13	84.7	42.7	0.29
Hickory Corners	AAC Basil	89.4	29.8	NA	NA	12.5	72.3	0.10	78.3	79.0	0.52
Hickory Corners	AAC Reid	72.4	30.6	NA	NA	13.7	80.9	0.16	76.3	91.3	0.38
Hickory Corners	RC Amaze	94.2	30.2	NA	NA	12.3	66.9	0.05	89.0	87.7	0.40
Hickory Corners	**Average**	**85.9**	**30.9**	**NA**	**NA**	**12.9**	**69.9**	**0.11**	**82.1**	**75.2**	**0.40**
Average	**Rushmore**	**97.0** a	**36.7** a	**07-Jul** b	**35.0** a	**12.1** ab	**66.6** a	**0.4** a	**90.8** a	**59.3** b	**0.26**
Average	**AAC Basil**	**89.1** a	**34.4** c	**07-Jul** b	**30.9** b	**11.9** b	**70.7** a	**0.3** a	**84.6** b	**79.0** ab	**0.37**
Average	**AAC Reid**	**90.8** a	**35.8** ab	**11-Jul** a	**34.2** ab	**12.8** a	**74.8** a	**0.3** a	**86.8** ab	**89.9** a	**0.35**
Average	**RC Amaze**	**96.0** a	**34.6** bc	**01-Jul** c	**31.0** b	**12.0** b	**72.7** a	**0.3** a	**90.9** a	**83.9** a	**0.30**
	Mean	**93.2**	**35.4**	**7-Jul**	**32.8**	**12.2**	**71.2**	**0.30**	**88.3**	**78.0**	**0.32**
	P-Value	**0.39**	**<0.001****	**<0.001****	**0.01***	**0.025***	**0.075**	**0.42**	**0.019***	**0.0016****	**NA**

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