

Table 1. Agronomic trait means of the 2020-2021 Winter Malting Barley Trial (WMBT)^a at 19 locations.

Trial location	Winter Survival (%)	Yield (Bu/A)	Heading date (Julian day)	Height (cm)	Lodging degree (0-9)	Straw breakage (%)	Maturity date (Julian day)	Test Weight (lb/Bu)	Grain Protein-breeder measure (%)	Plump-breeder measure (%)	Kernel weight (mg)
Georgetown, DE	100.0	67.8	.	.	.	.	.	36.3	.	.	.
Aberdeen, ID	98.1	93.0	148.3	65.9	0.0	.	.	52.1	13.9	95.9	.
Versailles, KY	100.0	99.2	125.2	88.0	.	.	.	.	.	.	.
South Deerfield, MA	100.0	54.5	.	.	.	.	.	.	.	.	.
Hickory Corners, MI	100.0	.	141.8	83.0	0.9	.	176.0	.	.	.	.
Kawkawlin, MI	100.0	.	.	.	.	.	.	.	.	.	.
Saint Paul, MN	94.9	134.2	144.7	92.5	1.1	22.4	.	.	.	.	.
Laurel Springs, NC	0.0	.	.	.	.	.	.	.	.	.	.
Raleigh, NC	100.0	90.9	99.0	75.1	2.5	.	.	49.9	11.2	.	.
Mead, NE	100.0	109.0	134.3	82.4	0.0	.	.	.	.	.	.
Farmington, NM	100.0	77.3	127.3	53.2	0.0	.	.	43.5	10.2	.	.
Ithaca, NY	87.7	.	.	.	.	.	.	.	.	.	.
Custar, OH	100.0	126.3	.	.	1.7	.	.	.	11.5	90.2	42.5
Wooster, OH	100.0	104.5	128.4	102.7	2.4	.	.	.	11.6	90.8	43.9
Corvallis, OR	100.0	152.5	117.0	107.9	.	12.2	.	54.0	11.2	96.2	.
Blacksburg, VA	100.0	91.2	120.5	61.9	.	.	.	51.6	.	.	.
Warsaw, VA	100.0	113.4	114.2	66.9	0.7	.	.	51.5	.	.	.
Alburgh, VT	82.7	166.9	142.0	85.0	2.3	.	.	43.6	.	.	.
Alma, WI	100.0	100.2	143.5	83.7	0.0	.	.	45.0	.	.	.
GRAND MEAN	92.8	105.4	130.5	80.4	1.0	17.2	176.0	46.2	11.3	92.3	42.8

^a Agronomic data reported for 19 of 23 locations planted

Table 2. Disease trait means of the 2020-2021 Winter Malting Barley Trial (WMBT)^a at six locations.

Trial location	Fusarium Head Blight severity (%)	Fusarium Head Blight incidence (%)	BYDV susceptibility (0-9)	Leaf Scald severity (%)	Net Blotch susceptibility (1-10)	Powdery Mildew susceptibility (0-9)	Spot Blotch severity (%)	Stripe Rust severity (%)
Saint Paul, MN	.	.	1.0	.	.	.	.	.
Raleigh, NC	.	.	2.2	.	2.4	.	53.3	.
Mead, NE	23.8	42.5	.	.	.	.	.	.
Farmington, NM	.	.	.	.	.	0.1	.	.
Corvallis, OR	.	.	.	12.5	.	.	.	3.1
Alma, WI	5.7	.	.	.	.	.	.	.
GRAND MEAN	10.5	42.5	1.6	12.5	2.4	0.1	53.3	3.1

^a Disease data reported for six of 23 locations planted

Table 3. Winter Survival (%) line means for 2020-2021 Winter Malting Barley Trial (WMBT) entries at 19 locations.

Line	Line Mean	Georgetown, DE	Aberdeen, ID	Versailles, KY	South Deerfield, MA	Hickory Corners, MI	Kawkawlin, MI	Saint Paul, MN	Laurel Springs, NC	Raleigh, NC	Mead, NE	Farmington, NM	Ithaca, NY	Custar, OH	Wooster, OH	Corvallis, OR	Blacksburg, VA	Warsaw, VA	Alburgh, VT	Alma, WI
CHARLES	91.9	100	93.3	100	100	100	100	93.3	0	100	100	100	88.3	100	100	100	100	100	71.7	100
THOROUGHbred	93.7	100	100.0	100	100	100	100	95.0	0	100	100	100	90.0	100	100	100	100	100	95.0	100
ENDEAVOR	91.4	100	96.7	100	100	100	100	93.3	0	100	100	100	86.7	100	100	100	100	100	60.0	100
WINTMALT	93.0	100	100.0	100	100	100	100	90.0	0	100	100	100	86.7	100	100	100	100	100	90.0	100
DH140963	93.3	100	96.7	100	100	100	100	93.3	0	100	100	100	91.7	100	100	100	100	100	91.7	100
DH141132	93.3	100	100.0	100	100	100	100	90.0	0	100	100	100	90.0	100	100	100	100	100	.	100
DH141222	93.2	100	100.0	100	100	100	100	90.0	0	100	100	100	88.3	100	100	100	100	100	.	100
DH141225	93.7	100	100.0	100	100	100	100	93.3	0	100	100	100	90.0	100	100	100	100	100	96.7	100
ARS15B12	90.3	100	98.3	100	100	100	100	90.0	0	100	100	100	75.0	100	100	100	100	100	51.7	100
AVALON	92.8	100	91.7	100	100	100	100	96.7	0	100	100	100	90.0	100	100	100	100	100	85.0	100
VA16M-84_2R	92.4	100	96.7	100	100	100	100	93.3	0	100	100	100	91.7	100	100	100	100	100	73.3	100
KWS_FARO	94.0	100	100.0	100	100	100	100	96.7	0	100	100	100	91.7	100	100	100	100	100	98.3	100
KWS_SCALA	93.2	100	100.0	100	100	100	100	90.0	0	100	100	100	91.7	100	100	100	100	100	90.0	100
KWS_SOMERSET	93.2	100	100.0	100	100	100	100	95.0	0	100	100	100	90.0	100	100	100	100	100	85.0	100
KWS_JOYAU	92.7	100	90.0	100	100	100	100	93.3	0	100	100	100	86.7	100	100	100	100	100	91.7	100
PIXEL	93.9	100	100.0	100	100	100	100	93.3	0	100	100	100	93.3	100	100	100	100	100	96.7	100
VISUEL	93.4	100	100.0	100	100	100	100	96.7	0	100	100	100	85.0	100	100	100	100	100	93.3	100
DEMENTIEL	93.3	100	100.0	100	100	100	100	93.3	0	100	100	100	86.7	100	100	100	100	100	93.3	100
SC_31450_TH	93.0	100	98.3	100	100	100	100	96.7	0	100	100	100	86.7	100	100	100	100	100	85.0	100
13ARS537-13	90.5	100	100.0	100	100	100	100	96.7	0	100	100	100	78.3	100	100	100	100	100	45.0	100
13ARS537-19	90.7	100	100.0	100	100	100	100	100.0	0	100	100	100	90.0	100	100	100	100	100	33.3	100
13ARS537-25	91.7	100	96.7	100	100	100	100	96.7	0	100	100	100	90.0	100	100	100	100	100	58.3	100
02WI-13	93.3	100	100.0	100	100	100	100	100.0	0	100	100	100	80.0	100	100	100	100	100	.	100
0214-007	93.1	100	95.0	100	100	100	100	93.3	0	100	100	100	88.3	100	100	100	100	100	91.7	100
NB15420	94.0	100	100.0	100	100	100	100	96.7	0	100	100	100	91.7	100	100	100	100	100	98.3	100
FLAVIA	92.5	100	95.0	100	100	100	100	93.3	0	100	100	100	78.3	100	100	100	100	100	91.7	100
HIRONDELLA	94.1	100	100.0	100	100	100	100	96.7	0	100	100	100	91.7	100	100	100	100	100	100.0	100
GRAND MEAN	92.8	100	98.1	100	100	100	100	94.3	0	100	100	100	87.7	100	100	100	100	100	81.9	100

Table 4. Yield (Bu/A) line means for 2020-2021 Winter Malting Barley Trial (WMBT) entries at 15 locations.

Line	Line Mean	Georgetown, DE	Aberdeen, ID	Versailles, KY	South Deerfield, MA	Saint Paul, MN	Raleigh, NC	Mead, NE	Farmington, NM	Custar, OH	Wooster, OH	Corvallis, OR	Blacksburg, VA	Warsaw, VA	Alburgh, VT	Alma, WI
CHARLES	90.5	51.2	95.1	88.1	37.1	118.1	63.8	107.1	88.1	96.3	78.7	120.8	90.4	97.7	112.2	102.6
THOROUGHBRED	118.1	75.8	78.6	117.9	74.1	185.1	130.1	116.6	51.9	114.0	102.2	171.1	111.8	143.5	188.6	113.6
ENDEAVOR	101.7	67.4	91.6	66.3	34.4	119.3	116.6	120.5	87.6	100.0	110.7	141.3	108.6	117.2	132.4	107.8
WINTMALT	99.0	54.7	80.3	108.1	73.3	84.1	81.8	110.2	85.1	121.4	110.0	146.0	78.9	96.4	163.0	88.9
DH140963	108.5	66.4	83.5	131.7	62.4	116.5	98.2	98.8	77.8	129.4	76.8	175.2	91.0	111.7	209.9	102.2
DH141132	98.9	64.2	78.0	83.5	61.6	108.1	45.3	102.3	67.2	153.0	116.9	163.3	92.5	112.1	.	114.1
DH141222	95.7	83.6	84.2	90.9	54.5	105.5	71.6	96.9	76.5	125.8	85.2	149.2	96.1	113.3	.	96.6
DH141225	111.4	72.5	114.1	92.1	68.1	150.1	68.1	107.3	65.2	132.0	112.3	161.7	86.5	120.3	193.1	106.7
ARS15B12	103.4	63.3	87.6	90.5	53.4	119.3	116.2	109.0	84.5	125.1	90.5	145.5	87.6	114.6	156.8	89.9
AVALON	95.0	59.4	70.8	98.1	43.0	146.0	132.3	100.7	67.9	97.6	61.3	141.3	80.8	110.3	118.2	99.1
VA16M-84_2R	89.4	61.0	48.5	92.2	47.6	140.5	119.8	90.2	61.4	101.6	98.4	126.6	63.5	105.6	113.7	81.0
KWS_FARO	127.1	76.0	138.4	128.1	81.2	141.2	104.6	123.6	98.7	163.6	144.7	105.8	114.1	125.6	236.3	117.2
KWS_SCALA	101.7	71.8	90.4	82.8	43.0	114.8	84.3	110.5	78.0	117.2	111.5	153.9	83.0	106.2	172.0	97.8
KWS_SOMERSET	109.8	68.3	87.8	118.7	83.7	111.2	71.2	113.6	85.9	128.8	123.2	155.2	96.3	104.5	182.0	106.6
KWS_JOYAU	121.7	83.5	106.8	108.1	54.9	168.6	115.1	108.2	80.0	150.6	123.0	197.3	95.9	122.7	181.1	123.3
PIXEL	131.4	87.7	109.3	137.9	71.9	178.9	98.0	134.6	75.8	154.9	144.6	169.6	112.3	152.0	219.0	115.9
VISUEL	120.0	77.8	101.2	108.8	63.3	145.5	119.4	92.6	72.3	150.3	142.3	194.0	112.1	144.4	172.6	99.3
DEMENTIEL	116.6	75.0	84.9	119.4	67.6	175.5	71.0	111.2	69.6	161.4	125.0	160.7	105.2	110.5	186.9	110.1
SC_31450_TH	103.8	64.5	106.6	94.5	56.0	107.2	50.2	125.2	94.5	131.3	108.9	164.8	71.1	95.5	164.4	101.2
13ARS537-13	95.7	61.4	108.2	88.8	21.2	145.5	79.8	114.7	68.7	118.6	94.4	136.0	83.6	100.1	103.7	103.0
13ARS537-19	90.4	43.0	101.3	97.2	30.5	152.4	58.1	117.9	76.1	122.6	58.2	122.4	87.4	87.4	96.7	96.8
13ARS537-25	96.0	60.3	105.9	101.5	34.1	132.2	79.1	104.6	82.5	105.2	94.1	146.6	82.0	96.0	112.3	100.0
02WI-13	91.4	66.2	84.0	75.1	59.1	123.1	86.9	91.6	65.6	124.0	102.7	128.5	81.2	95.7	.	89.4
0214-007	97.6	67.3	81.7	74.2	59.8	127.0	97.8	91.2	75.8	113.5	104.5	135.7	63.4	97.1	189.1	80.5
NB15420	102.9	68.5	100.8	84.6	52.3	157.2	87.4	129.4	80.0	109.7	49.7	153.7	92.3	127.4	139.3	100.2
FLAVIA	110.8	69.5	99.0	88.8	51.2	139.1	101.7	103.7	86.6	129.0	110.8	169.9	90.6	117.0	197.5	98.0
HIRONDELLA	117.8	76.4	92.7	111.7	33.0	111.0	104.6	111.2	82.5	134.3	132.2	180.1	104.4	137.5	246.1	102.3
GRAND MEAN	105.4	68.0	93.0	99.2	54.5	134.2	90.9	109.0	77.3	126.3	104.2	152.5	91.2	113.4	166.1	101.6

Table 5. Agronomic trait line means for 2020-2021 Winter Malting Barley Trial (WMBT) entries.

Line	Winter Survival (%)	Yield (Bu/A)	Heading date (Julian day)	Height (cm)	Lodging degree (0-9)	Straw breakage (%)	Maturity date (Julian day)	Test weight (lb/Bu)	Grain Protein-breeder measure (%)	Plump-breeder measure (%)	Fusarium Head Blight severity (%)	Fusarium Head Blight incidence (%)	BYDV susceptibility (0-9)	Leaf Scald severity (%)	Net Blotch susceptibility (1-10)	Powdery Mildew susceptibility (0-9)	Spot Blotch severity (%)	Stripe Rust severity (%)	Kernel weight (mg)
CHARLES	91.9	90.5	129.3	71.7	1.9	40.0	172.0	43.1	11.7	91.1	5.8	40.0	1.8	58.3	3.5	0.0	90	0.0	38.8
THOROUGHbred	93.7	118.1	128.5	87.4	1.7	15.0	179.0	49.5	10.7	86.1	11.0	63.3	1.4	5.0	2.5	0.7	65	28.3	37.1
ENDEAVOR	91.4	101.7	130.5	82.6	2.2	30.0	176.7	45.7	11.1	76.5	10.3	63.3	2.4	41.7	4.0	0.0	80	0.0	34.0
WINTMALT	93.0	99.0	134.6	77.9	1.2	10.0	177.3	45.1	11.4	91.9	6.4	10.0	1.6	18.3	3.0	0.0	50	3.3	41.2
DH140963	93.3	108.5	133.3	80.3	0.5	1.7	179.0	43.9	11.6	95.6	15.4	13.3	1.6	1.7	2.5	0.7	60	0.0	46.0
DH141132	93.3	98.9	133.0	77.9	0.3	13.7	179.0	45.9	11.7	95.1	6.1	10.0	1.8	0.0	3.0	1.0	45	0.0	46.0
DH141222	93.2	95.7	132.7	81.8	0.4	8.3	179.0	47.5	11.6	96.4	8.3	13.3	1.2	0.0	1.0	0.3	50	0.0	46.1
DH141225	93.7	111.4	130.7	82.0	0.7	7.0	172.3	47.0	11.5	96.7	14.9	53.3	1.6	0.0	9.0	0.7	25	0.0	47.5
ARS15B12	90.3	103.4	129.8	89.8	0.6	3.3	179.7	46.9	11.7	96.2	10.9	46.7	3.0	3.3	2.5	0.0	65	0.0	50.3
AVALON	92.8	95.0	129.4	95.8	1.2	18.3	179.0	49.0	12.5	96.7	8.8	63.3	1.6	20.0	0.0	0.0	65	10.0	47.3
VA16M-84_2R	92.4	89.4	129.9	96.5	0.4	4.2	176.0	49.6	11.8	95.0	9.1	60.0	0.4	10.0	1.5	0.0	40	5.0	49.7
KWS_FARO	94.0	127.1	129.9	81.3	0.8	23.3	176.3	47.7	10.2	94.3	13.1	60.0	1.4	0.0	2.0	0.0	15	1.7	39.3
KWS_SCALA	93.2	101.7	131.1	74.8	1.2	14.2	173.3	44.9	11.4	96.2	10.0	6.7	0.2	15.0	2.0	0.3	75	0.0	46.1
KWS_SOMERSET	93.2	109.8	133.2	80.4	0.5	7.5	177.7	45.1	11.4	97.1	10.0	13.3	2.0	3.3	7.0	0.0	35	1.7	45.7
KWS_JOYAU	92.7	121.7	128.9	78.6	0.6	9.2	177.7	47.1	11.2	93.5	15.0	76.7	1.0	0.0	0.0	0.0	20	0.0	43.5
PIXEL	93.9	131.4	130.4	78.0	0.6	25.8	176.7	45.4	10.4	94.8	15.7	73.3	1.8	0.0	1.5	0.0	50	1.7	41.8
VISUEL	93.4	120.0	130.0	81.9	0.9	34.2	172.0	44.9	10.0	92.3	14.1	56.7	1.4	0.0	0.0	0.0	25	3.3	41.1
DEMENTIEL	93.3	116.6	131.3	82.4	0.6	10.8	173.7	45.1	10.9	90.4	7.5	56.7	3.8	0.0	2.5	0.0	45	3.3	41.7
SC_31450_TH	93.0	103.8	130.4	72.2	1.0	28.3	173.3	45.9	11.1	92.4	8.3	40.0	3.2	0.0	1.5	0.0	80	0.0	41.8
13ARS537-13	90.5	95.7	126.0	65.2	0.5	26.7	175.3	45.3	11.2	89.6	11.5	33.3	0.6	40.0	1.5	0.0	70	0.0	39.7
13ARS537-19	90.7	90.4	125.6	69.8	0.9	28.3	174.3	46.8	11.1	91.3	10.0	63.3	1.6	70.0	4.5	0.0	55	0.0	41.7
13ARS537-25	91.7	96.0	126.3	73.9	1.1	40.8	175.0	46.9	11.8	91.0	14.3	73.3	2.4	16.7	1.0	0.3	75	0.0	42.0
02WI-13	93.3	91.4	132.2	81.7	0.4	2.0	179.3	44.7	11.7	94.4	6.9	20.0	1.0	16.7	2.5	0.0	65	3.3	45.3
0214-007	93.1	97.6	130.5	79.8	0.5	4.2	174.3	46.9	12.1	95.5	8.8	26.7	1.2	10.0	4.5	0.0	60	0.0	44.7
NB15420	94.0	102.9	129.1	90.5	3.8	18.3	177.7	45.4	11.5	71.5	11.0	60.0	0.8	0.0	0.0	0.0	70	18.3	32.0
FLAVIA	92.5	110.8	133.2	73.4	0.8	6.7	172.0	46.8	11.1	97.4	10.3	33.3	0.6	8.3	1.5	0.0	30	1.7	47.7
HIRONDELLA	94.1	117.8	134.1	83.5	1.1	32.5	175.0	45.4	10.7	91.8	9.7	16.7	1.6	0.0	1.0	0.0	35	1.7	38.3
GRAND MEAN	92.8	105.4	130.5	80.4	1.0	17.2	176.0	46.2	11.3	92.3	10.5	42.5	1.6	12.5	2.4	0.1	53.3	3.1	42.8
# of Env.	19	15	13	13	11	2	1	9	6	4	2	1	2	1	1	1	1	1	2

Table 6. Line entry details available for submissions to the 2020-2021 Winter Malting Barley Trial (WMBT).

Entry	Line	Row type	Submitter
1	CHARLES	2	
2	THOROUGHBRED	6	
3	ENDEAVOR	2	
4	WINTMALT	2	
5	DH140963	2	Oregon State U
6	DH141132	2	Oregon State U
7	DH141222	2	Oregon State U
8	DH141225	2	Oregon State U
9	ARS15B12	2	USDA-ARS North Carolina
10	AVALON	2	Virginia Tech
11	VA16M-84_2R	2	Virginia Tech
12	KWS_FARO	6	KWS
13	KWS_SCALA	2	KWS
14	KWS_SOMERSET	2	KWS
15	KWS_JOYAU	6	KWS
16	PIXEL	6	Secobra
17	VISUEL	6	Secobra
18	DEMENTIEL	6	Secobra
19	SC_31450_TH	2	Secobra
20	13ARS537-13	2	USDA-ARS Aberdeen
21	13ARS537-19	2	USDA-ARS Aberdeen
22	13ARS537-25	2	USDA-ARS Aberdeen
23	02WI-13	2	Ohio State U
24	0214-007	2	Ohio State U
25	NB15420	6	U of Nebraska-Lincoln
26	FLAVIA	2	Ackermann Saatzzucht GmbH
27	HIRONDELLA	6	Ackermann Saatzzucht GmbH