THE BASICS OF WINTER BARLEY IN MICHIGAN

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Trials featuring winter malting barley varieties and management practices were initiated at Michigan State University in 2016, both at the W.K. Kellogg Biological Station in SW Michigan and on farms in the Saginaw Valley region. Objectives include optimizing yield while also meeting quality parameters for malting. Although more years of research are needed, winter barley has produced high yields of malting quality barley at both locations. This report summarizes the data and observations made from these trials through June, 2018.

Figure 1. A field of winter barley approaching maturity

Barley is part of Michigan's agricultural history. Production peaked at just over 300,000 acres harvest in 1919 and again in 1932. As with other cereal grains, barley is suited to Michigan's climate.

Key Observations for Winter Barley Management

1. Deep planting >1.5" has resulted in poor emergence. Seeds should be planted 1" deep at 1.0—1.4 million seeds per acre
2. Nitrogen fertilizer applied at 75-100 lbs/A at green-up in spring optimized yield without increasing grain protein above the threshold, which should be between 10-12%.
3. Sulfur and split / late applied nitrogen did not improve yields but split nitrogen applications did increase grain protein
4. Fungicide at flowering increased yield (and can protect against *Fusarium* infection)
5. Early planting (last two weeks of September) is advised, but we are still learning about effects of planting date
6. Varieties did not respond to nitrogen applications the same, in terms of yield and grain protein content
7. Barley should be harvested ASAP after grain moisture reaches 13.5% or below to avoid preharvest sprout. Drying grain is possible with low temperature (<100°F) systems

2017 Winter Barley Management Trial Data

Variety	N Rate (lb/A)	Prosaro® Fungicide	Yield	% plump	% thin	% Crude Protein	RVA (Stirring Number)
Puffin	0	Yes	70.3	92.7	0.8	8.8	146
Puffin	0	No	57.2	91.9	0.6	8.9	150
Scala	0	Yes	66.9	97.8	0.5	8.6	160
Scala	0	No	59.5	98.2	0.5	8.7	157
Tepee	0	Yes	67.1	96.6	0.1	8.1	135
Tepee	0	No	53.9	95.7	0.1	8.2	139
Wintmalt	0	Yes	60.8	98.1	0.2	8.8	146
Wintmalt	0	No	51.0	98.3	0.2	9.1	139
Puffin	75	Yes	96.8	90.3	1.1	10.4	160
Puffin	75	No	89.7	90.3	1.2	10.3	161
Scala	75	Yes	93.8	97.7	0.3	10.3	178
Scala	75	No	84.9	97.5	0.5	10.0	157
Tepee	75	Yes	107.5	93.3	0.3	9.3	156
Tepee	75	No	93.5	92.6	0.5	9.5	148
Wintmalt	75	Yes	81.4	95.4	0.4	10.3	166
Wintmalt	75	No	81.4	94.6	0.5	10.3	161
Puffin	150	Yes	92.7	85.6	2.0	13.0	161
Puffin	150	No	93.2	88.9	1.6	13.2	160
Scala	150	Yes	107.5	95.3	0.6	11.8	182
Scala	150	No	94.5	96.3	0.4	11.9	181
Tepee	150	Yes	115.5	86.3	1.0	12.1	174
Tepee	150	No	104.6	91.0	0.7	11.6	177
Wintmalt	150	Yes	91.6	91.3	1.0	12.8	168
Wintmalt	150	No	80.5	91.7	0.8	12.5	166

The data table to the left represents yield and quality data from the 2017 winter barley management study at the W.K. Kellogg Biological Station.

Four varieties were fertilized with three different nitrogen rates. Plots were also split with a fungicide application (Prosaro) at flowering.

Dark green highlighted cells indicate optimum yields / quality scores while **light green** cells indicate tolerable and **red** indicates unacceptable (based on the guidelines outlined by the American Malting Barley Association).

Big Takeaways from 2017 Trial Data

1. Scala & Tepee responded better to high nitrogen rates than Puffin & Wintmalt, as exhibited by increased yields and suitable crude protein (CP).
2. Fungicide application improved yields across all four varieties without affecting grain quality.
3. Scala retained a high percentage of plump kernels across all treatments.

The picture above represents the different varieties of winter barley that were planted at the Kellogg Farm for 2018.

Next steps for 2018 Research Trials

Two varieties ('Puffin' and 'Scala') over three different planting dates (Mid Sept., Early Oct., Late Oct.)

Comparing seven nitrogen rates from 0-175 lbs N/A using the variety 'Puffin'

Evaluation of double crops after winter barley, including soybeans, sorghum sudan and cover crop mixtures with and without irrigation

2017 Winter Barley Management Malt Quality Data

Variety	Nitrogen Rate (Lbs/A)	Fungicide	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Wort Clarity	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (˚ASBC)	Alpha-amylase (20˚DU)	Beta-glucan (ppm)	FAN (ppm)
Puffin	0	Yes	37.7	95.1	36	81.4	1.9	1	9.0	4.23	52.2	86	50.2	51	150
Puffin	0	No	37.5	95.2	28	81.3	1.8	1	8.9	4.28	50.4	82	49.7	45	146
Scala	0	Yes	44.4	98.2	41	82.3	n.d.	3	8.9	4.16	47.0	106	51.9	30	135
Scala	0	No	44.1	98.5	29	81.7	n.d.	3	9.2	4.11	48.5	106	51.9	17	132
Teepee	0	Yes	39.6	97.4	35	81.9	2.2	1	8.7	4.22	52.1	104	48.8	22	162
Teepee	0	No	40.3	97.1	25	81.5	2.2	1	8.3	4.18	51.5	100	46.7	20	145
Wintmalt	0	Yes	38.8	98.3	45	79.9	n.d.	3	9.1	4.03	46.0	82	49.2	23	129
Wintmalt	0	No	39.5	98.5	34	79.6	3.1	2	9.5	4.02	46.0	84	51.1	13	132
Puffin	75	Yes	36.0	93.4	29	80.0	1.8	1	10.1	4.45	45.7	91	45.6	201	151
Puffin	75	No	35.2	92.6	21	79.4	1.6	1	10.5	4.41	45.0	89	48.2	131	154
Scala	75	Yes	43.0	98.1	27	81.2	n.d.	3	10.4	4.29	44.1	111	52.3	52	139
Scala	75	No	42.5	97.9	21	80.7	n.d.	3	10.7	4.22	42.0	110	52.7	32	138
Teepee	75	Yes	40.0	94.6	20	81.6	2.1	1	10.0	4.47	48.2	118	50.2	23	163
Teepee	75	No	39.3	94.4	14	81.1	1.9	1	9.6	4.44	47.3	113	50.3	24	163
Wintmalt	75	Yes	38.2	95.7	27	79.0	3.3	2	10.8	4.28	42.6	91	51.2	34	138
Wintmalt	75	No	39.1	95.0	31	78.4	n.d.	3	11.1	4.12	38.9	93	58.7	44	141
Puffin	150	Yes	36.5	90.4	20	78.1	1.8	1	13.2	4.82	37.9	92	42.3	319	166
Puffin	150	No	35.6	92.3	13	77.7	1.8	1	13.5	4.79	36.8	95	45.9	229	163
Scala	150	Yes	41.7	96.3	21	79.2	1.9	1	13.0	4.70	36.5	122	58.5	133	162
Scala	150	No	40.8	96.2	14	79.2	1.8	1	12.5	4.64	38.0	120	59.6	70	161
Teepee	150	Yes	36.7	89.7	16	79.5	2.0	1	12.1	4.85	41.7	122	50.5	72	187
Teepee	150	No	38.2	92.8	9	79.9	1.8	1	11.9	4.88	41.3	124	54.6	28	186
Wintmalt	150	Yes	37.1	92.0	31	76.8	n.d.	3	13.6	4.41	32.7	101	60.4	126	161
Wintmalt	150	No	36.0	91.4	28	75.8	2.4	2	13.2	4.66	34.9	98	65.5	105	183
CONRAD MALT CHECK			40.7	97.4	55	81.6	2.6	1	12.3	5.04	42.1	126	92.0	151	216
CONRAD MALT CHECK			40.2	97.0	56	81.6	2.6	1	12.7	5.27	43.2	121	89.8	198	224
CONRAD MALT CHECK			40.9	97.4	55	81.8	2.5	1	12.8	5.49	44.8	117	92.1	229	223