

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
MIDWEST AREA
CEREAL CROPS RESEARCH UNIT

**MISSISSIPPI VALLEY REGIONAL SPRING BARLEY NURSERY
2016 Crop**

Malting Quality Data

*Cereal Crops Research Unit Staff

Detailed Data:

Aberdeen, ID
Crookston, ND

Appendix:

Methods
Criteria for Quality Score

These are preliminary data that have not been sufficiently confirmed to justify general release. Confirmed results will be published through established channels. These data are a primarily tool available to cooperators and their official staffs and for those persons who are interested in the development of improved barleys.

These data are furnished by the Agricultural Research Service and by the State Agricultural Experiment Stations. The report is not intended for publication and should not be referred to in literature citations nor quoted in publicity or advertising. Use of the data may be granted for certain purposes upon written request to the agency or agencies involved.

Samples were malted and analyzed by the Cereal Crops Research Unit,
Madison, WI

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Mississippi Valley Spring Barley Nursery - 2016 Crop

Table 2 - Station Means of Barley and Malt Quality Factors for 23 Varieties or Selections*

LOCATION	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha- amylase (20°DU)	Beta- glucan (ppm)	FAN (ppm)
Aberdeen	35.1	82.3	94	79.0	2.1	13.8	4.87	36.8	174	77.3	136	221
Crookston	34.9	82.6	32	80.9	2.7	13.2	5.83	47.1	179	77.1	246	256

* Morex, Robust, Legacy, Lacey, Tradition, ND Genesis, 2ND28065, ND29196, ABI Balster, ABI Growler, SR460, S6M164, S6M166, S6M167, ND31091, 2ND31914, 2ND32184, SR14465, S6M169, S6M170, 2ND32322, 2ND32529, 2ND32829, ND32889, ND32920, ND33325, ND33413, 2B10-4162, and 2B10-4378

Mississippi Valley Spring Barley Nursery - 2016 Crop

Table 3 - Varietal Means of Barley and Malt Quality Factors for Two Stations**

Variety or Selection	Kernel Weight (mg)	on 6/64" (%)	Barley Color (Agtron)	Malt Extract (%)	Wort Color	Barley Protein (%)	Wort Protein (%)	S/T (%)	DP (°ASBC)	Alpha-amylase (20°DU)	Beta-glucan (ppm)	FAN (ppm)
MOREX	30.2	65.4	65	77.9	2.2	14.6	5.55	40.3	213	75.8	176	261
ROBUST	32.6	76.2	60	78.8	2.1	14.2	5.5	39.5	197	64.5	277	259
LEGACY	32.0	78.5	33	78.7	2.1	13.6	5.17	40.5	194	75.6	226	238
LACEY	33.5	80.3	65	80.3	2.0	13.2	5.49	44.6	196	71.9	153	249
TRADITION	30.4	70.9	61	78.3	2.2	13.5	5.22	39.9	211	71.0	202	237
ND Genesis	39.8	89.5	64	80.2	2.2	12.9	5.14	41.9	139	76.9	264	230
2ND28065	38.4	89.1	56	81.3	1.8	13.8	4.98	38.8	130	67.8	340	220
ND29196	31.6	83.6	67	79.0	2.2	14.0	5.35	40.2	201	81.8	223	240
ABI Balster	35.4	79.7	59	81.2	2.7	13.2	5.64	47.0	160	84.6	178	271
ABI Growler	37.8	87.3	60	79.8	2.6	13.5	5.71	45.9	206	91.7	116	238
SR460	30.8	72.5	66	79.4	3.2	13.7	5.50	42.2	142	72.9	188	266
S6M164	32.8	86.3	64	79.2	2.1	14.1	5.44	40.0	218	73.4	185	215
S6M166	31.3	82.1	62	79.4	2.5	14.3	5.32	38.6	192	69.8	191	231
S6M167	32.4	76.9	67	79.4	2.4	14.7	5.68	40.3	204	76.4	187	267
ND31091	31.5	77.9	61	79.0	1.9	12.8	5.17	42.4	203	75.2	65	198
2ND31914	42.7	90.8	58	82.0	2.9	12.0	5.02	43.8	159	66.3	210	206
2ND32184	40.9	90.8	51	80.6	2.1	13.3	5.17	39.7	139	80.9	102	193
SR14465	33.4	85.3	65	80.9	2.6	12.9	5.57	45.4	197	80.1	229	275
S6M169	33.0	83.0	63	78.9	2.7	14.9	5.68	39.9	180	75.6	234	277
S6M170	34.5	90.8	63	79.3	2.2	14.1	5.53	40.6	164	69.3	298	251
2ND32322	42.6	93.6	74	81.4	2.6	13.1	5.38	44.5	156	95.8	273	233
2ND32529	39.0	83.0	66	82.8	2.6	11.6	5.05	46.3	128	81.3	185	212
2ND32829	45.1	91.6	59	81.5	2.4	12.2	5.15	43.9	127	80.1	125	222
ND32889	32.7	79.1	69	78.8	2.2	13.6	5.50	41.8	225	78.8	150	259
ND32920	34.2	87.5	69	79.8	2.2	13.4	5.37	41.7	201	77.1	164	234
ND33325	33.0	88.8	63	80.5	2.3	12.4	4.87	41.9	155	78.2	117	214
ND33413	29.7	66.2	66	79.1	2.4	14.0	5.49	41.0	192	84.3	164	246
2B10-4162	34.1	72.6	64	79.9	2.6	13.7	5.47	43.1	142	75.5	182	239
2B10-4378	36.2	85.8	54	81.1	2.6	14.4	5.39	40.0	167	86.4	128	234

**Aberdeen, ID; Crookston, MN

***n.d.: Sample's clarity reported as hazy, hence the wort color was not defined.

2016 Mississippi Valley Barley Nursery -- Aberdeen, ID

Lab No.	Variety or Selection	Rowed	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)	Relative Viscosity	Turbidity (Hach)
5811	MOREX	6	32.4	71.8	93	78.1	2.2	1	14.9	5.26	37.4	214	74.5	140	258	1.50	3.0
5812	ROBUST	6	32.6	74.2	93	78.3	1.9	1	14.2	5.05	35.7	196	63.3	151	246	1.52	2.8
5813	LEGACY	6	31.8	76.2		78.0	2.0	1	13.2	4.98	40.6	216	82.6	64	244	1.49	2.7
5814	LACEY	6	34.8	83.4	97	78.7	2.0	1	14.2	5.15	38.3	208	72.2	97	249	1.51	3.8
5815	TRADITION	6	30.4	68.1	87	78.5	2.0	1	12.5	4.54	37.1	191	72.4	106	196	1.55	3.9
5816	ND Genesis (2ND25276)	2	38.6	84.4	99	79.8	2.0	1	12.6	4.74	39.2	135	78.8	211	228	1.51	4.0
5817	2ND28065	2	37.7	85.0	89	78.9	1.5	1	14.3	4.44	33.3	116	55.0	302	208	1.54	3.1
5818	ND29196	6	31.8	84.3	99	78.4	1.9	1	14.1	4.94	36.6	201	79.2	104	233	1.53	2.7
5819	2B05-0811 (ABI Balster)	2	35.8	80.8	83	78.9	2.2	1	15.2	4.96	34.2	148	87.3	223	264	1.50	4.2
5820	2B09-3425 (ABI Growler)	2	39.4	90.1	87	77.5	2.0	1	15.0	4.96	34.2	192	90.2	120	194	1.49	5.4
5821	SR460	6	31.2	73.8	99	79.4	2.3	1	13.4	5.10	40.1	148	82.9	94	261	1.54	3.3
5822	S6M164	6	34.4	89.9	96	78.5	1.8	1	14.4	4.90	34.7	224	69.9	101	171	1.53	4.0
5823	S6M166	6	31.7	83.6	96	79.1	2.3	1	14.8	5.21	35.8	214	81.5	122	241	1.52	3.0
5824	S6M167	6	32.7	80.6	99	78.8	2.0	1	14.0	5.06	38.0	187	67.7	185	231	1.53	3.3
5825	ND31091	6	33.8	85.2	92	79.2	1.7	1	12.8	4.79	39.2	169	70.0	56	163	1.52	3.5
5826	2ND31914	2	37.5	83.3	96	79.8	1.9	1	12.0	4.57	39.6	171	76.5	53	209	1.45	3.2
5827	2ND32184	2	40.1	86.4	81	78.0	2.0	1	13.4	4.64	33.5	121	77.7	128	165	1.47	4.6
5829	SR14465	6	34.6	87.1	99	80.8	2.0	1	12.8	4.92	40.6	190	79.0	193	236	1.57	2.7
5831	S6M168	6	33.5	80.7	99	77.3	1.9	1	15.0	4.82	33.8	187	70.6	218	192	1.57	3.3
5832	S6M169	6	33.8	83.2	98	78.7	2.4	1	15.5	5.16	34.6	184	74.2	152	251	1.53	4.3
5833	S6M170	6	34.8	89.4	95	79.7	2.0	1	14.3	5.03	35.6	163	69.1	175	226	1.52	4.0
5834	2ND32322	2	41.7	91.0	93	79.7	2.4	1	14.3	4.97	37.0	143	92.3	181	227	1.49	5.3
5835	2ND32529	2	35.0	68.1	99	79.2	2.5	1	12.4	4.69	38.8	145	79.0	106	215	1.46	4.9
5836	2ND32829	2	43.7	87.9	93	79.4	2.0	1	12.7	4.73	37.5	131	82.1	112	216	1.46	3.2
5837	ND32889	6	33.3	78.8	99	78.7	2.1	1	13.2	5.11	39.6	197	74.6	110	241	1.58	3.3
5838	ND32920	6	35.2	89.9	99	79.6	2.1	1	13.7	5.01	37.1	191	75.1	120	221	1.53	3.8
5839	ND33325	6	33.7	89.5	99	79.8	2.0	1	12.4	4.34	37.2	147	73.9	75	190	1.59	3.9
5840	ND33413	6	31.8	78.2	99	79.4	2.0	1	13.5	4.69	36.6	164	77.9	115	199	1.53	4.8
5841	2B10-4162	2	37.5	81.8	88	78.2	2.0	1	15.1	4.70	32.1	148	84.4	217	208	1.51	3.6
5842	2B10-4378	2	36.5	82.0	79	78.9	2.1	1	14.9	4.70	33.6	193	98.1	136	211	1.47	4.7

2016 Mississippi Valley Barley Nursery -- Aberdeen, ID

Lab No.	Variety or Selection	Kernel Weight Rowed	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)	Relative Viscosity	Turbidity (Hach)	
5828	LACEY MALT CHECK	6	33.2	89.1	45	78.8	3.1	2	13.5	5.34	42.2	146	78.4	38	257	1.45	11.4
5830	CONRAD MALT CHECK	2	39.9	97.6	54	81.0	2.2	1	12.4	4.69	39.1	142	83.1	184	215	1.51	6.4
Minima			30.4	68.1	79	77.3	1.5		12.0	4.34	32.1	116	55.0	53	163	1.45	2.7
Maxima			43.7	91.0	99	80.8	2.5		15.5	5.26	40.6	224	98.1	302	264	1.59	5.4
Means			35.1	82.3	94	78.9	2.0		13.8	4.87	36.7	174	77.1	139	220	1.52	3.7
Standard Deviations			3.2	6.4	6	0.8	0.2		1.0	0.23	2.4	30	8.7	57	28	0.04	0.8
Coefficients of Variation			9.3	7.8	6	1.0	10.0		7.2	4.80	6.5	17	11.3	41	13	2.34	20.6

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by Dr. Gongshe HU, USDA ARS, Aberdeen, ID

Neg Std Dev	25.3	63.2	76	76.6	1.4		10.8	4.17	29.5	84	51.0	-33	137	1.41	1.4
Pos Std Dev	44.8	101.4	112	81.2	2.7		16.8	5.58	43.9	265	103.1	311	303	1.62	6.1

2016 Crookston MVBN

Lab No.	Variety or Selection	Rowed	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)
5900	2B10-4162	2	30.6	63.4	40	81.5	3.1	1	12.2	6.24	54.2	136	66.5	148	270
5901	2B10-4378	2	36.0	89.6	29	83.4	3.2	1	13.8	6.09	46.5	140	74.8	121	258
5902	2ND28065	2	39.1	93.1	22	83.7	2.1	1	13.2	5.53	44.3	144	80.6	378	232
5903	2ND31914	2	47.9	98.2	20	84.3	4.0	3	12.1	5.46	47.9	147	56.2	367	203
5904	2ND32184	2	41.6	95.2	21	83.1	2.2	1	13.1	5.69	45.9	158	84.2	77	222
5905	2ND32322	2	43.5	96.1	54	83.0	2.9	1	11.8	5.79	52.0	168	99.2	365	238
5906	2ND32529	2	43.1	97.9	32	86.3	2.6	1	10.8	5.42	53.8	110	83.6	263	210
5907	2ND32829	2	46.6	95.2	24	83.6	2.8	1	11.8	5.58	50.4	123	78.1	138	227
5908	ABI Balster	2	35.0	78.6	34	83.5	3.1	1	11.3	6.33	59.7	172	81.9	133	277
5909	ABI Growler	2	36.3	84.5	33	82.0	3.1	2	11.9	6.47	57.5	220	93.3	112	282
5910	LACEY	6	32.1	77.2	33	81.9	2.1	1	12.1	5.82	50.9	183	71.6	208	249
5911	LEGACY	6	32.2	80.8	33	79.3	2.2	1	13.9	5.36	40.5	172	68.5	388	232
5912	MOREX	6	27.9	59.0	36	77.6	2.2	1	14.2	5.84	43.2	213	77.0	211	264
5913	ND Genesis	2	40.9	94.5	29	80.7	2.4	1	13.1	5.54	44.7	144	75.0	317	232
5914	ND29196	6	31.5	82.9	34	79.6	2.5	1	13.9	5.76	43.7	202	84.4	342	247
5915	ND31091	6	29.3	70.6	30	78.7	2.0	1	12.8	5.54	45.6	236	80.4	74	233
5916	ND32889	6	32.2	79.3	38	78.8	2.3	1	14.1	5.89	44.0	253	82.9	189	278
5917	ND32920	6	33.2	85.1	38	80.0	2.3	1	13.1	5.73	46.4	211	79.2	207	247
5918	ND33325	6	32.3	88.0	27	81.2	2.7	1	12.3	5.41	46.5	163	82.4	160	238
5919	ND33413	6	27.6	54.2	33	78.8	2.7	1	14.5	6.28	45.4	220	90.6	213	293
5920	ROBUST	6	32.7	78.2	26	79.2	2.3	1	14.2	5.87	43.3	198	65.8	403	273
5921	S6M164	6	31.3	82.6	31	79.9	2.3	1	13.9	5.98	45.3	213	77.0	270	259
5922	S6M166	6	30.8	80.5	28	79.7	2.6	1	13.8	5.43	41.3	170	58.1	259	221
5923	S6M167	6	32.1	73.1	34	80.0	2.8	1	15.4	6.29	42.6	222	85.1	190	302
5925	S6M169	6	32.1	82.7	27	79.1	3.0	1	14.4	6.21	45.2	177	77.1	317	302

2016 Crookston MVBN

Lab No.	Variety or Selection	Rowed	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)
5926	S6M170	6	34.2	92.2	30	79.0	2.4	1	13.9	6.02	45.6	164	69.5	421	276
5927	SR14465	6	32.2	83.4	31	80.9	3.2	1	13.1	6.23	50.1	205	81.2	266	314
5928	SR460	6	30.3	71.2	32	79.4	4.0	1	14.0	5.90	44.3	137	62.8	283	272
5930	TRADITION	6	30.5	73.6	34	78.1	2.4	1	14.5	5.90	42.7	230	69.6	299	278
5931	CONRAD MALT CHECK	2	40.6	97.6	58	81.6	2.5	1	11.9	5.40	48.1	142	77.9	262	241
Minima			27.6	54.2	20	77.6	2.0		10.8	5.36	40.5	110	56.2	74	203
Maxima			47.9	98.2	58	86.3	4.0		15.4	6.47	59.7	253	99.2	421	314
Means			34.9	82.6	32	80.9	2.7		13.2	5.83	47.1	179	77.1	246	256
Standard Deviations			5.5	11.6	8	2.2	0.5		1.1	0.33	4.7	37	9.7	100	29
Coefficients of Variation			15.7	14.0	25	2.7	19.3		8.6	5.59	9.9	21	12.6	41	11

Malt Check Data are Excluded from Rank Sorting and Statistics

Table Data Flagged by an Asterisk Exceed the Mean by +/- 3 Standard Deviations and are Excluded from Statistics

For Wort Clarity - 1 = clear, 2 = slightly hazy, 3 = hazy; Wort Colors were not determined (n.d.) on hazy samples

Samples Submitted by Dr. Kevin Smith, U. of Minnesota

Neg Std Dev	18.4	47.9	8	74.5	1.1	9.8	4.85	33.1	67	48.0	-55	170
Pos Std Dev	51.3	117.4	57	87.4	4.2	16.6	6.81	61.0	291	106.3	547	342

Appendix A:

METHODS

Cleaning All samples were cleaned on a Carter Dockage Tester and only grain between 5 and 7/64" was used.

Barley Mill Ground barley was prepared with a Labconco Burr mill that was adjusted so that only 35% of the grist remained on a 525 µm sieve after 3 min of shaking and tapping.

Kernel Weight The number of kernels in a 20 g aliquot of each sample was counted electronically and the '1000 kernel weight' was calculated.

Plumpness Samples were sized on a Eureka-Niagra Barley Grader and the percentage of the seeds retained on a 6/64" screen was determined.

Barley Color The brightness of the grains was measured using an Agtron M45-D analyzer.

Barley Moisture Content (Barley 5B) Five g of ground sample was dried for 3 h at 104°C. The percentage of weight loss that occurred during this drying was calculated.

Barley Protein Content Total nitrogen values were obtained using an automated Dumas combustion procedure with a LECO FP-528 analyzer. Nitrogen values were converted to protein percentages by multiplication by 6.25.

Malting Conditions 170 g (db) aliquots of barley were processed in Joe White micro-malters. Samples were hydrated to 47% moisture via a 32 h steep at 19°C: 8 h wet, 8 h air, 5 h wet, 5 h air, 2 h wet, 2 h air, 2 h wet. (Larger barleys, > 42 mg/kernel, received a continuous, wet pre-steep (16°C) of between 1 and 3 h). The samples were germinated for 48 h (18°C), 24 h (17°C), and 24 h (16°C), with moisture adjustment to 47% at 0, 24, and 48 h. The samples received 4 full turns every 2 h. The germinated grain was kilned for 24h as follows: 49°C, 10 h; 54°C, 4 h; 60°C, 3 h; 68°C, 2 h; and 85°C, 3 h, with 30 min. ramps between stages. All stages received 40% total flow, with 0% recirculation for stages 1-3, 50% for stage 4, and 75% for stage 5.

Malt Mill Fine-grind malts were prepared with a Miag laboratory cone mill that was adjusted so that 10% of the grist remained on a 525 µm sieve after 3 min of shaking, with tapping. Malts to be used for moisture, protein and amylolytic activity analyses were ground in a Labconco Burr mill (see Barley Mill).

Malt Moisture Content Determined by Malt 3 (Methods of Analysis of the ASBC, 8th ed, 1992) See Barley Moisture Content.

Malt Protein Content See Barley Protein Content.

Malt Extract Samples were extracted using the Malt-4 procedure (Methods of Analysis of the ASBC, 8th ed, 1992), except that all weights and volumes specified for the method were halved. The specific gravity of the filtrate was measured with an Anton Parr DMA5000 density meter. The density data were used to calculate the amount of soluble material present in the filtrate, and thus the percentage that was extracted from the malt.

Wort Color was determined on a Skalar SAN plus analyzer by measuring the absorbance at 430nm and dividing by a factor determined by collaborative testing.

Wort Clarity was assessed by visual inspection.

β-Glucan Levels were determined on a Skalar SAN plus analyzer by using the Wort-18 fluorescence flow injection analysis method with calcofluor as the fluorescent agent (Methods of Analysis of the ASBC, 8th ed, 1992).

Free Amino Nitrogen Levels were determined on a Skalar SAN plus analyzer using an automated version of the Wort-12 protocol (Methods of Analysis of the ASBC, 8th ed, 1992).

Soluble (Wort) Protein Levels were determined on a Skalar SAN plus analyzer using the Wort-17 UV-spectrophotometric method (Methods of Analysis of the ASBC, 8th ed, 1992).

S/T Ratio was calculated as Soluble Protein / Total Malt Protein

Diastatic Power Values were determined on a Skalar SAN plus analyzer by the automated ferricyanide procedure Malt-6C (Methods of Analysis of the ASBC, 8th ed, 1992).

α-Amylase activities were measured on a Skalar SAN plus analyzer by heating the extract to 73°C to inactivate any β-amylase present. The remaining (α-amylase) activity was measured as described for Diastatic Power Values.

Viscosities were measured on an Anton Paar AMVn rolling ball viscometer. Relative viscosities were reported: flow time of mash extract over the flow time of distilled water.

Turbidities were determined in Nephelometric Turbidity Units (NTU) on a Hach Model 18900 Ratio Turbidimeter.

Quality Scores were calculated by using a modification of the method of Clancy and Ullrich (Cereal Chem. 65:428-430, 1988). The criteria used to quantify individual quality factors are listed in Table A1.

Overall Rank Values were ordered from low to high based on their Quality Scores. A rank of '1' was assigned to the sample with the best quality score.



American Malting Barley Association, Inc.

MALTING BARLEY BREEDING GUIDELINES IDEAL COMMERCIAL MALT CRITERIA

	<u>Six-Row</u>	<u>Adjunct Two-Row</u>	<u>All Malt Two-Row</u>	<u>Distillers'</u>
AMBA Member Interest*	10%	61%	25%	4%
Barley Factors				
Plump Kernels (on 6/64)	> 80%	> 90%	> 90%	> 70%
Thin Kernels (thru 5/64)	< 3%	< 3%	< 3%	< 5%
Germination (4ml 72 hr. GE)	> 98%	> 98%	> 98%	> 98%
Protein	≤ 13.0%	≤ 13.0%	≤ 12.0%	11.5 -14.0%
Skinned & Broken Kernels	< 5%	< 5%	< 5%	< 5%
Malt Factors				
Total Protein	≤ 12.8%	≤ 12.8%	≤ 11.8%	11.0 - 13.5%
on 7/64 screen	> 60%	> 70%	> 75%	>50%
Glycosidic Nitrile (ppm)				< 1.5
Measures of Malt Modification				
Beta-Glucan (ppm)	< 120	< 100	< 100	
F/C Difference	< 1.2	< 1.2	< 1.2	
Soluble/Total Protein	42-47%	40-47%	38-45%	>48%
Turbidity (NTU)	< 10	< 10	< 10	
Viscosity (absolute cp)	< 1.50	< 1.50	< 1.50	
Congress Wort				
Soluble Protein	5.2-5.7%	4.8-5.6%	< 5.3%	>6.0%
Extract (FG db)	> 79.0%	> 81.0%	> 81.0%	> 79.0%
Color (°ASBC)	1.8-2.5	1.6-2.5	1.6-2.8	<4.0
FAN	> 210	> 210	140-190	>250
Malt Enzymes				
Diastatic Power (°ASBC)	> 150	> 120	110-150	>200
Alpha Amylase (DU)	> 50	> 50	40-70	>75

* Based on 2017 dues weighted survey of Regular members

General Comments

Barley should mature rapidly, break dormancy quickly without pregermination and germinate uniformly. The hull should be thin, bright and adhere tightly during harvesting, cleaning and malting.

Malted barley should exhibit a well-balanced, modification in a conventional malting schedule with four day germination.

Malted barley must provide desired beer flavor.

Distillers' Malt guidelines are designed to reflect how varieties perform when malted in the normal Brewers' cycles used for AMBA and CCRU variety trials.

April, 2017