Upper Peninsula Research and Extension Center

Spring Malting Barley Production

Presented by:
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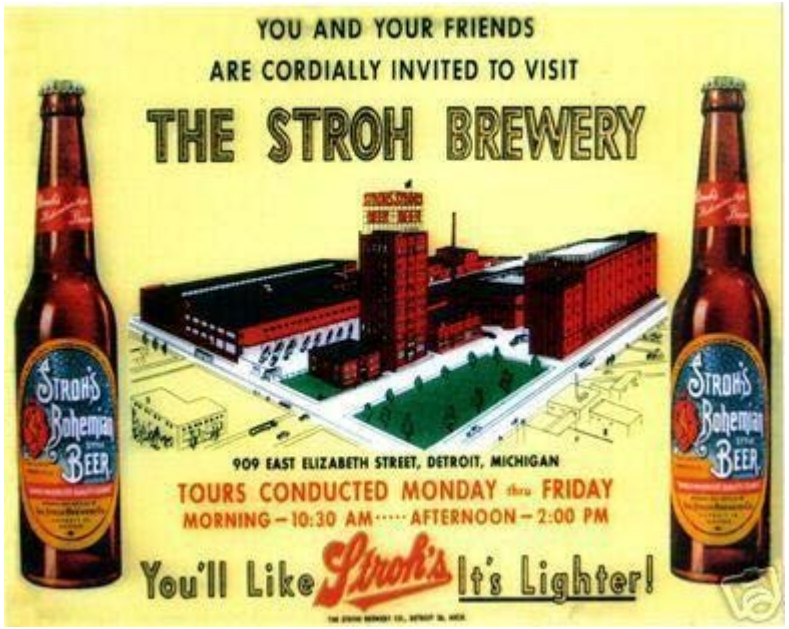
What is Barley?

- **The soul of beer!**
- Barley malt gives color, flavor, and body

State History

- Michigan once large scale producer/end user of barley
- 1985 = 55,000 acres in state
- 2014 = 8,000 total acres
- Of that, less than 500 acres grown for malt



Challenges

- Barley easy crop to grow, hard crop to achieve quality
- Many quality parameters
- Management important!
- Climate

Big Three

- Crude protein-tied to Nitrogen
- DON level-result of *Fusarium* head blight
- Pre harvest sprout-excessive rainfall

Spring Barley types

Two row

- Higher extract, lower protein
- Regarded as higher in quality
- Standard in U.K. and Europe
- Sweeter flavor?

Six row

- Lower extract, higher protein
- Higher diastatic power, well suited for adjuncts
- Better adapted to MI climate?

Flavor

- Is it important?
- Is it variety specific?
- Or a combination of genetics, management and climate?
- Terroir
- What role does malting and brewing play?

First step

- Secure a market!
- Work closely with malthouse, also livestock producer
- Why livestock?

Variety selection

- Refer to UPREC variety trial data
- Consult with malthouse, craft brewer
- 2 row vs 6 row?
- Spread your risk

Field selection

- Prefers well drained soils-sandy loam, silt loam, clay loam
- Soil pH range from 6 to 8
- Low tolerance of acidic soils

Crop rotations

- Well planned crop rotation important
- Continuous small grain production is BAD
- Why? Leads to higher incidence of disease and insects
- Barley following legume best

- Barley grown after corn can lead to an increase of FHB

Planting

- Plant as soon as soil conditions allow
- Early planting leads to higher yields and lower crude protein
- Plant 1 to 1.5 inches deep.
- 96 lbs. /acre (2 bushels)

Soil Fertility

- Don't guess soil test!
- Number 1 question- How much N?
- Based on yield goal, previous crop grown
- Goal is high quality barley, not world record yield
- Be conservative

Phosphorous/Potassium

- P and K amounts are based on soil test and yield goal.

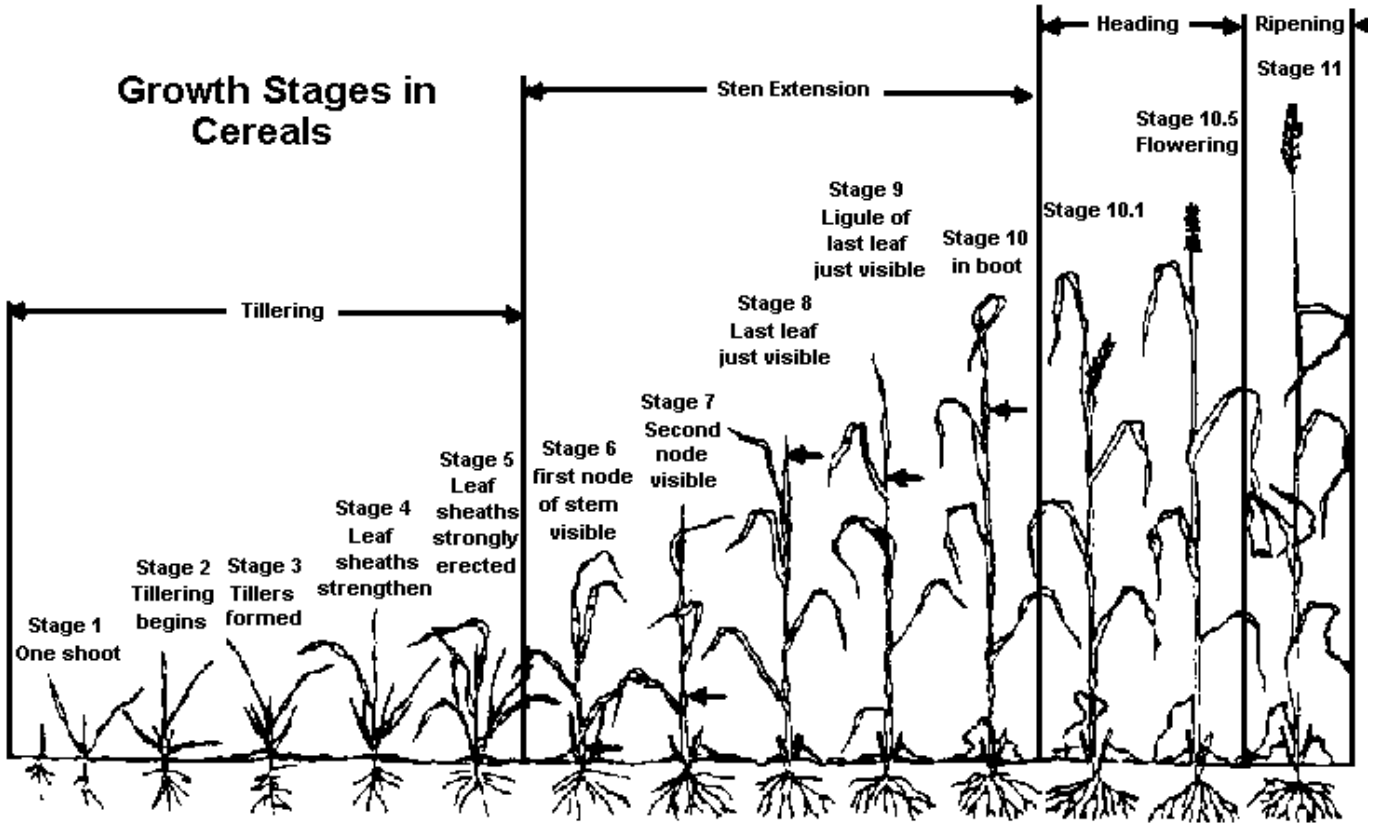
Potassium rec (lbs. K_2O/acre)

Soil test (ppm)	60 bu/ac YG
0-40	47
41-80	26
81-120	5
121-160	0

Phosphorus rec (lbs. P_2O_5/acre)

Soil test (ppm)	60 bu/ac YG
0-5	28
6-10	20
11-15	12
16-20	4

Feekes Stages



Weed Control

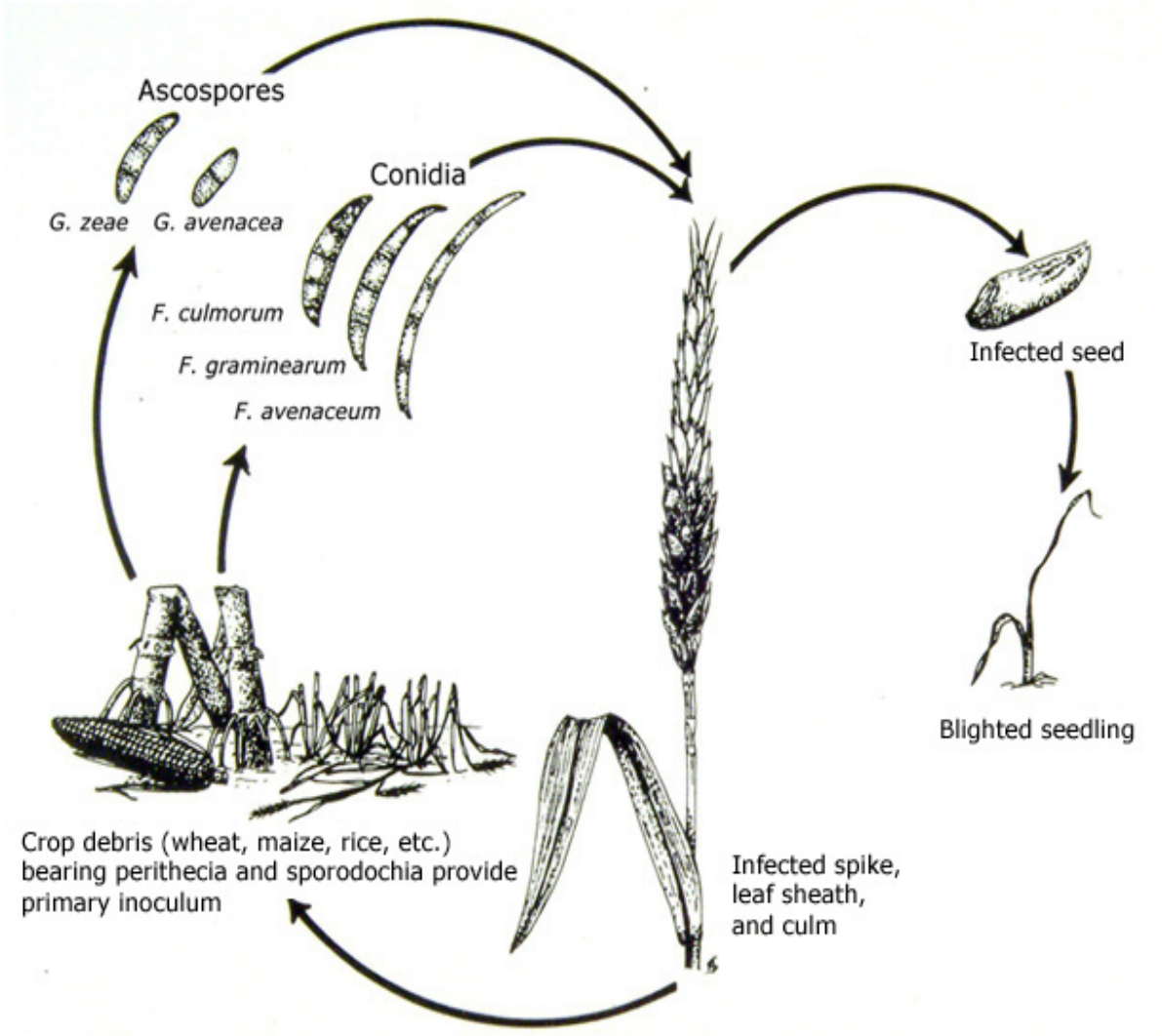
- **Read the label**
- Annual grass-Axial XL, Puma
- Broadleaves-Huskie, 2-4D Amine, MCPA, Buctril
- Growth stage of Barley is important

Insects

- Cereal leaf beetle main insect pest
- Threshold is 3 larva/stem before boot stage
- After boot stage, 1 larva/flag leaf
- Always protect the flag leaf!! Factory for grain fill

Disease

- Most severe disease is *Fusarium* head blight (FHB)
- Fungal disease that infects kernels
- Develops mycotoxins (DON)
- Levels over 1 ppm lead to rejection
- Favorable environment 75^0 to 85^0 F
- Spores carried by wind or splashed by rain


Ascospores
G. zeae
G. avenacea
Conidia
F. culmorum
F. graminearum
F. avenaceum
Infected seed
Blighted seedling
Crop debris (wheat, maize, rice, etc.) bearing perithecia and sporodochia provide primary inoculum
Infected spike, leaf sheath, and culm

FHB Control – UPREC Fungicide Trial

- Fungicide application-apply at Feekes Stage 10.5
- Crop rotation
- Burying infected residue through tillage

Fungicide and amount applied	DON Level (ppm)	Yield (bushels/acre)
Control (No fungicide applied)	1.05	47.2
Prosaro- 8.2 oz/ac,	0.66	60.5
Caramba- 14 oz/ac,	0.79	55.4

Harvesting

- Target moisture, 13.5%
- Barley harvested above 13.5 % has to be dried
- Can be harvested at 18% but watch for kernel damage, slow both reel and ground speed
- Dry with cool aeration or low heat (100^0 F maximum)

Harvesting

- Beard removal can be challenging
- Watch out for skinned and broken kernels
- Slow cylinder speeds, adjust concave

Spring Barley

Location: Presque Isle County

# of Varieties: 23

Planting date: May 7, 2014

Seeding rate: 96 lbs./acre

Fertility: 108 lbs./acre was applied at planting (46-0-0)

Herbicide: Huskie was applied to control annual weeds at a rate of 11 oz./acre

Fungicide: Prosaro was applied at heading at a rate of 8.2 oz./acre to control Fusarium head blight

Harvested: August 28, 2014

Variety	Moisture (%)	Test wt (lbs/bu)	Ht (in)	Bu/acre	Relative Maturity	Type	Origin
2B05-0811	15.5	51.4	20.5	88.2	Medium	2 row	Experimental
2B09-3425	15.2	50.7	17.5	88.7	Medium	2 row	Experimental
2ND25276	15.5	51.9	20.9	91.6	Medium	2 row	Experimental
ABI Voyager	15.6	51.9	19.6	82.9	Late	2 row	BARI
AC Metcalfe	15.4	52.2	20.3	83.9	Medium	2 row	Can
Celebration	15.1	50.8	20.0	66.8	Early	6 row	BARI
Conlon	15.0	52.7	20.6	70.0	Early	2 row	ND
Conrad	15.2	52.2	22.0	83.5	Late	2 row	BARI
Innovation	15.1	51.0	22.1	75.0	Early	6 row	BARI
Lacey	15.1	51.5	22.4	76.7	Early	6 row	MN
LCS Genie	15.0	52.9	18.0	85.7	Late	2 row	LCS
Legacy	14.9	50.8	21.8	73.8	Early	6 row	BARI
Merit	15.6	51.6	20.2	90.5	Late	2 row	BARI
Merit 57	15.4	51.7	19.2	84.3	Medium	2 row	BARI
NSA 1820	15.3	52.5	19.0	78.5	Late	2 row	LG
Odyssey	15.3	51.7	19.5	93.5	Late	2 row	LG
Overture	14.9	52.6	18.0	90.9	Late	2 row	LG
Pinnacle	15.4	51.1	19.1	77.1	Early	2 row	ND
Quest	15.0	50.8	21.8	81.4	Early	6 row	MN
Rasmusson	15.2	51.6	20.4	83.1	Early	6 row	MN
Robust	15.1	50.9	24.3	69.7	Early	6 row	MN
Stellar ND	15.0	49.3	19.1	76.2	Early	6 row	ND
Tradition	15.0	50.7	22.4	73.5	Early	6 row	BARI

Variety	Moisture (%)	Test wt (lbs/bu)	Ht (in)	Bu/acre	Relative Maturity	Type	Origin
Conlon	15.0	52.7	20.6	70.0	Early	2 row	ND
Odyssey	15.3	51.7	19.5	93.5	Late	2 row	LG
Pinnacle	15.4	51.1	19.1	77.1	Early	2 row	ND
Rasmusson	15.2	51.6	20.4	83.1	Early	6 row	MN
Tradition	15.0	50.7	22.4	73.5	Early	6 row	BARI

Variety	Protein	RVA	GE %	DON	S/T %	DP	Alpha amylase	Beta-glucan (ppm)	FAN (ppm)
2B05-0811	10.7	8.3	89	0.00	48.3	107	82.2	387	287
2B09-3425	11.0	7.4	75	0.01	47.0	124	84.6	136	302
2ND25276	10.5	17.7	96	0.04	42.3	115	76.2	246	223
ABI Voyager	11.3	8.7	81	0.00	51.0	129	80.8	142	315
AC Metcalfe	11.4	7.3	76	0.02	43.7	128	90.4	118	287
Celebration	12.3	81.2	100	0.11	44.0	165	73.3	257	271
Conlon	11.4	92.8	98	0.00	40.1	113	67.8	639	209
Conrad	11.7	7.1	90	0.00	49.4	135	85.9	155	323
Innovation	12.4	85.2	97	0.01	43.0	167	60.9	418	253
Lacey	12.4	102.1	100	0.00	40.7	158	60.6	368	233
LCS Genie	10.4	149.0	97	0.01	39.6	109	51.0	101	194
Legacy	12.2	13.2	96	0.00	47.7	147	73.8	376	289
Merit	10.0	8.0	91	0.00	48.5	103	97.0	163	249
Merit 57	10.8	6.6	87	0.01	49.9	88	103.8	161	273
NSA 1820	10.6	106.1	97	0.01	36.9	88	62.0	83	173
Odyssey	10.1	151.9	99	0.00	38.6	71	54.9	109	167
Overture	10.5	86.2	98	0.01	40.6	74	66.2	163	194
Pinnacle	10.2	116.1	91	0.00	41.7	70	58.1	515	191
Quest	12.4	153.3	98	0.00	43.9	139	67.3	540	234
Rasmusson	12.7	158.8	99	0.00	43.4	142	66.0	341	244
Robust	12.5	62.3	99	0.00	40.8	143	55.2	343	232
Stellar ND	11.9	27.2	96	0.00	42.6	154	64.5	209	229
Tradition	12.6	104.1	96	0.00	41.0	174	66.2	316	223

Variety	Protein	RVA	GE %	DON	S/T %	DP	Alpha amylase	Beta-glucan (ppm)	FAN (ppm)
Conlon	11.4	92.8	98	0.00	40.1	113	67.8	639	209
Odyssey	10.1	151.9	99	0.00	38.6	71	54.9	109	167
Pinnacle	10.2	116.1	91	0.00	41.7	70	58.1	515	191
Rasmusson	12.7	158.8	99	0.00	43.4	142	66.0	341	244
Tradition	12.6	104.1	96	0.00	41.0	174	66.2	316	223

Malting Barley Project

http://agbioresearch.msu.edu/centers/uprc/malting_barley

Thank you!

GLHBC Hop Track RUP Code

53403A02

Private or Commercial CORE

4/10/2015

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2B05-0811	15.1	48.2	30.9	102.6	Medium	2 row	Experimental
2B09-3425	15.2	47.8	27.1	88.9	Medium	2 row	Experimental
2ND25276	15.8	49.0	34.0	109.8	Medium	2 row	Experimental
ABI Voyager	15.7	47.3	33.4	95.1	Late	2 row	BARI
AC Metcalfe	15.2	50.2	33.0	85.2	Medium	2 row	Can
Celebration	14.9	50.8	30.5	124.2	Early	6 row	BARI
Conlon	15.2	51.1	31.0	98.1	Early	2 row	ND
Conrad	15.2	49.6	33.6	106.5	Late	2 row	BARI
Innovation	14.7	50.1	31.3	113.2	Early	6 row	BARI
Lacey	14.7	51.6	31.1	102.6	Early	6 row	MN
LCS Genie	15.4	50.7	25.8	122.9	Late	2 row	LCS
Legacy	14.6	47.5	32.8	115.3	Early	6 row	BARI
Merit	15.4	47.4	32.6	100.3	Late	2 row	BARI
Merit 57	15.7	48.7	32.1	104.9	Medium	2 row	BARI
NSA 1820	15.2	50.6	28.8	97.1	Late	2 row	LG
Odyssey	15.1	49.6	25.1	112.8	Late	2 row	LG
Overture	15.6	47.9	27.5	111.2	Late	2 row	LG
Pinnacle	16.0	48.1	30.5	100.0	Early	2 row	ND
Quest	15.2	50.2	32.3	113.0	Early	6 row	MN
Rasmusson	15.1	50.4	31.3	120.6	Early	6 row	MN
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