

Table 1. Agronomic trait means of the 2013-2014 Winter Malting Barley Trial (WMBT)^a at 14 locations.

Trial location	Winter Survival (%)	Yield (Bu/A)	Heading date (Julian day)	Height (cm)	Lodging degree (0-9)	Lodging incidence (%)	Straw breakage (%)	Test Weight (lb/Bu)	Grain Protein-breeder measure (%)	Plump-breeder measure (%)	Thin grain (%)	Deoxynivalenol content (ppm)	BYDV susceptibility (0-9)	Leaf Scald severity (%)	Leaf Rust susceptibility (0-9)	Net blotch (net form) reaction (0-9)	Powdery Mildew susceptibility (0-9)	Stripe Rust severity (%)	
Aberdeen, ID	95.6	174.9	145.1	84.5	0.0	.	.	50.0	.	.	.	.	.	.	.	.	.	.	.
Filer, ID	100.0	152.2	132.2	.	0.8	.	.	50.3	.	.	.	.	.	.	.	.	.	.	.
Saint Paul, MN	73.2	84.1	157.9	61.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Laurel Springs, NC	94.9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mills River, NC	.	56.9	.	64.4	3.6	.	.	39.0	.	.	.	.	.	.	.	.	.	.	.
Raleigh, NC	98.1	64.5	113.7	87.1	3.5	.	.	41.0	.	.	.	.	5.8	.	.	.	3.1	.	.
Ithaca, NY	47.2	68.5	.	73.2	.	.	.	48.1	.	.	.	.	.	.	.	.	.	.	.
Corvallis, OR	100.0	92.6	114.6	108.9	.	60.6	62.2	48.8	11.7	70.7	6.8	.	.	21.3	.	.	.	.	17.3
Logan, UT	91.2	128.8	149.3	71.1	.	.	.	54.2	.	.	.	.	.	.	.	.	.	.	.
Blacksburg, VA	88.8	140.3	126.0	73.3	4.9	.	.	48.0	.	.	.	.	.	.	4.5	1.9	.	.	.
Warsaw, VA	.	97.0	121.3	83.3	4.7	.	.	43.1	.	.	.	.	0.7	.	1.6	3.5	.	.	.
Alburgh, VT	67.4	27.7	160.6	54.2	0.0	.	.	40.2	.	.	.	2.4	.	.	.	.	.	.	.
Pullman, WA	100.0	88.1	.	83.0	0.0	.	.	51.6	.	92.2	.	.	.	.	.	.	.	.	.
Alma, WI	0.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GRAND MEAN	79.7	98.6	135.6	76.9	2.1	60.6	62.2	46.8	11.7	81.4	6.8	2.4	3.4	21.3	3.0	2.7	3.1	17.3	

^a Agronomic data reported for 14 of 19 locations planted

Table 2. Malt quality^a trait means of the 2013-2014 Winter Malting Barley Trial (WMBT)^b at three locations.

Trial location	Kernel weight (mg)	Plump grains (%)	Malt extract (%)	Grain Protein (%)	Wort Protein (%)	S/T (%)	Diastatic Power °ASBC	Alpha Amylase (20°DU)	Beta Glucan (ppm)	Free Amino Nitrogen (ppm)	Grain color (°ASBC)	Wort color (°ASBC)	Wort clarity (1-3)
Aberdeen, ID	44.1	96.3	77.3	12.8	3.7	30.1	119.0	47.8	394.3	144.9	63.9	2.4	2.1
Saint Paul, MN	40.7	92.7	77.6	15.5	5.9	38.7	173.8	70.7	320.6	265.2	34.0	2.8	1.4
Logan, UT	39.8	95.0	80.8	10.9	4.4	42.1	135.0	57.2	573.4	182.3	46.3	2.1	1.5
GRAND MEAN	41.6	94.7	78.1	13.2	4.5	35.3	136.4	56.4	412.7	188.3	50.7	2.5	1.7

^a Malt quality data courtesy of the USDA-ARS Cereal Crops Research Unit, Madison, WI

^b Malt quality data reported for three of 19 locations planted

Table 3. Winter Survival (%) line means for 2013-2014 Winter Malting Barley Trial (WMBT) entries at 12 locations.

Line	Line Mean	Aberdeen, ID	Filer, ID	Saint Paul, MN	Laurel Springs, NC	Raleigh, NC	Ithaca, NY	Corvallis, OR	Logan, UT	Blacksburg, VA	Alburgh, VT	Pullman, WA	Alma, WI
CHARLES	78.7	98.3	100	75.0	100	95.5	13	100	98	89.7	74.5	100	0
STRIDER	86.5	100.0	100	93.3	95	97.5	75	100	93	91.0	92.8	100	0
MCGREGOR	87.3	100.0	100	93.3	100	100.0	83	100	98	93.0	80.4	100	0
2AB08-X05W061-216	74.5	100.0	100	75.0	80	95.0	17	100	98	85.0	43.6	100	0
2AB09-X05W018-119	79.7	100.0	100	76.7	100	100.0	17	100	95	84.7	83.0	100	0
05ARS540-125	78.1	100.0	100	90.0	95	98.0	7	100	93	88.3	66.4	100	0
02AB431	77.9	98.3	100	80.0	85	97.5	12	100	95	86.7	80.9	100	0
02AB671	78.2	100.0	100	.	97	95.0	30	100	98	88.0	52.1	100	0
02AB669	77.2	100.0	100	75.0	97	95.0	15	100	90	88.3	66.0	100	0
AC07x022x2	68.1	66.7	100	41.7	97	100.0	10	100	70	86.7	44.7	100	0
AC07x041x33	77.2	80.0	100	63.3	97	100.0	23	100	75	94.3	93.8	100	0
FLAVIA	77.5	88.3	100	76.7	97	87.5	40	100	79	94.0	68.1	100	0
HICKORY	83.9	100.0	100	.	100	100.0	80	100	95	.	63.8	100	0
KWS_JOY	83.4	100.0	100	.	90	100.0	65	100	98	96.0	68.4	100	0
ETINCEL	66.0	43.3	100	45.0	90	100.0	12	100	83	.	53.0	100	0
THOROUGHbred	83.2	100.0	100	96.0	100	100.0	72	100	96	94.3	39.5	100	0
VA10B-43	79.9	98.3	100	95.0	97	100.0	52	100	73	82.7	60.6	100	0
VA12B-7	83.2	100.0	100	87.5	97	100.0	72	100	88	91.0	63.4	100	0
VA12B-8	82.8	100.0	100	65.0	98	97.5	85	100	98	91.3	59.4	100	0
LCS_SATURN	84.4	100.0	100	73.3	100	100.0	78	100	99	89.3	72.8	100	0
LCS_VIOLETTA	80.9	100.0	100	57.5	98	100.0	53	100	98	89.7	74.2	100	0
NECTARIA	75.1	100.0	100	42.5	97	98.0	27	100	93	86.7	57.5	100	0
MALTESSE	85.1	100.0	100	76.7	95	100.0	80	100	93	88.0	88.0	100	0
SC11203	84.9	98.3	100	71.7	100	100.0	70	100	93	92.7	92.8	100	0
SC11213	82.2	100.0	100	70.0	100	97.5	63	100	93	86.3	76.8	100	0
07OR-64	63.0	100.0	100	2.0	60	100.0	7	100	88	78.0	21.2	100	0
08OR-48	79.9	100.0	100	92.5	92	100.0	50	100	90	84.7	49.6	100	0
2011-F5-141-5	87.5	100.0	100	94.3	97	95.0	90	100	98	88.3	87.0	100	0
06OR-09	84.7	100.0	100	93.3	100	95.5	70	100	88	89.7	80.1	100	0
GRAND MEAN	79.7	95.6	100	73.2	94.9	98.1	47.2	100	91.2	88.8	67.4	100	0

Table 4. Yield (Bu/A) line means for 2013-2014 Winter Malting Barley Trial (WMBT) entries at 12 locations.

Line	Line Mean	Aberdeen, ID	Filer, ID	Saint Paul, MN	Mills River, NC	Raleigh, NC	Ithaca, NY	Corvallis, OR	Logan, UT	Blacksburg, VA	Warsaw, VA	Alburgh, VT	Pullman, WA
CHARLES	94.4	172.0	143.8	77.4	.	19.9	115.3	63.5	146.2	120.1	71.0	26.6	82.7
STRIDER	104.7	202.3	151.6	106.4	81.8	57.9	51.1	82.5	164.6	136.3	96.1	37.1	88.1
MCGREGOR	104.3	176.8	135.1	108.3	76.4	105.9	43.3	101.1	132.6	151.6	105.5	21.4	93.1
2AB08-X05W061-216	93.0	185.4	155.8	96.3	31.8	29.4	117.7	58.8	152.8	97.3	83.7	19.7	87.0
2AB09-X05W018-119	99.9	181.0	169.3	83.4	47.1	71.7	95.4	67.5	150.2	132.0	87.8	22.1	90.7
05ARS540-125	92.4	191.8	90.6	88.2	39.2	52.0	.	56.9	138.7	127.4	90.0	39.9	101.5
02AB431	95.6	181.9	124.6	94.9	42.2	47.7	.	71.1	139.0	123.3	92.3	35.2	99.5
02AB671	95.4	188.2	137.1	.	63.3	23.0	91.7	71.3	146.5	121.6	87.4	27.7	91.8
02AB669	96.3	192.0	124.5	92.2	51.9	43.5	104.1	63.6	146.2	125.9	93.6	26.1	91.5
AC07x022x2	87.8	154.6	157.5	85.8	35.7	56.4	.	76.3	52.2	140.9	89.8	25.3	91.8
AC07x041x33	89.9	166.7	151.5	54.3	44.8	61.5	88.6	81.3	82.9	155.0	95.8	20.8	75.7
FLAVIA	96.3	164.8	155.8	82.3	47.4	53.1	75.0	98.3	91.1	159.9	106.9	32.5	88.0
HICKORY	93.8	169.0	170.7	.	39.4	67.7	53.7	103.6	129.7	.	.	22.1	87.9
KWS_JOY	104.3	191.2	133.0	.	57.5	95.6	67.5	72.5	139.8	163.1	113.0	22.2	91.7
ETINCEL	102.8	175.2	154.1	80.6	66.3	97.6	.	145.2	100.0	.	.	29.0	76.9
THOROUGHbred	92.6	146.9	128.5	87.3	.	94.2	46.6	47.0	115.6	156.9	104.5	21.0	69.8
VA10B-43	105.8	181.2	168.5	70.5	.	132.8	72.0	86.8	105.3	151.5	96.5	30.4	68.2
VA12B-7	93.4	141.7	148.7	71.4	55.1	128.4	49.6	44.0	124.3	137.9	106.1	31.0	82.8
VA12B-8	97.9	148.4	121.7	62.8	83.5	97.4	43.5	104.0	121.0	153.2	105.6	41.1	92.7
LCS_SATURN	110.3	198.4	168.3	103.7	75.5	64.4	33.0	140.8	150.4	152.9	102.1	55.6	78.2
LCS_VIOLETTA	97.2	150.6	161.3	65.3	29.3	70.2	75.6	121.3	122.9	150.3	107.4	22.1	90.1
NECTARIA	93.4	158.0	155.4	39.4	76.5	62.1	89.0	94.8	112.3	138.6	100.4	19.5	74.7
MALTESSE	98.1	187.6	156.4	79.6	75.1	36.1	49.4	100.8	123.9	147.9	100.8	27.9	91.4
SC11203	97.0	172.2	191.5	66.9	42.2	28.8	69.5	133.2	124.9	132.9	88.8	14.9	98.6
SC11213	95.8	178.2	155.7	71.9	33.1	24.1	66.2	109.9	133.9	153.3	105.0	22.5	95.3
07OR-64	100.8	158.2	147.7	.	47.5	78.8	.	131.2	140.6	117.2	87.1	6.8	93.1
08OR-48	112.6	173.3	197.9	106.8	78.8	104.2	63.3	117.7	151.1	143.3	102.3	21.3	91.7
2011-F5-141-5	106.5	208.3	186.5	112.5	62.2	12.0	38.1	120.7	138.4	151.4	101.5	38.7	107.9
06OR-09	108.5	177.2	170.7	114.5	94.6	53.4	45.2	119.0	159.0	145.7	98.0	41.7	82.6
GRAND MEAN	98.6	174.9	152.2	84.1	56.9	64.5	68.5	92.6	128.8	140.3	97.0	27.7	88.1

Table 5. Agronomic trait line means for 2013-2014 Winter Malting Barley Trial (WMBT) entries.

Line	Winter Survival (%)	Yield (Bu/A)	Heading date (Julian day)	Height (cm)	Lodging degree (0-9)	Lodging incidence (%)	Straw breakage (%)	Test weight (lb/Bu)	Grain Protein-breeder measure (%)	Plump-breeder measure (%)	Thin grain (%)	Deoxynivalenol content (ppm)	BYDV susceptibility (0-9)	Leaf Scald severity (%)	Leaf Rust susceptibility (0-9)	Net blotch (net form) reaction (0-9)	Powdery Mildew susceptibility (0-9)	Stripe Rust severity (%)
CHARLES	78.7	94.4	132.6	71.3	3.1	73.3	70.0	44.4	13.1	82.8	4	0.80	5.5	86.7	5.2	2.7	0.0	0.0
STRIDER	86.5	104.7	136.3	80.0	1.5	68.3	61.7	44.8	11.8	70.2	7	3.90	4.8	3.3	3.2	3.3	3.0	0.0
MCGREGOR	87.3	104.3	133.6	82.0	2.1	65.0	53.3	45.1	12.7	88.8	3	4.40	0.0	5.0	2.0	1.0	6.0	21.7
2AB08-X05W061-216	74.5	93.0	135.9	76.2	3.4	95.0	88.3	44.7	12.2	75.8	7	2.60	3.9	81.7	5.2	3.2	7.0	0.0
2AB09-X05W018-119	79.7	99.9	140.1	78.6	2.2	90.0	90.0	48.1	10.9	80.7	7	1.13	3.5	60.0	5.2	2.0	7.0	1.7
05ARS540-125	78.1	92.4	136.9	74.9	3.0	75.0	61.7	47.7	13.3	71.0	13	0.83	3.3	80.0	4.2	2.5	1.5	0.0
02AB431	77.9	95.6	135.6	81.3	3.6	71.7	81.7	47.0	11.5	75.5	10	0.83	3.5	35.0	4.8	4.5	8.0	1.7
02AB671	78.2	95.4	133.7	81.4	3.1	86.7	80.0	46.8	11.4	83.5	5	1.57	4.3	55.0	4.7	3.8	6.5	3.3
02AB669	77.2	96.3	137.6	80.0	3.5	80.0	78.3	47.1	10.9	73.3	10	1.30	4.0	80.0	5.8	4.3	8.5	0.0
AC07x022x2	68.1	87.8	136.9	76.1	2.6	33.3	73.3	45.6	11.8	86.5	2	1.70	4.2	0.0	1.0	3.3	0.0	68.3
AC07x041x33	77.2	89.9	136.4	68.8	2.9	73.3	70.0	47.1	10.1	91.5	1	1.33	1.5	15.0	0.5	1.7	0.0	11.7
FLAVIA	77.5	96.3	136.3	72.7	1.7	61.7	41.7	47.8	11.6	92.7	1	1.57	4.5	20.0	0.8	2.2	4.5	11.7
HICKORY	83.9	93.8	139.7	75.8	2.0	48.3	31.7	47.1	11.1	94.2	1	2.13	5.0	10.0	.	.	0.0	1.7
KWS_JOY	83.4	104.3	136.2	77.0	1.5	75.0	46.7	46.8	11.1	85.3	3	1.87	3.5	50.0	1.7	1.2	1.5	40.0
ETINCEL	66.0	102.8	139.2	77.7	0.8	28.3	33.3	47.0	11.3	87.8	2	2.23	4.5	1.7	.	.	0.0	8.3
THOROUGHbred	83.2	92.6	132.6	76.7	3.0	86.7	93.3	47.5	12.3	52.5	43	3.17	0.9	3.3	6.3	2.3	7.5	90.0
VA10B-43	79.9	105.8	131.4	74.7	2.4	70.0	71.7	47.9	12.9	77.0	6	4.87	0.0	1.7	1.0	1.7	0.0	50.0
VA12B-7	83.2	93.4	131.6	78.4	1.7	86.7	95.0	46.5	14.5	59.5	25	2.03	0.5	0.0	7.5	2.2	2.0	91.7
VA12B-8	82.8	97.9	131.3	83.0	2.6	88.3	95.0	48.1	12.7	68.8	11	1.13	1.3	0.0	3.8	2.8	0.0	43.3
LCS_SATURN	84.4	110.3	134.9	75.9	1.5	18.3	78.3	45.8	10.9	91.3	1	1.53	1.8	0.0	0.8	2.3	0.0	8.3
LCS_VIOLETTA	80.9	97.2	133.9	77.1	1.8	55.0	33.3	48.5	13.1	93.7	1	3.17	2.5	0.0	0.3	3.0	0.0	0.0
NECTARIA	75.1	93.4	136.0	75.5	2.1	50.0	30.0	48.6	11.3	94.3	1	2.30	3.5	1.7	1.3	4.2	6.5	25.0
MALTESSE	85.1	98.1	136.4	71.6	2.4	63.3	46.7	48.3	11.1	89.3	2	2.20	5.3	15.0	0.7	1.7	0.0	11.7
SC11203	84.9	97.0	135.3	72.5	0.7	25.0	25.0	48.5	10.9	93.2	1	2.77	4.3	3.3	0.8	2.5	0.0	5.0
SC11213	82.2	95.8	136.3	74.8	1.8	45.0	21.7	47.7	11.6	93.8	1	2.00	4.4	1.7	0.8	1.8	0.0	1.7
07OR-64	63.0	100.8	134.6	73.3	1.0	25.0	81.7	45.8	10.7	59.3	17	4.00	4.2	1.7	5.2	4.7	6.0	3.3
08OR-48	79.9	112.6	136.0	83.4	1.1	33.3	76.7	46.1	11.1	84.2	4	8.97	3.5	0.0	6.0	3.2	6.0	1.7
2011-F5-141-5	87.5	106.5	137.0	71.3	0.9	56.7	65.0	46.8	11.6	76.2	6	1.47	5.2	3.3	0.7	2.2	4.0	0.0
06OR-09	84.7	108.5	139.3	87.4	1.6	28.3	30.0	45.1	11.0	88.2	2	1.93	4.3	3.3	2.8	4.0	3.0	0.0
GRAND MEAN	79.7	98.6	135.6	76.9	2.1	60.6	62.2	46.8	11.7	81.4	6.8	2.40	3.4	21.3	3.0	2.7	3.1	17.3
# of Env.	12	12	9	11	8	1	1	11	1	2	1	1	2	1	2	2	1	1

Table 6. Malt quality^a trait line means for 2013-2014 Winter Malting Barley Trial (WMBT) entries at three locations.

Line	Kernel weight (mg)	Plump grains (%)	Malt extract (%)	Grain Protein (%)	Wort Protein (%)	S/T (%)	Diastatic Power °ASBC	Alpha Amylase (20°DU)	Beta Glucan (ppm)	Free Amino Nitrogen (ppm)	Grain color (°ASBC)	Wort color (°ASBC)	Wort clarity (1-3)
CHARLES	41.2	95.7	80.9	12.5	4.9	40.8	155.9	79.3	300.8	238.3	59.0	2.2	1.0
STRIDER	38.9	94.8	76.3	11.4	3.1	28.1	49.0	30.0	739.0	99.0	58.0	.	3.0
MCGREGOR	35.7	93.4	76.4	12.0	3.4	29.8	61.0	37.2	974.5	138.0	45.0	2.5	2.5
2AB08-X05W061-216	42.7	93.5	80.8	12.7	5.4	43.6	149.4	81.4	265.3	247.2	46.7	2.4	1.3
2AB09-X05W018-119	42.1	93.6	80.2	12.5	4.9	41.4	154.1	85.0	306.7	223.1	52.7	2.4	1.3
05ARS540-125	37.6	90.5	79.8	13.3	5.2	40.4	183.6	84.6	260.0	230.8	53.3	2.3	1.0
02AB431	43.3	94.5	81.0	12.7	5.8	46.7	136.1	87.3	240.0	272.6	43.0	2.7	1.0
02AB671	42.8	97.4	82.4	11.1	5.0	48.3	131.3	85.4	184.8	213.4	49.0	2.3	1.5
02AB669	42.8	96.1	81.8	11.6	5.0	46.7	120.4	84.5	182.7	219.3	55.0	2.3	1.0
AC07x022x2	50.8	95.8	76.3	15.3	5.3	34.0	187.5	50.6	235.5	210.0	50.5	3.4	2.0
AC07x041x33	49.0	97.6	77.4	14.8	4.9	33.7	175.5	53.4	187.0	196.0	44.0	2.9	2.0
FLAVIA	45.8	97.5	77.8	13.8	4.2	31.9	180.1	46.9	221.5	162.7	48.7	2.7	2.3
HICKORY	49.0	98.5	79.6	11.2	4.0	38.3	128.8	41.2	247.3	149.8	66.0	2.8	2.5
KWS_JOY	44.0	98.4	79.4	11.7	3.7	33.2	127.7	42.8	162.8	137.3	68.0	2.3	2.5
ETINCEL	42.2	97.8	76.9	13.6	4.7	34.1	126.0	48.5	419.5	188.0	44.5	2.8	2.0
THOROUGHbred	33.5	92.6	78.0	12.7	4.0	32.3	143.1	45.9	685.1	162.7	51.0	2.6	2.0
VA10B-43	31.3	91.4	74.3	14.1	4.2	30.2	51.5	48.8	727.0	186.0	39.0	2.9	1.5
VA12B-7	31.1	85.8	75.3	14.8	4.2	29.1	132.5	44.2	720.5	150.5	46.5	3.1	2.5
VA12B-8	33.6	93.3	74.6	15.7	4.7	29.6	96.0	50.8	491.0	193.5	51.0	2.6	2.0
LCS_SATURN	40.0	95.0	75.2	11.8	3.8	32.7	124.5	37.1	849.6	143.4	52.3	.	3.0
LCS_VIOLETTA	45.9	96.7	78.4	14.5	5.1	35.9	208.6	48.1	293.1	211.4	47.7	2.2	1.0
NECTARIA	46.3	93.9	78.7	13.6	4.7	35.3	150.2	54.1	459.3	200.0	46.0	2.5	1.3
MALTESSE	50.2	97.7	78.7	13.3	4.4	34.1	136.2	48.4	675.0	184.2	43.0	2.4	1.3
SC11203	49.2	95.8	76.4	15.0	4.5	30.1	148.5	41.2	466.0	175.5	44.5	2.6	2.0
SC11213	49.0	97.1	76.9	15.2	4.5	29.7	155.0	38.3	443.0	183.5	41.5	2.8	1.5
07OR-64	31.8	81.3	78.3	11.8	3.9	34.8	165.0	72.9	110.0	173.0	60.0	2.2	1.0
08OR-48	39.2	96.5	77.4	13.3	4.4	33.7	131.0	56.3	464.5	198.0	49.5	3.1	2.5
2011-F5-141-5	36.1	96.6	78.0	12.7	4.4	35.3	129.0	58.4	309.5	201.5	53.0	2.1	1.0
06OR-09	40.9	96.2	77.5	13.6	4.1	30.3	117.5	51.7	346.5	172.5	62.0	2.0	1.0
GRAND MEAN	41.6	94.7	78.1	13.2	4.5	35.3	136.4	56.4	412.7	188.3	50.7	2.5	1.7

^a Malt quality data courtesy of the USDA-ARS Cereal Crops Research Unit, Madison, WI

Table 7. Line entry details available for submissions to the 2013-2014 Winter Malting Barley Trial (WMBT).

Entry	Line	Row type	Submitter
1	CHARLES	2	
2	STRIDER	6	
3	MCGREGOR	6	
4	2AB08-X05W061-216	2	USDA-ARS Aberdeen
5	2AB09-X05W018-119	2	USDA-ARS Aberdeen
6	05ARS540-125	2	USDA-ARS Aberdeen
7	02AB431	2	USDA-ARS Aberdeen
8	02AB671	2	USDA-ARS Aberdeen
9	02AB669	2	USDA-ARS Aberdeen
10	AC07x022x2	2	Ackermann Saatzucht GmbH
11	AC07x041x33	2	Ackermann Saatzucht GmbH
12	FLAVIA	2	Ackermann Saatzucht GmbH
13	HICKORY		KWS
14	KWS_JOY	2	KWS
15	ETINCEL	6	Secobra
16	THOROUGHBRED	6	Viginia Tech
17	VA10B-43	6	Viginia Tech
18	VA12B-7	6	Viginia Tech
19	VA12B-8	6	Viginia Tech
20	LCS_SATURN	6	LimaGrain
21	LCS_VIOLETTA	2	LimaGrain
22	NECTARIA		Secobra
23	MALTESSE		Secobra
24	SC11203		Secobra
25	SC11213		Secobra
26	07OR-64	6	Oregon State U
27	08OR-48	6	Oregon State U
28	2011-F5-141-5	6	Oregon State U
29	06OR-09	2	Oregon State U