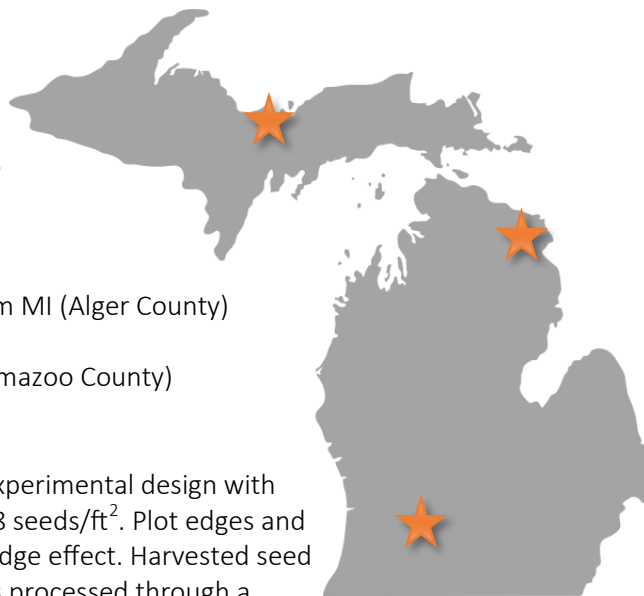


2017 Michigan State University Spring Malting Barley Variety Trials

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With support from: MSU AgBioResearch, MSU Extension, the Brewers Association, and the Hardies Farm

This report outlines the data and results from Michigan State University's involvement in the Eastern Spring Barley Nursery (ESBN), led by North Dakota State University and funded by the Brewers Association. This multi-state collaborative effort facilitates simultaneous testing of spring malting barley varieties.



ESBN Locations

1. MSU Upper Peninsula Research and Extension Center, Chatham MI (Alger County)
2. Hardies Farm, Hillman, MI (Alpena County)
3. MSU W.K. Kellogg Biological Station, Hickory Corners, MI (Kalamazoo County)

Protocol

Twenty-five barley varieties were laid out in a rectangular lattice experimental design with three replications. All varieties were planted at a seeding rate of 28 seeds/ft². Plot edges and alleys were cut out before harvest for the purpose of eliminating edge effect. Harvested seed was cleaned in an A.T. Ferrell Eclipse fanning mill and the seed was processed through a Dickey-John GAC 2500 for test weight and grain moisture percentage. Yield was corrected for 13% moisture, and test weight was recorded in pounds per bushel. Seed was submitted for grain quality and malt analysis to the testing laboratory at North Dakota State University. Malt analysis was not performed on samples from Hillman due to the high incidence of pre-harvest sprout. Agronomic details and weather information for the plots are outlined in Table 1.

Table 1. Plot information and weather data for each trial location

	Chatham (UPREC)	Hillman (Hardies Farm)	Hickory Corners (KBS)
Soil Type	Eben Very cobbly sandy loam	Omena Fine sandy loam	Kalamazoo Loam
Previous Crop	Soybeans	Soybeans	Soybeans
Planting Date	May 10	May 15	April 18
Fertility applied	50 lbs N/ac	50 lbs N/ac	50 lbs N, 100 lbs P, 50 lbs K, 12 lbs S /ac
Herbicide applied	13.5 ozs/ac Huskie	13.5 ozs/ac Huskie	12 ozs Huskie + 16.4 ozs Axial /ac
Fungicide applied	8.2 ozs/ac Prosaro	8.2 ozs/ac Prosaro	8.2 ozs/ac Prosaro
Insecticide applied	NA	NA	2.32 ozs/ac Grizzly Z
Harvest date	August 21	August 31	July 26
Precipitation ¹ (average)	12.63 (7.99)	8.39 (8.24, Hawks Station)	7.16 (10.7)
GDD ² (average)	1008 (1093)	1175 (1264)	1758 (1738)

¹Precipitation (inches) May through July, with 6-year rainfall average

²Growing degree days (Base level 50° since 1/1/16) through July, with 6-year GDD average from 1/1-7/31

Selecting a variety

The malting barley industry in Michigan is still quite immature, leading to very few readily available varieties within the state. Collaborative research and Extension programs, such as the ESNB, have helped inform researchers at MSU, and have also led to varietal recommendations to in-state certified seed growers. Careful consideration must be made when selecting varieties, and one should not purchase a variety simply because “it’s what’s available”. Keep in mind, craft brewers prefer 2-row varieties that have been bred specifically for malting. Maltsters, a barley grower’s direct market, will prefer grain with 10-12% protein that has plump kernels and uniform germination with no evidence of sprout or DON.

Manage quality over quantity!

Seed Sources

[Michigan Crop Improvement Association](http://www.michcrop.com)

www.michcrop.com

(includes C3 Seeds &

Schmidt Farms of Auburn)

[Limagrain Cereal Seeds](http://www.limagraincerealseeds.com/products/barley)

www.limagraincerealseeds.com/products/barley

[Seedway](http://www.seedway.com/product-farm-seed/small-grains)

www.seedway.com/product-farm-seed/small-grains

[Albert Lea Seed](http://www.alseed.com)

www.alseed.com

Findings from the Field

Dr. Rich Horsley, North Dakota State University barley breeder since 1988, provides oversight and guidance across the entire ESNB project. He shares his observations on varietal performance specific to the eastern states, which market primarily to the craft beer industry.

2017 Agronomic Performance, and Barley and Malt Quality

Entries in the 2017 ESNB included 20 named varieties and five experimental lines from the NDSU breeding program. The named varieties included two from Canada, five from the U.S., four from France, and eight from Germany. The experimental NDSU lines were selected because of their moderate resistance to pre-harvest sprouting (PHS). In general, the varieties from Europe show some promise because of their superior resistance to PHS as compared to the two-rowed Canadian varieties AAC Synergy and Newdale; and the two-rowed NDSU varieties Conlon, Pinnacle, and ND Genesis. In general, the yield of the varieties developed in Europe varieties is competitive with the varieties developed in North America. The experimental lines 2ND33757 and 2ND33760 had yields comparable to AAC Synergy and ND Genesis.

As in previous years, a wide variation in resistance to PHS resistance was observed. Damage due to PHS is determined using the stirring number obtained from the Rapid Visco-Analyzer (RVA). Stirring number values less than 120 indicate that there is damage due to PHS. Resistance to PHS is going to be a major criterion on deciding which varieties to recommend for planting in the eastern U.S. Varieties with the best PHS resistance included the European varieties LCS Genie, KWS Fantex, Manta, and Acorn; and the six-rowed varieties Tradition and Quest. The varieties showing the most damage due to PHS included AAC Synergy, Conlon, ND Genesis, KWS Tinka, Bettina, and Newdale.

In general, the malt quality of the European varieties was superior to that of the six-rowed varieties, NDSU varieties, and experimental lines. The European varieties typically had higher malt extract and friability, and lower wort β -glucan levels. Varieties showing promising malt quality included Sangria, Esma, and Bettina. However, Esma and Bettina also had greater damage to the barley due to PHS.



Table 2. Agronomic, grain quality, and malt analysis data for Chatham, MI

Variety	Type (Row)	Heading Date	Test weight (lbs/bu)	Height (cm)	Yield (Bu/ac)	DON	Protein	RVA	% Plump	Friability (%)	Malt Extract (%)	Wort Protein	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	FAN (ppm)
2ND28065	2	7/15/2017	53	55.6	70.3	0.15	10.2	192	90.7	76.2	82.1	4.51	44.3	83	55.1	428	212
2ND33710	2	7/8/2017	52	46.0	61.6	0.00	10.0	151	91.7	79.5	82.6	4.06	40.5	103	56.8	302	186
2ND33757	2	7/12/2017	52	45.6	69.6	0.35	9.4	172	93.6	79.6	83.0	4.20	44.9	88	60.0	262	200
2ND33760	2	7/12/2017	52	47.2	69.8	0.00	9.4	176	95.2	79.8	83.2	4.37	46.5	88	61.3	378	200
2ND33821	2	7/13/2017	49	59.3	75.1	0.21	10.0	46	98.5	65.1	81.7	4.00	40.2	70	48.1	575	183
AAC Synergy	2	7/15/2017	50	63.3	51.3	0.00	9.7	84	96.8	86.2	82.8	4.81	49.4	91	77.6	275	223
Acorn	2	7/20/2017	49	54.4	55.3	0.30	9.1	172	95.7	87.5	84.1	3.94	43.3	65	49.8	390	188
Bettina	2	7/20/2017	50	51.0	55.1	0.07	9.4	130	95.7	91.0	83.3	4.37	46.6	88	61.8	235	201
Conlon	2	7/6/2017	52	55.8	58.4	0.17	10.3	155	98.1	71.5	82.1	4.20	40.9	90	66.9	587	200
Esma	2	7/18/2017	51	54.7	69.1	0.20	9.4	155	95.6	92.5	83.3	4.26	45.3	85	54.6	175	198
Explorer	2	7/18/2017	50	57.7	72.2	0.09	9.2	146	95.5	94.1	82.1	3.97	43.1	76	60.6	150	192
KWS Beckie	2	7/20/2017	49	48.1	72.6	0.52	9.0	175	96.4	88.1	82.9	3.95	43.6	65	49.6	371	196
KWS Fantex	2	7/20/2017	50	51.5	75.2	0.24	9.1	188	94.9	83.1	83.7	4.23	46.7	69	54.2	537	206
KWS Josie	2	7/20/2017	50	57.4	63.0	0.07	8.9	179	95.8	86.3	82.9	3.80	42.7	68	53.2	458	191
KWS Tinka	2	7/19/2017	49	56.7	73.9	0.25	9.2	145	95.4	84.6	82.9	4.23	45.8	77	54.2	505	205
LCS Genie	2	7/20/2017	50	53.0	72.2	0.39	9.3	185	94.8	78.3	83.6	4.31	46.2	78	50.8	396	205
LCS Odyssey	2	7/20/2017	46	44.0	57.2	0.20	8.8	176	95.4	85.0	83.8	4.07	46.2	72	52.2	382	201
Manta	2	7/19/2017	50	59.5	68.5	0.43	10.0	121	96.1	78.9	81.9	4.32	43.3	92	65.1	458	192
ND Genesis	2	7/14/2017	52	49.8	68.3	0.11	9.4	189	92.4	83.9	83.6	4.08	43.2	73	50.6	398	198
Newdale	2	7/17/2017	50	60.6	63.9	0.00	10.5	165	89.4	77.4	81.3	4.49	42.6	102	73.2	366	215
Pinnacle	2	7/13/2017	49	52.5	67.2	0.14	10.1	157	82.2	67.2	80.8	4.55	45.1	81	50.4	579	196
Quest	6	7/8/2017	51	56.4	72.3	0.28	11.2	173	90.6	77.9	80.8	4.70	42.1	117	60.9	467	221
Sangria	2	7/18/2017	51	45.8	59.7	0.49	10.3	116	90.8	79.4	82.3	4.34	42.1	84	52.0	316	203
Sirish	2	7/18/2017	50	56.3	61.6	0.45	9.7	186	96.1	86.9	82.8	4.10	42.2	84	54.6	285	204
Tradition	6	7/6/2017	51	47.2	46.8	0.14	11.0	134	95.2	76.6	81.1	4.63	42.1	127	59.0	473	210

Table 3. Agronomic and grain quality data for Hillman, MI (no malt analysis due to quality)

Variety	Type (Row)	Heading Date	Test weight (lbs/bu)	Height (cm)	Yield (Bu/ac)	DON	Protein	RVA	% Plump
2ND28065	2	7/5/2017	47.3	82.6	94.7	0.0	11.9	5	92.2
2ND33710	2	7/10/2017	46.7	68.6	105.8	0.1	12.7	6	80.4
2ND33757	2	7/18/2017	47.2	66.0	82.3	0.0	12.5	71	88.9
2ND33760	2	7/17/2017	48.2	77.9	85.2	0.2	10.7	18	96.9
2ND33821	2	7/12/2017	42.4	73.2	36.9	0.1	12.2	39	70.1
AAC Synergy	2	7/13/2017	47.0	77.9	97.7	0.0	12.4	139	85.0
Acorn	2	7/11/2017	48.3	86.8	98.0	0.0	13.2	187	84.2
Bettina	2	7/11/2017	48.6	59.3	69.0	0.0	13.5	146	88.4
Conlon	2	7/14/2017	43.3	55.0	85.6	0.0	11.5	166	77.2
Esma	2	7/10/2017	49.9	78.7	106.1	0.0	12.0	60	89.9
Explorer	2	7/14/2017	47.7	61.8	83.3	0.1	12.3	80	88.6
KWS Beckie	2	7/11/2017	45.4	53.3	81.2	0.0	11.9	117	80.6
KWS Fantex	2	7/13/2017	47.9	61.4	86.8	0.0	11.8	177	94.1
KWS Josie	2	7/11/2017	47.3	59.7	102.7	0.0	11.4	178	90.8
KWS Tinka	2	7/14/2017	46.4	53.3	105.6	0.0	11.4	178	94.4
LCS Genie	2	7/15/2017	46.8	60.5	106.6	0.0	12.5	156	78.6
LCS Odyssey	2	7/13/2017	47.0	58.4	78.2	0.1	11.9	101	84.3
Manta	2	7/11/2017	46.7	58.8	103.5	0.1	11.8	53	89.9
ND Genesis	2	7/12/2017	46.7	67.7	94.7	0.0	12.2	70	93.0
Newdale	2	7/7/2017	47.2	58.8	110.1	0.0	11.4	134	92.0
Pinnacle	2	7/9/2017	47.1	73.7	76.1	0.0	11.9	42	87.4
Quest	6	7/13/2017	49.3	78.3	101.1	0.0	12.4	117	89.8
Sangria	2	7/13/2017	50.0	73.7	96.3	0.0	11.3	75	93.3
Sirish	2	7/12/2017	48.9	77.5	109.4	0.0	12.1	43	90.2
Tradition	6	7/10/2017	46.7	85.1	83.1	0.2	11.6	43	95.8



Table 4. Agronomic, grain quality, and malt analysis data for Hickory Corners, MI

Variety	Type (Row)	Heading Date	Test weight (lbs/bu)	Height (cm)	Yield (Bu/ac)	DON	Protein	RVA	% Plump	Friability (%)	Malt Extract (%)	Wort Protein	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	FAN (ppm)
2ND28065	2	6/17/2017	47.8	59.1	55.9	0.00	11.8	113	93.1	84.40	81.2	5.42	45.9	122	82.9	115	251
2ND33710	2	6/16/2017	48.0	59.1	47.8	0.00	13.4	146	83.7	78.78	79.5	6.04	45.0	146	83.1	86	252
2ND33757	2	6/18/2017	48.8	63.4	60.6	0.00	11.6	162	95.3	72.04	80.1	4.63	40.0	110	67.5	321	187
2ND33760	2	6/16/2017	49.0	61.0	60.3	0.00	10.8	105	95.5	84.22	81.7	4.89	45.1	91	69.6	205	196
2ND33821	2	6/17/2017	47.1	58.3	38.2	0.00	10.9	185	93.2	78.86	81.0	4.85	44.6	86	79.3	255	191
AAC Synergy	2	6/26/2017	45.7	59.7	38.6	0.00	11.0	168	71.6	76.42	79.8	4.71	42.9	137	65.2	196	209
Acorn	2	6/27/2017	47.7	60.3	36.9	0.01	12.3	206	76.8	76.32	80.2	5.15	42.0	135	69.3	219	239
Bettina	2	6/26/2017	49.0	57.4	55.1	0.00	13.0	191	96.8	79.94	81.0	5.48	42.2	147	62.1	76	232
Conlon	2	6/16/2017	49.4	60.2	56.5	0.00	11.5	188	96.9	86.70	81.7	4.77	41.4	100	80.9	121	202
Esma	2	6/18/2017	48.5	59.7	47.5	0.00	10.5	170	77.3	82.56	81.1	4.62	44.0	88	80.6	143	189
Explorer	2	6/22/2017	50.1	58.2	66.8	0.00	11.0	173	98.7	91.60	81.4	4.94	44.8	114	61.6	40	227
KWS Beckie	2	6/26/2017	49.7	57.0	84.5	0.00	11.1	176	95.2	91.68	80.7	4.70	42.4	105	76.6	19	222
KWS Fantex	2	6/23/2017	49.7	56.6	68.7	0.00	11.5	185	98.9	85.28	82.4	4.36	37.8	101	61.5	135	196
KWS Josie	2	6/25/2017	48.4	50.5	70.7	0.09	11.7	186	96.9	85.60	81.3	4.64	39.6	115	55.3	153	213
KWS Tinka	2	6/26/2017	47.1	51.7	76.4	0.00	10.8	163	98.4	91.36	82.0	4.09	37.9	108	50.6	77	181
LCS Genie	2	6/27/2017	50.2	55.7	62.2	0.14	12.3	178	95.9	80.08	81.5	4.74	38.5	107	55.5	95	219
LCS Odyssey	2	6/26/2017	50.5	62.0	82.0	0.00	11.9	158	96.4	87.98	81.0	5.11	42.9	126	46.5	26	247
Manta	2	6/23/2017	50.2	61.5	80.3	0.00	11.0	162	92.3	90.20	81.8	5.47	49.6	116	62.1	18	266
ND Genesis	2	6/17/2017	48.3	60.3	54.6	0.00	13.0	157	96.5	75.40	79.9	5.86	45.0	113	63.4	105	269
Newdale	2	6/26/2017	51.3	51.8	73.9	0.05	12.4	187	98.7	77.34	80.9	4.53	36.6	108	63.0	114	206
Pinnacle	2	6/16/2017	49.0	61.9	58.3	0.00	12.4	148	96.4	85.84	80.6	5.37	43.3	116	69.7	50	230
Quest	6	6/17/2017	48.2	60.5	52.0	0.00	10.7	195	86.3	83.30	81.7	4.30	40.2	107	73.6	128	196
Sangria	2	6/18/2017	50.6	61.4	62.2	0.00	10.3	170	94.3	83.64	82.6	4.32	41.7	78	64.6	120	204
Sirish	2	6/27/2017	50.3	58.5	61.9	0.11	11.1	179	94.6	83.80	82.1	4.53	40.8	96	57.4	128	212
Tradition	6	6/17/2017	45.8	58.3	48.8	0.00	10.6	166	92.0	82.26	81.4	4.42	41.9	78	66.1	166	206



The MSU Malting Barley Research Team would like to thank you for your support!



Michigan State University Malting Barley Research Program

Upper Peninsula Research and Extension Center
 Research and resources can be found at: msue.anr.msu.edu/topic/info/malting_barley