PROJECT TITLE: MALT BARLEY YIELD TRIAL – 2003

PROJECT LEADER:

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COOPERATOR:

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OBJECTIVE: To select the best adapted experimental lines for release and to determine the best adapted varieties of malt barley for eastern Montana.

MATERIALS AND METHODS:

Dryland site:

Soil type: Williams clay loam
Previous crops: 2002 - fallow, 2001 - safflower. 2000 - small grain plots
Residual soil N to 4 ft: 107 lb N/ac
Residual soil P to 12 in: 17 ppm
Residual soil K to 12 in: 173 ppm
Residual soil S to 12 in:25.8 lb/ac
Applied fertilizer: None
Herbicides: 1.0 pt/ac Roundup applied April 17, 1.5 pt/ac Bronate applied 27 May
Precipitation April – August, 2003: 10.44 inches
Ave (55 yr) precipitation April – August: 9.50 inches
Precipitation September 2002 – August 2003: 15.04 inches
Ave (55 yr) precipitation September – August: 13.88 inches
Planted: April 14 Harvested: July 24

Irrigated site:

Soil type: Savage silty clay
Previous crops: 2002 - onions, 2001 - safflower, 2000 – potatoes
Residual soil N to 4 ft: 59 lb N/ac
Residual soil P to 12 in: 23 ppm
Residual soil K to 12 in: 450 ppm
Residual soil S to 12 inches: 141 lb/ac
Applied fertilizer: 400 lb 18-46-0 applied 15 October 2002
Irrigated (flood) on: 10 Jun, three inches
Herbicides: 1.5 pt/ac Bronate and 2.5 pt/ac Hoelon applied 29 May
Fungicide: Folicure was applied at a rate of 4 oz/ac on Jun 23
Precipitation April – August, 2003: 8.34 inches
Ave (55 yr) precipitation April – August: 9.50 inches
Precipitation September 2002 – August 2003: 13.16 inches
Ave (55 yr) precipitation September – August: 13.88 inches
Planted: April 28 Harvested: August 8

RESULTS:
Dryland: Agronomic data from the dryland malt barley yield trial are shown in Table 1. MT981091, MT981210, and Excel yielded significantly more than the check variety, Harrington. Six lines and varietieis yielded significantly less. Five-year summaries for yield, test weight, protein contents and percent plump seed are shown in Tables 2-5.

Irrigated: Agronomic data from the irrigated malt barley yield trial are shown in Table 6. Baronesse yielded mostl, and 15 lines and varieties yielded significantly more than the chech variety, Harrington. Two varieties yielded significantly less than Harrington. Five-year summaries of yield, test weight, protein contents, and percent plump are shown in Tables 7-10.

FUTURE PLANS: New experimental lines and varieties of malt barley will continue to be tested under dryland and irrigated conditions to identify those which will perform best under these conditions. Closer cooperation with North Dakota State University will allow testing of experimental lines from North Dakota as well as from Montana, so that when those lines are released as varieties, information will be available as to their performance in this region.

Table 1. Agronomic data obtained from a malt barley yield trial grown under dryland fallow conditions at the Eastern Agricultural Research Center, Sidney, MT.
Planted: April 14 Harvested: July 24

Variety	ID number	Heading[1]	Height, Cm	Plump percent	Regular percent	Protein content	Test wt	Yield bu/ac	
MT981091	MT981091	63.0	73.7	58.0	36.00	12.89	50.3	85.9	a
MT981210	MT981210	66.7	75.7	68.0	28.00	12.93	50.5	82.9	a
Excel	MN 52	62.3	86.3	51.0	40.00	12.15	48.7	79.8	a
MT981238	MT981238	64.0	75.3	70.0	26.00	12.73	52.2	76.7	
MT970116	MT970116	63.3	83.3	73.0	23.00	13.28	51.3	76.6	
Kendall	TR133	65.0	69.7	58.0	35.00	12.03	48.0	76.5	
Conlon	ND13299	61.0	76.7	81.0	15.00	13.46	52.2	75.5	
Baronesse	PI568246	67.3	66.3	23.0	63.00	12.94	48.0	74.9	
Gallatin	PI491534	64.3	75.0	31.0	56.00	13.37	50.3	73.8	
Coors 37	C37	67.3	60.0	33.0	55.00	13.55	48.0	73.6	
Harrington	SK 76333	65.7	69.3	40.0	51.00	12.12	46.2	72.9	
Metcalfe	TR232	64.3	74.0	42.0	48.00	13.26	48.2	72.7	
Stratus	TR128	66.7	62.3	29.0	58.00	11.71	46.7	72.6	
Legacy	6B932978	62.7	78.7	56.0	37.00	11.16	48.5	70.9	
Stander	PI564743	62.0	74.0	79.0	18.00	12.63	50.5	70.8	
Garnet	PI605472	67.3	69.0	46.0	38.00	12.65	47.3	70.3	
BA 1202	BA 1202	65.7	69.0	26.0	61.00	12.25	45.7	69.5	
Drummond	ND15477	62.0	83.0	74.0	24.00	12.29	50.3	68.8	
Lacey	PI613703	61.3	84.7	70.0	26.00	11.27	51.2	68.5	x
MT960101	MT960101	68.0	62.3	38.0	44.00	12.29	49.3	68.2	x
Robust	PI476976	62.0	88.7	77.0	20.00	12.38	51.0	66.3	x
Foster	PI592758	61.0	82.3	78.0	20.00	10.75	49.2	65.0	x
Morex	CI 15773	62.3	90.3	57.0	38.00	12.29	48.8	62.3	x
Merit	2B914947	67.0	71.0	40.0	46.00	12.33	44.0	61.0	x
Mean		64.3	75.0	54.1	37.8	12.45	49.0	72.3	
Probability		<0.001	<0.001			0.343	<0.001	<0.001	
CV (s/mean)		1.1	6.0			9.5	3.0	7.3	
LSD 0.05		0.7	3.5			5.5	1.8	4.2	

[1] Days from planting
a indicates significantly greater than check variety, Harrington, at a probability of 0.05
x indicates significantly less than check variety, Harrington, at a probability of 0.05

Table 2. Relative yielding abilities of malt barley varieties as compared to Morex when grown under dryland conditions at the EARC, Sidney, Montana.

Variety	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
MT981091	--	--	--	--	90.3	85.9	88.1	121.4
MT981210	--	--	--	--	91.4	82.9	87.2	120.1
MT981238	--	--	--	--	88.3	76.7	82.5	113.7
Excel	--	--	70.2	60.2	--	79.8	70.1	113.3
Tradition	--	--	63.4	53.2	91.9	--	69.5	112.8
Baronesse	97.0	97.4	69.2	62.5	85.4	74.9	81.1	110.6
Conlon	--	--	62.5	62.2	80.2	75.5	70.1	108.8
Kendall	--	--	--	56.5	--	76.5	66.5	107.1
MT970116	92.6	82.1	69.8	57.9	89.3	76.6	78.1	106.5
Metcalfe	--	--	--	59.6	--	72.7	66.2	106.5
MT960101	104.8	90.4	65.2	54.4	82.8	68.2	77.6	106.0
Gallatin	90.9	86.5	61.4	55.1	89.3	73.8	76.2	104.0
Garnet	--	--	55.0	55.7	84.4	70.3	66.4	103.0
Drummond	--	--	--	57.7	--	68.8	63.3	101.9
Harrington	98.3	83.6	61.3	51.3	72.2	72.9	73.3	100.0
Foster	--	--	62.2	57.1	--	65.0	61.4	99.4
Robust	--	--	58.9	57.3	--	66.3	60.8	98.4
Stratus	--	--	55.2	54.3	--	72.6	60.7	98.2
Stander	--	--	--	51.0	--	70.8	60.9	98.1
Legacy	--	--	55.4	47.1	78.6	70.9	63.0	97.8
Coors 37	82.6	--	--	58.6	--	73.6	71.6	96.5
Merit	90.4	82.7	59.4	51.1	77.7	61.0	70.4	96.1
BA 1202	84.8	--	--	57.6	--	69.5	70.6	95.2
Lacey	--	--	--	--	--	68.5	68.5	94.0
Morex	85.0	70.3	44.4	62.6	--	62.3	64.9	88.4

[1] Intrastate trial [2] malt barley trial

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 3. Relative test weights of malt barley varieties as compared to Morex when grown under dryland conditions at the EARC, Sidney, Montana.

Variety	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
MT981238	--	--	--	--	51.8	52.2	52.0	111.2
Lacey	--	--	--	--	--	51.2	51.2	110.8
MT981210	--	--	--	--	51.7	50.5	51.1	109.3
MT981091	--	--	--	--	50.5	50.3	50.4	107.8
MT970116	54.7	53.0	48.7	49.5	51.5	51.3	51.5	107.0
Conlon	--	--	48.0	46.2	52.3	52.2	49.7	106.9
Stander	--	--	--	47.0	--	50.5	48.8	106.6
Drummond	--	--	--	47.0	--	50.3	48.7	106.3
Gallatin	54.7	52.5	47.8	47.3	51.2	50.3	50.6	105.3
MT960101	54.3	51.7	49.7	47.8	49.3	49.3	50.4	104.7
Metcalfe	--	--	--	47.0	--	48.2	47.6	104.0
Coors 37	53.7	--	--	46.5	--	48.0	49.4	103.3
Baronesse	54.0	51.5	48.7	47.5	48.3	48.0	49.7	103.3
Robust	--	--	45.1	45.8	--	51.0	47.3	102.5
Tradition	--	--	45.5	47.3	49.5	--	47.4	101.9
Stratus	--	--	47.7	46.2	--	46.7	46.9	101.5
Garnet	--	--	46.7	46.3	48.3	47.3	47.2	101.5
Legacy	--	--	45.2	46.7	47.7	48.5	47.0	101.2
Kendall	--	--	--	44.3	--	48.0	46.2	100.9
Foster	--	--	45.2	45.3	--	49.2	46.6	100.9
Excel	--	--	45.2	44.8	--	48.7	46.2	100.1
Harrington	52.0	50.8	47.0	45.3	47.3	46.2	48.1	100.0
Morex	52.2	47.5	45.2	46.3	--	48.8	48.0	99.5
BA 1202	52.7	--	--	44.0	--	45.7	47.5	99.2
Merit	51.2	50.5	45.8	44.3	46.7	44.0	47.1	97.9

[1] Intrastate trial [2] malt barley trial

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 4. Relative protein contents of malt barley varieties as compared to Morex when grown under dryland conditions at the EARC, Sidney, Montana.

Variety	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
Coors 37	9.2	--	--	13.3	--	13.6	12.0	110.4
MT981238	--	--	--	--	12.8	12.7	12.8	109.4
Conlon	--	--	10.4	14.3	11.7	13.5	12.5	108.0
Gallatin	8.7	10.7	11.6	13.2	12.0	13.4	11.6	107.9
MT981210	--	--	--	--	12.2	12.9	12.6	107.7
Metcalfe	--	--	--	12.6	--	13.3	13.0	106.1
Morex	10.0	10.1	11.4	12.6	--	12.3	11.3	105.8
Kendall	--	--	--	13.8	--	12.0	12.9	105.7
MT970116	8.5	10.4	10.6	12.8	12.6	13.3	11.4	105.7
MT960101	8.1	9.8	11.3	13.6	12.8	12.3	11.3	105.3
Merit	8.7	11.2	10.9	12.8	11.7	12.3	11.3	104.8
Garnet	--	--	10.7	12.5	12.4	12.6	12.1	104.3
MT981091	--	--	--	--	11.4	12.9	12.2	104.3
Baronesse	8.4	9.8	10.7	12.5	12.6	12.9	11.2	103.7
BA 1202	8.6	--	--	13.1	--	12.2	11.3	103.7
Robust	--	--	10.4	12.5	--	12.4	11.8	100.9
Harrington	8.3	10.0	10.6	12.3	11.2	12.1	10.8	100.0
Legacy	--	--	11.0	12.2	11.7	11.2	11.5	99.8
Tradition	--	--	10.2	11.6	12.0	--	11.3	99.1
Stratus	--	--	9.1	13.8	--	11.7	11.5	98.9
Excel	--	--	10.4	11.7	--	12.2	11.4	98.0
Stander	--	--	--	11.3	--	12.6	12.0	98.0
Drummond	--	--	--	11.3	--	12.3	11.8	96.7
Lacey	--	--	--	--	--	11.3	11.3	93.4
Foster	--	--	9.8	11.5	--	10.8	10.7	91.7

[1] Intrastate trial [2] malt barley trial

NOTE: Average protein percents in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 5. Relative percent plump of malt barley varieties as compared to Morex when grown under dryland conditions at the EARC, Sidney, Montana.

Variety	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
Lacey	--	--	--	--	--	70	70.0	175.0
Stander	--	--	--	85	--	59	72.0	129.7
MT981238	--	--	--	--	79	70	74.5	126.3
Drummond	--	--	--	65	--	74	69.5	125.2
MT981210	--	--	--	--	78	68	73.0	123.7
Robust	--	--	79	67	--	77	74.3	114.9
Conlon	--	--	92	33	94	81	75.0	110.3
MT970116	93	91	91	82	72	73	83.7	109.4
Foster	--	--	82	52	--	78	70.7	109.3
Garnet	--	--	89	83	79	46	74.3	109.2
Kendall	--	--	--	62	--	58	60.0	108.1
Tradition	--	--	97	69	70	--	78.7	101.7
Harrington	94	93	83	71	78	40	76.5	100.0
Legacy	--	--	83	74	57	56	67.5	99.3
MT981091	--	--	--	--	57	58	57.5	97.5
Metcalfe	--	--	--	66	--	42	54.0	97.3
Merit	94	89	80	69	73	40	74.2	96.9
Excel	--	--	72	59	--	51	60.7	93.8
Stratus	--	--	82	67	--	29	59.3	91.8
Morex	87	86	76	42	--	57	69.6	91.3
Gallatin	95	86	76	63	60	31	68.5	89.5
BA 1202	92	--	--	63	--	26	60.3	88.3
Baronesse	95	94	82	63	36	23	65.5	85.6
MT960101	81	88	84	60	37	38	64.7	84.5
Coors 37	93	--	--	5	--	33	43.7	63.9

[1] Intrastate trial [2] malt barley trial

NOTE: Average plump percents in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety.

Table 6. Agronomic data obtained from an irrigated malt barley yield trial grown under sprinkler irrigated conditions at the Eastern Agricultural Research Center, Sidney, MT.
Planted: April 28 Harvested: August 8

Line or cultivar	ID number	Days to Heading[1]	Height Cm	Lodging index	Percent plump	Grain Protein	Test Weight	Yield Bu/acre	
Baronesse	PI568246	71.0	92.3	1.0	90	10.58	51.7	144.2	a
Legacy	6B932978	68.0	100.3	1.0	91	10.01	48.5	142.3	a
Excel	MN 52	67.0	96.0	1.0	86	10.86	48.0	140.4	a
Lacey	PI613703	66.7	95.3	0.0	94	10.57	50.7	136.6	a
Stander	PI564743	67.0	93.7	0.3	91	10.33	49.2	133.9	a
MT981091	MT981091	69.0	82.0	0.0	92	11.64	52.2	131.8	a
MT981210	MT981210	72.3	96.7	2.3	91	12.13	51.7	131.6	a
MT970116	MT970116	70.0	102.3	1.3	93	12.14	52.8	131.1	a
Foster	PI592758	66.7	93.3	0.0	95	10.74	49.3	130.7	a
Stratus	TR128	72.0	77.7	0.0	81	10.21	48.5	130.6	a
Drummond	ND15477	67.3	95.3	0.0	93	11.21	48.3	130.2	a
Coors 37	C37	72.3	83.0	0.3	93	11.27	50.0	129.4	a
MT960101	MT960101	73.3	88.3	0.3	89	11.02	52.5	128.2	a
BA 1202	BA 1202	72.0	92.0	1.7	93	11.08	49.7	128.1	a
Garnet	PI605472	72.3	96.3	1.3	94	10.93	49.5	124.3	a
Morex	CI 15773	67.0	100.0	5.7	88	11.09	48.5	123.4	
Merit	2B914947	72.3	92.3	1.3	87	11.26	49.5	122.9	
Harrington	SK 76333	72.3	101.3	3.3	93	11.04	50.2	120.8	
Conlon	ND13299	65.3	91.0	0.0	96	12.19	52.0	120.5	
Robust	PI476976	67.7	104.0	0.3	91	11.23	50.2	119.5	
Gallatin	PI491534	69.0	96.3	3.0	89	11.75	51.3	119.0	
Kendall	TR133	72.0	97.3	3.3	91	11.81	50.0	118.5	
Metcalfe	TR232	71.7	97.7	3.7	88	11.46	49.0	117.5	x
MT981238	MT981238	68.7	92.0	0.3	91	11.80	52.0	116.3	x
Mean		69.7	94.0	1.3	90.8	11.18	50.2	128.0	
Probability		<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	
CV (se/mean)		0.8	3.8	83.6		4.4	1.7	5.2	
LSD 0.05		0.5	2.2	48.3		2.5	1.0	3.0	

[1] Days from planting
a indicates significantly greater than check variety, Harrington, at a probability of 0.05
x indicates significantly less than check variety, Harrington, at a probability of 0.05

Table 7. Relative yielding abilities of malt barley varieties grown under irrigation at the Eastern Ag Research Center, Sidney, Montana.

Cultivar	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
Excel	136.3	136.3	86.7	90.0	--	140.4	117.9	125.5
Legacy	131.3	130.5	92.8	94.2	130.4	142.3	120.3	122.6
Stander	--	130.1	97.1	87.7	--	133.9	112.2	121.9
Baronesse	135.2	116.5	82.4	86.0	137.3	144.2	116.9	119.3
Foster	--	122.9	91.8	89.6	--	130.7	108.8	118.1
Tradition	--	--	90.5	89.0	131.0	--	103.5	118.1
Stratus	--	--	92.1	82.1	--	130.6	101.6	114.9
Calgary	--	--	84.3	84.1	133.0	--	100.5	114.6
Drummond	--	--	--	98.1	--	130.2	114.2	113.5
Lacey	--	--	--	--	--	136.6	136.6	113.1
Robust	106.9	127.1	80.7	87.3	--	119.5	104.3	111.0
Coors 37	120.7	111.2	76.5	82.1	--	129.4	104.0	110.7
Morex	114.8	113.3	75.2	88.2	--	123.4	103.0	109.6
MT981091	--	--	--	--	137.1	131.8	131.8	109.1
MT981210	--	--	--	--	122.3	131.6	131.6	108.9
MT970116	--	--	--	--	137.0	131.1	131.1	108.5
Conlon	--	--	83.5	87.2	116.6	120.5	102.0	106.3
MT960101	--	--	--	--	131.3	128.2	128.2	106.1
Merit	111.5	118.2	72.5	77.2	121.6	122.9	104.0	106.1
Gallatin	117.5	111.5	74.0	75.5	119.5	119.0	102.8	104.9
Kendall	--	--	79.5	80.0	--	118.5	92.7	104.8
BA1202	103.6	106.1	71.0	72.3	--	128.1	96.2	102.4
Garnet	--	--	79.7	65.4	120.7	124.3	97.5	101.6
Harrington	101.4	103.1	64.0	80.4	118.6	120.8	98.1	100.0
Metcalfe	--	--	--	78.8	--	117.5	98.2	97.6
MT981238	--	--	--	--	116.8	116.3	116.3	96.3

[1] Intrastate trial [2] malt barley trial

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 8. Relative test weights of malt barley varieties grown under irrigation at the Eastern Ag Research Center, Sidney, Montana.

Cultivar	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
MT970116	--	--	--	--	53.0	52.8	52.9	105.9
Conlon	--	--	43.3	48.3	52.8	52.0	49.1	105.5
MT981091	--	--	--	--	52.7	52.2	52.5	105.0
Gallatin	51.5	50.7	44.3	47.7	52.0	51.3	49.6	104.8
Baronesse	50.7	51.7	43.8	47.2	52.0	51.7	49.5	104.6
MT981238	--	--	--	--	52.2	52.0	52.1	104.3
MT960101	--	--	--	--	51.3	52.5	51.9	103.9
MT981210	--	--	--	--	51.8	51.7	51.8	103.6
Calgary	--	--	44.0	45.8	51.0	--	46.9	103.5
Coors 37	50.5	49.2	43.2	48.3	--	50.0	48.2	103.0
Garnet	--	--	44.7	47.3	49.8	49.5	47.8	102.7
Kendall	--	--	43.9	46.0	--	50.0	46.6	102.5
Robust	49.5	47.8	42.5	48.2	--	50.2	47.6	101.7
Tradition	--	--	41.6	46.3	50.0	--	46.0	101.4
Lacey	--	--	--	--	--	50.7	50.7	101.0
Harrington	48.2	49.5	40.3	46.0	49.7	50.2	47.3	100.0
Foster	--	46.7	43.4	46.3	--	49.3	46.4	99.8
Metcalfe	--	--	--	47.0	--	49.0	48.0	99.8
Stratus	--	--	41.8	45.8	--	48.5	45.4	99.7
Stander	--	46.2	42.0	46.7	--	49.2	46.0	99.0
BA1202	47.2	--	41.0	44.5	--	49.7	45.6	98.8
Drummond	--	--	--	46.7	--	48.3	47.5	98.8
Legacy	48.2	46.7	41.8	45.8	48.2	48.5	46.5	98.3
Merit	47.2	48.2	41.3	43.8	49.2	49.5	46.5	98.3
Excel	48.0	46.5	40.2	46.7	--	48.0	45.9	98.0
Morex	47.5	45.7	41.3	45.0	--	48.5	45.6	97.4

[1] Intrastate trial [2] malt barley trial

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 9. Relative protein contents of malt barley varieties grown under irrigation at the Eastern Ag Research Center, Sidney, Montana.

Cultivar	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
MT981210	--	--	--	--	11.6	12.1	11.9	111.3
MT970116	--	--	--	--	11.3	12.1	11.7	109.9
MT981238	--	--	--	--	11.5	11.8	11.7	109.4
MT981091	--	--	--	--	11.5	11.6	11.6	108.5
Metcalfe	--	--	--	12.7	--	11.5	12.1	107.1
Kendall	--	--	12.6	12.6	--	11.8	12.3	106.9
Stander	--	11.4	12.4	12.9	--	10.3	11.8	105.4
Garnet	--	--	12.7	13.1	10.6	10.9	11.8	105.3
Robust	10.7	10.9	12.4	12.2	--	11.2	11.5	105.3
Drummond	--	--	--	12.6	--	11.2	11.9	105.3
Calgary	--	--	13.1	12.3	10.2	--	11.9	105.0
Merit	10.6	12.1	12.1	11.7	10.2	11.3	11.3	104.9
Morex	10.7	10.9	11.7	12.7	--	11.1	11.4	104.8
Conlon	--	--	11.1	11.7	11.9	12.2	11.7	104.5
Gallatin	9.7	10.4	11.9	12.6	10.8	11.8	11.2	103.7
Coors 37	9.9	10.8	11.7	12.6	--	11.3	11.3	103.3
Stratus	--	--	12.6	12.6	--	10.2	11.8	102.3
Foster	--	11.0	11.3	12.1	--	10.7	11.3	101.1
Legacy	10.4	10.9	12.5	11.7	10.0	10.0	10.9	101.1
BA1202	10.5	--	11.6	11.7	--	11.1	11.2	100.9
Harrington	9.9	10.0	12.0	11.6	10.3	11.0	10.8	100.0
Baronesse	9.5	10.2	12.1	12.0	10.4	10.6	10.8	100.0
MT960101	--	--	--	--	10.2	11.0	10.6	99.5
Excel	10.2	10.3	11.9	10.8	--	10.9	10.8	99.3
Tradition	--	--	10.6	12.3	10.5	--	11.1	98.5
Lacey	--	--	--	--	--	10.6	10.6	96.4

[1] Intrastate trial [2] malt barley trial

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.

Table 10. Relative plump percent of malt barley varieties grown under irrigation at the Eastern Ag Research Center, Sidney, Montana.

Cultivar	1999	2000	2001	2002	2003[1]	2003[2]	Ave	as % of Harrington
Garnet	--	--	84.0	90.0	96.0	94.0	91.0	107.1
Coors 37	82.0	79.0	81.0	96.0	--	93.0	86.2	106.7
Baronesse	86.0	88.0	77.0	93.0	85.0	90.0	86.5	104.8
Merit	83.0	81.0	92.0	78.0	93.0	87.0	85.7	103.8
Conlon	--	--	69.0	91.0	97.0	96.0	88.3	103.8
Foster	--	--	69.0	94.0	--	95.0	86.0	103.6
Kendall	--	--	82.0	84.0	--	91.0	85.7	103.2
BA1202	72.0	--	86.0	80.0	--	93.0	82.8	102.8
Drummond	--	--	--	92.0	--	93.0	92.5	102.2
MT970116	--	--	--	--	94.0	93.0	93.5	101.6
Lacey	--	--	--	--	--	94.0	94.0	101.1
MT981091	--	--	--	--	93.0	92.0	92.5	100.5
MT981210	--	--	--	--	94.0	91.0	92.5	100.5
Tradition	--	--	65.0	89.0	94.0	--	82.7	100.4
Harrington	73.0	82.0	68.0	88.0	91.0	93.0	82.5	100.0
Legacy	--	--	65.0	93.0	91.0	91.0	85.0	100.0
MT981238	--	--	--	--	92.0	91.0	91.5	99.5
Stander	--	--	64.0	92.0	--	91.0	82.3	99.2
Robust	--	--	64.0	92.0	--	91.0	82.3	99.2
Metcalfe	--	--	--	89.0	--	88.0	88.5	97.8
Gallatin	74.0	76.0	72.0	87.0	86.0	89.0	80.7	97.8
MT960101	--	--	--	--	85.0	89.0	87.0	94.6
Excel	--	--	62.0	86.0	--	86.0	78.0	94.0
Morex	67.0	77.0	51.0	84.0	--	88.0	73.4	90.8
Calgary	--	--	31.0	70.0	98.0	--	66.3	80.6
Stratus	--	--	17.0	79.0	--	81.0	59.0	71.1

[1] Intrastate trial [2] malt barley trial

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.