Potato Breeding Program Research Update 2008

Felix Navarro[1], Bryan Bowen[2] and Jiwan Palta[3]

Asst. Scientist-Rhinelander Ag. Research Station[1]
Superintendent Rhinelander Ag. Research Station[2]
Leader UW-Madison Potato Breeding Program[3]

Introduction

The Wisconsin breeding program has emphasized the evaluation of clones of different year of evaluation. Special effort has been made to evaluate for tuber quality traits and diseases early enough in the selection process to make the best possible use of the variability present in the available populations. This report covers the 2007 results from ongoing projects carried out by our program staff and a review some of the results of experiments collaborated by researchers from WI, the North Central, North East, Oregon and Canada. Every year the breeding program contribute clones for evaluation to a network of more than thirty researchers in the US and Canada as further reports become available in which WI lines are included, these results will be posted in our website www.uwpotatoes.wisc.edu.

1. Elite Line Trials
- **-Agronomic and Diseases Evaluations (See reports by Bussan)**
- **-SpudPro**
- **-North Central Potato Variety Trial (NCPVT)**

2. Advanced Breeding Lines
- **-Potato Variety and Advanced Selection Evaluation (See Kostichka report)**
- **-Replicated yield and adaptation trials**
- **-Scab trial**
- **-Late blight trial**

3. Early Generation Selection

Performance of North Central and Wisconsin Potato Clones in 2007

The North Central variety trial includes clones that

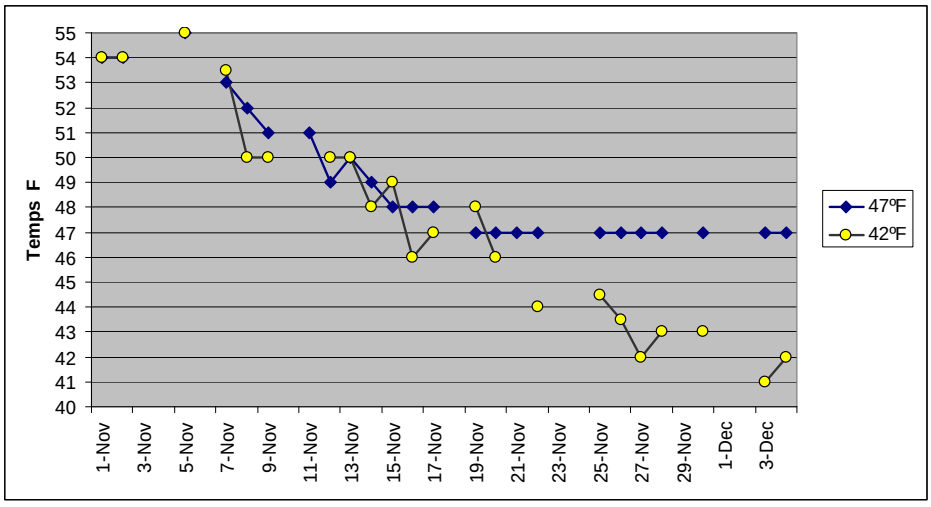
The experiment was established in May 1 and harvested in September 4 at Hancock, WI under irrigation. The experimental design was a RCBD with 17 clones and 4 reps. The traits evaluated were: Vigor (1= very vigorous, 5= very low vigor), plant growth habit (1= very upright, 5= very decumbent), foliar diseases: Early Blight was evaluated three times (July 17, July 24 and August 7 on a 1 to 5 scale (1=no disease to 5= 100% leaf blight) and the area under the disease curve progress (AUDPC) was computed as

$$\text{AUDPC} = \sum_{i=1}^{n-1}\left[\left(t_{i+1}-t_i\right)\left(y_i+y_{i+1}\right)/2\right]$$

where $t_{i+i} - t_i$ = number of days between evaluations, $y_i + y_{i+1}$ = addition of the 1 to 5 scores observed in the respective evaluations. Early Dying (1= no early dying symptoms 85 days after planting, 5= 100% of plants in a plot and branches showing early dying symptoms 85 days after planting). Maturity by vine senescence: number of days after planting (DAP) at which 50% or more of the branches in 50% or more of the plants senesced (1-5 scale), where 1 = Very Early (<100 DAP), 2 = Early (100-110 DAP), 3 = Mid-season (111-120 DAP), 4 = Late (121-130 DAP) and 5 = Very Late (>130 DAP).

Grading Data at Harvest: Tuber External Evaluations: Shape: 1 = perfectly round, to 9 = very elongated. Size: 1 = extremely small to 9 = extremely large. Skinning at harvest: 1 totally skinned, to 9 = no skin detached. Scab: 1 = 100% of potatoes with deep pitted scab, to 9 = no scab symptoms observed. Preference: tuber appeal 1 = very smooth, nice looking tubers to 5 = very rough ugly tubers with external defects. Evaluation of culled potatoes in cwt/a: rot, greening, growth cracks, secondary growth, and off-shape. Specific gravity was evaluated using the weight in the air / weight in the water method. Tuber internal defects were measured as percentage in 60 cut tubers: hollow heart, brown center, vascular discoloration, internal brown spot and stem end discoloration

Chip Color data: a 15 tuber sample of each plot was stored at 55ºF until, sprout inhibited and located in two storage room that were ramped down to 47 and 42ºF (see graph below). Potatoes were chipped directly out of the storage. Chips were fried at 350°C for three minutes using a Hotpoint™ HK3 model (General Electric, Chicago Heights, IL). Chip color scores were estimate using a visual 1-10 scoring scale was used where 1=very light chip color and 10=very dark chip color.



Statistical Analyses: data were analyzed using a PROC MIXED procedure, each lines is compared within its market type. Underlined and boldfaced italics imply statistical significance with respect to the market group. Underlined value imply a poor performance referred to the market type and boldfaced italics values imply

Highlights of Data Reported (See Table 1)

CV97065-1: Round white clone with low yield, gravity lower than Atlantic and Snowden, susceptible to foliar early blight and early dying. Chip color as Atlantic and darker than Snowden from 47°F 3 months after harvest.

MSJ316-A: Round white with total yields comparable to Snowden and Atlantic, but lower solids, high percentage of IBS and resistance to early dying and early blight.

MSI005-20Y: Round white with High US#1 yield, it also exhibited the lowest specific gravity among the tested clones tested and dark chip color (47F at 3 months of storage).

AND98324-1Rus: Low US#1 yield due to high percentage of tubers with internal defects. Good chip color and high specific gravity.

CV98112-3: Russet clone with low US#1 yield due to high percentage of tubers with hollow heart, very low specific gravity (<1.060) and late-very late vine senescence.

MSA8254-2BRUS: Low yield, significantly higher cull weights compared to other russets evaluated. Dark chip color from 3months of storage at 47F.

W1879-1rus: Moderate yield, excellent internal and external quality, higher proportion of undersize tubers (4.4%), significantly higher than the average russet clone tested.

W2683-2rus: Moderate yield with excellent internal and external quality and moderate gravity and good chip color 3 months after harvest.

WV4298-1rus: High yield with excellent internal quality. 9.5% culls mostly due to greening. Moderate gravity and good chip color 3 months after harvest.

ATND98459-1Ry: Red clone with excellent yield comparable to Red Pontiac and good internal quality.

UHB0950-2: Red clone with low yield and high proportion of internal defects, mostly tuber rot.

ND4659-5R: Red clone with good yield and tuber quality.

ND5002-3R: Good yield and tuber quality.

Table 1. Results of the North Central Potato Variety Trial, Hancock, WI.

			Internal Defects					External Defects					Processing Traits			Tuber Characteristics					In Season Evaluations				
	TotalYld	Undersize %	Hollow Heart %	Brown Center %	Vascular Disc. %	Stem End Disc %	Internal Brown Spot %	Growth Crack %	Second Growth %	Tuber Greening %	Tuber Rot %	Offshape %	Specific Gravity	Chip Color 3 mo 42°F	Chip Color 3 mo 47°F	Shape	Size	Skin	Scab	Pref	Plant Vigor	Plant Growth Habit	Early Blight AUDPC	Early Dying August 7	Days to Vine Senesc
CHIP																					1.8	2.0	46.8	2.1	114
CV97065-1	425	1.7	2.2	0.8	0.8	0.6	***1.1***	0.0	0.3	2.9	0.2	0.7	1.072	***4.1***	5.2	3.2	5.1	8.8	8.4	2.2	2.3	2.7	72.8	3.4	***105***
MSI005-20Y	545	2.3	1.1	0.6	1.3	0.6	***1.7***	0.1	0.3	1.8	0.2	0.5	1.069	7.7	7.5	3.7	5.8	8.8	7.4	2.2	2.6	2.8	58.8	2.8	***108***
MSJ-316A	531	2.6	0.8	1.4	1.9	0.4	12.4	0.0	0.2	1.0	0.5	0.4	1.073	6.6	5.9	3.7	5.5	8.0	***8.8***	2.3	***1.3***	1.7	***33.2***	***1.1***	125
Atlantic	510	1.9	6.6	2.0	1.3	0.9	8.6	0.0	0.5	2.6	0.2	0.6	***1.081***	***4.3***	5.4	3.9	***6.8***	8.4	8.1	2.8	1.8	2.0	42.7	2.0	113
Snowden	568	2.4	6.7	1.5	2.0	0.6	5.6	0.0	0.2	0.7	0.1	0.7	***1.080***	***4.1***	***3.6***	3.5	***6.6***	8.5	8.4	2.4	***1.2***	***1.6***	41.0	1.7	124
REDS																					1.8	2.0	46.8	2.1	114
ATND 98459-1RY	***632***	2.2	0.7	0.5	0.5	0.5	0.3	0	0.18	1.2	0.1	0.2	1.069			4.0	4.5	7.8	8.4	3.0	1.8	2.2	54.3	2.1	***108***
ND4659-5R	538	2.7	0.7	0.5	0.5	0.4	0.1	0	0.2	0.9	0.2	0.2	1.061			3.5	4.5	7.1	8.1	2.1	1.9	2.0	***39.0***	2.3	111
ND5002-3R	510	1.9	0.9	0.5	1.0	0.4	0.5	2	0.23	0.9	0.2	0.4	1.061			4.3	5.2	6.9	8.1	2.4	1.9	2.3	41.0	2.0	119
VHB0950-2	417	3.0	8.5	0.8	1.2	1.0	0.5	0	0.31	2.2	0.6	0.3	1.070			***5.9***	5.5	6.9	7.9	2.5	1.9	2.0	44.5	2.4	***110***
RPONTIAC	***700***	1.6	2.1	0.8	2.6	0.6	1.2	0	0.18	2.0	0.1	0.4	1.062			***5.5***	***7.0***	7.4	8.4	3.9	1.5	***1.6***	50.5	2.2	116
RUSSETS																					1.8	2.0	46.8	2.1	114
AND98324-1Rus	508	1.7	20.7	4.0	9.6	1.3	5.1	0.0	0.2	0.6	0.4	1.5	***1.081***	***2.4***	***5.4***	5.9	5.6	8.0	8.8	3.2	***1.3***	1.8	42.3	1.7	111
CV98112-3	413	3.2	23.5	1.8	0.5	0.4	2.6	0.0	0.4	1.5	0.9	0.6	1.056	4.6	6.8	***7.2***	6.3	8.0	9.0	***2.0***	***1.1***	***1.2***	***39.8***	1.9	123
MSA8254-2BRUS	350	3.7	12.5	1.0	0.5	0.4	2.6	0.2	0.7	1.6	1.1	1.5	1.064	6.5	8.5	***7.3***	***6.4***	7.7	9.0	2.7	1.8	***1.5***	***39.0***	***1.2***	119
W1879-1rus	449	4.4	3.1	0.6	1.3	0.8	0.4	0.0	0.2	0.6	0.4	1.2	1.067	5.1	7.1	6.0	5.1	8.2	9.0	2.8	2.3	2.2	48.1	2.1	116
W2683-2rus	468	1.9	7.7	0.5	0.5	1.0	1.5	0.2	0.2	1.4	0.7	1.0	1.069	2.9	6.5	6.4	6.0	8.4	9.0	2.4	1.8	2.2	***39.4***	1.7	118
WV4298-1rus	525	2.6	***1.5***	0.5	0.5	0.6	3.7	0.0	0.2	2.7	0.5	1.4	1.068	4.4	7.5	6.6	6.3	***8.7***	9.0	1.9	***1.3***	***1.6***	40.6	1.7	117
Norkotah	489	1.6	2.5	0.5	0.5	0.6	1.8	0.0	0.2	0.7	0.5	0.6	1.067	5.0	7.4	6.3	5.8	7.9	9.0	1.9	2.8	2.9	69.5	3.4	***101***

Note: Statistical significance of the values are given by boldfacing (superior to their market type performance) or underlining (inferior to market type performance)

SpudPro Candidates Variety Trial: Fifteen advanced clones were included in this trial established in cooperation with **Charles Kostichka** at the Hancock Experimental Station. They represent elite lines evaluated previously to presenting them to the SpudPro variety promotion committee.The methods of evaluations were done as explained for the North Central Variety trial. Fried materials for the russets consist of slabs whose color are read with the help of a photovolt and the values are not comparable to chips obtained from round white clones. Highlights of the 2007 SpudPro trial are as follows:

Round White and Chipping Lines
W2564-2: High total and US#1 yield. Largest size profile among the lines tested. Lower specific gravity compared to Atlantic and Dakota Pearl. Good internal and external characteristics. Did not fry well in October from 55°F or January, from 42°F, 45°F and 48°F. May be a candidate for a fresh market round white variety.
W3186: Best chipping ability in the group. Good total yield and percentage of US#1. Better solids compared to Dakota Pear, but lower than Atlantic. Somewhat variable tuber shape which includes some flat tubers.
W3852-4Y: Lowest yield in the chipping group. Smooth, shallow eyes and yellow flesh.
W4016-4: Good chipping ability. Average yield with respect to chippers tested. Had good specific gravity 100 DAP. Small size profile and ariable shape.

Red Clones:
W2609-1R: Lower than average yield among the reds. Variable size. Color similar to Dark Red Norland.
W3882-1R: Small size profile. Lower than average yield, good color and skin set.
W3957-6R: Good yield, better than Dark Red Norland. Very uniform.
W6270-1R: Highest yield of tested reds, relatively smooth.

Russets Clones:
W2253-5rs: Lowest yield among the russets. Very good frying data until January 15. Low gravity of 1.060.

W3160-rus: Low total yield and low US #1 yield. It has the potential to develop internal brown spot. Small tuber size profile but of attractive appearance.
W3666-2rus: Yield similar to Russet Burbank with significantly smaller proportion of tubers with external and internal defects. Gravity is lower than Burbank and similar to Goldrush. Darker fried products compared to Russet Burbank. Fresh market russet.
W3743-5rus: Attractive large size tubers. Darker fried products at any temperarture among tested russets. Specific gravity is similar to Goldrush. Fresh market light russet.
W3952-3rus: Uniform mid size russet. Total yield is comparable to Russet Burbank. Specific gravity is significantly lower than Burbank with darker fried products.
W5716-1rus: Higher than average yield among the russets. Small tuber size profile with shallow eyes and smooth appearance. Specific gravity is similar to Burbank; in addition, fried products in October and January similar in color to Russet Burbank.
W6153-6Yrus: Yellow flesh russet with moderate yield lower than Russet Burbank and much better tuber appearance and uniformity.

Table 2. Results of SpudPro trial, Hancock Agricultural Research Station, 2007, in cooperation with Charles Kostchichka.

	Tuber Yield				Size Grades						External			Internal Defects				Processing Traits					
	Total Yield (cwt/a)	Percent US#1 Yield	Tuber Yield <2oz (cwt/a)	Culls Yield (cwt/a)	% Tubers 2-4 oz	% Tubers 4-6 oz	% Tubers 6-10 oz	% Tubers 10-13 oz	% Tubers 13-16 oz	% Tubers >16 oz	Tuber Shape (1-9)	Tuber Size (1-9)	Preference (1-5)	% Hollow Heart	% Brown Center	% Internal Brown Spot	% Vascular Discoloration	Specific Gravity 100 DAP	Specific Gravity 130 DAP	Fry Data 55°F/ Oct 12	Fry Data 42°F/ Jan 15	Fry Data 45°F/ Jan 15	Fry Data 48°F/ Jan 15
All Chips	469	88.4	14	15	24	30	35	8	3	1	3.8	5.7	2.6	1.2	1.8	2.1	0.9	1.075	1.073	4.5			
All Reds	478	88.2	29	22	39	36	23	1	0	0	3.8	4.9	2.8	0.0	0.2	0.0	0.6	1.056	1.057				
All Russets	444	85.2	38	15	17	31	36	10	4	2	6.7	6.8	2.5	0.6	0.4	1.4	0.2	1.063	1.064	1.8			
Atlantic	***563***	81.3	14	23	19	23	***37***	***10***	***9***	1	3.9	***6.8***	2.8	0.7	5.3	1.5	0.3	***1.080***	***1.083***	5.0	6.6	7.2	6.7
Dakota Pearl	462	80.6	13	18	23	32	34	6	5	0	3.9	5.7	2.6	4.6	2.5	3.6	1.0	1.073	1.068	4.1	***3.6***	***3.7***	***3.7***
W2564-2	532	***89.3***	10	11	***14***	23	***38***	***13***	***10***	1	3.9	***6.8***	2.5	0.3	0.9	1.2	0.7	1.067	1.067	6.7	7.1	7.6	7.0
W3186	510	89.8	13	15	20	28	37	9	5	1	3.8	5.9	***1.9***	0.2	1.2	1.5	0.4	1.077	1.073	***3.1***	***3.8***	5.2	4.9
W3852-4Y	371	85.8	13	12	36	31	25	2	5	0	3.4	**4.6**	2.6	0.3	0.5	3.3	0.3	1.073	1.076				
W4016-4	468	86.6	18	11	32	36	27	1	3	0	3.9	**4.6**	2.8	1.1	0.5	1.7	2.4	***1.080***	1.072	***3.4***	5.5	6.3	***4.6***
Dark Red Norland	484	88.4	23	19	31	39	25	2	3	0	***4.4***	5.2	3.0	0.0	0.1	1.4	0.2	1.051	1.051				
W2609-1R	436	86.4	28	18	44	33	19	0	3	0	3.5	4.2	2.7	0.0	0.5	1.4	0.2	1.057	1.057				
W3882-1R	432	82.2	26	22	39	34	22	2	4	0	3.4	4.2	2.7	0.0	0.1	1.4	1.9	1.056	1.058				
W3957-6R	531	84.8	37	29	39	33	23	2	3	0	3.7	5.5	2.7	0.0	0.5	1.4	0.2	1.057	1.057				
W6270-1R	570	***87.6***	32	20	39	34	23	1	3	0	4.1	5.2	2.7	0.0	0.1	1.4	0.2	1.061	***1.062***				
Bannock	397	84.9	***12***	17	***7***	***16***	36	***20***	***17***	4	6.8	***7.5***	2.2	1.4	0.1	1.0	0.1	1.062	1.065	1.5	2.1	2.6	***2.0***
Goldrush	491	***88.3***	***21***	***9***	14	23	***40***	***12***	9	2	6.7	6.8	2.7	0.1	0.1	0.8	0.7	1.061	1.065	1.2	2.4	2.7	2.8
Burbank	***509***	80.8	43	19	19	34	34	6	5	1	6.8	6.6	3.0	1.0	2.9	0.8	0.1	***1.069***	***1.068***	1.8	***1.8***	2.1	2.1
W2253-5rus	361	86.4	***20***	12	***11***	***27***	41	11	8	2	6.5	7.0	2.6	0.6	0.1	1.0	0.4	1.058	1.060	1.6	***1.7***	***1.5***	***1.7***
W3160-rus	413	66.3	74	14	29	35	24	4	6	2	6.5	5.8	***2.0***	1.4	0.2	5.2	0.1	1.061	1.067	1.7	3.6	3.8	3.9
W3666-2rus	482	***89.6***	***26***	14	13	24	35	***13***	***10***	***5***	6.4	6.8	2.6	0.1	0.1	0.8	0.1	1.064	1.062	2.8	3.1	3.5	3.3
W3743-5rus	499	85.0	***24***	20	***7***	24	***43***	***17***	8	1	7.0	***7.6***	2.4	0.0	0.2	1.2	0.1	1.061	1.061	2.8	3.8	3.8	3.9
W3952-3rus	503	77.2	75	19	20	39	29	5	5	1	6.9	6.6	2.4	0.1	0.1	0.8	0.1	1.061	1.064	1.2	2.9	3.4	2.9
W5716-1rus	482	86.9	***26***	***8***	22	37	32	4	4	1	6.6	6.6	2.7	0.6	0.1	1.0	0.1	***1.069***	1.067	1.3	***1.9***	2.1	2.4
W6153-6Yrus	449	78.5	63	16	19	38	31	5	6	1	***7.2***	7.0	2.5	0.6	0.1	1.0	0.1	1.065	1.064				

Note: Statistical significance of the values are given by boldfacing (better performance compared to its market type) or underlining (inferior performance).
For preference score 1-5 or 1 = best, 5= worst. Tuber shape: 1 = round, 9 = long. Tuber size 1 = small, 9 very large. Fry data 1 = white, 10 = very dark,

Advanced Breeding Lines of Year 4 and 5:

Replicated Yield and Adaptation Trials (RT): Two selection experiments that included advanced breeding lines were conducted at the Rhinelander and Hancock A.R.S. locations using three replications with a plot size of one 20 ft row. The replicated trial 1 (RT_1) was composed of 112 lines, including 50 round white, 32 russets, 16 reds and 5 yellow flesh and appropriate standard varieties in each group. The reds, a portion of the russets and round white and the yellow flesh are considered candidates for the fresh market while most of the round white and a portion of the russets are targeted to the processing industries for fried products that include chips and French fries. Appropriate checks are included in each group. This trial was planted at Hancock and Rhinelander. The main objective of this trial is to gather data on the field performance, adaptation and tuber qualities of 4^{th} year selections. At the same time, diseases such as common scab, early blight, early and early dying are evaluated at the same or separate trials. The RT_2 was composed by 50 lines, including the best performing 24 round white, 12 russet and 4 red clones, selected from Year 4 experiments in previous years. Results for both experiments are given in Tables 3 and 4. Frying evaluations are being performed directly from 42 and 47°F storages at 3, 5 and 9 months after harvest. As in previous years, tuber quality is being stressed for selection; especial interest have being given to have large enough sample size (30 to 60 tubers per replication) to estimate the proportion of tubers with internal defects. **Additionally, samples of each plot are being analyzed for tuber calcium content and data will be analyzed to study the relation between tuber calcium and tuber attributes** which include internal and external defects**.**

The results and the selections made using information from RT_1 and RT_2 will yield the lines to be evaluated in 2008 and also will be important information to initiate the first year of breeder's seed multiplication. This seed multiplication makes possible future on-farm grower exposure within WI and further research in selected clones in WI throughout a series of locations in the US and Canada. All of these efforts are important to estimate the value and adaptation of WI lines to several production areas and also serve as initial promotion of future potato varieties.

Table 3. Performance of Year 4 clones of the UW potato breeding program, Hancock Agricultural Research Station, 2007.

Clone	Foliage Color	Plant Vigor	Plant Habit	Early Blight AUDCP	Early Dying	Days to Vine Senescence	% Row Coverage	Tuber Shape (1-9)	Tuber Size (1-9)	Tuber Skin Set (1-9)	Common Scab (1-9)	Preference Score (1-5)	A-Size Yield (cwt/a)	B-size Yield (cwt/a)	Culls	Specific Gravity	% Hollow Heart	% Brown Center	% Internal Brown Spot	Chip Color 42°F & 3mo	Chip Color 47°F & 3mo
Chips Mean	2.0	2.0	2.4	34.5	2.7	123	69	3.0	5.5	8.7	8.8	2.7	470	50	13	1.076	1.8	1.1	24.7	3.5	3.1
Atlantic	2.0	***1.6***	***1.7***	30.7	2.8	119	75	3.0	***6.8***	8.9	8.9	2.4	***565***	40	20	***1.082***	1.5	2.9	28.1	3.7	3.1
Dakota Pearl	2.6	2.1	2.8	41.9	3.2	***114***	57	***2.3***	5.5	8.9	8.9	***2.2***	***580***	39	32	1.071	5.7	2.0	***12.8***	3.5	2.8
Pike	***1.4***	2.0	2.2	***26.7***	***1.4***	129	***84***	3.0	5.3	8.9	8.9	2.7	364	50	26	***1.081***	1.1	0.2	49.7	4.0	3.0
Snowden	2.1	2.1	2.4	33.6	2.9	126	68	3.0	5.1	8.9	8.9	2.7	492	37	23	1.077	1.6	0.2	52.4	3.3	2.7
W1201	1.8	1.9	2.4	33.6	2.3	122	73	3.1	5.8	8.9	8.9	2.7	***522***	51	24	***1.081***	1.2	0.2	17.3	5.2	4.0
W1355-1	2.3	2.1	2.6	34.5	2.7	126	68	3.0	4.0	8.9	8.9	3.4	395	100	18	1.073	1.2	0.2	37.1	***2.7***	2.7
W5800-5	1.8	***1.6***	2.0	29.3	***1.7***	128	***88***	3.3	5.5	8.7	8.9	2.6	***550***	***32***	20	1.071	5.7	0.2	24.5	3.2	3.0
W5840-4	1.9	2.6	3.1	38.3	2.8	120	62	3.3	5.6	8.9	8.9	2.7	400	***30***	22	1.074	3.9	0.2	***11.0***	***2.5***	***2.3***
W5885-3	1.9	2.6	3.1	39.7	3.3	119	57	2.9	5.2	7.9	8.9	2.6	436	53	19	1.071	1.1	0.2	14.6	4.0	3.2
W5916-1	2.1	1.7	2.1	33.4	2.7	121	71	3.4	4.5	8.6	8.4	3.1	493	55	32	1.078	1.1	0.2	21.8	4.4	3.3
W5939-4	2.4	2.0	2.7	35.1	3.1	123	68	3.0	5.5	8.9	8.9	2.6	475	49	17	1.078	2.5	1.1	37.9	3.3	2.7
W5941-3	2.7	2.4	3.3	39.7	2.7	126	71	2.7	4.6	8.7	8.9	2.9	481	116	18	1.065	1.6	0.2	31.7	3.6	4.1
W5948-2	***1.6***	***1.6***	***2.0***	***29.2***	2.7	126	***78***	3.5	5.9	8.9	8.9	2.3	***557***	41	24	1.069	2.1	1.1	29.0	4.3	4.2
W5955-1	2.0	***1.6***	***1.9***	30.4	2.9	123	74	***2.5***	5.5	8.9	8.9	2.4	499	83	23	***1.086***	1.5	1.1	***9.2***	3.1	2.6
W5963-2	1.9	1.9	***2.0***	35.4	***2.1***	124	***81***	***2.5***	5.4	8.9	8.7	2.4	367	50	23	***1.089***	1.2	0.3	59.1	3.2	3.0
W6036-1	2.4	2.3	2.6	35.1	3.0	125	64	3.1	4.3	8.4	8.9	2.9	519	54	27	1.071	1.1	0.2	***7.4***	3.2	3.0
W6040-6	2.1	2.2	2.5	33.7	2.9	121	71	2.7	5.6	8.7	8.9	2.6	451	40	25	1.067	1.1	0.2	***8.3***	4.6	3.3
W6323-6	2.1	1.9	2.5	35.2	2.9	124	68	3.0	5.2	8.4	8.7	3.0	464	47	42	1.080	1.5	0.2	41.6	***2.5***	3.1
W6387-3	***1.6***	2.1	2.8	39.8	2.9	***117***	54	3.0	***6.5***	8.7	8.9	2.6	***528***	***28***	25	1.075	2.2	1.6	***12.8***	3.0	2.7
W6387-4	2.3	2.0	2.4	34.4	2.7	131	68	3.0	***7.3***	7.3	8.9	2.8	517	***24***	25	1.068	1.6	0.2	32.6	2.9	3.3
W6387-7	1.9	2.0	2.3	35.1	2.9	120	58	3.0	***6.8***	8.4	8.7	***2.2***	487	***27***	20	1.074	1.1	1.6	15.0	4.5	3.2
W6388-3	1.9	2.2	2.8	***40.7***	3.0	120	56	2.9	3.9	8.9	8.5	3.3	393	73	18	1.077	1.5	0.2	34.4	3.8	3.3
W6390-2	1.8	1.7	2.3	36.1	3.0	126	64	2.7	5.6	8.9	8.9	***2.3***	***562***	***26***	20	1.067	1.1	0.2	38.8	3.2	2.9
W6390-5	2.1	2.2	2.8	37.3	2.9	129	68	2.9	4.8	8.9	8.9	3.0	460	87	31	1.075	1.1	0.2	54.1	2.9	3.3
W6393-1	***1.6***	2.2	2.7	36.4	3.0	119	63	4.1	***6.2***	8.9	8.9	2.8	520	36	26	1.074	3.8	0.2	33.5	3.6	2.8
W6407-3	2.2	2.3	2.7	38.5	3.2	120	61	3.0	4.8	8.7	8.9	2.9	394	***31***	23	1.073	1.5	0.2	18.2	3.5	3.3
W6444-2	2.2	***1.6***	***2.0***	34.5	***1.8***	128	77	3.3	***6.2***	8.9	8.9	***2.3***	509	***17***	27	1.077	1.6	0.2	14.6	3.5	3.0
W6483-1	2.0	2.0	2.2	32.0	2.6	123	72	3.0	5.6	7.4	8.9	2.8	***545***	58	31	1.068	1.6	2.0	15.5	3.7	3.5
W6483-4	1.9	2.2	***2.0***	30.2	***1.8***	128	***79***	2.6	***6.4***	8.9	8.9	***2.3***	500	***25***	24	1.075	2.0	2.0	***13.7***	3.0	3.7
W6483-5	2.9	2.1	2.6	35.6	3.0	***115***	65	3.0	***7.0***	8.4	8.9	***2.3***	484	***31***	43	1.071	1.1	2.0	***8.3***	2.8	2.7
W6484-2	***1.5***	1.7	2.2	32.3	2.5	127	77	3.0	5.2	8.9	8.2	2.9	486	66	29	1.077	2.0	0.2	24.5	3.1	3.2
W6484-5	***1.6***	1.7	***1.8***	***28.3***	***2.2***	125	***81***	3.0	5.2	8.7	8.9	2.7	***558***	40	29	1.078	3.9	0.2	18.2	2.8	2.7
W6529-1	2.0	2.1	2.4	33.4	3.0	125	70	2.7	4.9	8.9	8.9	2.8	390	59	19	***1.086***	1.1	1.1	40.7	3.8	3.2
W6571-3	2.6	2.7	3.3	39.9	3.4	***114***	59	3.0	5.1	8.7	8.6	3.0	419	46	30	***1.084***	1.1	0.2	19.1	***2.6***	2.7
W6591-1	1.9	2.1	2.8	44.2	3.4	122	57	3.0	4.6	8.9	8.9	2.7	450	83	21	1.076	1.1	0.2	***6.5***	4.7	4.3
W6598-2	2.1	2.0	2.1	31.1	2.5	127	***79***	2.7	***6.5***	8.4	8.9	***2.3***	486	***33***	21	1.070	2.9	4.7	17.3	2.9	3.0
W6599-2	2.4	2.0	2.2	41.0	3.5	118	52	3.3	***6.5***	8.9	8.9	2.7	446	74	69	1.075	2.5	0.2	20.9	3.9	3.1
W6602-2	1.9	2.4	2.5	30.9	***2.2***	122	75	3.5	5.8	6.6	8.4	3.4	329	41	35	***1.085***	1.1	2.0	50.8	3.1	3.1
W6609-3	1.9	2.1	2.5	30.9	2.3	123	***78***	3.0	5.6	8.7	8.9	2.7	370	46	25	1.078	1.2	2.0	***8.3***	3.3	3.1

Table 3 (cont'd). Performance of Year 4 clones of the UW potato breeding program, Hancock Agricultural Research Station, 2007.

Clone	Foliage Color	Plant Vigor	Plant Habit	Early Blight AUDCP	Early Dying	Days to Vine Senescence	% Row Coverage	Tuber Shape (1-9)	Tuber Size (1-9)	Tuber Skin Set (1-9)	Common Scab (1-9)	Preference Score (1-5)	A-Size Yield (cwt/a)	B-size Yield (cwt/a)	Culls	Specific Gravity	% Hollow Heart	% Brown Center	% Internal Brown Spot	Chip Color 42°F & 3mo	Chip Color 47°F & 3mo
Chips Mean	2.0	2.0	2.4	34.5	2.7	123	69	3.0	5.5	8.7	8.8	2.7	470	50	13	1.076	1.8	1.1	24.7	3.5	3.1
W6803-2	1.9	***1.5***	2.0	31.0	2.3	122	73	3.0	5.8	8.9	8.9	2.4	477	42	38	1.071	1.6	2.9	***13.7***	3.2	3.2
W6803-3	***1.6***	***1.5***	***1.9***	30.8	***1.8***	124	***78***	2.7	6.1	8.9	8.9	***2.3***	498	38	40	1.071	3.5	1.1	***11.9***	3.2	3.1
W6822-2	1.8	1.8	***1.9***	31.2	3.0	123	73	3.3	4.6	8.9	8.9	3.0	***539***	47	22	1.079	1.2	0.2	23.6	2.9	2.5
W6822-3	2.0	1.8	2.0	31.8	2.9	***118***	70	3.0	5.2	8.9	8.9	2.7	453	71	23	***1.080***	2.1	0.2	18.2	3.2	2.9
W6822-4	1.9	1.8	2.1	31.5	3.0	120	67	2.9	4.8	8.9	8.7	2.7	468	65	22	1.072	1.2	0.2	***7.4***	***2.7***	2.7
W6850-3	1.9	2.1	2.1	***29.2***	***2.1***	127	***80***	3.0	4.6	8.9	8.9	2.9	431	81	19	***1.084***	1.2	0.2	16.4	3.4	2.9
W6854-1	2.0	1.8	2.1	32.5	***2.2***	127	***82***	2.6	***7.4***	8.9	8.9	***2.3***	508	***25***	29	1.072	1.6	0.2	***8.3***	3.8	3.4
W6929-1	2.3	1.8	2.0	35.2	2.7	121	66	3.7	5.1	8.7	8.5	2.9	378	100	22	***1.082***	1.2	1.1	51.5	3.2	2.8
W6929-2	1.9	***1.4***	2.0	33.7	2.5	131	77	3.7	5.9	8.4	8.5	2.8	456	***17***	31	1.078	1.2	0.2	32.6	3.4	3.2
W6929-3	***1.6***	***1.6***	***1.7***	33.6	2.9	124	70	3.3	5.2	8.1	8.5	3.3	***532***	46	19	***1.086***	1.2	0.2	66.7	2.9	2.5
W6938-3	2.1	2.4	2.9	37.9	3.2	125	71	3.8	5.1	7.9	8.9	2.7	***551***	49	18	1.079	1.1	0.2	27.2	5.6	3.9
W7279-5	1.9	2.0	2.6	32.8	2.9	***117***	68	3.0	5.4	8.7	8.9	***2.3***	407	57	23	1.076	2.0	15.5	23.6	5.3	2.9
W7279-8	2.2	2.4	2.9	40.1	3.3	***116***	57	***2.5***	5.1	8.9	8.9	2.4	432	68	24	1.069	3.8	3.8	***12.9***	3.4	3.3
W7312-1	***1.6***	1.9	2.7	36.2	3.2	123	58	2.9	5.1	8.9	8.9	2.7	518	34	41	1.072	1.5	0.2	23.6	3.0	3.0
W8138-2	1.9	2.4	2.7	39.0	3.6	***106***	42	2.2	4.6	8.9	8.9	2.9	280	42	22	1.072	1.5	0.2	**6.6**	5.8	4.2
Reds Mean	1.5	1.9	2.4	34.9	3.2	114	60	3.8	5.4	8.0	8.9	2.8	461	60	20	1.060	1.2	0.3	17.6		
Dark Red Norland	1.6	2.4	2.7	34.9	3.2	***100***	60	4.2	4.9	***8.8***	9.0	2.8	341	99	***16***	1.053	1.1	0.0	11.5		
W5888-1R	1.3	2.1	2.7	31.9	3.0	118	68	4.0	5.6	6.7	8.9	2.9	***555***	61	29	1.059	0.7	0.0	26.7		
W5907-3R	1.4	2.3	2.9	41.4	3.5	110	44	4.0	5.0	8.0	8.9	2.6	485	66	***15***	1.064	0.7	0.0	21.4		
W6002-1R	1.4	2.3	2.7	37.5	3.0	115	63	***2.0***	4.9	***8.8***	8.9	***2.3***	346	***83***	***16***	1.059	0.9	0.0	***4.3***		
W6049-1R	1.9	1.9	2.2	34.3	3.4	115	63	***3.2***	5.3	***8.8***	9.0	2.8	474	55	22	1.056	1.1	0.0	6.1		
W6396-1R	1.2	1.8	2.6	34.8	3.3	116	61	3.4	4.6	8.5	9.0	2.9	498	***84***	22	1.059	0.7	0.0	***3.4***		
W6406-4R	***1.1***	1.8	2.2	33.5	3.0	113	64	3.7	5.6	6.7	9.0	3.3	473	48	18	1.061	0.7	0.0	***6.0***		
W6465-1R	2.0	***1.5***	2.2	31.9	3.3	116	58	3.4	4.3	8.3	9.0	3.1	506	59	16	***1.069***	0.7	0.0	34.8		
W6481-1R	1.6	1.7	2.1	36.4	3.2	114	60	5.6	5.3	***8.5***	9.0	3.3	***523***	75	19	1.065	0.7	0.0	20.5		
W6511-1R	***1.1***	1.7	***1.9***	***28.0***	2.9	122	***74***	5.2	4.9	***8.5***	9.0	2.6	493	***108***	21	***1.069***	0.7	0.0	35.7		
W6515-1R	***1.1***	***1.5***	***1.8***	32.0	3.0	119	***70***	3.2	5.8	6.7	9.0	2.5	480	43	45	1.053	1.1	1.8	5.1		
W7273-1R	1.5	2.4	2.7	36.1	3.6	***108***	49	3.0	***6.2***	6.7	9.0	2.8	***401***	***38***	26	1.060	0.7	0.0	16.8		
W7299-2R	***2.0***	2.4	2.8	41.8	3.7	***108***	42	***2.5***	***5.9***	7.2	9.0	2.8	456	63	41	1.051	6.7	0.9	8.8		
W7343-1R	1.2	2.2	2.6	34.1	3.3	116	57	4.5	5.3	7.7	8.8	2.6	412	***31***	15	1.062	0.7	0.9	42.0		
W8125-1R	1.9	1.8	2.2	31.6	***2.6***	117	***71***	3.6	***6.1***	***8.5***	9.0	3.1	415	***30***	38	1.060	1.1	0.0	32.1		
W8130-1R	1.4	***1.5***	***1.9***	36.2	3.4	118	57	3.7	5.5	***8.5***	9.0	2.6	***532***	***40***	45	1.056	1.6	0.0	6.1		
W8131-1R	1.5	1.8	***1.9***	36.6	3.4	116	60	5.4	***6.1***	***8.5***	8.8	2.6	454	***34***	42	***1.069***	0.7	0.0	17.7		
Russets Mean	2.0	2.0	2.2	33.9	2.7	122	71	6.4	5.5	8.7	8.4	3.0	420	41	22	1.072	4.2	0.3	15.6	7.0	5.8
Bannock Russet	1.9	1.7	2.1	27.7	***1.7***	130	***82***	6.7	***7.0***	8.1	8.6	***2.3***	***504***	***20***	31	1.070	3.1	0.1	6.6	7.8	6.1
Goldrush	1.9	2.3	2.4	43.4	3.5	***116***	43	6.3	5.8	8.9	8.6	***2.5***	401	48	16	1.065	2.2	0.1	***4.8***	8.8	6.8
Russet Burbank	2.2	2.2	2.5	34.4	3.0	***113***	69	6.5	4.9	8.9	8.8	3.2	367	87	27	1.072	2.6	0.9	15.6	8.2	6.5
W1348rus	1.7	2.0	2.0	39.6	3.2	122	62	6.5	4.9	9.0	8.8	3.0	467	***36***	25	1.069	3.0	0.1	14.7	7.0	6.2
W1836rus	***1.4***	1.9	1.9	31.3	3.1	129	77	6.3	5.8	8.9	8.7	2.8	***618***	26	18	1.069	3.0	0.1	6.5	7.1	6.2

Table 3 (cont'd). Performance of Year 4 clones of the UW potato breeding program, Hancock Agricultural Research Station, 2007.

Clone	Foliage Color	Plant Vigor	Plant Habit	Early Blight AUDCP	Early Dying	Days to Vine Senescence	% Row Coverage	Tuber Shape (1-9)	Tuber Size (1-9)	Tuber Skin Set (1-9)	Common Scab (1-9)	Preference Score (1-5)	A-Size Yield (cwt/a)	B-size Yield (cwt/a)	Culls	Specific Gravity	% Hollow Heart	% Brown Center	% Internal Brown Spot	Chip Color 42°F & 3mo	Chip Color 47°F & 3mo
Russets Mean	2.0	2.0	2.2	33.9	2.7	122	71	6.4	5.5	8.7	8.4	3.0	420	41	22	1.072	4.2	0.3	15.6	7.0	5.8
W5866-2rus	2.0	1.9	1.8	32.7	2.6	119	63	3.4	4.6	8.9	8.6	3.1	366	81	16	1.073	2.2	0.1	7.5	8.2	7.2
W6132-2rus	***1.5***	1.8	***1.6***	***28.8***	2.7	127	77	6.5	5.8	8.9	8.5	2.9	***508***	33	23	1.071	4.0	1.8	19.2	7.3	6.1
W6294-3rus	2.1	1.9	1.9	***29.0***	2.6	123	***79***	6.7	5.7	8.7	8.6	***2.3***	392	21	16	1.075	4.0	0.1	10.2	7.3	***4.8***
W6306-2rus	2.1	2.1	2.3	***27.3***	***1.8***	121	***81***	6.1	5.5	8.9	8.3	3.0	329	32	30	***1.078***	6.3	0.1	21.9	7.1	***4.6***
W6312-1rus	2.2	2.5	2.3	30.0	***1.5***	123	***81***	6.3	5.4	8.9	8.6	3.0	438	56	18	1.072	2.2	0.1	***4.8***	8.6	7.7
W6312-4rus	2.4	2.1	2.4	38.1	2.9	***116***	63	***6.9***	***6.7***	8.9	8.5	***2.2***	386	15	26	1.069	11.8	0.1	19.6	***5.8***	***4.5***
W6313-1rus	1.7	***1.7***	1.8	31.0	2.5	128	***79***	6.3	5.5	8.9	8.6	2.6	394	34	14	***1.082***	9.1	0.9	19.2	6.2	5.0
W6313-2rus	2.1	2.4	2.7	39.3	3.1	121	61	6.3	4.8	8.9	8.6	3.1	421	36	11	***1.079***	6.3	0.1	21.0	***4.9***	***4.9***
W6316-3rus	2.2	2.1	1.9	34.5	2.6	121	77	6.2	5.1	8.9	8.6	3.4	327	13	19	1.072	3.5	0.1	30.8	8.0	5.8
W6360-1rus	1.9	1.8	2.1	***28.3***	***2.1***	126	***84***	6.5	5.4	8.1	8.6	3.2	375	40	92	1.074	2.2	0.1	21.0	***5.5***	***4.8***
W6360-3rus	2.4	2.1	2.3	32.5	2.6	125	78	5.8	4.9	8.9	8.6	2.9	412	66	12	***1.079***	16.0	0.1	7.5	6.9	5.3
W6363-2rus	2.1	1.8	1.9	33.2	2.5	125	78	5.7	4.9	8.9	7.1	3.7	***534***	51	36	1.067	2.2	0.1	12.0	6.7	5.2
W6712-1rus	1.7	1.9	1.9	30.4	2.4	124	***82***	6.6	4.6	8.7	7.5	3.4	418	35	31	1.072	3.0	0.1	38.3	***5.7***	***4.3***
W6775-2rus	2.1	***1.5***	2.0	36.4	2.9	123	70	6.3	4.8	9.0	7.5	4.0	420	44	18	1.069	2.6	0.1	6.6	***4.7***	5.3
W6842-1rus	2.4	2.1	2.3	36.4	3.0	122	69	6.2	5.2	9.0	***9.0***	2.6	***560***	39	15	1.066	2.6	0.1	***3.9***	7.2	5.8
W6894-6rus	***1.4***	2.1	2.2	***28.8***	2.8	124	79	5.4	5.9	7.6	***9.0***	3.5	***496***	32	38	1.061	4.0	0.1	16.5	8.8	7.3
W6905-2rus	2.5	2.1	2.3	35.6	3.3	122	59	4.7	4.3	9.0	8.2	3.7	363	95	30	1.077	2.6	0.9	20.1	***4.6***	***3.7***
W6905-4rus	2.0	2.1	2.4	29.6	2.8	127	76	***7.4***	4.5	8.7	8.2	3.8	365	57	41	***1.084***	4.4	0.9	10.2	***4.3***	***3.4***
W6935-4rus	2.0	1.9	2.3	32.8	***2.2***	127	***83***	5.9	4.6	7.4	***9.0***	3.8	399	36	***14***	1.074	2.6	0.1	17.4	8.0	6.5
W7253-3rus	1.7	1.8	1.9	31.3	2.4	128	***80***	6.7	***6.5***	9.0	7.8	***2.5***	***535***	27	36	1.066	3.0	0.1	21.0	***5.4***	5.7
W8152-1rus	2.5	2.4	2.8	44.3	3.6	***113***	41	6.2	5.7	9.0	7.8	3.0	401	28	12	1.077	2.6	0.9	11.1	***4.9***	***3.9***
W8178-2rus	2.0	2.2	1.9	32.8	2.6	123	77	***7.1***	***6.4***	8.2	7.7	3.4	359	21	***27***	1.074	4.9	1.5	18.7	9.4	8.5
W8181-1rus	2.4	2.5	2.8	43.9	3.6	***110***	49	***7.0***	5.7	9.0	8.6	2.6	312	52	18	1.069	9.5	0.9	***3.0***	7.5	5.9
W8186-1rus	1.7	1.8	2.0	32.2	***1.9***	120	***84***	6.6	***7.1***	8.2	8.4	2.7	456	26	32	***1.082***	3.0	0.1	12.0	8.6	7.1
W8198-1rus	2.0	2.1	2.4	40.1	2.7	128	64	6.9	5.2	8.9	8.5	3.0	478	78	22	1.074	2.5	0.1	***4.8***	7.3	7.0
W8206-1rus	***1.6***	1.7	1.8	33.7	2.5	124	72	***7.1***	***7.1***	8.9	8.7	***2.4***	413	14	50	1.069	3.0	0.1	49.7	7.5	6.9
W8208-1rus	2.0	2.2	2.5	29.8	2.5	126	77	6.6	***6.4***	7.9	8.5	2.8	340	33	20	1.070	2.5	0.1	19.1	***5.7***	6.7
W8208-2rus	2.6	2.1	2.5	36.1	3.2	***116***	58	6.9	5.8	8.9	8.7	3.1	302	29	40	1.071	4.6	0.1	11.8	6.9	***4.8***
W8246-1rus	***1.6***	1.9	1.9	32.3	2.5	***116***	65	6.8	5.6	8.9	8.1	2.9	404	52	29	1.076	3.0	0.1	7.5	8.8	7.7
W8250-1rus	***1.5***	2.5	2.4	39.1	3.3	***111***	50	6.9	5.6	8.9	8.7	***2.4***	437	53	17	1.073	2.5	0.1	32.6	8.2	6.6
Yellow Flesh Mean	2.1	1.8	2.5	32.8	2.0	126	79	3.9	5.8	8.9	8.9	2.4	566	52	20	1.068	0.4	0.4	13.2	8.9	7.8
W6431-1	***1.5***	***1.2***	2.1	43.4	***1.3***	134	***95***	4.5	5.4	9.0	8.9	2.6	686	61	33	1.066	0.2	0.1	2.6	9.7	9.4
W6493-1	2.4	2.1	2.8	35.2	2.8	122	71	4.0	5.5	9.0	8.9	2.4	594	55	25	1.075	0.2	0.1	16.9	9.6	8.7
W6493-2	2.0	2.1	2.6	***26.5***	1.9	121	80	4.3	6.3	8.7	8.9	2.6	578	16	26	1.070	0.7	0.1	8.8	8.2	6.6
W6703-1	2.3	2.0	2.5	***25.2***	***1.1***	134	***92***	3.7	5.4	9.0	8.9	2.8	501	51	29	1.077	0.2	0.1	23.2	7.9	6.5
W6703-5	2.2	1.7	2.6	30.1	1.5	134	85	3.6	6.3	9.0	8.9	2.1	552	52	15	1.070	0.2	0.1	7.1	9.5	8.5
Yukon Gold	2.3	1.6	2.6	36.0	3.4	***111***	52	3.3	6.0	9.0	8.7	***1.9***	486	13	30	1.077	0.7	1.9	20.5	8.3	7.2

Note: Statistical significance of the values are given by boldfacing (better performance compared to its market type) or underlining (inferior performance). For preference score 1-5 or 1 = best, 5= worst. Tuber shape: 1 = round, 9 = long. Tuber size 1 = small, 9 very large. Tuber skinning 1 = no skin observed, 9 = 100% skin present. Common scab 1 = deep pit scab, 9 = no scab symptoms observed. Fry data 1 = white chips, 10 = very dark chips. Internal brown spot is simulated: 30 potatoes sample and 10 revolutions in a bruising wooden drum.

Table 4. Performance of Year 5 clones of the UW potato breeding program, Hancock Agricultural Research Station, 2007.

Clone	Plant Vigor	Plant Habit	Early Blight 1 to 5	% Early Dying	Early Dying 1 to 5	Days to Vine Senescence	% Row Coverage	Tuber Shape 1 to 9	Tuber Size 1 to 9	Tuber Skin Set	Preference Score	A-Size Yield (cwt/a)	B-size Yield (cwt/a)	Culls (cwt/a)	Specific Gravity	% Hollow Heart	% Brown Center	% Internal Brown Spot	Potential IBS (1 to 5)	Chip Color 42°F & 3mo	Chip Color 47°F & 3mo
All Chips	2.1	2.5	3.3	50	2.9	120	66	3.2	5.1	8.8	2.6	484	58	10.2	1.225	1.2	0.5	4.2	2.4	4.2	3.2
Atlantic	2.0	***2.0***	3.3	56	3.1	115	63	3.0	***6.4***	8.9	2.4	534	***35.2***	16.8	1.080	5.2	3.8	18.6	2.5	5.1	3.2
Dakota Pearl	2.1	2.4	3.8	74	3.5	112	46	2.7	5.4	9.0	***2.2***	512	***35.0***	18.4	1.074	3.6	1.6	12.0	1.9	3.7	3.1
Snowden	1.7	2.2	3.0	53	2.9	124	67	3.0	5.4	8.9	2.7	538	***32.9***	13.6	1.077	0.3	0.2	33.7	2.9	3.6	2.6
W1355-1	1.9	2.6	3.0	36	2.8	124	72	3.3	4.6	8.9	2.9	476	55.9	5.1	1.076	1.1	0.2	25.8	2.6	***2.9***	2.2
W3747-1	2.3	2.9	3.9	77	3.4	122	51	3.0	4.4	8.9	2.9	398	75.9	6.8	1.079	0.3	0.2	***9.0***	***1.5***	3.9	2.5
W3747-7	2.1	2.2	3.3	43	2.9	127	66	3.5	***5.9***	8.9	***2.3***	***578***	***36.5***	7.7	1.075	1.9	0.2	36.7	3.1	4.1	3.1
W3784-1	2.5	3.3	3.3	67	3.4	***112***	60	3.0	5.3	8.7	2.7	352	***37.1***	7.2	1.070	2.0	0.2	21.6	2.5	5.7	3.4
W4282-2	***1.6***	***2.0***	***2.8***	***28***	***2.3***	126	***80***	***2.6***	4.6	8.9	2.4	480	80.5	4.1	1.072	0.3	0.2	28.3	2.7	***3.0***	2.7
W4565-9	***1.3***	***2.1***	3.1	40	***2.5***	127	70	3.0	***6.0***	8.9	2.4	***660***	***32.8***	10.4	1.074	0.3	0.2	27.5	3.0	6.3	3.3
W4734-2	2.1	2.9	3.4	46	2.8	125	73	***2.4***	4.7	8.9	2.5	417	81.1	7.0	1.077	1.1	1.6	***8.2***	***1.4***	5.6	3.4
W4980-1	1.9	2.2	3.4	72	3.4	116	57	2.8	4.7	8.9	2.5	528	59.1	8.2	1.076	0.3	0.2	29.2	2.6	3.2	2.3
W5015-12	1.7	2.2	3.0	44	2.7	125	72	3.0	5.0	8.9	2.9	536	71.1	13.7	1.074	3.6	0.2	19.1	1.7	3.4	2.6
W5015-19	2.1	2.6	3.9	55	2.9	***114***	73	2.8	***5.7***	8.9	2.4	453	***40.5***	5.8	1.074	0.3	0.2	14.9	2.1	3.7	2.6
W5015-2	2.1	2.4	***2.8***	***27***	2.7	123	***77***	3.0	***5.6***	8.9	2.9	453	***39.1***	7.0	***1.091***	4.4	0.9	24.1	2.6	***3.0***	2.8
W5015-5	***1.2***	***1.8***	***2.8***	44	2.9	131	72	2.9	***5.6***	8.9	2.7	***610***	***42.5***	8.0	1.080	2.8	0.2	56.9	3.5	3.6	2.7
W5267-1Y	2.1	2.6	3.4	44	2.8	124	70	3.0	***5.7***	9.0	2.5	501	77.6	16.0	1.073	0.3	0.2	44.3	3.1	5.3	4.3
W5267-3	1.7	***2.1***	***2.8***	***31***	***2.5***	132	***82***	4.7	5.2	***8.0***	2.8	447	44.2	7.9	1.078	0.3	0.2	22.9	2.7	***2.8***	2.8
W5267-4	1.9	2.4	3.2	58	2.8	128	73	4.3	4.7	***7.8***	2.8	455	65.3	10.0	1.072	0.3	0.2	43.0	3.0	***2.9***	***2.2***
W5285-9	2.0	2.2	3.7	37	2.7	123	74	3.2	4.9	9.0	2.4	464	71.1	10.0	1.081	0.3	0.2	17.9	2.2	***2.9***	2.5
W5287-3	2.3	2.5	3.6	38	2.8	122	***77***	3.0	4.6	8.7	2.7	386	46.2	5.9	***1.083***	0.3	0.2	47.3	3.3	***3.1***	***2.1***
W6009-8	2.0	2.5	4.0	***32***	***2.5***	***115***	74	***2.4***	5.6	9.0	2.4	509	***40.2***	11.5	1.078	2.8	1.6	43.1	3.0	***3.0***	***2.3***
W6036-3	2.0	2.6	***2.8***	52	3.0	123	69	3.0	4.4	8.7	2.8	450	56.5	5.5	1.081	1.1	0.2	23.7	2.7	3.2	2.5
W6237-6	2.4	3.2	***2.8***	44	2.7	119	73	2.9	5.3	8.7	2.5	492	47.3	6.2	1.074	0.3	0.2	27.3	2.8	3.3	2.7
W6238-1	1.9	2.4	***2.9***	40	3.0	125	73	3.0	4.9	9.0	2.7	***612***	69.3	10.3	1.074	0.4	0.2	12.2	1.7	3.0	***2.3***
W7080-2	2.5	3.2	3.3	***33***	2.7	121	71	3.5	5.3	8.7	2.9	436	57.1	21.1	1.075	0.3	0.2	***7.0***	***1.4***	2.4	2.5
W7124-7	2.3	2.4	3.8	69	3.6	***112***	48	2.9	4.2	8.9	3.0	433	74.7	8.4	1.072	0.3	0.2	13.6	1.9	2.7	2.7
W7124-9	2.5	2.5	4.0	48	3.1	***115***	64	2.9	4.2	8.9	3.0	396	86.4	6.0	1.074	0.3	0.9	10.2	1.7	2.9	2.5

Table 4. (cont'd) Performance of Year 5 clones of the UW potato breeding program, Hancock Agricultural Research Station, 2007.

Clone	Plant Vigor	Plant Habit	Early Blight 1 to 5	% Early Dying	Early Dying 1 to 5	Days to Vine Senescence	% Row Coverage	Tuber Shape 1 to 9	Tuber Size 1 to 9	Tuber Skin Set	Preference Score	A-Size Yield (cwt/a)	B-size Yield (cwt/a)	Culls (cwt/a)	Specific Gravity	% Hollow Heart	% Brown Center	% Internal Brown Spot	Potential IBS (1 to 5)	Chip Color 42°F & 3mo	Chip Color 47°F & 3mo
All Red	2.0	2.5	3.3	61	3.1	112	59	3.8	5.5	8.4	3.0	495	43	23.1	1.748	1.7	1.6	3.9	1.7	3.9	2.8
Dark Red Norland	2.4	2.9	3.3	61	3.1	***96***	66	3.8	5.2	***8.8***	2.9	451	47.9	18.7	1.059	0.5	0.5	6.9	1.4		
Red Lasoda	2.0	2.1	3.6	74	3.2	113	60	4.2	***6.5***	***8.8***	3.4	539	***23.9***	29.3	1.062	5.3	5.7	3.5	1.3		
Romance	***1.2***	***1.7***	***2.5***	***28***	***2.2***	130	***93***	4.5	4.4	***8.8***	3.2	476	59.1	50.4	1.068	0.5	0.5	4.4	1.3		
W5767-1R	1.7	2.1	2.9	***42***	2.7	119	***79***	3.2	***6.5***	8.1	3.0	538	29.6	19.4	1.066	2.9	0.5	22.0	2.6		
W5841-1R	2.5	3.1	4.0	90	3.8	***102***	40	***3.0***	5.1	8.6	***2.4***	486	68.1	15.8	1.070	0.5	1.3	6.2	1.5		
W6147-2R	***1.5***	2.4	2.9	57	3.2	118	72	3.3	5.1	8.3	2.9	476	35.6	12.0	***1.073***	2.1	0.5	17.8	2.2		
W7299-1R	2.5	2.9	4.0	77	3.4	106	53	4.3	5.9	7.4	2.9	497	37.4	16.3	1.054	0.5	2.0	8.6	1.7		
All Russets	2.0	2.1	3.2	61	3.0	118	64	6.4	6.0	8.9	2.5	462	36	24.6	1.038	1.0	0.1	8.7	1.8	8.7	6.8
Bannock Russet	***1.5***	***1.8***	***2.0***	***20***	***1.9***	134	***91***	6.8	***7.3***	8.6	2.2	490	***19.8***	24.4	1.072	2.7	0.0	6.5	1.4	8.6	**5.3**
Goldrush	2.3	2.4	4.0	85	3.4	***115***	51	6.5	6.1	9.0	2.5	487	46.1	16.7	1.064	0.3	0.0	4.0	1.2	9.8	8.4
Rburbank	2.1	2.3	***2.6***	46	2.6	118	***79***	6.4	4.9	9.0	2.8	489	***89.0***	31.4	1.074	0.3	0.0	12.4	2.0	8.9	6.9
W3666-2rus	2.1	2.3	3.3	56	3.0	118	75	6.0	5.7	8.9	2.8	484	28.9	23.4	1.069	0.3	0.0	6.6	1.4	9.9	7.7
W4315-5rus	2.1	2.4	3.3	77	3.2	***112***	53	6.8	5.7	8.9	2.5	495	63.2	19.1	1.075	0.3	0.0	30.1	2.8	7.2	***3.4***
W4619-3rus	1.7	1.9	2.9	49	2.8	120	74	5.5	***6.7***	8.5	2.9	***525***	***19.5***	24.4	1.079	0.3	0.0	6.5	1.7	9.9	9.0
W4697-2rus	1.9	2.0	3.3	61	3.0	117	65	6.6	5.6	9.0	***2.1***	401	37.5	***10.5***	***1.082***	7.6	0.0	28.3	2.5	9.7	8.9
W5257-2rus	1.7	***1.8***	3.0	58	2.9	122	70	6.8	6.3	9.0	2.4	435	22.1	78.2	1.068	0.3	0.0	4.3	1.3	9.0	7.6
W5303-1rus	2.0	2.4	2.8	58	2.9	120	74	6.5	5.6	8.7	2.7	447	25.2	14.3	1.072	0.3	0.0	27.5	2.8	***5.9***	***4.8***
W6197-2rus	2.5	***1.6***	2.8	50	***2.5***	124	***80***	7.0	5.4	9.0	2.3	232	26.6	***6.9***	***1.092***	0.3	1.3	14.5	2.1	***6.1***	***4.1***
W6234-4rus	1.7	2.0	3.7	77	3.4	***113***	59	6.1	6.1	8.7	2.5	***527***	29.5	18.4	1.072	0.3	0.0	7.3	1.7	8.2	***4.8***
W6968-2rus	2.4	2.6	3.7	71	3.4	***108***	39	6.8	6.3	8.9	2.2	495	33.5	***12.6***	1.069	0.3	0.0	10.4	1.8	8.9	***5.4***
W7012-1rus	1.7	2.0	3.0	59	3.0	117	68	6.8	***6.6***	8.7	***2.2***	438	31.8	21.8	1.071	1.9	0.0	5.6	1.4	9.0	7.5
W7070-2rus	2.1	2.3	3.7	70	3.3	115	51	7.0	***6.6***	9.0	2.3	***546***	34.7	30.6	1.071	0.3	0.0	8.2	1.7	9.4	8.4
W7098-2rus	2.4	2.2	3.4	77	3.3	119	62	5.0	5.4	9.0	2.7	434	28.4	36.6	1.061	0.3	0.0	7.3	1.7	9.4	9.3

Note: Statistical significance of the values are given by boldfacing (better performance compared to its market type) or underlining (inferior performance). For preference score 1-5 or 1 = best, 5= worst. Tuber shape: 1 = round, 9 = long. Tuber size 1 = small, 9 very large. Tuber skinning 1 = no skin observed, 9 = 100% skin present. Common scab 1 = deep pit scab, 9 = no scab symptoms observed. Fry data 1 = white chips, 10 = very dark chips. Internal brown spot is simulated: 30 potatoes sample and 10 revolutions in a bruising wooden drum. Potential IBS = potential internal brown spot since it is simulated, 1 = no symptoms of necrosis in tubers, 5 extensive number or area with necrosis in 100% of the tubers.

Evaluation of Common Scab Resistance to Scab in Advanced Clones (Year 4, 5 and older):

Experiments including 160 advanced lines were planted under heavy disease pressure at Heartland Farms in collaboration with Dr. Charlie Higgins, Alliston, ON in collaboration with Dr. Eugenia Banks, and Rhinelander WI. The experimental plots consisted of three replicates of 4 feet each. Tubers were evaluated at harvest for their incidence and severity of common scab. Severity, reported here was evaluated on a 1-5 scale, discussed earlier in this report. Consistency in response to scab was observed for many lines across the three locations. Lines that did not exhibited high incidence of scab will be selected and advanced. For a line to be considered with good scab performance, it needed to exhibit scab resistance between what is observed for between Superior and Pike for round white, or Goldrush for the russets. According to the analyses of variance for each of the locations Hearland Farms at Hancock was the best site to compare clones for scab resistance with minimum unexplained variation. Alliston, ON and Rhinelander, WI followed closely. Overall, 2007 was a very successful year for selection for resistance to common scab. Seventy five of the 160 clones tested had consistent performance as resistant or susceptible in all three locations (Table 5). Susceptible lines were those with susceptibility to common scab which equal or greater to the susceptibility exhibited by Atlantic or Snowden. Lines that are not presented in Table 5 were those included in the Year 4 and Year 5 replicated trials that did not differ in scab resistance from the mean of their market type.

Late Blight Evaluation of Clones in the Field and Controlled Conditions

Field Late Blight Evaluations (Oregon)

1. Planting Date: June 15 , 2007
2. Spacing: 9” in row and 34” between rows
3. Plot Size: 12-hills row
4. Late Blight Spreader rows: Russet Burbank
5. Late Blight Inoculations: late blight was inoculated 3 times with water-borne spores of US-8 strain on a 10 x 10-foot grid in late August 21 & 29 and early September. Spores were applied as a water suspension using a hand-held pump-up sprayer.

Late Blight infection rate was recorded September 29th, October 1st and October 8th & Area Under the Disease Progress Curve (AUDPC) was calculated. The AUDPC is most frequently calculated using the midpoint rule method (Campbell and Madden, 1990) as discussed for early blight in the North Central clones evaluation. Tubers were lifted, cut and examined for tuber infection and decay. Ten random tuber samples from each plot were stored for two weeks & scored for infection rate.

Field Late Blight Foliage Ratings:

1 = no foliar injury;
2 = 1-5% injury; General light infection. 1 in 20 leaves affected
3 = 5-10% injury; 1 in 10 leaflets affected
4 = 10-20%; 1 in 5 leaflets infected
5 = 25-40%; Nearly every leaflet infected but plants retain normal form; plants may smell of blight. Field looks green although every plant is affected
6 = 40-60%; Every plant is affected and about 50% of the leaf area is destroyed. Field appears green flecked with brown
7 = 60-75%; Every plant infected & more than 50 percent of leaf area is destroyed. Field appear brown with few green flecks
8 = 75-90%; About 75% of the leaf area destroyed; field appears neither predominantly green nor brown, Only a few leaves on plants, but stems are green
9 = 90-100% injury. Both leaves & stems destroyed.
AUDPC was calculated after converting to percent midpoint.

Advanced Clones: From forty the 4th and 5th + year clones evaluated, W5015-5 exhibited remarkable field resistance to late blight with very low foliar and tuber late blight (Fig. 1). Medium foliar late blight resistance was observed in W7063-1. Both of these are chipping lines and are under evaluation to determine if the late blight resistant clones also exhibit good field performance, yield and processing quality. This information will be presented at the Wisconsin Grower Education Meeting at Stevens Point in February 5-7, 2007. Most of the elite clones that have the highest potential to become varieties were also included in this test and exhibited susceptibility to foliar late blight and variable performance for tuber late blight. This information is very important for plant variety protection.

Early Year Clones Evaluation (Year 3): A preliminary unreplicated evaluation of one hundred and fifteen clones indicated that W6360-1 exhibited a high level of resistance to foliar and tuber late blight (Fig. 2). ARS1197-2 exhibited a mid level of resistance to foliar late blight; however, this clone exhibited a 35% tuber late blight. Clones that were advanced due to good adaptation and tuber quality should be included again in late blight evaluations of 2008 to confirm late blight reactions.

National Late Blight Trial: Twenty clones were evaluated in this trial. Among them, three Wisconsin clones that have been promoted by the SpudPro committee were evaluated: W1836-3 (Freedom Russet), W2683-2rus and W2133-1 (Fig. 3). W2683-2rus and W2133-1 have been also evaluated in 2006 and 2007 in the North Central Regional Trial. W2133-1 was also evaluated in the USPB-Snack Food Trial and in the Fast Track initiative. All three clones exhibited susceptibility to late blight. Freedom Russet and W2683-2rus had low levels of tuber infection %; W2133-1 a 30% tuber infection. The susceptibility of these three clones was expected since none of the clones had parents with resistance to this disease. This information thus, is important for a more complete description of these lines.

Table 5. Results of clones that exhibited consistent scab performance over three locations, 2007.

	Alliston	HFarms	Rhine			Alliston	HFarms	Rhine
Round Whites					**Red Clones**			
& Chipping					***W2609-1R***	***2.2***	***2.5***	***2.5***
Atlantic	3.0	3.1	3.8		W5888-1R	.	3.4	4.5
Pike	2.2	***2.0***	3.3		***W7299-2R***	***2.0***	***2.2***	3.3
Snowden	2.9	3.5	2.8		***W84-75R (Red Pearl)***	***2.2***	***1.5***	***1.9***
Superior	***1.7***	***1.9***	***1.8***		Dark Red Norland	**2.2**	2.9	3.5
MegaChip (1201)	2.3	***2.4***	***2.7***					
W2324-1	3.7	3.3	3.8		**Russets**			
W3186-2	3.6	3.3	3.0		***Goldrush***	***1.5***	***1.3***	2.6
W4980-1	2.9	3.4	4.0		Russet Burbank	***1.6***	2.3	2.8
W5015-2	2.9	3.4	4.1		***W1348rus (Millenium)***	***1.3***	2.4	***2.3***
W5267-1	2.8	***2.1***	***2.7***		***W1836-3rus (Freedom)***	***1.3***	***1.7***	2.6
W5840-4	3.4	3.4	3.6		***W1879-1rus***	***1.3***	***1.5***	***1.8***
W5885-3	2.9	3.4	3.7		***W2683-2rus***	***1.3***	***1.6***	***2.2***
W5916-1	3.0	3.6	3.9		***W3160-5rus***	***1.3***	***1.7***	***2.1***
W5939-4	3.8	3.4	4.0		W3743-5rus	4.6	3.1	2.6
W5948-2	2.5	***1.9***	***2.8***		***W4184-3rus***	***1.2***	***1.4***	***1.3***
W5955-1	2.3	***2.1***	***2.8***		W4315-5rus	3.1	3.7	3.9
W5963-2	2.5	***1.5***	***2.4***		W4619-3rus	2.7	2.9	3.1
W6009-8	2.3	3.9	4.3		**W5257-2rus**	**1.5**	**1.3**	**2.7**
W6040-6	***2.1***	***2.0***	***2.8***		W5303-1rus	3.3	2.4	3.6
W6238-1	3.6	3.4	3.7		***W6197-2rus***	***1.2***	***1.7***	***2.1***
W6323-6	3.2	3.4	***2.6***		W6234-4rus	3.5	3.2	3.2
W6387-3	3.1	3.5	4.0		***W6294-3rus***	***1.7***	***1.5***	***1.6***
W6387-7	2.3	3.3	4.0		W6312-4rus	2.0	3.6	3.6
W6388-3	2.9	3.5	4.0		***W6313-1rus***	***1.3***	***1.9***	***1.9***
W6390-2	3.8	3.5	4.3		***W6316-3rus***	***1.2***	***1.8***	***2.2***
W6390-5	3.2	3.7	4.2		W6360-3rus	2.6	3.2	3.4
W6483-4	***1.9***	***1.6***	3.0		W6363-2rus	2.6	2.9	3.6
W6484-2	***2.1***	***2.2***	***2.2***		W6712-1rus	2.0	3.7	3.6
W6529-1	2.5	***2.0***	***2.8***		***W6842-1rus***	***2.0***	***1.5***	***2.4***
W6571-3	3.6	3.9	4.3		W6905-2rus	2.6	2.8	3.9
W6591-1	***2.1***	***2.0***	***2.1***		W7070-2rus	2.6	3.2	3.3
W6598-2	***2.1***	***2.3***	3.2		W8198-1rus	3.1	3.3	3.5
W6602-2	3.2	3.5	3.6		W8208-1rus	2.4	3.2	3.5
W6609-3	***2.1***	***1.9***	***2.0***		W8246-1rus	2.6	3.4	3.4
W6803-2	2.5	***2.2***	***2.5***		W8250-1rus	1.5	3.2	3.1
W6803-3	***2.3***	***1.9***	***2.2***					
W6929-1	***2.1***	***1.9***	.		**Yellow Flesh**			
W6929-2	***2.1***	***1.8***	***2.6***		***W6431-1***	2.7	***2.1***	***2.3***
W6929-3	***1.9***	***1.8***	3.1		***W6703-1***	***1.8***	***2.2***	***2.5***
W7124-9	***2.1***	***2.0***	***2.5***		***W6703-5***	***2.1***	***1.7***	***2.5***
					Yukon Gold	3.2	3.3	3.9

Note: Boldfaced letter font indicates resistant reaction in at least two of three locations, statistically significant within its market type (round white, red, russet or yellow flesh). Underlined values indicate susceptible reaction, statistically significant within its market type. Normal font for the values indicate performance no different than the mean for their market type.

Fig. 1. Performance of advanced clones for foliar and tuber late blight, Corvallis, OR.

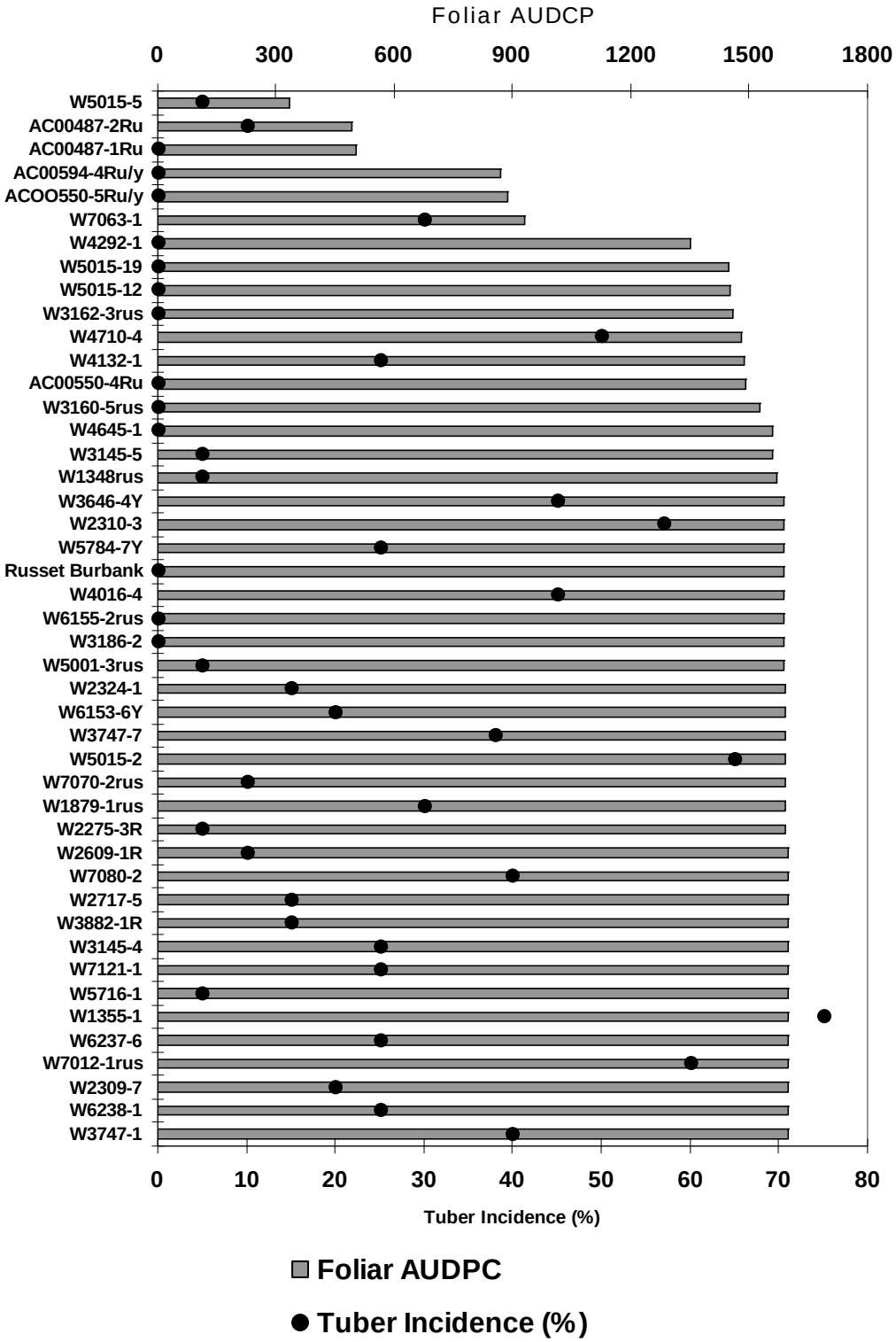


Fig. 2. Performance of early selection clones for foliar and tuber late blight, Corvallis, OR.

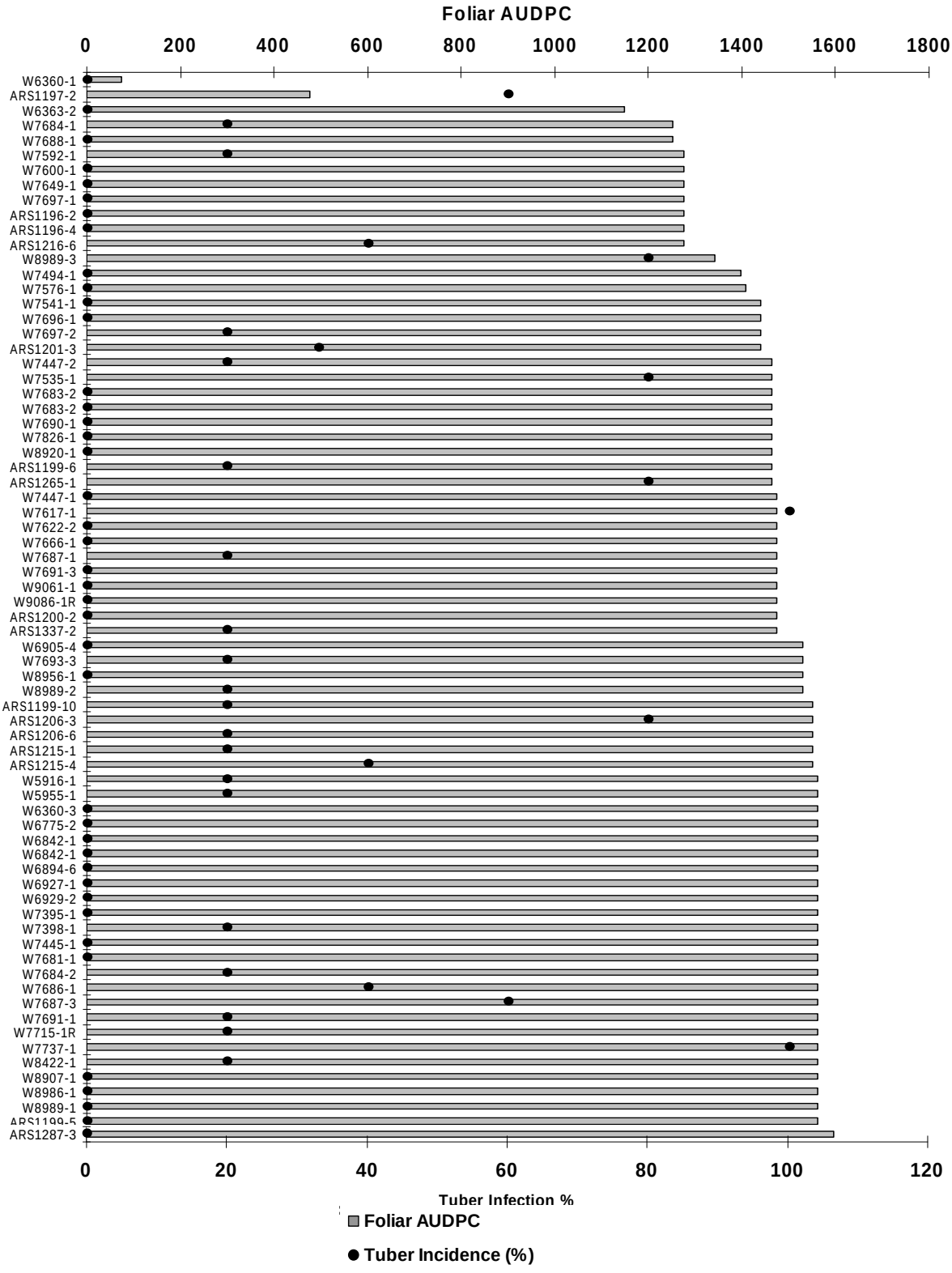


Fig. 2. Performance of early selection clones for foliar and tuber late blight, Corvallis, OR. (Cont'd)

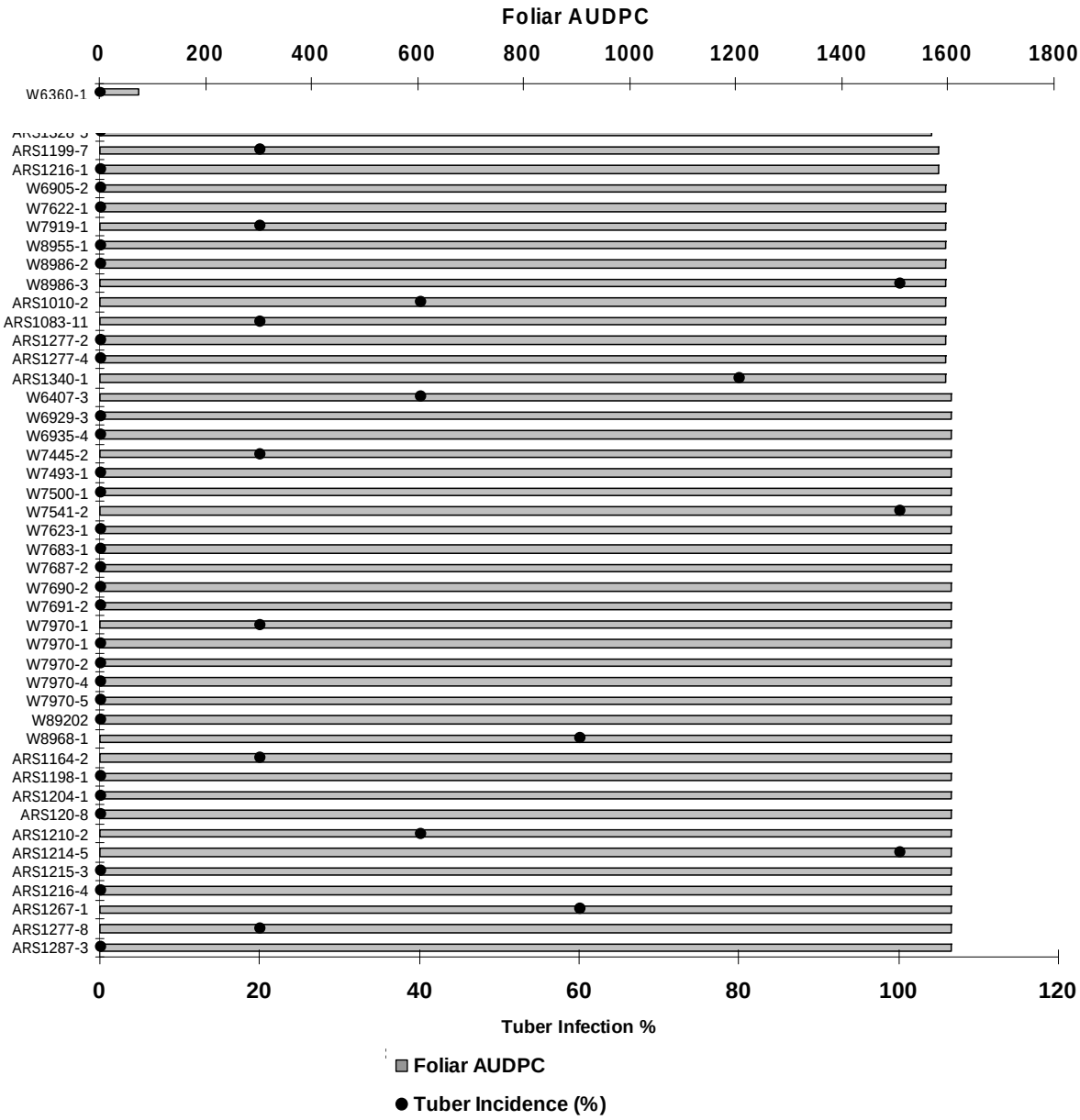
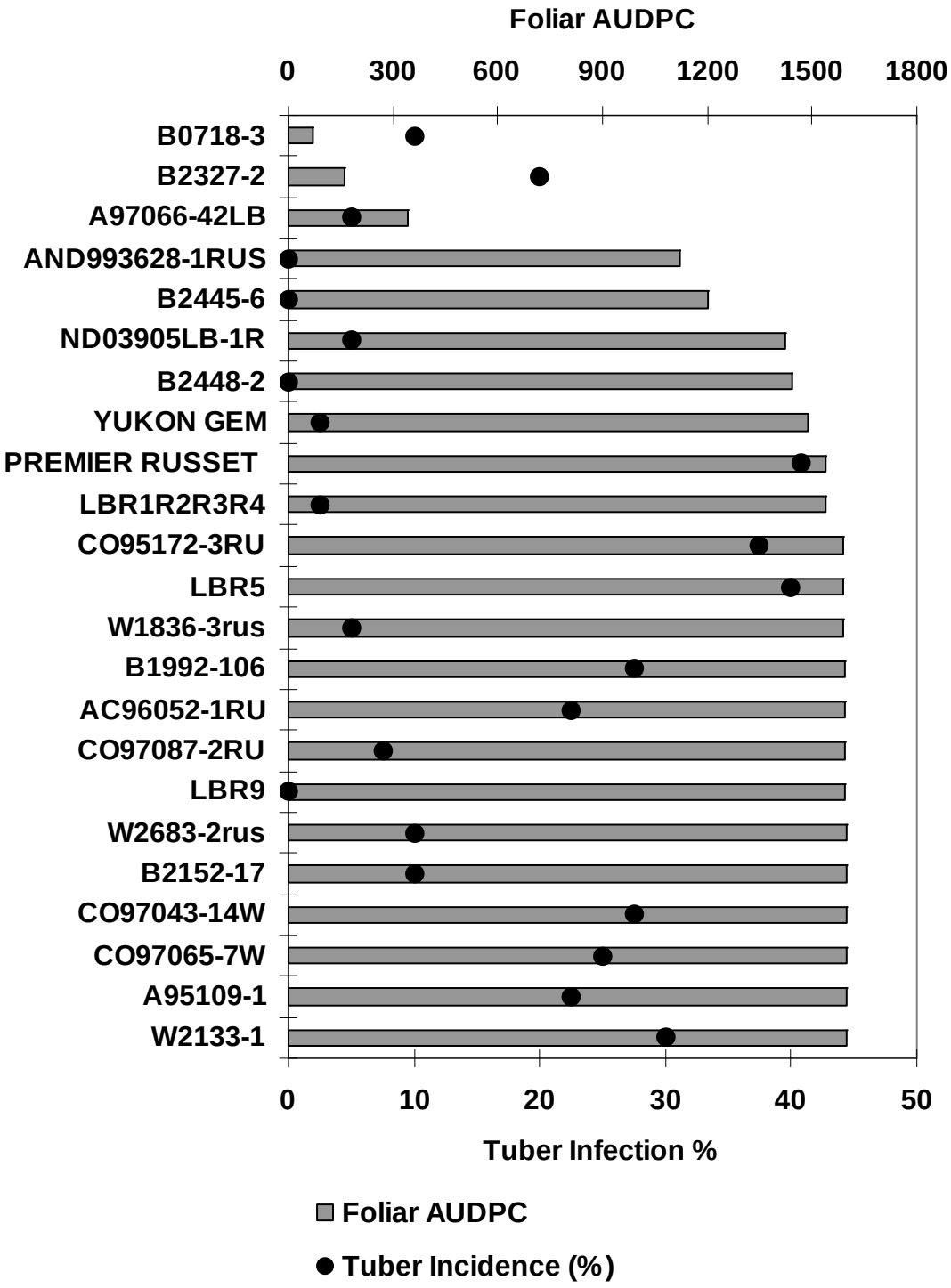


Fig. 3. Results of the National Late Blight Trial in Corvallis, OR.



Evaluation of Year 2 Clones for Late Blight by the Detached Leaf Assay in Collaboration with Terese Barta (UW-Stevens Point)

Incidence of late blight in the field is highly dependent on weather conditions (Crosier, 1934). Therefore, to assess late blight resistance, detached leaf assays were performed using plants grown in the greenhouse using the ME93A2 strain of the A2 mating type of *P. infestans* (obtained from UW-Madison) grown for 13-14 days at 18°C on a rye medium (Caten and Jinks, 1968) to induce sporulation. This strategy helps the breeding program to evaluate early year clones before they are field evaluated. The procedure included the use of leaves between the sixth and eighth node from the shoot apex were detached and placed in test tubes of distilled water until inoculated by spraying with 0.5-0.7 ml of the sporangial suspension using a common misting bottle. All plates were sealed with Parafilm® and incubated in a controlled environment chamber that supports both leaf survival and fungal infection (18°C, and 12-hour photoperiod 80 mmol/m^2 light). At six and 11 days after inoculation, the percent surface area of the leaf with lesions or sporangia will be used to rate the leaves for susceptibility. Susceptible varieties (such as Russett Burbank, Snowden, or Goldrush) were used as susceptible standards. The resistant control lines used included MX676014, MX781993, and J101K6. Rating scale was as follows: 0 (no infection), 1 (5% or less), 3 (6-25%), 5 (26-50%), 7 (51-75%), 9 (76-100%). Leaves that had ratings greater than 5 by day six were considered susceptible. Leaves that scored an average of 3 or lower were judged to have some level of resistance. If there was a high rating based on necrosis or water soaking but no sporangia were observed, the line was judged inconclusive pending further testing. These assays have been evaluated by other researchers and shown to be valid in determining resistance (Dorrance and Inglis, 1997).

Twenty four clones appeared to have some level of resistance compared to susceptible and resistant control varieties (Table 6). Highly susceptible lines were often scored a 9 by day six with the presence of sporangia. In 2007, all of the clones evaluated were grown at the Rhinelander Agricultural Research Station in 4 hills plots, where data on their adaptation was taken and samples were drawn for tuber processing quality evaluation. The results discussed here will help combine disease resistance, adaptability and tuber quality. Clones with the best combination of the desired traits will be Year 3. Advanced materials to Year 3 will be evaluated for adaptability and quality at the Hancock and Rhinelander Experimental Stations and for late blight field resistance in year 2008.

Table 6. Results of Evaluation of late blight resistance by detached leaf assay, 160 breeding clones of 2nd Year, Stevens Point, WI.

Sample #	Clone #	Day 6 Average	Day 11 Average	Resistance
1	W8391-1	0.3	1.7	R
2	W8391-2	0.3	3.0	R
3	W8391-3	3.0	8.3	I
4	W8391-4	1.5	4.8	R
5	W8391-5	3.0	9.0	S
6	W8391-6	0.8	4.3	I
7	W8407-1	3.7	7.7	S
8	W8407-2	0.3	1.3	R
9	W8407-3	1.0	9.0	I
10	W8407-4	1.3	3.7	I
11	W8407-5	0.0	3.7	R
12	W8407-6	3.0	6.7	S
13	W8407-7	1.3	7.7	R
14	W8407-8	9.0	-	S
15	W8407-9	1.0	7.0	S
16	W8407-10	2.3	7.0	I
17	W8407-11	9.0	0.0	S
18	W8407-12	1.7	7.7	I
19	W8407-13	4.3	5.7	I
20	W8407-14	6.3	7.7	S
21	W8407-15	3.0	5.0	S
22	W8407-16	5.0	9.0	S
23	W8407-17	2.3	6.3	S
24	W8407-18	0.3	7.0	I
25	W8407-19	7.0	9.0	S
26	W8407-20	9.0	9.0	S
27	W8408-1	0.7	3.7	R
28	W8408-2	9.0	-	S
29	W8408-3	9.0	-	S
30	W8408-4	1.0	5.7	S/R
31	W8408-5	9.0	6.0	S
32	W8408-6	0.3	2.0	R
33	W8408-7	5.7	0.0	S
34	W8409-1	8.3	0.0	S
35	W8409-2	0.3	1.0	R
36	W8409-3	2.7	4.7	S
37	W8409-4	9.0	0.0	S
38	W8409-5	0.3	1.0	R
39	W8409-6	2.3	0.0	R
40	W8409-7	9.0	0.0	S
41	W8409-8	9.0	0.0	S
42	W8410-1	6.0	0.0	S
43	W8410-2	9.0	0.0	S
44	W8410-3	7.0	0.0	S
45	W8410-4	4.3	9.0	S
46	W8410-5	1.7	3.7	I
47	W8410-6	9.0	0.0	S
48	W8411-1	5.0	0.0	S
49	W8411-2	9.0	0.0	S
50	W8411-3	7.0	0.0	S, I
51	W8411-4	9.0	9.0	S
52	W8411-5	5.7	0.0	S
53	W8411-6	0.0	4.3	R
54	W8413-1	5.0	9.0	S
55	W8413-2	2.3	7.0	R/S
56	W8413-3	0.7	3.0	R
58	W8413-5	0.3	3.0	R
59	W8414-1	4.3	9.0	S
60	W8414-2	3.0	0.0	S
61	W8414-3	5.7	0.0	S
62	W8415-1	5.0	0.0	S
63	W8415-2	1.7	3.3	S
64	W8415-3	8.3	9.0	S
65	W8415-4	8.3	9.0	S
66	W8415-5	5.7	0.0	S
67	W8415-6	3.7	0.0	S
68	W8418-1	5.7	8.3	S
69	W8418-2	3.7	0.0	S
70	W8418-3	0.0	0.0	R
71	W8418-4	3.7	9.0	S
72	W8420-1	9.0	0.0	S
73	W8420-2	7.0	9.0	S
74	W8420-3	5.0	9.0	S
75	W8420-4	7.0	9.0	I
76	W8420-5	3.7	9.0	S
77	W8420-6	5.7	0.0	S
78	W8421-1	5.0	0.0	S
79	W8421-2	7.7	9.0	I
80	W8421-3	4.2	5.2	S, I
82	W8421-5	5.7	9.0	S

Note : Rating scale was as follows: 0 (no infection), 1 (5% or less), 3 (6-25%), 5 (26-50%), 7 (51-75%), 9 (76-100%).

Resistance level expected: R = resistant, I = intermediate resistance, S = susceptible

Table 6. Results of Evaluation of late blight resistance by detached leaf assay, 160 breeding clones of 2nd Year, Stevens Point, WI (Cont'd).

Sample #	Clone #	Day 6 Average	Day 11 Average	Resistance
83	W8421-6	3.0	0.0	I
84	W8422-1	7.7	9.0	S
85	W8422-2	3.0	9.0	I
86	W8422-3	5.7	0.0	S
87	W8422-4	2.3	7.7	R
88	W8424-1	0.3	0.0	R
89	W8424-2	6.3	8.3	S
90	W8424-3	5.0	6.3	S
91	W8424-4	3.0	8.3	R/S
92	W8425-1	9.0	0.0	S
93	W8425-2	7.0	9.0	S
94	W8425-3	1.0	7.7	R
95	W8425-4	0.7	4.3	R
96	W8425-5	5.7	7.7	S
97	W8437-1	7.7	9.0	S
98	W8437-2	8.3	9.0	S
99	W8437-3	9.0	0.0	S
100	W8437-4	3.0	7.0	S
101	W8437-5	9.0	0.0	S
102	W8437-6	8.3	9.0	S
103	W8437-7	8.3	9.0	S
104	W8437-8	0.0	3.0	R
105	W8437-9	4.7	7.0	S
106	W8437-10	8.3	9.0	S
107	W8437-11	5.0	9.0	S, I
108	W8437-12	7.7	9.0	S
109	W8437-13	7.7	3.0	S
110	W8443-1	8.3	3.0	S
111	W8443-2	8.3	3.0	S
112	W8452-1	4.3	0.0	I
113	W8452-2	5.7	9.0	I
114	W8452-3	3.0	8.3	S
115	W8452-4	7.0	9.0	I, S
116	W8453-1	3.3	9.0	I
117	W8453-2	2.3	7.7	R/S
118	W8453-3	5.7	9.0	I
119	W8453-4	9.0	9.0	S
120	W8453-5	7.7	9.0	S
121	W8455-1	4.5	8.5	S
122	W8455-2	3.3	5.7	S
123	W8455-3	5.7	9.0	S
124	W8455-4	5.7	9.0	S
125	W8455-5	4.3	8.3	S
126	W8455-6	1.7	5.7	R
127	W8455-7	1.7	5.7	R
128	W8455-8	6.3	9.0	S
129	W8455-9	7.7	9.0	S
130	W8455-10	8.3	3.0	S
131	W8456-1	3.0	6.3	R/S
132	W8456-2	9.0	9.0	S
133	W8456-3	5.0	7.7	S
134	W8456-4	9.0	0.0	S
135	W8456-5	9.0	9.0	S
136	W8456-6	7.7	3.0	S
137	W8457-1	4.0	9.0	S
138	W8457-2	7.7	6.0	S
139	W8457-3	3.0	8.3	S
140	W8457-4	7.7	9.0	S
141	W8457-5	3.0	8.3	R
142	W8457-6	4.3	9.0	I
143	W8457-7	3.7	0.0	I
144	W8457-8	6.3	9.0	S
145	W8457-9	7.7	9.0	S
146	W8457-10	4.3	8.3	S
147	W8457-11	2.0	5.7	R
148	W8458-1	0.0	3.7	R
149	W8458-2	4.3	5.7	I
150	W8458-3	1.0	1.7	R
151	W8458-4	3.7	8.3	S
153	W8459-2	0.7	3.0	R
154	W8560-1	7.7	9.0	S
156	W8592-1	1.3	7.7	I
157	W8592-2	2.0	7.0	I
158	W8592-3	1.0	1.0	R
159	W8592-4	7.0	9.0	S
160	W8592-5	8.0	3.0	S
161	W8605-1	0.0	7.7	I
162	W8605-2	3.7	9.0	I
163	W8605-3	3.7	9.0	S
164	W8605-4	5.0	9.0	I
165	W8605-5	7.7	3.0	S
166	W8605-6	7.7	9.0	S
167	W8605-7	6.3	7.7	S
168	J101K6	0.3	2.0	I, R
169	MX676014	4.6	4.8	S, S, R
170	MX781993	1.9	4.9	R/S, R,R
172	Goldrush	6.9	5.0	S
173	Russet Burbank	6.3	9.0	S

Note : Rating scale was as follows: 0 (no infection), 1 (5% or less), 3 (6-25%), 5 (26-50%), 7 (51-75%), 9 (76-100%).

Resistance level expected: R = resistant, I = intermediate resistance, S = susceptible