Michigan Regional Location

Local Coordinators:	**Cooperating Grower:**	**Cooperating Chip Processor:**
Chris Long Dave Douches Michigan State University East Lansing, MI	Tim & Todd Young Sandyland Farms LLC Howard City, MI	Herr Foods, Inc. Nottingham, PA

Trial Information:

Planting Date:	May 21, 2010
Vine Kill Date:	September 9, 2010
Harvest Date:	October 8, 2010 (140 Days)
Between Row & In Row Plant Spacing:	34″ x 10″; irrigated
Plots:	Single rows for each entry approximately 300′ long
GDD, Base 40	3327

Trial Procedure:

Seed was mechanically cut on May 14, 2010 and delivered to the grower's seed storage three days later. No seed treatments were applied at the time of seed cutting.

Two pre-harvest sugar profiles were taken for each variety three weeks and one week prior to vine kill on August 24th and September 7th, respectively. The pre-harvest sugar profile protocol was as follows: obtained a minimum of 40 tubers from each variety, take all the tubers from each hill, even if that required collecting more than 40 tubers. A canopy rating was taken for each variety as a percent rating of green foliage. Canopy uniformity was noted as a percentage of how uniform the foliage health appeared. The number of hills required to obtain 40 tubers was recorded, along with the total number of stems harvested. From the tubers harvested, specific gravity, a glucose value (a percent by fresh weight), a sucrose rating (a percent by fresh weight X10) and an average tuber weight (in ounces) was established.

At harvest, three plot areas of 23 feet were harvested from each entry and were used to determine yield, size distribution, specific gravity and internal defects. Two, 40 lb. storage samples were collected from each entry and were placed in the grower's commercial storage for evaluation. One set of samples will be evaluated in the winter of 2010 and the other in the spring of 2011. Eighteen, 40 tuber samples were also collected for each variety at harvest. All eighteen samples were stored at the Michigan Potato Industry Commission's Cargill Demonstration Storage Facility at approximately 48ºF or 55ºF for a monthly sugar profile evaluation at Techmark, Inc. Nine, 40 tuber samples were stored at each temperature and

evaluated October 2010 through June 2011. The storage sugar profiles began six days after harvest. Two out-of-the-field chip samples were taken for each variety at harvest. One was sent to Herr Foods, Inc. for processing and the additional sample was processed at Michigan State University.

A plant growth and vigor observation was made on June 21st. MSJ126-9Y appeared to have the slowest rate of vine growth, whereas, NY139 and W2717-5 were the most vigorous at this date.

Growing Season Weather:

Weather conditions during the 2010 growing season were warmer than average. Growing degree days base 40 recorded for this time period was the highest in six years at 3327. Total rainfall from May 20th through September 8th was approximately 9.83". The daytime temperatures during this growing period did not exceeded 90ºF. The nighttime temperatures during this period, May through September, were the highest in six years. The nights with temperatures over 70 ºF during this growing period were twice the five year average. The average specific gravity in Michigan was below average as a result of the increased nighttime heat stress.

Results:

Table 1 summarizes the yield, size distribution, and specific gravity data at harvest. AF2291-10 and W5015-12 topped the yield table in 2010 followed by a group of lines that yielded above average. These lines are: Snowden, MSL292-A, NY138, Atlantic, NY139 and W2310-3. AF2291-10 and MSL292-A had a large percentage of recorded oversize tubers. W2978-3, MSJ126-9Y and CO97043-14W had very low specific gravities.

Table 1. Yield ,Size Distribution*, Specific Gravity

	Yield (cwt/A)		Percent Size Distribution					
Entry	US#1	TOTAL	US#1	Small	Mid-Size	Large	Culls	Specific Gravity
AF2291-10	506	565	90	4	74	16	6	1.081
W5015-12	498	565	89	11	78	11	0	1.080
Snowden	**463**	**510**	**90**	**10**	**82**	**8**	**0**	**1.077**
MSL292-A	457	490	93	7	79	14	0	1.071
NY138	444	471	94	6	82	12	0	1.071
Atlantic	**443**	**472**	**94**	**6**	**82**	**12**	**0**	**1.082**
NY139	428	469	91	8	80	11	1	1.076
W2310-3	418	479	87	6	78	9	7	1.082
W2978-3	392	434	91	9	82	9	0	1.064
CO97065-7W	344	377	91	8	81	10	1	1.070
MSJ126-9Y	285	336	84	16	81	3	0	1.065
CO97043-14W	265	305	87	13	80	7	0	1.065
W2717-5	258	300	86	13	84	2	1	1.080
MEAN	**400**	**444**	**90**	**9**	**80**	**10**	**1.2**	**1.074**

*small <1 7/8"; mid-size 1 7/8"-3 1/4"; large >3 1/4"

Table 2 summarizes the at-harvest tuber quality. Internal quality across the trial was generally acceptable. Hollow heart was prevalent in Atlantic, CO97065-7W and to a lesser degree in W5015-12 and W2717-5. W5015-12 also recorded six internal brown spots in addition to the hollow heart.

Table 2. At-Harvest Tuber Quality. Sandyland Farms, Howard City, Michigan.

	Internal Defects[1]				
Entry	**HH**	**VD**	**IBS**	**BC**	**Total Cut**
AF2291-10	2	5	0	0	30
W5015-12	3	5	6	0	30
Snowden	**1**	**7**	**0**	**0**	**30**
MSL292-A	0	5	0	0	30
NY138	1	5	0	0	30
Atlantic	**8**	**3**	**2**	**0**	**30**
NY139	0	2	0	0	30
W2310-3	0	3	0	1	30
W2978-3	0	2	0	0	30
CO97065-7W	9	1	0	1	30
MSJ126-9Y	0	3	0	0	30
CO97043-14W	0	7	0	0	30
W2717-5	3	7	0	0	30

[1]Internal Defects. HH = hollow heart, VD = vascular discoloration, IBS = internal brown spot, BC = brown center.

Table 3 shows the post-harvest chip quality based on samples collected at harvest on October 8th and processed at Herr Foods, Inc. on October 11th. Chip colors were generally acceptable, with MSL292-A having the highest Agtron score of the trial at 67.3. The varieties listed in ranked order based on observations from Herr Foods, Inc. are as follows: CO97043-14W, W2310-3, NY138, W2717-5, W5015-12, MSL292-A, Snowden, W2978-3, MSJ126-9Y, Atlantic, CO97065-7W, AF2291-10 and NY139.

Table 3. 2010 Post-Harvest Chip Quality[1].

Entry	Agtron Color	SFA[2] Color	Specific Gravity	Percent Chip Defects[3] Internal	External	Total
AF2291-10	62.4	3	1.075	56.1	4.0	60.1
W5015-12	62.0	3	1.077	18.4	13.9	32.3
Snowden	**63.5**	**2**	**1.076**	**21.9**	**4.9**	**26.8**
MSL292-A	67.3	2	1.071	9.1	6.7	15.8
NY138	65.4	3	1.070	37.0	3.4	40.4
Atlantic	**62.9**	**4**	**1.080**	**47.9**	**5.4**	53.3
NY139	62.0	2	1.076	26.6	11.4	38.0
W2310-3	64.5	3	1.082	31.4	5.2	36.6
W2978-3	64.2	2	1.064	21.5	30.6	52.1
CO97065-7W	61.0	3	1.066	18.2	10.8	29.0
MSJ126-9Y	65.7	2	1.066	24.8	6.6	31.4
CO97043-14W	63.5	3	1.065	20.9	10.5	31.4
W2717-5	60.3	3	1.078	22.4	7.7	30.1

[1] Samples collected at harvest October 8th and processed by Herr Foods, Inc., Nottingham, PA on October 11, 2010 (3 days).

Chip defects are included in Agtron and SFA samples.

[2] SFA Color: 1= lightest, 5 = darkest

[3] Percent Chip Defects are a percentage by weight of the total sample; comprised of undesirable color, greening, internal defects and external defects.

Table 4 summarizes the results of the samples collected for black spot bruise. Two, 25 tuber samples were collected at harvest. One sample served as a check and the second sample was stored for at least 12 hours at 50ºF, then placed in a 6 sided plywood drum and rotated 10 times to produce a simulated bruise. Two to three weeks later, all samples were abrasively peeled and scored for the presence of black spot bruise. Among the "Simulated Bruise" samples, the best entries were NY138, MSJ126-9Y and W2978-3. W5015-12, AF2291-10, Snowden, and Atlantic showed the lowest percent bruise free.

Table 4. Black Spot Bruise Test

	A. Check Samples[1]									B. Simulated Bruise Samples[2]								
	# of Bruises Per Tuber						Total	Percent Bruise	Average Bruises Per	# of Bruises Per Tuber						Total	Percent Bruise	Average Bruises Per
Entry	**0**	**1**	**2**	**3**	**4**	**5**	**Tubers**	**Free**	**Tuber**	**0**	**1**	**2**	**3**	**4**	**5**	**Tubers**	**Free**	**Tuber**
AF2291-10	10	13	2				25	40	0.7	2	10	5	5	2	1	25	8	1.9
W5015-12	11	5	5	3	1		25	44	1.1	1	4	5	6	3	6	25	4	3.0
Snowden	14	8	2	1			25	56	0.6	3	2	7	8	1	4	25	12	2.6
MSL292-A	12	6	3	2	2		25	48	1.0	10	9	3	1	1	1	25	40	1.1
NY138	23	1	1				25	92	0.1	17	6	1	1			25	68	0.4
Atlantic	2	12	4	5	1	1	25	8	1.8	3	7	7	2	3	3	25	12	2.2
NY139	14	9	1	1			25	56	0.6	9	10	5		1		25	36	1.0
W2310-3	8	10	5	2			25	32	1.0	4	9	4	3	2	3	25	16	2.0
W2978-3	22	3					25	88	0.1	12	8	3	2			25	48	0.8
CO97065-7W	13	9	3				25	52	0.6	5	5	11	4			25	20	1.6
MSJ126-9Y	20	5					25	80	0.2	15	9	1				25	60	0.4
CO97043-14W	14	10	1				25	56	0.5	10	9	4	2			25	40	0.9
W2717-5	15	10					25	60	0.4	10	5	5	3	2		25	40	1.3

[1]Tuber samples collected at harvest and held at room temperature for later abrasive peeling and scoring.

[2]Tuber samples collected at harvest, held at 50ºF for at least 12 hours, then placed in a 6 sided plywood drum and rotated 10 times to produce simulated bruising. They were then held at room temperature for later abrasive peeling and scoring.

Tables 5A and 5B summarize the results of the pre-harvest panel data. All varieties appeared to have stable sugar levels prior to harvest. CO97065-7W and W2978-3 were the earliest maturing varieties based on the canopy rating. AF2291-10 had the largest average tuber weight at both panel dates.

Table 5A. Pre-Harvest Panels, 8/24/10

Entry	Specific Gravity	Glucose[1] %	Sucrose[2] Rating	Canopy Rating[3]	Canopy Uniform.[4]	Number of Hills	Number of Stems	Average[5] Tuber Weight
AF2291-10	1.072	0.013	0.568	90	90	5	9	6.84
W5015-12	1.073	0.002	0.385	80	90	5	17	4.00
Snowden	**1.073**	**0.002**	**0.297**	**85**	**95**	**4**	**28**	**4.68**
MSL292-A	1.069	0.002	0.363	75	95	4	10	4.80
NY138	1.065	0.002	0.228	75	95	4	7	5.89
Atlantic	**1.072**	**0.002**	**0.280**	**90**	**95**	**4**	**11**	**5.65**
NY139	1.074	0.002	0.363	85	90	4	13	5.73
W2310-3	1.079	0.005	0.419	80	90	5	17	5.02
W2978-3	1.063	0.002	0.469	20	90	3	7	5.48
CO97065-7W	1.070	0.002	0.226	10	80	5	18	4.36
MSJ126-9Y	1.066	0.002	0.720	60	90	7	13	4.24
CO97043-14W	1.062	0.001	0.280	85	90	5	12	3.64
W2717-5	1.083	0.002	0.636	70	90	5	12	4.71

[1]Percent Glucose is the percent of glucose by weight in a given amount of fresh tuber tissue.

[2]Sucrose Rating is the percent of sucrose by weight in a given amount of fresh tuber tissue X10.

[3]The Canopy Rating is a percent rating of green foliage (0 is all brown dead foliage, 100 is green vigorous foliage).

[4]The Canopy Uniformity is a percentage of how uniform the foliage health is at the date of observation.

[5]The Average Tuber Weight is the total tuber weight collected divided by the number of tubers reported in ounces.

Table 5B. Pre-Harvest Panels, 9/7/10

Entry	Specific Gravity	Glucose[1] %	Sucrose[2] Rating	Canopy Rating[3]	Canopy Uniform.[4]	Number of Hills	Number of Stems	Average[5] Tuber Weight
AF2291-10	1.079	0.003	0.503	45	90	5	9	6.51
W5015-12	1.080	0.002	0.312	35	90	4	15	4.24
Snowden	**1.076**	**0.002**	**0.484**	**40**	**95**	**3**	**24**	**3.99**
MSL292-A	1.075	0.002	0.452	35	95	4	9	5.92
NY138	1.071	0.002	0.299	35	95	4	7	5.07
Atlantic	**1.076**	**0.002**	**0.417**	**50**	**95**	**4**	**18**	**4.34**
NY139	1.076	0.002	0.428	40	95	5	15	4.74
W2310-3	1.085	0.003	0.275	35	90	5	15	4.48
W2978-3	1.064	0.003	0.434	15	85	4	12	5.23
CO97065-7W	1.070	0.002	0.286	5	95	6	15	5.21
MSJ126-9Y	1.064	0.002	0.705	20	90	4	10	3.37
CO97043-14W	1.069	0.001	0.316	30	85	5	13	4.94
W2717-5	1.065	0.003	0.796	30	90	5	19	3.92

[1]Percent Glucose is the percent of glucose by weight in a given amount of fresh tuber tissue.

[2]Sucrose Rating is the percent of sucrose by weight in a given amount of fresh tuber tissue X10.

[3] The Canopy Rating is a percent rating of green foliage (0 is all brown, dead foliage, 100 is green, vigorous foliage).

[4] The Canopy Uniformity is a percentage of how uniform the foliage health is at the date of observation.

[5] The Average Tuber Weight is the total tuber weight collected, divided by the number of tubers reported in ounces.

Variety Comments:

AF2291-10: This was the top yielding variety in the 2010 variety trial with a 506 cwt./A US#1 yield and an above average specific gravity at 1.081. The variety had the largest number of oversize tubers of any variety in the trial at 16 percent. Internal raw tuber defects were moderate. AF2291-10 performed at the bottom of the group at Herr Foods on October 11th, 2010 and recorded the highest amount of chip defects of any variety totaling 60.1 percent. AF2291-10 exhibited a very high level of black spot bruise susceptibility for the second year in a row with only 8 percent of the tubers being bruise free both in 2009 and 2010. It appears to be a full season variety.

W5015-12: This variety had the second highest yield in 2010 at 498 cwt./A US#1 yield with a specific gravity of 1.080. Internal tuber defects were moderate at harvest. W5015-12 ranked 5th at Herr's for chip quality out-of-the-field. The variety had the worst black spot bruise reaction of any of the varieties in the trial, receiving only a 4 percent bruise free rating in the simulated bruise testing. This variety appeared to be mature in the September 7th pre-harvest panel.

Snowden: Snowden was the third highest yielding variety in the 2010 variety trial with a 463 cwt./A US#1 yield and an above average specific gravity at 1.077. Internal raw tuber quality was good at harvest. This variety was average in chip performance at Herr Foods at the out-of-the-field fry test. Snowden was tied for third most susceptible line to black spot bruise in the trial.

MSL292-A: MSL292-A was above average in yield at 457 cwt./A US#1 with 14 percent oversize recorded. The specific gravity for this variety was slightly below the trial average at 1.071. This variety exhibited very low raw internal tuber effects. This variety ranked highest at Herr's out-of-the-field chip evaluation for AGTRON color at 67.3 and the lowest for total percent chip defects at 15.8. MSL292-A was moderately resistant to black spot bruise and ranked near the trial average. This variety appeared to be the most mature based on the pre-harvest panel data from September 7th where the sucrose rating was 0.452 and glucose level was 0.002.

NY138: NY138 yielded higher than the trial average at 444 cwt./A US#1. Specific gravity was just below average at 1.071. Tuber quality at harvest was good. Only a slight amount of internal defects were observed. Herr's ranked this variety 3 of 13 in chip performance out-of-the-field mostly due to a strong AGTRON number of 65.4. NY138 showed the lowest susceptibility to black spot bruising with 68 percent of the tubers being bruise free after simulated bruise testing.

Atlantic: This was an above average yielding variety with a 443 cwt./A US#1 yield and an above average specific gravity at 1.082. This variety had a good percentage of oversize tubers, but 27 percent of them were hollow. Chip quality at Herr Foods on October 11th ranked below average with 53.5 percent total chip defects recorded; this is the second worst in the trial. Atlantic showed black spot bruise susceptibility with only 12 percent of the tubers being bruise free. The vines appeared to hold-on this growing season for an extended period of time.

NY139: NY139 had a nice yield of US#1 tubers at 428 cwt./A and a tuber size distribution that consisted of 80 percent A-size and 11 percent oversize tubers. The specific gravity was above the trial average. The internal tuber defects were very low, but the at-harvest chip fry ranked this variety 13th out of the 13 varieties for overall appearance even though the AGTRON and chip defects were average. This variety was average for black spot bruise susceptibility in the 2010 trial.

W2310-3: The US#1 yield for W2310-3 was slightly above the trial average at 418 cwt./A. The specific gravity was good at 1.082. This was the highest recorded specific gravity in the trial for 2010. Seven percent of the total harvested tubers for this variety were culls which was the highest in the trial. Internal tuber defects were low and the ranking at Herr's was excellent, ranking second of 13 varieties in out-of-the-field chip performance. Black spot bruise tolerance was poor with only 16 percent of the tubers remaining bruise free.

W2978-3: The yield on W2978-3 was below average at 392 cwt./A US#1. The specific gravity was the lowest in the 2010 trial at 1.064. Internal defects were very low and the ranking at Herr's was below average, ranking eight of 16 varieties in out-of-the-field chip performance. Recorded total percent chip defects for W2978-3 was the third highest in the trial at 52.1 percent. Black spot bruise tolerance was very good but expected with such a low specific gravity. This variety showed signs of having an early maturity in 2010 based on the pre-harvest panel data collected.

CO97065-7W: This variety had a 344 cwt./A US#1 yield with a below average specific gravity of 1.070. Nine hollow heart were observed in thirty cut oversize tubers at harvest giving this variety the worst hollow heart susceptibility in the trial. Herr's ranked this variety 11th for overall chip quality. CO97065-7W recorded only 20 percent of the tubers with a bruise free rating. The vine maturity appeared to be the earliest in the trial.

MSJ126-9Y: This variety recorded the third lowest yield in this year's trial. MSJ126-9Y was tied for the second to lowest for specific gravity in the trial at 1.065. Internal tuber quality was generally good. The clone ranked 9th at Herr's in the chip quality. The bruise free rating was 60 percent which ranked MSJ126-9Y second in black spot bruise tolerance.

CO97043-14W: The US#1 yield for this line was 265 cwt./A with below average specific gravity. Internal defects were generally low with some vascular discoloration recorded. The variety appeared to be slightly susceptible to black spot bruise. This variety was mature at the time of vine kill.

W2717-5: W2717-5 yielded 258 cwt./A US#1 with a specific gravity of 1.080. This is the lowest recorded US#1 yield for the 2010 trial. The variety had three hollow heart and seven vascular discoloration in thirty cut tubers. Herr's ranked this variety 4th in the overall chip quality evaluation. The line appears to have an average tolerance to black spot bruise and was mature at the time of vine kill.