Potato Breeding Program Research Update Field Year 2012

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Wisconsin Seed and Commercial Potato Growers-On Farm Variety Testing

Potato Breeding Program Research Update Field Year 2012

Abstract: The goal of the UW Potato Breeding Program is to develop potato cultivars that are genetically superior and that satisfy or exceed the standard for yield and grade in the fresh and processing markets. To achieve these objectives, parental lines with desired traits are crossed and progenies are evaluated emphasizing early selection evaluation in Central WI and other environments. In 2012 we made significant progress towards selecting superior varieties for long storability, processing ability from cold stores for chip stocks, processing russets for French fries and fresh market russets and reds. Exciting developments from the 2011 include the naming of W2324-1 (Accumulator) and W2717-5 (Lelah) in December of 2011. Accumulator, a short storage chipper, is arguably the highest yielding chip variety in the US and Lelah is probably the WI variety with the best capacity for long term cold storage, usually a month longer than Snowden. These varieties are being evaluated by the USPB-Fast-Track project at the semi-commercial level. In addition, we have prepared and submitted the PVP applications to protect the recently named varieties Tundra and Nicolet. We have also made significant progress in selecting for disease resistance and tuber quality. We have continued our selection in early years for common scab resistance, early blight and Verticillium wilt. In collaboration with Amy Charkowski and Shelley Jansky we have validated molecular markers for extreme resistance to PVY. We are now in a position to launch a marker assisted selection program to increase our efficacy and efficiency in selecting PVY resistant varieties. Moreover, we maintain collaborative late blight projects with scientists at Oregon State University and UW-Stevens Point that evaluated 20 advanced clones and 220 clones from early years of selection to identify those with resistance. In collaboration with Amanda Gevens (UW) and Terese Barta (UWSP), we are screening clones that are source of late blight resistance to understand their value against prominent *P. infestans* strains. Besides our own evaluation of fry quality, we collaborated with scientists at the USDA-East Grand Forks to evaluate processing traits of over 1,000 Year 2 and Year 3 clones. We also collaborated with scientist from the University of Guelph and the New Brunswick Ministry of Agriculture and Aquaculture on sugar and chip color evaluation of 37 of our 4^{th} and 5^{th} year selection clones over 9 months of storage. These results are critical to select clones with potential as processing varieties. We are also testing 41 chip and 14 russet clones in the USPB-National Chip and National French fry trials respectively. In 2012, Wisconsin seed growers harvested 689 acres of certified seed of twelve clones. This was a 15.4% increase over the 597 acres of certified seed of seven WI clones for 2011 and 36% over the 507 acres harvested in 2010. This trend is likely to continue as varieties like Nicolet are adopted and other new WI varieties grow in acceptance. The number of new WI varieties planted for seed increased from 5 to 7.

Objectives:

The main objectives the UW-Potato Breeding Program pursues are as follow:

i. **Development of Processing and Dual Purpose Processing/Fresh Market Russet Varieties.**
ii. **Development of Fresh Market Russet Varieties.**
iii. **Development of Long Storage Chippers as Potential Snowden Replacements.**
iv. **Development of Early Chippers as Potential Atlantic Replacements**.
v. **Development of Fresh Market Red Skin and Specialty Varieties**.

Data in this report includes:

1. **Introduction: Outputs and Impacts**
   1.1 Impact of new clones measured by certified seed acreage
   1.1. SpudPro breeding clone status
   1.2. Update on new varieties and elite clones in the pipeline
   1.3. Update on Best Performing Advanced UW Potato Breeding Clones, 2012

2. **Performance of Advanced and Elite WI Clones in National and Regional Trials**
3. **Evaluation of Year 4 and Year 5 Clones**
4. **Early Generation Selection Strategies**
5. **Parental Selection and Unselected Clone Exchange.**

1. Output and Impact of New Wisconsin Potato Varieties

1.1 Impact of New Clones Measured by Certified Seed Acreage

The goal of the UW Potato Breeding Program is to develop potato cultivars that are genetically superior and that satisfy or exceed the standard for yield and grade for the fresh and processing markets. A measure of success of breeding programs is the rate of adoption of new releases. In the last few years, the acreage planted with recent releases is now about four times what it was seven years ago (Fig 1 and Table 1). Wisconsin new clones increased in seed acreage about 24% per year since 2005 and 16.5% per year in the last two years.

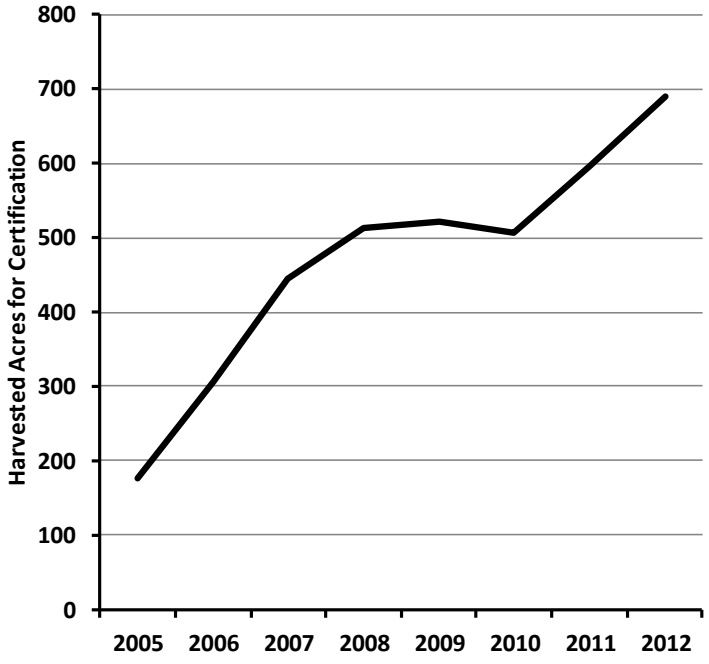


Fig. 1. Certified seed acreage (2005-12) of new Wisconsin clones

In the last seven years, **MegaChip** has been increasingly adopted. In several locations of the South, particularly in Mo, MegaChip has represented a suitable choice for replacing Atlantic acreage. Outside of the US, MegaChip has had a top performance in Brazil and Egypt in experiments conducted by the USPB. The USPB is making efforts to register this variety in Brazil and Egypt. This may represent additional business oportunities for WI and other US growers.

Nicolet and Accumulator are two other varieties that are getting good acceptance as people have on-farm experiences with them. **Nicolet** is expected to perform as a **long storage chipper** to replace Snowden in the US-North and **Accumulator** is a **short storage chipping** clone with **very high yield potential** that is aimed to replace Atlantic acreage.

Table 1. Certified acres planted with new Wisconsin varieties

Variety	Seed Acres Entered for Certification							
	2012	2011	2010	2009	2008	2007	2006	2005
MegaChip	462	385	349	382	361	279	133	50
Freedom	13	56	108	128	112	103	60	35
White Pearl	22	22	3	0	19	25	24	11
Villetta Rose	11	22	9	7	21	18	67	69
Tundra	18	1	2	0	0	4	0	0
Nicolet	87	55	20	5	0	2	0	0
Lelah	5	0	0	0	0	0	0	0
Accumulator	67	56	16	0	0	0	0	0
W6002-1R	1	0	0	0	0	0	0	0
W6511-1R	1	0	0	0	0	0	0	0
W6703-1Y	1	0	0	0	0	0	0	0
W6703-5Y	1	0	0	0	0	0	0	0
Total Acres	**689**	**597**	**507**	**522**	**513**	**444**	**307**	**177**
Number of Varieties	**12**	**7**	**7**	**4**	**4**	**7**	**5**	**5**

Exciting developments from 2012 include the naming of W2324-1 (Accumulator) and W2717-5 (Lelah) in December of 2011. Accumulator, a short storage chipper, is arguably the highest yielding chip variety in the US and Lelah is probably the WI variety with the best capacity to store long term, usually a month longer than Snowden. These newly named varieties are being evaluated by the USPB-Fast-Track project at the semi-commercial level. In addition, we have prepared and submitted the PVP applications for Tundra and Nicolet, previously named in December of 2010. Both varieties can produce chips with commercial quality and longer cold storage than Snowden, usually through May. Results for Nicolet are especially encouraging due to longer storage than Snowden and low stem end defects. In addition to increasing the number of acres of seeds for certification, the number of new WI clones planted by seed growers increased from 7 to 12.

1.2. SpudPro Breeding Lines Promoted to Virus Cleaning and Seed Multiplication

Between December of 2011 and March of 2012, **the SpudPro committee** with the support of WPVGA and WARF **promoted twelve additional clones to PVY cleaning and three for seed production**. Much of the impact of new WI variety may be attributed to the articulation of this promotion mechanism. Interested growers may fast-track some clones by commercial demand.

Table 2. SpudPro promotion and seed production schedule, WI clones

Variety	2012	2013	2014	2015	2016	2017	2018	2019	2020
MegaChip	SG/Com	Outside the SpudPro promotion mechanism							
Freedom Russet	SG/Com	Outside the SpudPro promotion mechanism							
White Pearl	SG/Com	Outside the SpudPro promotion mechanism							
Villetta Rose	SG/Com	Outside the SpudPro promotion mechanism							
Tundra	SG								
	E2	SG	SG/Com						
Nicolet	SG								
	E2	SG	SG/Com						
Lelah	SG	SG/Com							
Accumulator	SG	SG/Com							
	E2	SG	SG/Com						
W6002-1R	E1	E2	SG	SG/Com					
W6703-1Y	MT	E1	E2	SG	SG/Com				
W6234-4rus	E2	SG	SG/Com						
	E1	E2	SG	SG/Com					
W5015-12	E1	E2	SG	SG/Com					
	MT	E1	E2	SG	SG/Com				
W6609-3	MT	E1	E2	SG	SG/Com				
W5955-1	MT	E1	E2	SG	SG/Com				
W5015-5		MT	E1	E2	SG	SG/Com			
W8152-1rus		MT	E1	E2	SG	SG/Com			
W8405-1R		MT	E1	E2	SG	SG/Com			
Clones promoted by SpudPro to seed cleaning. Kept in TC until promoted to seed production									
W9133-1rus	VC	VC/TC							
W8405-1R	VC	VC/TC							
W8886-3R	VC	VC/TC							
W8516-1rus	VC	VC/TC							
W8722-1rus	VC	VC/TC							
W8822-3	VC	VC/TC							
W9161-3rus	VC	VC/TC							
W6822-3	VC	VC/TC							
W8893-1R	VC	VC/TC							

Note: VC = Virus cleaning, TC = Tissue Culture, MT = mini-tuber production in greenhouse pots or NFT, E1, E2 = Field Generations at the Lelah Starks Foundation Seed, SG = Seed grower, Com = Commercial production

Table 2 is designed to inform seed and commercial growers about potential plans for SpudPro seed production. Outside this scheme, seed growers can make additional orders to start minitubers, E1 or E2 foundation seed production at the Seed Farm. It is important to note that the SpudPro seed promotion function only include an initial wave of seeds for on-farm experience. Growers interested in additional orders should arrange for mini-tuber production to be initiated according to seed and commercial production plans

1.3. Update on New Varieties and Elite Clones in the Pipeline: Foundation or Certified seed of Tundra, Nicolet, Lelah, Accumulator and W6234-4 available for grower's tests in 2013

Tundra (W2310-3): Long storage chipping variety with consistent high gravity

Parentage: Pike x S440. **Strengths**: Long storage potential producing good chip quality from 48°-50°F storage and warmer for 6-9 months. Specific gravity equal or higher than Snowden (Fig. 2). **Incentives for production**: Potential for long storage better than Snowden, low tuber internal and external defects, moderate scab resistance, high solids. **Tubers**: Uniform tuber shape and medium size profile. Medium set (9-10 tubers/hill), round-oval shape. Moderately netted skin and moderate eye depth. **Specific Gravity:** High, usually >1.084 and higher than Atlantic. Moderate tolerance to common scab, better than Snowden and Atlantic. **Vine Maturity:** Full-season cultivar (similar to Snowden). **Seed Status**: SpudPro foundation seed available at Seed Farm and Wisconsin seed growers.

Fig. 2. Specific gravity of Tundra vs. Snowden, 10 locs

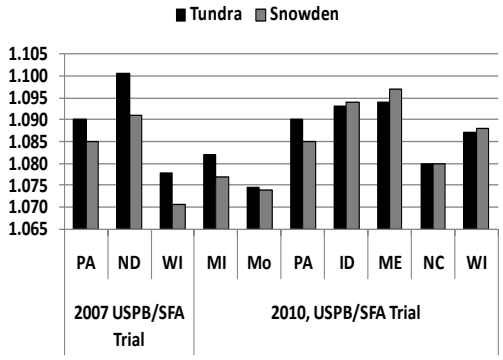
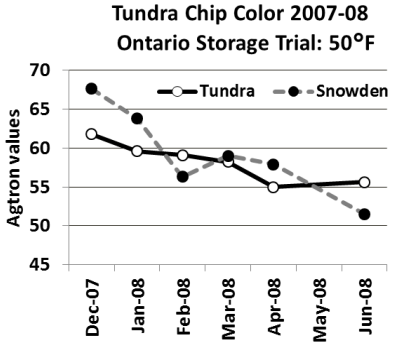
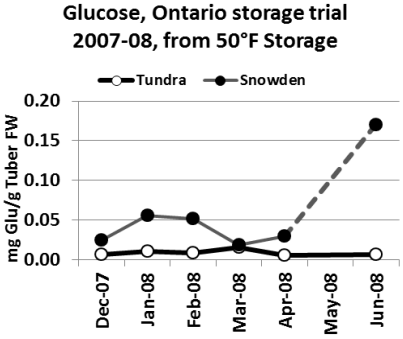


Fig.3.Typical chip color and Glucose content of Tundra and Snowden, 50°F storage trials





Nicolet (W2133-1): **Parentage:** Snowden x S440

Strengths: High yield potential (Fig. 4), good internal quality, very good tuber size and appearance. Medium to long storage chipper from 47ºF. **Incentives for production:** Yield comparable with Snowden and Atlantic, with better tuber shape uniformity. Fry products show high resistance to stem end discoloration. **Specific Gravity:** High gravity, consistently over 1.080, usually between Snowden and Atlantic (Fig.4). **Vine Maturity:** Full-season cultivar (similar to Snowden). **Processing:** Good chip color after harvest from 48°F-50°F storage through seven months of storage when storage is managed properly (Fig. 5). Fry products show high resistance to stem end discoloration. Glucose values may remain low while Snowden sugars increase after long cold storage. **Seed Status**: SpudPro foundation seed available at Seed Farm and Wisconsin seed growers.

Fig.4. Yield and specific gravity of Nicolet (W2133-1) vs. Snowden in trial conducted in the North Central Region

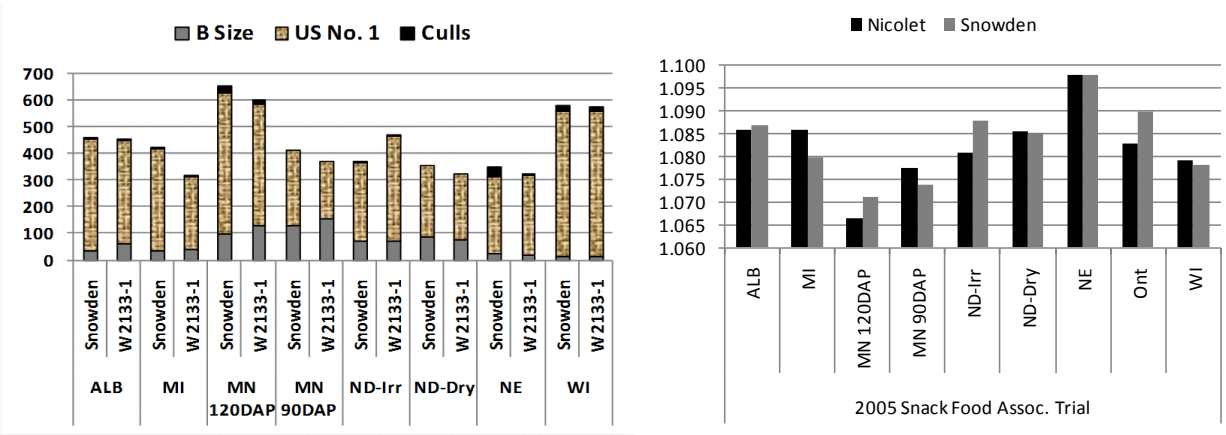
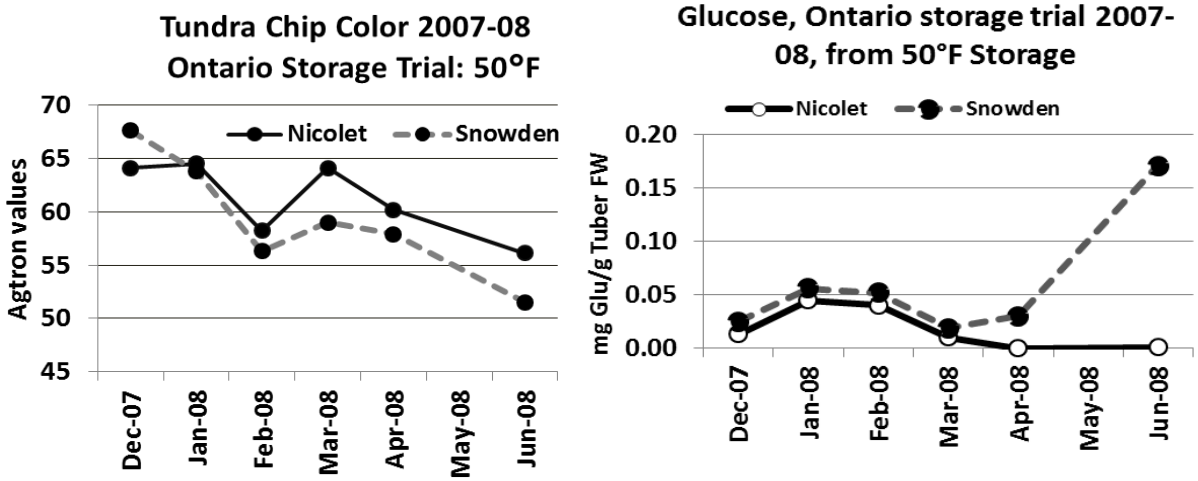


Fig.5. Nicolet and Snowden chip color and glucose from long storage



Lelah (W2717-5): Long term and cold storage chipper

Parentage: S440 x ND3828-15. **Strengths**: Attractive round-oval tubers with smooth skin finish. Very uniform tuber size profile, and high specific gravity. Cold sweetening resistance through 9 months at 47°F. **Incentives for production:** High and consistent specific gravity (1.080-1.090). Long storage chipping ability. Very low glucose and sucrose profile through 9 months (A-II basal invertase +). **Tubers:** Medium size, 6 to 8oz, very uniform size and round-oval shape and very shallow eyes. **Maturity:** Medium-Early, 14 days earlier than Snowden. **Yield:** Medium; lower than Snowden. Yield data suggest that it yields among the best in low yielding conditions. Commercial fry quality can be extended at least 45 days longer than Snowden under cold storage**. Foundation seed status:** Some seed growers and USPB Fast-track

Fig.6. Lelah fry color and tuber glucose, compared to Snowden, Ontario storage trial 2010-11

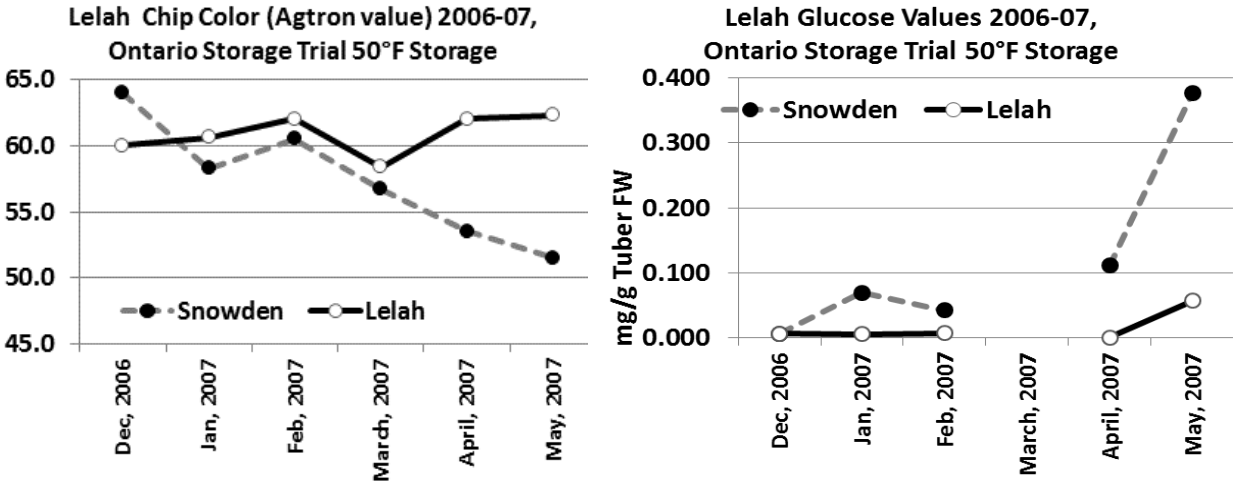
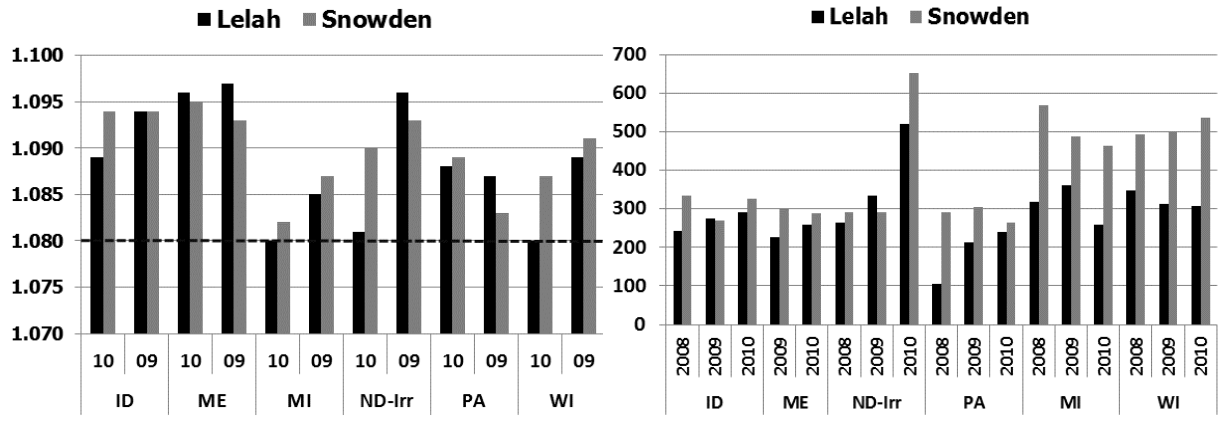


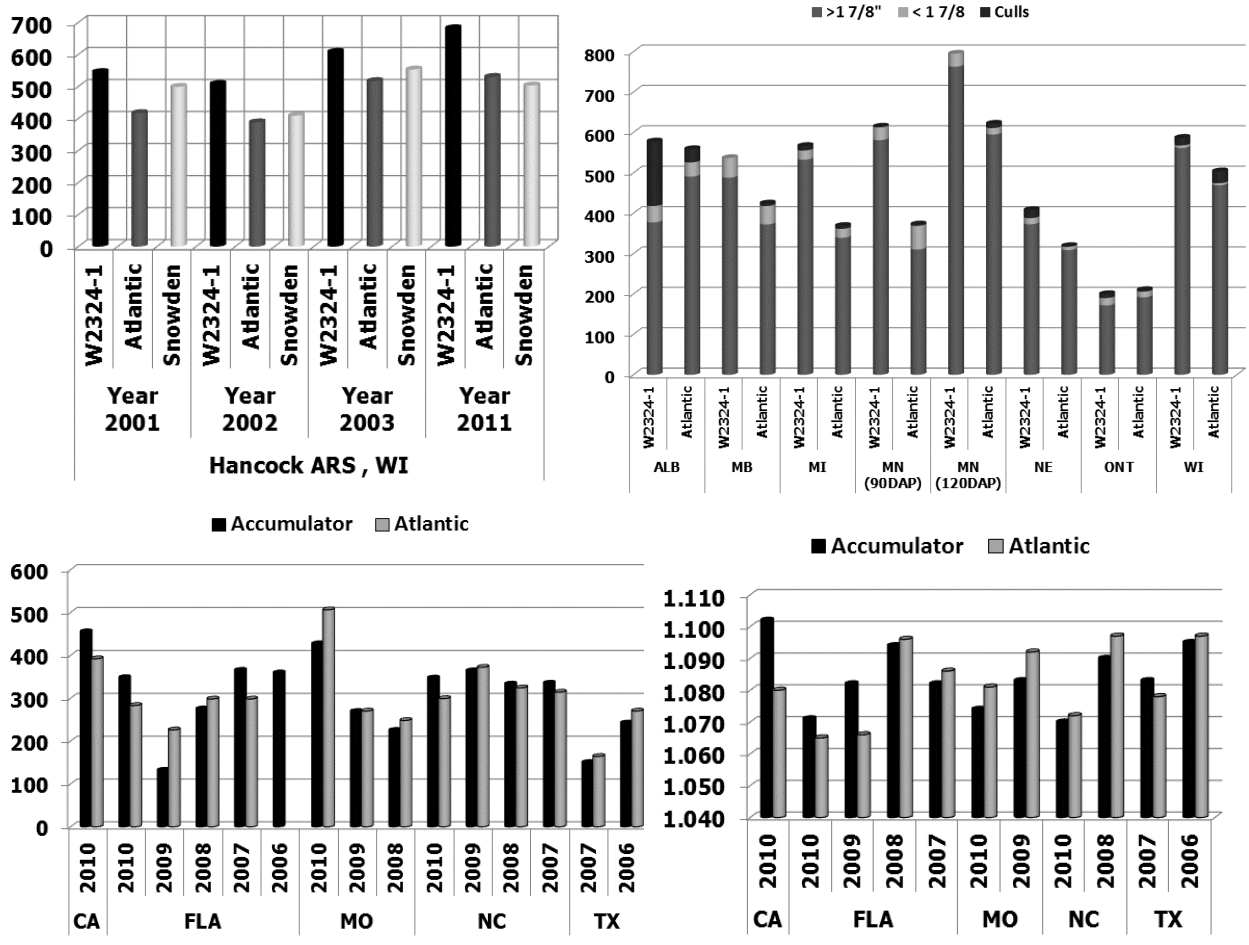
Fig.7. Lelah specific gravity and yield, compared to Snowden, Ontario storage trial North Central and USPB Snack Food Association Trials 2008-10



Accumulator (W2324-1): Very high yield short storage chipper, potential Atlantic replacement. **Seed Status**: SpudPro foundation seed available at Seed Farm, and Wisconsin seed growers.

Parentage: Snowden x S438**. Strengths:** Accumulator is arguably the highest yielding chip potato variety in the US; usually 20% above comparable varieties. It also has large and vigorous vines that result in early row closure and weed control. High tuber set and solids similar or better than Snowden. Very good tuber internal quality. Commercial chip quality from field through three to four months of storage is very good. **Incentives for production:** Very high yield, consistently high specific gravity and very low tuber internal raw or chip defects and potential for reduced nitrogen input. **Tubers:** Medium to large in size, high set, 10-16 tubers/plant Oval/blocky tuber shape that has somewhat variable contour and profile. Moderately netted tuber skin; eye depth is intermediate, with occasional folded bud end. **Maturity:** Full-season cultivar (similar to Snowden). **Yield:** In the Snack Food Trial, this variety has yielded up to 38% more than the average of varieties tested, and 24% more yield than Atlantic over 9 testing sites. **Specific Gravity:** Consistently high; similar or higher than Snowden. **Diseases:** Tolerant to early blight and Verticillium wilt. *More susceptible to common scab than Atlantic and Snowden*. **Storability:** Good chip color after harvest and from 48°F cold storage through January.

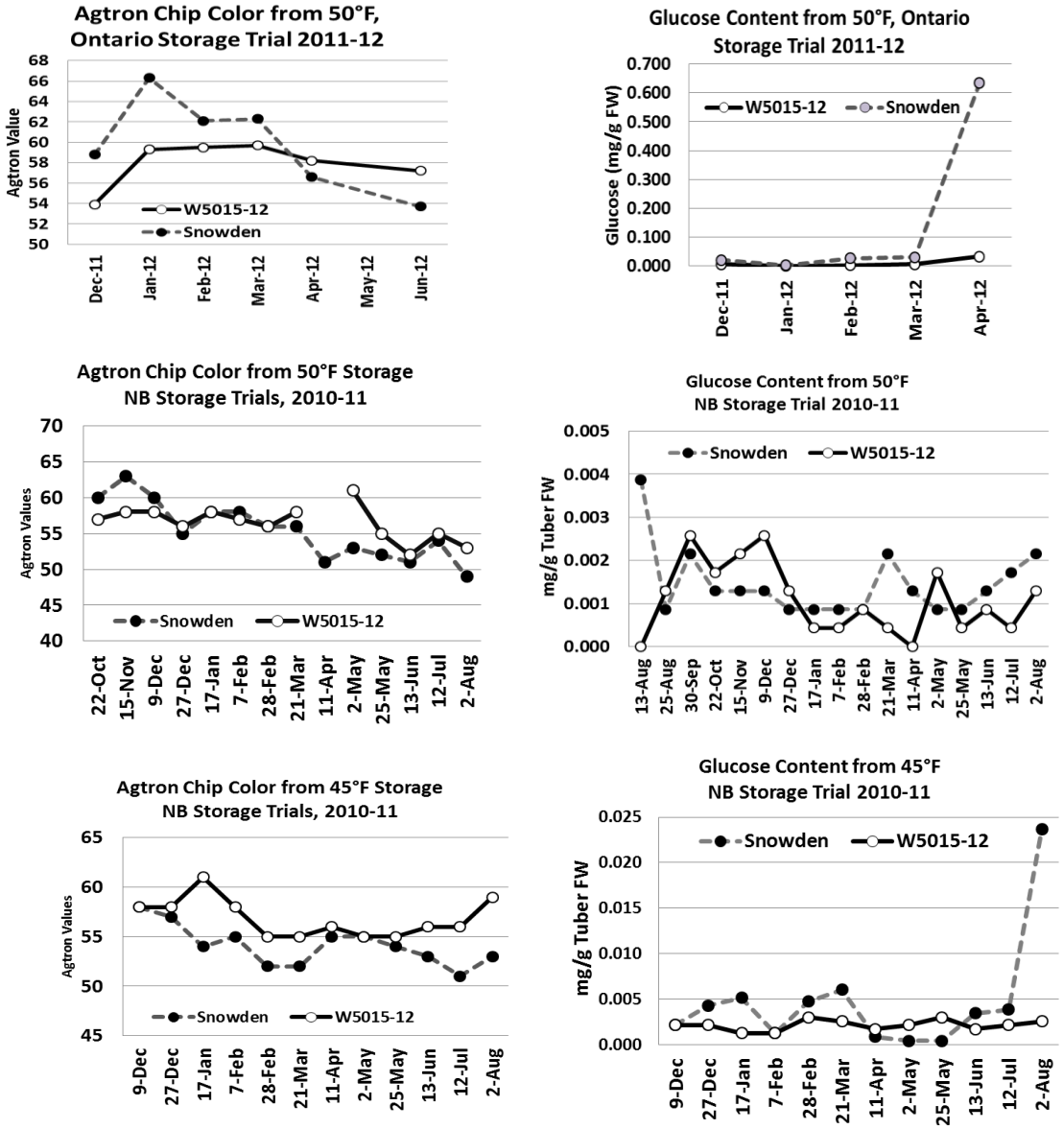
Fig. 8. Yield and Gravity of Accumulator (W2324-1) compared to Atlantic



W5015-12: Long Storage

Parentage: Brodick x White Pearl **Strengths:** High yield potential. Under high yielding US environments, yields have been higher than Snowden. **Weaknesses:** Susceptible to common scab. **Incentives for production:** Good chipping ability. Chips processed from potatoes stored at 48-50°F of can retain light color for six to nine months (Fig. 9). Gravity is similar to Snowden, consistently over 1.080. **Plant:** Large, semi-erect and strong vines, tolerant to Verticillium wilt. **Tubers:** Round-oval, somewhat flattened, uniform shape and size. **Maturity:** Medium late to full season**. Yield Potential:** Very high under high yielding locations and similar to Snowden under low to moderate yield locations. **Specific Gravity:** High, 1.080-1.095 average in most locations (see NCRT data in Table 5). **Late Blight**: Moderate resistance to late blight in field trials inoculated with *P. infestans* US 8 and US22 strains. **Foundation seed status:** E2 in 2013.

Fig. 9. **W5015-12 fry color and tuber glucose vs. Snowden, Ontario and NB storage trials**



W5955-1: Long Storage Chip Variety with Common Scab Tolerance

Parentage: Pike x C31-5-120. Strengths: Stable tolerance to common scab under field with high disease incidence. Specific gravity is similar to six units higher than Snowden. Chip color and sugar under long storage may be better than (Fig. 10). **Incentives for production:** Good chipping ability. Chips processed from potatoes stored at 48-50°F of can retain light color for six to nine months. **Good tolerance to Verticillium wilts. Tubers:** Uniform mid to large size, round, full and very smooth shape. **High yield potential, similar to Snowden (Fig. 10). Specific Gravity:** high, similar to Snowden, 1.080-1.095 average in most locations (Fig. 10). **Foundation seed status**: E1 in 2013, SpudPro Foundation seed for on-farm tests in 2015.

Fig. 10. Yield and specific gravity of W5955-1 vs. Snowden in five years of data, WI

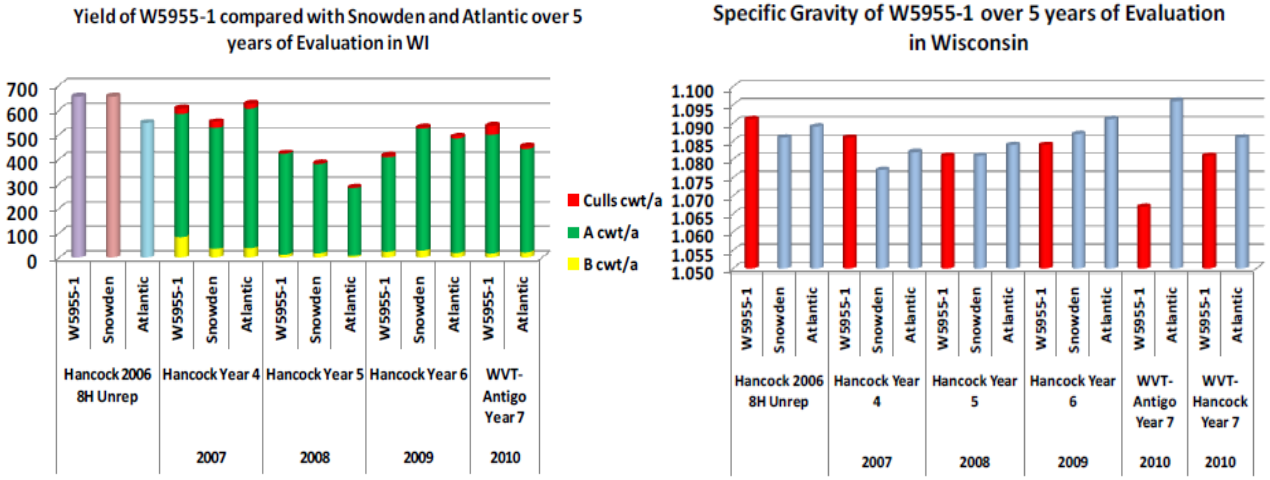
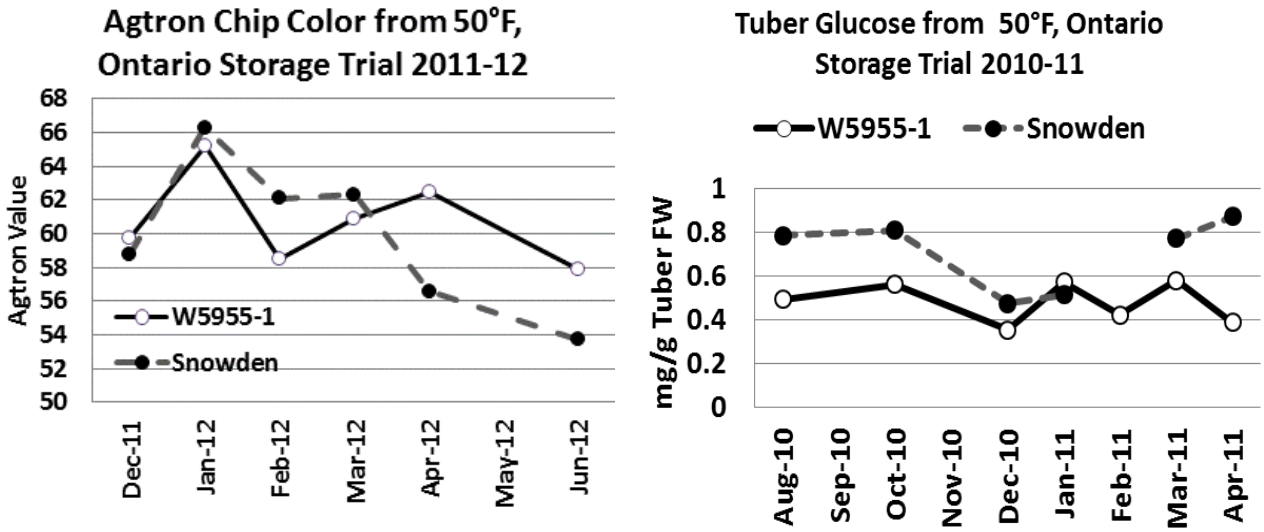


Fig. 11. Chip color and tuber glucose of W5955-1 vs. Snowden, Ontario storage trial, 2010-2011.



W6609-3: Long Storage Chip Variety with Common Scab Resistance

Parentage: Pike x Dakota Pearl. Strengths: the main strength of this breeding clone is the **combination of scab tolerance, processing quality and tuber type**, which represent good variety potential. **Specific gravity**: is similar to Snowden. **Chip color and sugar levels**: consistently lower than Snowden under long storage. Yield is from moderate to good. It has been included in the National Chip Processing Trial in 2013 for a better assessment of yield potential and adaptation. **Foundation seed status**: E1 in 2013, SpudPro Foundation seed for on-farm tests in 2015.

Fig. 12. Yield and specific gravity of W6609-3 vs. Snowden and Atlantic, WI, 5 years

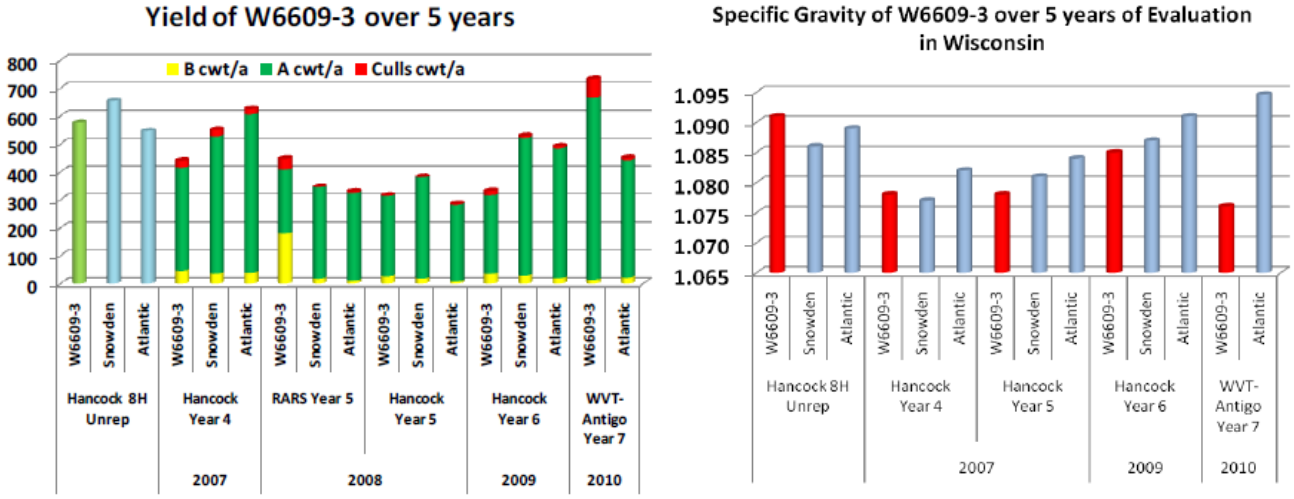
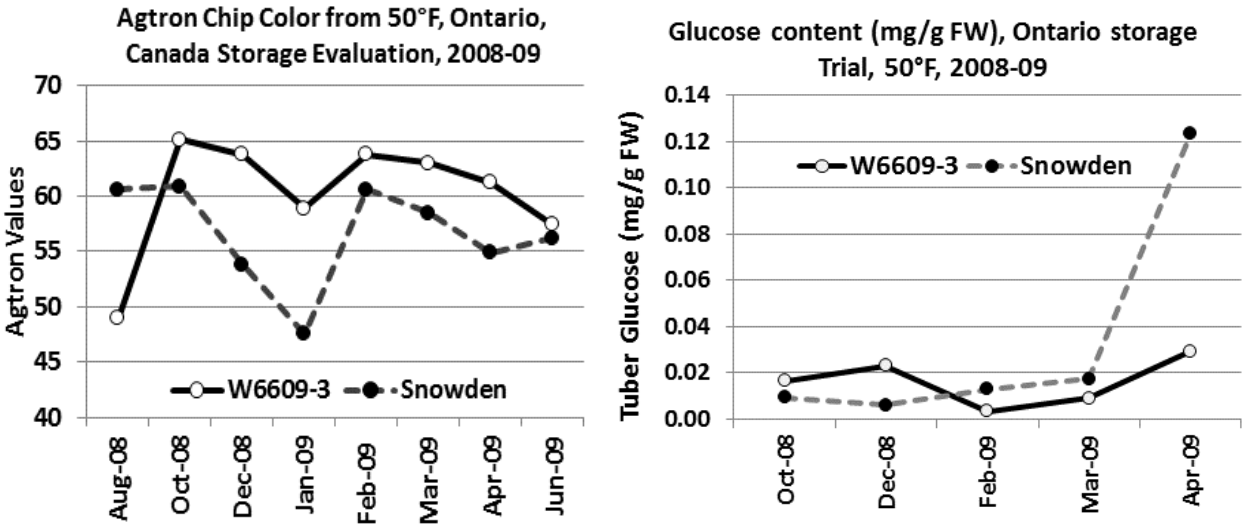


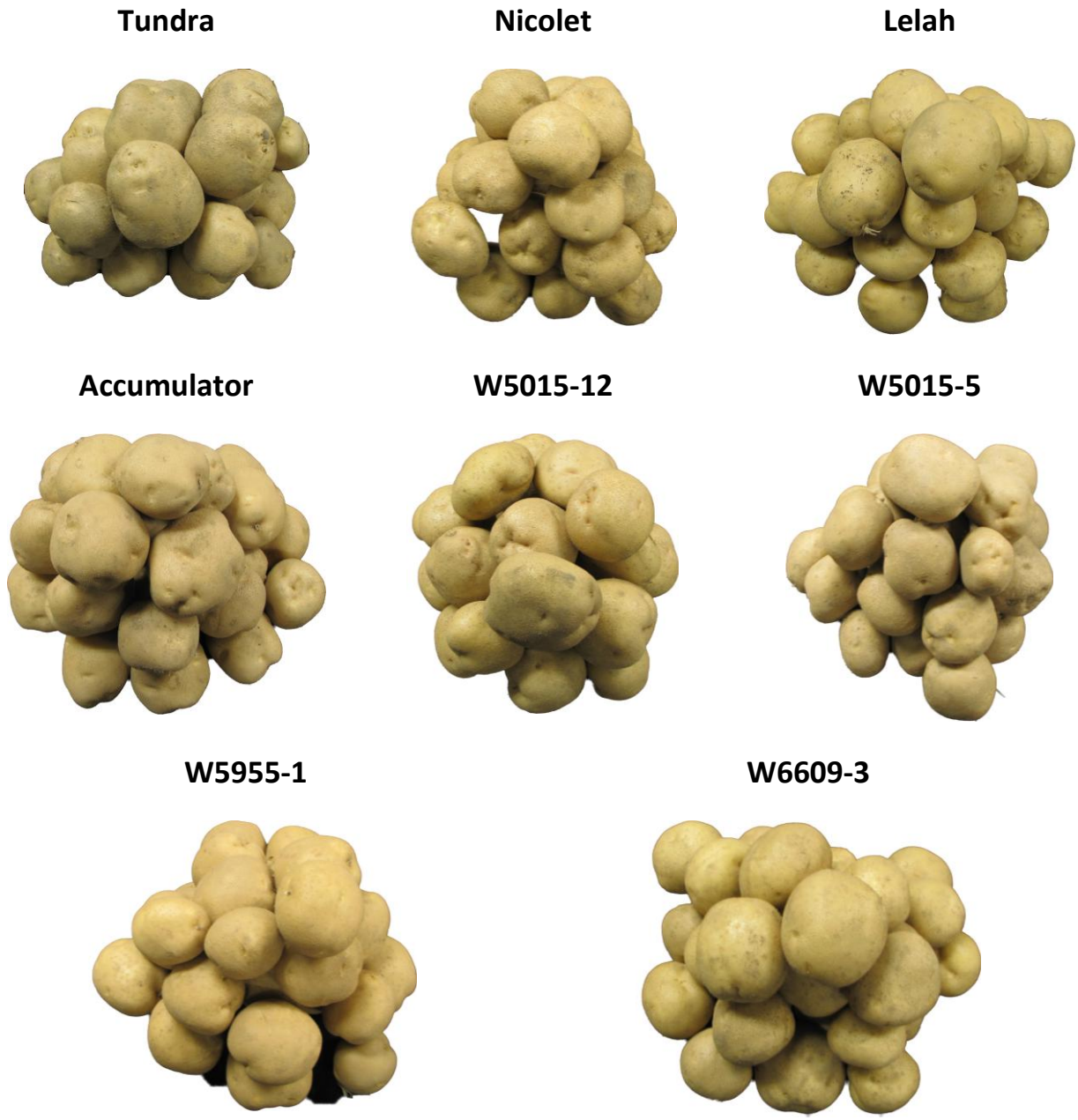
Fig. 13. Chip color and tuber glucose of W5955-1 vs. Snowden, Ontario storage trial, 2008-09



W5015-5: Long Storage Chipper with Late Blight Resistance

Parentage: Brodick x White Pearl**. Strengths:** High yielding long storage chipper. Yield may be similar or better than Snowden under long storage and foliar late blight tolerance. **Incentives for production:** High yield, good chipping ability. Chips processed from potatoes stored at 48-50°F of can retain light color for six to nine months. High gravity, similar to Snowden. **Tubers:** Round-oval, full uniform shape and size. **Vine Maturity:** Full season cultivar**. Foundation seed status**: Mini-tuber production in 2013, SpudPro Foundation seed for on-farm tests in 2016.

Fig. 14. Tuber characteristics of chip varieties and elite clones in the SpudPro pipeline



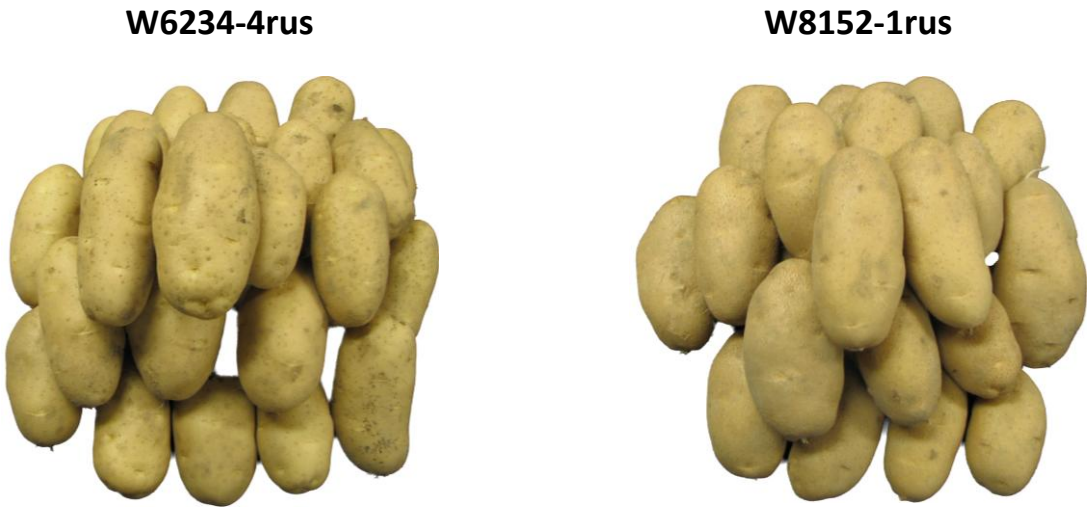
W6234-4rus: Early Russet Processing Potato with Reduced Acrylamide

Parentage: Umatilla Russet x A9014-2rus. **Strengths:** Attractive smooth and blocky tuber type which is suitable for processors and in addition has lighter fry color compared to Russet Burbank. W6234-4rus has also low acrylamide content compared to most russet varieties, including Russet Burbank. **Yield:** results from the 2012 North Central Regional Trial (NCRT) indicates high similar or higher marketable yield compared to Russet Burbank (Table 5). **Specific Gravity**: 2012 NCRT results indicate average gravity of 1.082 over six locations, four points higher than Burbank. Similar results were observed in the SpudPro trial of 2012 (See Bowen et al. report in these proceedings). Results from the National French Fry Processing Trial indicate that W6234-4rus has a good potential for quick service restaurant French fry applications. **Foundation seed status**: E2 production in 2013, SpudPro Foundation seed for on-farm tests in 2014.

W8152-1rus: French fry Processing Russet with Very Low Acrylamide Level

Parentage: A93004-3RU x CO94035-15RU. **Strengths:** Early russet of processing potential. High yield potential, good size and grade; blocky shape, specific gravity higher than Burbank and better fry color through March. Lowest acrylamide values among 81 clones tested in ID, ND and WA in 2011. **Incentives for production:** Long storage French fry processing russet with three times less acrylamide content than the average russet varieties available. **Specific gravity:** higher than Russet Burbank. In 2012, W8152 was also evaluated in the SpudPro trial; yield of this clone and gravity were higher than Russet Burbank (See Bowen et al. report in these proceedings). **Foundation seed status**: Mini-tuber production in 2013, SpudPro Foundation seed for on-farm tests in 2016.

Fig. 15. Tuber characteristics of russet processing clones in the Spudpro pipeline



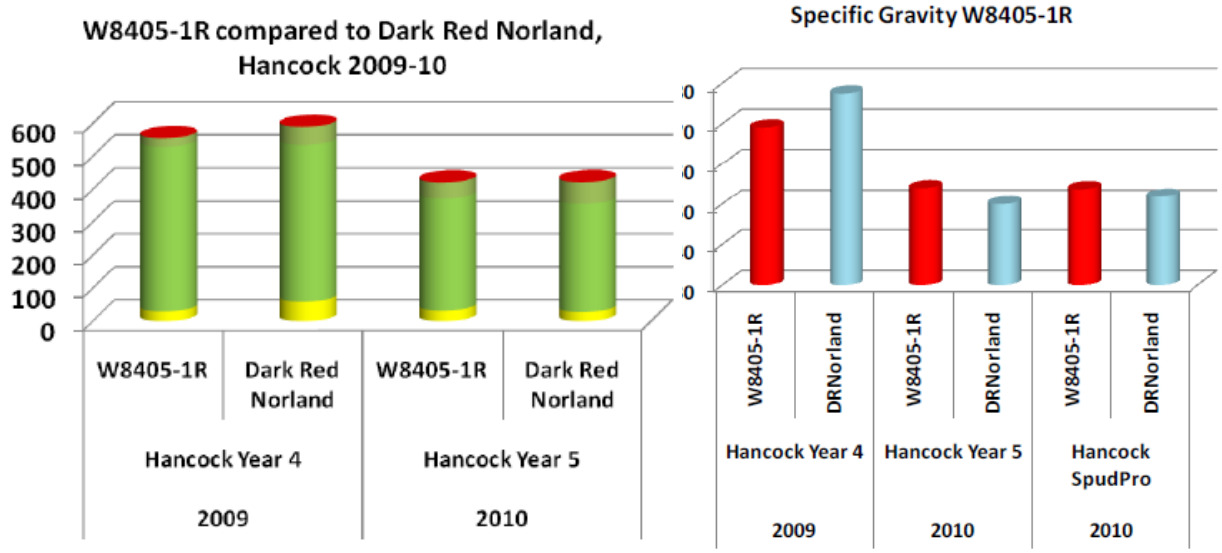
W6002-1R: Very Uniform and Attractive Medium Size Red Skin Clone

Parentage: B-1491-5R x W1100R. **Strengths:** Very uniform tuber size, shallow eyes, nice red color that is maintained in storage, stores well. **Incentives for production:** Attractive skin color that holds color in storage, very uniform tubers with good market appeal, good skin set, pronounced skin netting has not been observed. Recent trial data suggests that this clone may be more resistant to heat and drought stress than comparable red skin varieties. **Plant:** Intermediate growth type, medium vigorous vines. **Tubers:** It exhibits very uniform tuber size, shallow eyes, nice red color; excellent at harvest for fresh market and may be maintained in storage through February. **Maturity:** Similar to Dark Red Norland. **Yield:** High, similar or higher than Dark Red Norland (see Wisconsin Variety Trial report in these proceedings).

W8405-1R:

Parentage: Kankan x W2303-9R. **Strengths**: Attractive round oval red clone. Color can be maintained in storage much better than Dark Red Norland. Very high yield potential. **Incentives for production**: High yield, smooth red potato clone. **Plant:** Good initial and excellent late plant vigor. Vine row closing occur earlier than many red clones. **Tubers:** Uniform round-oval shape, shallow eyes. Good internal quality, lacking of internal defects. **Maturity**: Medium-late. **Yield Potential**: Higher than Dark Red Norland, up to 20% higher in some years. **Specific Gravity**: 1.052-1.069, similar to Dark Red Norland. **Diseases**: Tolerant to early blight and Verticillium wilt. **Utilization**: Fresh market red. **Storability**: Tubers harvested in September in WI and stored at 38°F (after two weeks at 55°F) normally store well and maintain color at through February. **Foundation seed status**: Mini-tuber production in 2013, SpudPro Foundation seed for on-farm tests in 2016.

Fig. 16. Performance of W8405-1R vs. Dark Red Norland, Hancock WI



W6703-1Y: A Yellow Flesh Clone with Resistance to Common Scab

Parentage: Satina x W2275-2Y.
Strengths: Yellow flesh variety with very smooth (shallow eyes) tubers. It has strong common scab resistance. **Incentives for production**: Good option for production of yellow flesh potatoes in areas where varieties such as Yukon Gold cannot be planted due to high incidence and severity of common scab. **Tubers:** Uniform round shape, yellow skin, yellow flesh, full and size, **Vine Maturity:** Full season cultivar. **Yield Potential**: Medium to high. Specific Gravity: 1.067-1.077. **Diseases:** Also tolerant to early blight and Verticillium wilt.

Fig. 17. Yield and specific gravity performance of W6703-1Y

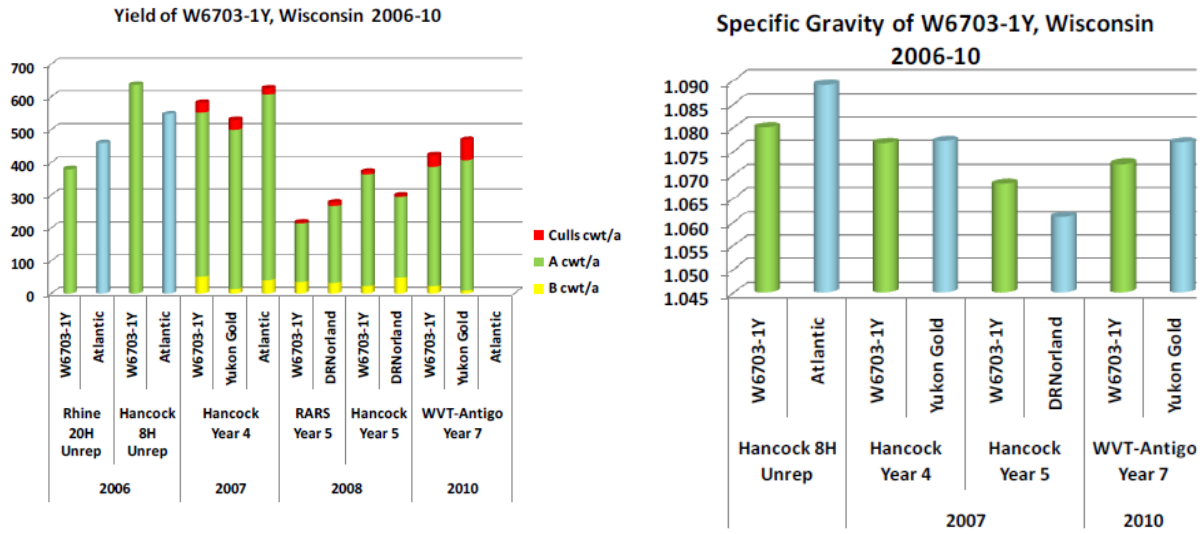


Fig. 18. Tuber characteristics red and yellow flesh clones in the Spudpro pipeline

W6002-1R **W8405-1R** **W6703-1Y**

1.4. Update on Best Performing Advanced UW Potato Breeding Clones, 2012

The most promising advanced clones in 2012 were six fresh market clones. 2012 data for these are reported in the SpudPro Variety Trial in these proceedings. Four of them have shown resistance to common scab, two to Verticillium wilt and two exhibit tolerance to early blight. Best clones among these maybe considered for promotion to virus cleaning and SpudPro seed production in the near future. Tuber characteristics and a data summary is given in Figure 19.

Fig. 19. Tuber characteristics of best performing advanced russet clones, 2012

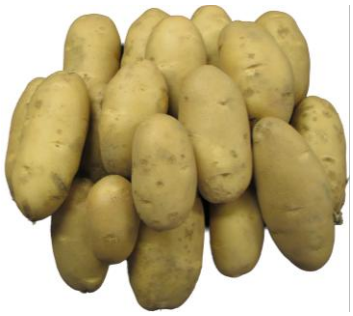
W8772-1rus (W2253-2rusxCO82142-4rus)

	HARS Yield	SG	CS	VW	E Blight
Yr3	532	62			
Yr4	351	63	R	S	S
Yr5	436	69	R	MS	MS
SPP	481	71			

W8516-1rus (Silverton x Ranger Rus)

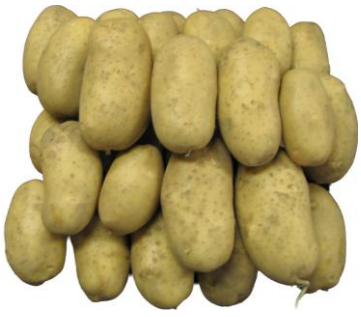
	HARS Yield	SG	CS	VW	Early Blight
Yr3		56			
Yr4	527	63	R	MS	S
SPP	572	63	R	MS	MS
SPP2	562	72			

W9433-1rus (Calwhite x A96023-6)



	HARS Yield	SG	CS	VW	Early Blight
Yr4	550	88	MS	R	R
Yr5	500	69	MS	R	R
SPP	682	79			
SPP2	647	77			

W9429-1rus (CV92056-4 x Stirling)



	HARS Yield	SG	CS	Vert Wilt	Early Blight
Yr4	550	69	MS	R	R
Yr5	500		MS	R	R
SPP	682	79			
SPP2	535	77			

W8722-1rus (A9014-2rus x W2683-2rus)

	HARS Yield	SG	CS	VW	Early Blight
Yr4	375	64	R	MS	MS
WVT	524	69		MS	MS
SPP	537	70			
SPP	465	67			

W9133-1rus (ND4093-4rus x CO82142-4rus)

	HARS Yield	SG	CS	VW	Early Blight
Yr3	503	63			
Yr4	533	68	R	MS	MS
SPP	694	60			
SPP2	509	61			

2. Performance of WI clones in Snack Food Association Trial (SFA) and North Central Regional Trial (NCRT)

2.1 USPB-Snack Food Processing Trial

Our breeding program participated with five varieties to the USPB-Snack Food Trial: W2978-3, W4980-1, W5015-12, W5955-1 and W6483-5. These were submitted to11 locations in the US North (ID, ME, MI, ND, OR, PA and WI) and South (CA, FL, MO, NC). These trials are evaluated for field performance, tuber yield, size grade and internal and external defects. The goal of this Northern trial is to identify clones that outperform Snowden as a long storage chipper.

Table 3. Results for Snack Food Processing Clones Entered in Northern States

	Specific Gravity						US #1 Yield						Yield and Oversize	
	WI	MI	ME	ID	OR	Ave	WI	MI	ME	ID	OR	Ave US#1	OR Total Yield	OR % >4"
AF4157-6	1.074	1.064	1.080	1.095	1.077	1.078	575	367	180	313	488	385	585	5
A01143-3C	1.078	1.075		1.087	1.072	1.078	492	288		393	572	436	661	1
Atlantic	1.085	1.077	1.085	1.096	1.082	1.085	428	504	203	356	439	386	720	30
CO00188-4W	1.066	1.062	1.077	1.095	1.076	1.075	474	242	142	159	544	312	635	44
CO00197-3W	1.076	1.067	1.080	1.091	1.077	1.078	473	315	192	395	514	378	711	17
CO02321-4W	1.083	1.073	1.086	1.099	1.079	1.084	390	365	171	316	406	330	601	23
MN99380-1Y	1.068	1.065	1.072	1.085	1.072	1.072	273	243	139	304	496	291	729	10
MSL292-A	1.072	1.068	1.078	1.095	1.081	1.079	401	392	185	358	472	362	613	15
MSR061-1	1.073	1.071	1.079	1.094	1.076	1.079	265	374	208	407	525	356	655	9
ND8304-2	1.062	1.058	1.075	1.084	1.069	1.070	623	252	142	141	379	307	481	2
ND8305-1	1.083	1.075	1.087	1.105	1.087	1.087	556	164	118	222	379	288	460	1
NY140	1.078	1.072	1.079	1.086	1.065	1.076	235	498	251	595	273	370	786	61
NY148	1.091	1.083	1.087	1.091	1.079	1.086	348	438	244	444	670	429	780	4
Snowden	1.081	1.070	1.085	1.096	1.080	1.082	677	446	245	424	530	464	647	9
W2978-3	1.061	1.059	1.077	1.085	1.068	1.070	269	368	192	321	462	322	577	7
W4980-1	1.081	1.064	1.080	1.089	1.077	1.078	446	484	219	290	449	378	569	6
W5015-12	1.080	1.076	1.085	1.097	1.077	1.083	644	272	228	438	576	432	684	8
W6483-5	1.062	1.059	1.071	1.078	1.065	1.067	515	377	167	373	361	359	582	25

W5015-12 had an overall good performance for yield and specific gravity in all Northern locations but MI. NY140 also had good performance except in OR, where 61% of the tubers were oversized (>4" diameter). W5015-12 size profile was an advantage in OR, where many clones had a significant % of tubers with diameter >4 inches, undesirable for chipping. From the WI group, W4980-1 was the second clone with best performance, but worse than W5015-12 and others. W2978-3 and W6483-5 had significant low gravity compared with Snowden and Atlantic (Table 3). The results of these Northern locations will be better appreciated after knowledge on the long storage chipping ability is obtained in June. Last year, W5015-12 was one of the top clones outperforming Snowden.

The goal of the SFA trial in the South is to identify a variety that may be used as an Atlantic replacement. In 2012, data indicate that Fla, as in previous year, results in the lowest gravity and yield. No clone was higher than Atlantic in gravity. Besides Fla results NY140 had high yield and specific gravity may be acceptable, however some instability for chip color was observed. NY148 also performed well. Among the WI clones, the best performer was W4980-1. W5955-1 performed relatively well in CA, Mo and NC. In the south, a high variation is observed among the locations tested. It is likely that varieties will be better suited to some of these localities than others.

Table 4. Results for Snack Food Processing Clones Entered in Southern States

	Specific Gravity					US #1 Yield					OTF Chip Color		Chip Color	
	Fla	CA	Mo	NC	Ave	Fla	CA	Mo	NC	Ave US#1	CA	Mo	NC 48 hrs	NC 7 days
NY140	1.074	1.096	1.085	1.071	1.081	180	447	472	439	384	1.0	69	2.0	2.5
Snowden	1.072	1.089	1.096	1.078	1.084	257	367	452	339	354	1.0	70	1.0	2.0
NY148	1.078	1.100	1.097	1.078	1.088	148	555	449	326	370	2.0	69	1.0	1.5
CO02321-4W	1.075	1.092	1.092	1.082	1.085	172	385	456	316	332	1.5	70	1.5	2.0
AF4157-6	1.077	1.091	1.094	1.080	1.085	167	254	403	314	285	2.0	70	1.0	2.0
CO00197-3W	1.073	1.085	1.083	1.075	1.079	178	315	317	308	280	1.5	70	1.5	2.0
MN99380-1Y			1.077	1.072	1.075			454	302	378		69	2.0	2.0
W4980-1	1.075	1.091	1.084	1.072	1.080	232	350	441	300	331	2.0	69	1.5	2.0
A01143-3C	1.069	1.082	1.084	1.069	1.076	225	372	366	292	314	2.5	70	1.0	2.0
AF0338-17	1.074	1.091	1.090	1.077	1.083	262	428	392	282	341	1.0	69	1.5	2.0
Atlantic	1.081	1.100	1.099	1.077	1.089	239	344	435	280	324	1.5	69	1.5	2.0
W5955-1	1.064	1.086	1.096	1.069	1.079	140	413	467	277	324	1.5	70	2.0	2.0
W2978-3	1.070	1.090	1.085	1.070	1.079	182	379	425	276	316	2.0	72	1.5	2.0
W6483-5	1.066	1.077	1.078	1.067	1.072	183	434	364	272	313	1.5	70	1.5	2.5
ND8305-1	1.087	1.096	1.099	1.088	1.092	155	327	316	235	258	2.0	70	1.0	1.5
MSQ086-3	1.069	1.088	1.080	1.066	1.076	178	244	398	228	262	1.5	69	1.0	2.0
ND8304-2	1.066	1.079	1.074	1.073	1.073	166	386	396	225	293	2.0	72	1.5	2.0
MSL292-A	1.071	1.094	1.092	1.075	1.083	212	95	395	205	227	2.0	70	1.5	2.0
CO00188-4W	1.074	1.078	1.080	1.078	1.078	179	372	283	202	259	1.0	69	1.5	2.0
MSR127-2	1.074	1.096	1.090	1.075	1.084	224	342	378	179	281	2.5	68	2.0	2.5
MSL007-B	1.069	1.095	1.094	1.080	1.085	121	212	302	138	193	2.0	72	2.0	2.0

Note: Chip color: OTF = off the field. Rating scale: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

2.2 North Central Variety Trial (NCRT)

In 2012, we submitted five clones for evaluation in the North Central Regional Trial. These were: Two red skin elite clones (W6002-1R and W8405-1R), a processing russet (W6234-4rus). and two chippers (Lelah and W5015-12). Trials are conducted inManitoba, Canada (MAN), MI, MN, ND and WI. These trials are evaluated for field performance, tuber yield, size grade and internal and external defects. In a separate NFPT/SCRI meeting in Oct 3, in East Grand Forks, ND, W6234-4rus was identified among the 5 most attractive clones among 88 tested.

Table 5. Field, tuber quality and processing traits evaluation, NCRT chip entries

	MAN		MI		MN		ND - Inkster			WI	ND - Hoople			Ave SG	Ave Chip
	SG	Chip	SG	Chip	SG	Chip	SG	Chip	Chip	SG	SG	Chip	Chip		
CV98173-4	1.088	59	-	-	1.078	1.3	1.093	4.0	47	1.077	1.087	3.6	53	1.085	3.0
MN02586	1.088	60	1.066	-	1.078	1.5	1.095	-		1.077	1.103	-		1.088	1.5
MN04844-07Y	1.087	68	1.072	1.0	1.073	1.0	-	-		1.074	1.096	-		1.080	1.0
ND7519-1	1.090	69	1.079	1.0	1.093	1.0	1.103	3.0	51	1.084	1.099	2.3	57	1.094	1.8
ND8305-1	-	-	1.082	1.0	1.084	1.0	1.105	3.0	45	1.085	1.108	2.3	53	1.093	1.8
Lelah (W2717-5)	1.092	64	1.084	1.0	1.096	1.0	1.098	4.0	48	1.086	1.101	2.8	51	1.095	2.2
W5015-12	1.092	57	1.081	1.0	1.087	1.0	1.095	3.5	49	1.084	1.090	2.8	56	1.090	2.1
Atlantic	1.095	50	1.082	1.0	1.083	1.6	1.096	4.0	49	1.085	1.100	4.0	49	1.092	2.7
NorValley	-	-	1.070	1.5	1.083	1.3	1.093	4.0	50	1.075	1.092	3.5	52	1.083	2.6
Snowden	1.092	67	1.077	1.0	1.087	1.0	1.095	2.8	51	1.075	1.100	2.8	57	1.090	1.9
Location Ave	1.091	62	1.077	1.1	1.084	1.2	1.097	3.5	49	1.080	1.098	3.0	54	1.090	2.2

	Yield							Common Scab				LB	Mat	Late Blight	Mat
CLONE	**MAN**	**MI**	**MN**	**ND - Inkster**	**WI**	**ND - Hoople**	**Ave**	**MI**	**MN**	**WI**	**ND - Hoople**	**MI**	**WI**	**MAN**	**ND - Inkster**
CV98173-4	288	-	379	176	544	133	304	-	6	7.1	5	-	MID	0	0
MN02586	181	243	108	193	611	60	233	2.8	6	6	0	17.6	L	0.3	0
MN04844-07Y	164	131	285	88	247	31	158	2	4	7.1	0	5.9	E	0	0
ND7519-1	147	238	530	134	472	97	270	2.4	4	7.3	0	21.2	ML	0	0
ND8305-1	-	277	432	228	444	209	318	3.1	6	7.1	5	20.7	ML	-	0
Lelah (W2717-5)	223	208	354	122	460	134	250	2.6	2	6.7	5	-	L	0	0
W5015-12	75	266	447	152	606	131	280	2.6	6	6.2	2	11.9	L	0	0
Atlantic	352	282	487	193	664	155	356	2.8	5	5.6	5	24.1	ML	0	0
NorValley	-	306	490	153	472	172	319	3	6	6.9	5	26.1	L	-	0
Snowden	165	298	507	206	596	137	318	2.6	6	6.4	5	15.8	L	0.3	0
Location Ave	199	250	402	165	512	126	280	2.7	5	6.6	3	17.9		0	0

Note: Chip evaluation MAN, ND: Agtron spectrum which most accurately describes light color of chips; higher value represents lighter color, > 55 acceptable. Other chip color scale: USDA scale 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

Common scab ratings: MI: 0: No Infection; 1: Low Infection <5%; 3: Intermediate; 5: Highly Susceptible

MN: Severity: 0 = no lesions (BEST); 1 = superfical discrete (Better); 2 = coalescing superficial (Good); 3 = raised discrete (Moderate); 4 = raised coalescing (Unacceptable); 5 = pitted discrete (Worse); 6 = pitted coalescing (WORST); Coverage: 1 = 1 lesion to 2% (BEST); 2 = 2.1-5% (Better); 3 = 5.1-10% (Good); 3 = 5 - 10% (Moderate); 4 = 10.1-25% (Unacceptable); 5 = 25.1-50% (Worse); 6 = > 50% Surface Area (WORST).

WI: 1 = More than 60% of tuber area covered with deep pits or prominently raised lesions. 9 = No signs of common scab present .

ND: 0 equals no infection, Severity rated as 1=severe, 5=none; T=1%, others as percent

MI late blight: Inoculated with field inoculated with *P. infestans* US22 genotype.

North Central Variety Trial: Russets

Fig. 20. Yield of elite russet potato clones in six North Central locations

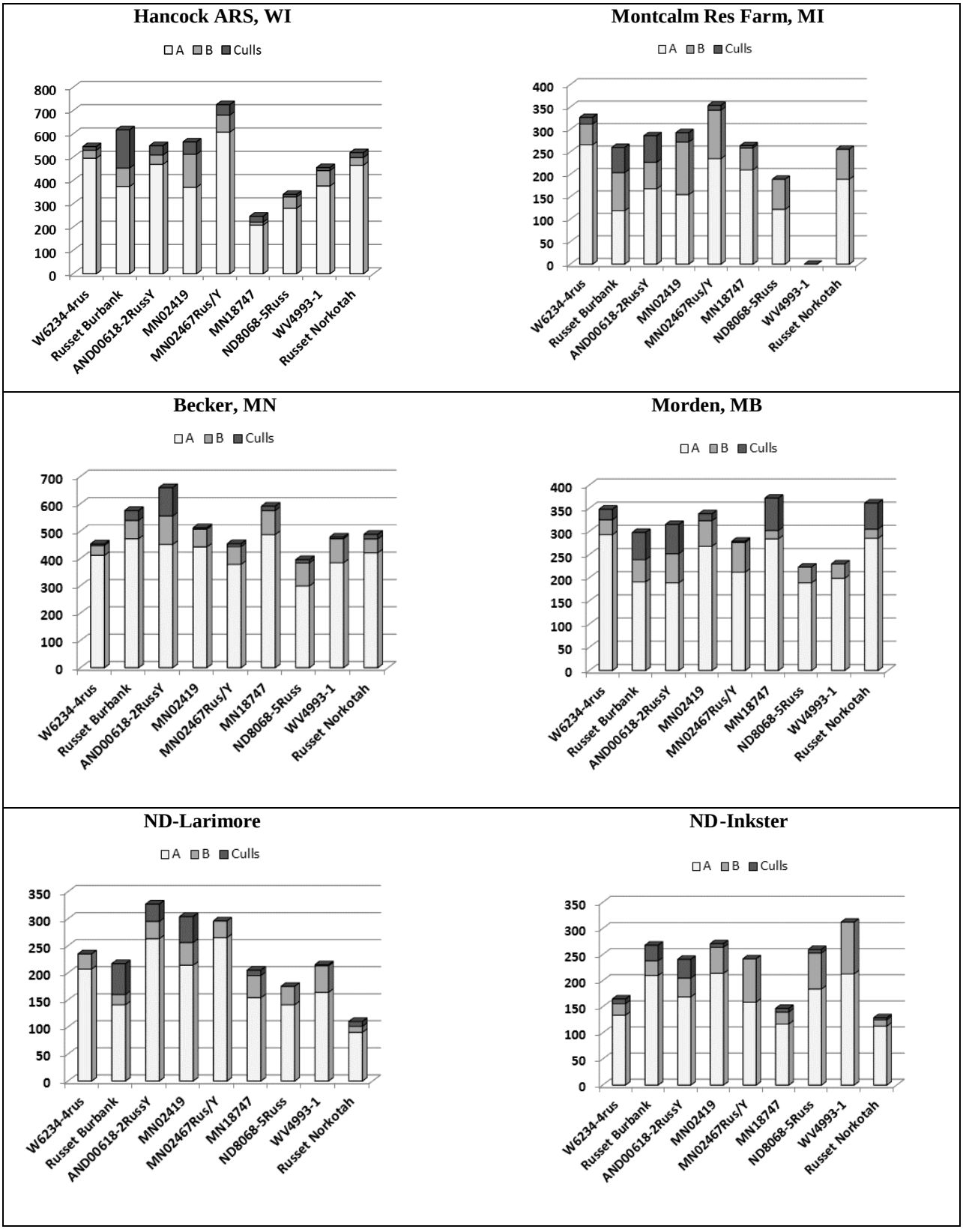


Table 6. Specific gravity, chip color and scab severity, NCRT 2012

	Specific Gravity							Chip Color		Scab Severity		
Clones	MAN	MI	MN	ND - Inkster	ND - Larimore	WI	Ave	MAN	MN	MI	MN	WI
AND00618-2RussY	1.083	1.077	1.079	1.087	1.104	1.083	1.086	42	2.6	0.9	1	8.7
MN02419	1.087	1.078	1.078	1.088	1.096	1.077	1.084	48	3.1	2.9	6	6.6
MN02467Rus/Y	1.087	1.076	1.074	1.090	1.102	1.074	1.084	49	2.4	1.5	5	8.5
MN18747	1.072	1.058	1.061	1.074	1.071	1.063	1.067	69	1.8	2.4	5	8.2
ND8068-5Russ	1.087	1.071	1.081	1.087	1.077	1.071	1.079	54	1.5	2.4	6	7
W6234-4rus	1.082	1.077	1.078	1.087	1.095	1.075	1.082	55	1.5	2.5	5	7.7
WV4993-1	1.084	-	1.074	1.089	1.081	1.071	1.080	52	1.9	-	5	8.1
Russet Burbank	1.076	1.067	1.072	1.082	1.096	1.073	1.078	48	3.5	2.1	6	6.8
Russet Norkotah	1.071	1.065	1.075	1.078	1.086	1.066	1.074	35	3.3	1.9	4	7.9

Note: Chip color and scab severity, see footnote in table 5.

2.3 National Verticillium Wilt Trial: Shelley Jansky, for whole report see Jansky article.

Planted on May 8, 2012, three replications of five-hill units were planted on field that was inoculated with *V. dahliae* in 2006 and has been maintained as a VW screening plot. On July 25 and August 1, 15, 21, and 28, plots were scored for Verticillium wilt symptoms. On August 7, stems from all clones were sampled, to collect sap for plating. For each plot, 100 ul of sap was plated on selective medium and the plates were incubated for two weeks and colony forming units evaluated. Symptom and sap data from the trial clones are presented in Table 7. Ranger Russet is considered a resistant cultivar check and Russet Norkotah is a susceptible check. Both symptom and sap scores were very high in 2012. Clones with low symptom and sap counts include AF0338-17, CO02024-9W (1803), W6360-1rus and W8152-1rus.

Table 7. Verticillium wilt resistance scores. AUDPC=area under the disease progress curve, sap = cfu/100 ul sap. Clones highlighted with bold type are potentially resistant to VW. Clones are grouped based on mean maturity score, and then, within maturity group, sorted by mean sap score. Clones with no sap score had high symptom expression, so stems were not collected.

		AUDPC				Sap			
Clone	**Mat Aug 15**	**Rep 1**	**Rep 2**	**Rep 3**	**Mean**	**Rep 1**	**Rep 2**	**Rep 3**	**Mean**
CO02024-9W(1803)	**2.7**	**1455**	**1235**	**1435**	**1375**	**8**	**272**	**88**	**123**
AF0338-17	**3**	**2188**	**440**	**1140**	**1256**	**116**	**248**	**10**	**125**
W8152-1rus	**3**	**650**	**598**	**765**	**671**	**196**	**812**	**540**	**516**
Ranger Russet	3	2875	2340	540	1918	621	604	687	637
W5015-12	3	1548	1230	665	1148	676	936	328	647
Atlantic	3	1878	1115	328	1107	288	1290	1055	878
Russet Norkotah	3.3	1145	85	1708	979	314	1518	984	939
W5955-1	3	933	1168	335	812	2520	316	392	1076
W2324-1(Accumulator)	3	768	1523	745	1012	1508	384	1344	1079
White Pearl	3	3133	1728	685	1848	1953	388	1054	1132
W6703-5Y	3.3	758	798	55	537	2364	44	2040	1483
W6703-1Y	3.3	503	935	188	542	1564	5040	63	2222
W6822-3	3	2133	1795	1045	1658				
W6360-1rus	**4**	**235**	**200**	**230**	**222**	**792**	**30**	**740**	**521**
Russet Burbank	4	58	45	363	155	983	970	654	869
Average	**3**	**1620**	**923**	**871**	**1138**	**1914**	**1742**	**1660**	**1772**

3. Evaluation of Clones in Year 4 and 5

Clone evaluations in year 4 and 5 are very important in the selection process. Yield trials are conducted at the Hancock Agricultural Research Station. Disease trials are conducted in different locations. These trials are planted using a blocks within replication design with three replications. Hancock Standard management is used. Trial is irrigated. The most relevant data used from year 4 and 5 evaluations are presented in tables 8 and 9. Evaluations are done following standard procedures as follows:

Yield:
A-size: Yield of marketable tubers remaining after removal of < 1 7/8" diameter and cull tubers (USDA standards).
B-size: < 1 7/8", Tubers less than 1 7/8" diameter, separated by a scroll sizer;
Culls: Pick outs of green, rot, growth crack, off-shape and other forms of external defects
Total Yield: Total tuber harvest including A-size grade, B-size and Cull tubers; expressed as cwt/acre.

Specific Gravity:Measure of potato solids at or shortly after harvest; measurements determined by weight in air/weight in water method (specific gravity = weight in air/weight in air-weight in water). Approximate conversions: 1.060 = 16.4% solids; 1.070 = 18.5% solids; 1.080 = 20.7% solids and 1.090 = 22.9% solids.

Internal Defects: % free of defect (brown center, hollow heart, internal brown spot, vascular discoloration); scored on samples averaging 50 tubers)

Tuber External Characteristics:
Preference: A combined rating of general tuber appearance, relative size, uniformity and yield; 1 = best, 2 = acceptable), 3 = marginal, > 4 = discard
Tuber Length: Rating of tuber shape with respect to length and width; 1 = spherical, 2 = round, 3 = round/oval, 5 = oval, 7 = long/oval, 9 = very long
Thickness: Rating of tuber flatness observed in the cross section where; 9= round, 7=moderately full, 5=flat, 3= extremely flat
Size: Scale of tuber size within the expected category; 9= extremely large, 7=large, 5=medium, 3=very smallSize
Uniformity: Scale of unifomity were; 9=complete uniformity, 7=generally uniform, 5=variable, 3= extremely variable.
Tuber eyes: 1= very deep, 5 = medium, 9 = very shallow.
Skinning: Skin set: 1 = very poor, 5 = fair, 9 = excellent
Skin Texture: 1= partial russet, 2 = heavy russet, 3 = moderate russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = moderately smooth, 8 = smooth, 9 = very smooth.
Tuber Preference: Tuber appearance scale: 1 = excellent 2.5 = fair, 5 = very poor,

Chip Color:
Hunter L ValueChip evaluation: spectrum which most accurately describes light color of chips; higher value represents lighter color, > 55 acceptable

Common scab: 1 = More than 60% of tuber area covered with deep pits or prominently raised lesions. 9 = No signs of common scab present .

Statistical Significance: All statistical differences of individuals were measured with respect to their category (i.e. russets, whites). Bolded-Italicized numbers are considered statistically better than the reference standard variety and those numbers with underlines are considered statistically poorer.

Table 8. Results from Year 5 Replicated Trials, Hancock WI

		Tuber Yield & Grade				Processing 2012			Processing 2011				Tuber External									Tuber Internals			
		Total Yield cwt/a	A Size cwt/a	B Size cwt/a	C Size cwt/a	Spec Grav	Chip Color 1-5	Chip SED 0-5	Chip Color L Nov28	Lmar	LMay 29 47	SG 2011	Tuber Length 1-9	Thickness 1-9	Tuber Size	Tuber Unif	Tuber Eyes	Stem/Bud Eye Depth	Skinning 1-9	Skin Texture 1-9	Tuber Pref 1-5	IBS 1-5	IBS %	HH %	SED %
Atlantic	chip	532	482	**23.6**	18.0	1.072	6.1	2.4	51.8	47.1	46.8	1.078	3.9	7.2	**7.4**	6.9	5.9	5.6	8.8	4.3	2.3	1.7	34.1	5.0	11.0
Snowden	chip	**596**	**533**	**24.4**	26.3	**1.080**	4.3	2.2	54.2	54.6	51.2	1.076	3.1	6.8	7.1	6.9	6.2	5.6	8.9	4.2	2.7	1.0	1.9	0.9	7.8
W10670-3	chip	436	385	33.9	16.3	1.072	4.6	2.1	54.2	51.3	54.2	1.076	3.1	7.4	6.0	6.3	6.4	5.8	8.9	4.5	2.2	1.0	1.0	0.3	6.1
W10675-1	chip	478	405	28.3	39.4	1.063	7.9	2.3	46.2	43.0		1.071	3.3	7.2	**6.7**	6.7	7.2	6.5	8.9	4.7	2.6	1.1	5.4	0.4	4.4
W2324-1	chip	**660**	**551**	47.9	46.1	1.074	**3.8**	2.3					3.3	6.4	6.0	5.4	5.7	4.9	8.9	4.7	3.2	1.1	2.8	0.7	9.4
W2717-5	chip	502	449	32.2	14.8	1.076	**3.2**	1.8					3.1	6.4	5.7	7.1	**7.7**	**7.0**	8.9	**5.4**	2.2	1.1	2.4	1.9	5.5
W9184-1	chip	471	423	**14.6**	27.7	1.068	7.1	2.3	46.4	45.1	44.1	1.071	3.1	7.4	**6.8**	6.5	6.7	6.1	8.9	4.9	2.0	1.0	1.0	0.3	4.2
W9200-13	chip	444	367	57.4	21.1	1.074	**3.2**	**1.6**	**54.9**	**55.4**	**54.9**	**1.076**	3.3	6.4	5.2	6.9	7.0	6.3	8.9	4.9	2.2	1.0	1.6	1.1	4.1
W9200-7	chip	505	459	28.2	16.7	1.068	**3.5**	2.2	51.3	50.7	52.5	1.072	3.1	7.0	**6.8**	6.9	7.0	6.8	8.9	4.4	**1.9**	1.1	4.7	0.3	6.8
W9202-2	chip	513	435	29.5	41.3	**1.082**	**3.2**	1.8	55.3	54.9	54.2	1.080	3.1	6.2	5.9	6.3	7.0	6.3	8.9	4.5	2.8	1.0	1.0	0.3	4.6
W9206-4	chip	354	283	46.2	29.9	1.068	**3.5**	2.1	52.6	49.8	53.7	1.074	3.3	6.4	5.0	6.7	7.0	6.5	8.8	5.1	2.8	1.0	1.0	0.3	6.3
W9210-4	chip	467	409	45.5	11.9	1.074	5.5	2.3	49.8	50.9	53.4	1.072	3.1	7.4	5.4	7.1	7.2	6.1	8.8	4.9	2.2	1.3	2.1	0.3	4.8
W9222-4	chip	496	442	34.7	15.0	1.074	5.9	2.1	53.9	50.2	48.5	1.077	2.8	7.2	6.3	6.7	7.0	6.3	8.9	4.9	2.7	1.0	1.0	0.3	7.1
W9225-1	chip	538	439	59.0	35.8	**1.083**	**3.0**	**1.5**	**52.9**	**53.6**	**55.0**	**1.082**	3.9	7.4	5.4	7.1	6.4	5.8	8.7	4.7	2.8	1.0	1.0	0.8	5.9
W9252-7	chip	543	448	61.5	29.1	1.072	5.5	3.3	51.0	51.6	51.5	1.078	3.9	6.8	5.2	5.8	6.7	6.3	8.9	4.7	2.9	1.1	3.2	0.7	14.8
W9281-14	chip	433	386	34.3	12.6	**1.082**	6.1	2.1	53.8	49.0	37.7	1.080	3.3	6.4	5.6	6.7	6.7	5.8	8.9	4.7	2.5	1.0	2.2	0.3	4.4
W9285-3Y	chip	506	453	**23.5**	23.9	1.076	**3.8**	2.0	53.1	51.1	48.8	1.073	**2.5**	7.4	**7.1**	7.5	6.4	5.8	8.9	4.5	**1.5**	2.0	18.6	1.2	5.6
W9301-5	chip	468	414	36.3	15.0	1.062	4.6	2.2	52.7	50.6	52.2	1.068	2.8	7.2	5.4	6.3	6.2	5.6	8.9	4.5	2.7	1.1	5.0	0.3	5.8
W9303-2	chip	461	380	64.1	18.4	1.069	**3.6**	1.8	54.1	55.5	52.7	1.074	3.1	7.0	4.9	7.5	7.0	6.5	8.9	4.7	2.8	1.0	1.8	0.3	4.3
W9304-2	chip	461	391	51.3	18.5	1.073	**3.3**	1.8	54.2	52.8	55.0	1.076	3.3	6.8	5.3	7.1	7.0	6.8	8.9	4.8	2.5	1.1	2.4	0.3	6.4
W9306-1	chip	516	448	37.4	24.2	1.075	6.5	2.2	48.3	46.0		1.075	2.8	7.0	6.5	6.9	7.0	6.1	8.9	4.3	2.2	1.1	6.7	2.1	5.9
W9313-2	chip	513	467	25.9	13.7	1.076	6.8	2.0	44.8	43.3		1.074	**2.5**	7.6	**6.7**	7.1	6.4	5.8	8.9	4.3	**1.8**	1.0	1.3	0.3	4.3
W9322-2	chip	**616**	**506**	**14.8**	77.0	1.072	6.2	3.1	47.1	42.2		1.068	3.1	7.2	**7.5**	6.3	5.7	5.4	8.8	4.7	2.5	1.1	6.9	0.3	12.0
W9636-5	chip	549	**495**	**22.7**	21.8	1.073	6.8	2.4					3.3	7.0	**7.0**	7.1	7.0	6.3	8.8	4.7	**1.8**	1.6	29.6	3.3	12.1
W9684-2	chip	460	374	49.5	35.1	1.071	4.1	2.1					3.3	7.0	4.6	6.9	7.2	6.8	8.9	5.0	2.8	1.0	1.8	0.3	4.9
W9696-1	chip	345	282	59.8	10.9	1.070	5.6	1.8					3.1	6.8	4.5	7.3	**7.5**	6.8	8.9	5.2	2.5	1.3	1.8	0.7	8.9
W9704-2	chip	506	385	81.2	38.8	1.058	8.3	2.6					3.6	7.2	5.7	6.5	**7.5**	**7.2**	8.8	**5.4**	2.5	1.1	12.0	0.3	13.5
W9705-1	chip	446	388	34.1	21.5	1.074	4.3	2.0					3.3	7.4	6.1	7.1	7.2	6.5	8.9	4.7	2.2	1.1	3.4	2.7	7.9
W9707-1Y	chip	488	423	46.2	15.9	**1.087**	4.6	2.4					3.1	7.4	6.0	7.5	7.0	6.5	8.9	5.0	2.2	1.1	2.9	0.3	6.4
W9758-2	chip	**601**	452	55.2	85.9	1.054	7.7	3.1	48.7	46.8	38.3	1.067	7.1	7.0	6.5	5.8	6.7	6.8	8.9	4.6	2.7	1.1	2.6	0.3	5.7

Table 8. Results from Year 5 Replicated Trials, Hancock WI (cont'd)

		Tuber Yield & Grade				Processing 2012			Processing 2011				Tuber External									Tuber Internals			
		Total Yield cwt/a	A Size cwt/a	B Size cwt/a	C Size cwt/a	Spec Grav	Chip Color 1-5	Chip SED 0-5	Chip Color L Nov28	Lmar	LMay 29 47	SG 2011	Tuber Length 1-9	Thickness 1-9	Tuber Size	Tuber Unif	Tuber Eyes	Stem/Bud Eye Depth	Skinning 1-9	Skin Texture 1-9	Tuber Pref 1-5	IBS 1-5	IBS %	HH %	SED %
DRNorland	red	553	**502**	34.2	16.5	1.052							4.2	7.0	6.1	7.1	6.8	6.8	8.9	5.2	2.9	1.0	0.7	0.3	5.7
W9396-4R	red	555	487	56.3	14.2	1.062							3.7	6.8	5.7	7.3	7.3	7.0	8.8	5.4	2.1	1.0	0.7	0.3	5.7
W9745-2R	red	550	437	65.1	50.3	1.053							4.0	6.6	5.7	6.3	7.3	7.0	8.9	5.3	3.0	1.0	2.5	0.3	6.0
W9746-4R	red	553	470	69.9	17.6	1.059							**2.6**	7.6	5.4	7.5	7.6	7.3	8.8	5.7	**1.7**	1.0	2.8	0.3	5.1
W9753-3R	red	200	176	**21.1**	22.1	1.061							5.6	6.0	5.7	5.6	7.1	6.8	8.9	5.5	2.9	1.0	0.8	0.4	3.9
W9765-3R	red	530	472	35.7	23.8	1.058							3.2	7.4	6.3	7.3	7.6	7.0	8.8	5.7	2.2	1.0	1.7	0.3	6.7
W9960-1R	red	502	397	78.6	34.4	1.058							3.2	7.2	5.7	7.1	7.8	**7.7**	8.8	5.7	2.4	1.0	0.7	0.3	4.2
RBurbank	rus	**579**	316	118.9	143.2	1.065	8.9	2.7	41.4	42.0	45.2	1.071	6.9	6.4	5.7	4.5	7.1	7.5	8.9	4.3	3.3	1.2	9.2	1.1	5.9
RNorkotah	rus	478	417	59.1	10.6	1.063	8.8	2.0	42.3	41.7		1.067	6.4	7.6	6.0	7.5	7.9	7.9	8.9	4.3	2.2	1.0	1.7	0.7	4.8
W10676-1rus	rus	421	284	108.6	42.0	1.070	**6.5**	2.2	**51.0**	**50.0**	50.5	1.074	6.1	7.0	5.2	6.9	7.9	7.9	8.9	4.1	3.3	1.0	1.2	1.6	6.0
W9107-2rus	rus	**646**	**527**	80.4	38.6	1.060	9.4	2.3	37.4	32.7		1.068	7.2	7.0	6.0	6.0	7.9	7.9	8.9	4.3	2.9	1.0	0.7	0.3	4.9
W9133-1rus	rus	480	443	**30.5**	9.4	1.059	8.4	2.2	42.7	39.6		1.068	6.1	**7.8**	**6.7**	7.3	7.9	7.9	8.9	4.3	**1.8**	1.0	0.6	0.3	3.2
W9135-1rus	rus	542	**496**	**28.3**	18.4	1.062	8.1	3.3	48.3	46.5	44.5	1.064	6.6	7.2	**6.7**	6.6	6.9	7.7	8.9	4.2	2.0	1.0	0.7	0.3	4.4
W9152-2rus	rus	437	359	65.5	21.7	1.068	**5.7**	2.1	47.7	47.6	41.8	1.069	5.8	6.4	5.6	5.8	7.4	7.7	8.8	4.3	3.1	1.0	1.2	0.7	4.9
W9161-3rus	rus	496	435	50.8	14.2	1.062	7.7	2.9	47.5	46.2	49.7	1.066	**7.7**	7.2	5.9	6.7	7.4	7.7	8.9	4.3	2.2	1.0	1.3	0.3	5.2
W9162-1rus	rus	509	447	**37.1**	26.3	1.067	**4.8**	2.4	**50.6**	**50.8**	**53.1**	1.065	6.0	6.8	6.0	6.5	7.4	7.9	8.9	5.5	2.9	1.0	0.6	0.3	5.2
W9162-3rus	rus	522	456	49.0	18.9	1.070	**6.3**	2.0	47.4	46.2	50.8	1.068	5.6	6.4	6.0	6.5	6.9	7.5	8.9	4.6	2.9	1.0	1.7	0.3	6.4
W9388-3rus	rus	524	414	84.5	33.1	1.072	8.9	2.6	43.4	42.7	45.3	1.078	5.8	6.8	5.2	6.5	6.6	7.0	8.9	4.7	3.1	1.0	0.7	0.7	6.2
W9739-2rus	rus	547	488	46.5	14.7	1.069	8.8	2.6	43.1	41.0	45.0	1.067	6.4	6.8	5.4	7.1	7.9	8.2	8.9	4.5	2.3	1.0	0.7	0.3	5.4
W9740-1rus	rus	452	293	149.4	26.7	**1.073**	7.7	2.4	48.1	44.6	49.3	1.071	6.1	7.2	4.6	6.2	7.6	7.7	8.8	4.3	2.9	1.0	1.7	0.3	8.6
W9741-2rus	rus	560	**499**	43.9	18.1	1.064	7.7	2.3	42.8	39.4		1.064	6.6	7.4	6.3	7.1	7.9	7.9	8.9	4.3	1.9	1.3	2.6	0.3	3.6
W9742-2rus	rus	457	381	47.5	33.7	1.069	9.2	3.1	40.2	41.3		1.074	6.9	7.0	6.0	5.6	7.9	7.9	8.9	4.1	2.8	1.1	3.8	1.4	9.3
W9742-3rus	rus	509	458	**37.6**	15.3	**1.091**	8.1	2.7	44.0	39.4		1.081	**7.4**	7.6	**6.7**	7.3	7.9	7.7	8.8	4.4	2.1	1.0	0.6	1.4	4.3
W9752-1rus	rus	486	434	**28.2**	25.5	1.072	8.0	2.6	45.6	47.1	42.9	1.070	**7.7**	6.8	**6.8**	6.7	7.4	7.7	8.9	4.4	**1.9**	1.1	3.3	0.8	5.3
W9759-1rus	rus	475	420	45.9	13.8	1.064	9.2	3.1	42.1	39.4		1.068	6.6	7.4	6.5	7.1	7.9	7.9	8.9	4.3	**1.9**	1.1	6.6	0.3	7.7
W9762-2rus	rus	**573**	450	68.8	54.9	1.066	8.6	2.5	42.4	40.2		1.065	6.6	6.8	6.0	6.2	7.9	7.9	8.9	4.7	2.7	1.1	8.6	1.3	4.4

Table 9. Results from Year 4 Replicated Trials, Hancock WI

Clone	Tuber Yield			Processing			Tuber Internal Defects					Tuber External Traits									
	A Yield (cwt/	B Size Yield (cwt/a)	Culls Yield (cwt/a	SG	Chip Color Dec3	Chip Stem End	IBS%	BC %	HH %	SED %	VD %	Tuber Length	Thickness	Tuber Size	Tuber Unif	Tuber Eye Depth	Stem /Butt Eye	Skinning	Skin Texture	Common Scab	Pref 1-5
Reds (All)	471	63	15	1.060			4.2	0.5	0.7	0.5	3.6	**3.5**	7.3	5.8	6.6	7.0	6.4	8.6	6.2	7.7	**2.2**
DRNorland	***547***	61	13	1.051			0.5	0.3	0.2	0.3	4.5	3.1	7.1	6.0	7.4	7.0	6.4	8.9	6.5	8.3	2.2
NYWH42-1R	195	110	8	1.059			0.5	0.6	0.2	0.5	4.5	5.5	7.1	5.0	5.9	7.0	7.1	8.9	6.9	7.7	2.5
VW08049-1R	403	81	8	1.055			1.1	1.2	0.2	0.5	2.8	2.8	7.8	5.4	7.4	7.4	7.1	8.9	5.9	6.5	1.9
VW08050-1R	523	64	12	1.067			1.1	0.6	0.2	0.8	4.3	2.8	7.6	6.0	6.1	7.2	6.1	8.9	5.9	8.1	2.1
W9407-1P	498	***43***	12	1.063			2.9	0.3	0.2	1.3	2.3	4.2	6.8	6.1	6.4	7.2	6.8	5.6	6.5	7.7	2.2
W9407-4P	***543***	82	15	1.058			0.5	0.3	0.7	0.3	2.3	3.1	6.8	6.0	6.1	6.3	5.6	8.9	6.1	6.1	2.2
W9426-3R	***592***	66	13	***1.070***			4.4	0.3	0.2	0.3	2.6	3.1	7.6	6.1	6.9	7.2	6.6	8.9	5.9	7.7	2.2
W9429-1R	447	59	15	1.051			0.6	0.3	0.2	0.5	2.3	3.1	7.6	5.8	7.2	7.2	6.8	8.9	6.7	7.9	2.1
W9433-1R	300	59	36	***1.069***			1.2	0.3	0.2	0.3	2.3	3.1	7.6	5.1	6.6	7.0	6.6	8.7	5.5	8.6	2.1
W9443-1R	***499***	***36***	6	1.047			17.9	1.4	0.2	0.3	2.9	2.8	7.6	**6.7**	7.2	7.0	6.1	8.7	6.3	8.3	2.1
W9443-2R	***557***	52	14	1.054			0.5	0.3	0.2	0.3	5.0	4.6	6.8	6.1	5.1	6.1	5.4	8.9	6.3	7.4	2.6
Chips (All)	503	39	13	1.073	4.8	2.3	7.1	0.5	0.9	0.5	4.2	**3.1**	**7.4**	6.4	**7.0**	7.3	6.4	8.5	5.0	7.6	**2.0**
Accumulator	***733***	38	15	1.077	3.9	2.5	2.0	0.3	1.1	0.8	5.5	3.6	6.8	6.2	4.9	6.4	4.6	8.6	4.5	5.4	2.6
Lelah	443	45	18	***1.083***	**3.2**	2.1	1.0	0.4	0.2	0.3	4.1	4.4	6.6	5.5	6.7	7.5	6.8	8.6	4.8	7.4	2.2
Nicolet	***608***	33	7	1.078	**3.3**	2.0	6.4	0.3	0.2	0.3	4.5	3.0	6.8	**7.1**	6.5	7.1	5.9	8.6	3.5	8.1	1.8
Atlantic	563	53	4	***1.083***	5.9	2.8	5.8	0.3	3.4	0.3	3.9	3.3	7.1	6.3	7.0	7.3	6.3	8.6	4.3	7.4	2.1
Snowden	***596***	32	5	1.079	**3.2**	2.1	0.8	0.3	1.2	0.3	3.6	3.0	7.1	6.2	6.0	6.4	5.6	8.9	3.7	6.5	2.5
AFW4734-1	372	27	4	1.078	**3.5**	2.1	5.3	0.3	0.2	0.3	2.7	3.0	7.4	6.2	7.5	7.1	6.6	8.9	4.5	8.6	2.0
NYWE50-2	505	***23***	12	1.065	3.8	2.0	23.8	1.1	2.1	0.3	5.0	3.0	7.6	**7.0**	5.7	6.9	5.1	8.9	5.8	6.1	2.4
NYWG20-4	383	***20***	8	1.068	3.8	1.8	0.8	0.6	0.2	0.3	2.9	3.0	7.6	**7.0**	7.8	7.3	6.8	8.9	5.6	8.4	1.9
NYWH13-3	279	***16***	2	***1.084***	3.8	2.1	1.6	0.3	0.2	0.3	2.7	3.0	7.4	6.8	7.0	7.1	6.3	8.6	5.0	8.4	2.0
NYWH28-2	468	***23***	7	1.065	4.2	2.2	1.4	0.3	0.2	0.3	4.3	3.3	7.9	**7.0**	7.7	7.3	6.3	8.9	4.2	7.0	2.1
NYWH28-5	487	28	2	1.078	**3.3**	2.4	9.6	0.3	0.2	0.3	8.5	**2.5**	7.6	6.9	7.3	7.3	6.1	8.6	4.0	7.8	1.8
NYWJ10-1	538	27	32	1.064	6.9	2.3	0.6	0.3	0.2	0.3	4.3	3.3	7.1	**7.9**	6.5	7.3	5.9	6.1	4.5	8.0	2.1
NYWJ10-8	***626***	29	5	1.071	**3.6**	2.3	2.4	0.6	0.2	0.5	4.4	3.8	7.9	**7.2**	7.0	7.5	6.8	8.9	5.3	6.7	2.1
NYWJ11-5	***608***	28	4	***1.108***	**3.2**	2.0	0.5	0.6	0.2	0.3	4.1	**2.2**	7.9	**7.3**	7.5	7.5	6.3	8.9	3.7	8.1	1.8
NYWJ13-2	510	39	3	1.066	5.4	2.1	0.6	0.3	0.2	0.5	4.5	2.7	7.6	5.9	7.3	7.1	6.3	8.9	4.5	8.3	1.8
NYWJ14-1	369	***24***	16	1.075	**3.6**	2.1	23.4	0.3	0.2	0.3	3.8	2.7	7.4	**7.5**	7.0	7.1	6.6	8.4	4.5	7.2	2.1
NYWJ15-2	***576***	45	8	1.078	4.4	2.3	39.9	0.3	0.2	0.3	3.5	2.7	7.9	6.9	7.8	7.5	6.8	8.6	4.3	8.3	1.7
NYWJ15-3	424	37	4	***1.079***	4.8	1.8	1.2	0.3	0.2	2.1	3.9	**2.2**	**8.4**	5.5	**8.1**	7.5	6.8	8.9	4.8	8.5	1.7
NYWJ15-4	521	29	3	1.077	3.9	2.3	6.7	0.3	0.2	0.3	3.7	3.6	7.4	6.8	7.5	7.5	6.6	8.9	5.3	8.6	1.8
NYWJ17-1	526	34	14	1.074	3.9	1.9	1.2	0.3	0.2	0.3	4.9	3.6	7.6	6.1	6.2	6.4	5.6	7.0	4.5	8.5	2.0
NYWJ17-2	455	43	7	1.075	3.8	2.1	1.1	0.3	0.2	2.1	5.3	3.0	6.8	5.5	7.8	7.8	**7.1**	8.9	5.6	8.6	1.9
NYWJ2-4	488	***21***	5	1.073	3.8	**1.5**	0.8	0.3	0.2	0.3	3.7	3.0	7.6	**7.3**	7.3	7.3	5.9	8.9	4.2	7.5	1.9
NYWJ5-4	351	66	19	***1.081***	6.0	2.0	21.4	0.3	2.3	0.3	3.2	2.7	7.6	4.9	6.2	7.1	5.1	8.4	5.6	6.1	2.3
VW08011-2	432	49	4	1.064	**3.6**	**1.7**	0.5	0.3	0.7	0.5	3.4	**2.5**	7.9	5.8	7.8	7.8	6.8	8.9	5.5	7.6	1.9
VW08057-3	512	32	6	***1.082***	4.5	1.8	0.8	0.3	0.2	0.6	4.8	4.4	7.6	6.5	7.3	7.1	6.8	8.6	5.6	7.0	2.0
VW08087-1	476	42	7	1.077	5.6	2.0	1.2	0.8	0.9	1.2	3.9	**2.2**	7.9	6.1	7.8	7.3	6.1	8.4	5.1	6.5	2.2
VW07074-1	552	32	15	1.077	4.5	2.1	2.3	0.3	0.2	0.3	3.4	2.7	7.9	6.1	7.3	7.1	6.1	8.6	4.5	5.6	2.4
VW07074-2	512	51	12	1.068	5.3	2.2	0.6	0.6	0.2	0.3	3.2	3.0	7.9	6.2	7.3	7.1	6.3	5.6	5.3	8.3	2.1
W9565-1Y	***581***	60	33	***1.079***	5.9	2.7	3.2	1.2	1.8	0.3	3.6	3.6	7.1	6.2	7.3	7.3	6.3	8.9	4.0	8.4	2.0
W9566-2Y	537	27	2	1.077	4.7	2.6	13.9	0.8	0.2	0.3	3.4	3.0	7.6	6.8	7.3	7.5	5.6	8.9	5.0	7.9	1.8
W9566-5	321	41	17	1.069	**3.3**	**1.5**	16.5	2.0	8.9	0.3	6.3	3.0	6.3	5.4	6.5	7.1	6.3	8.9	5.9	7.6	2.2
W9570-1	517	29	52	1.077	**3.6**	2.1	0.5	0.6	0.2	0.3	7.6	3.3	7.1	**7.3**	6.0	7.1	5.6	7.3	4.8	8.1	2.4
W9570-3	***606***	39	13	1.072	**3.2**	2.0	18.9	0.3	0.2	0.5	2.9	3.4	6.1	6.1	5.7	6.6	5.4	7.8	4.7	7.9	2.4
W9576-10	493	42	24	1.058	9.4	3.5	0.9	1.2	0.2	1.1	4.4	3.3	7.6	6.4	7.3	7.3	6.6	8.9	5.8	6.1	2.2
W9576-11	542	49	10	1.052	7.7	2.8	0.9	0.3	0.2	0.3	3.2	**2.5**	7.9	6.2	**8.1**	7.8	**7.6**	8.9	5.3	8.6	1.8
W9576-12	558	51	47	1.062	7.5	2.9	0.9	0.6	0.2	0.3	9.8	3.6	7.3	5.9	7.3	7.8	6.8	8.9	6.0	6.1	2.1
W9576-13	516	37	10	1.068	4.8	2.4	0.9	0.8	0.7	0.3	3.2	**2.2**	**8.4**	6.9	7.8	7.8	**7.3**	8.9	6.9	8.1	**1.5**
W9576-27	508	52	7	1.059	8.7	2.8	1.5	0.3	0.2	0.3	3.6	2.7	7.6	5.9	7.8	7.5	**7.1**	8.9	6.0	6.7	2.1
W9576-6Y	419	52	21	1.062	7.4	2.6	2.7	0.3	0.2	1.3	4.8	3.8	7.6	5.7	7.0	7.8	**7.3**	8.6	5.6	6.7	2.2
W9576-7Y	534	102	16	1.071	**3.8**	**1.6**	3.3	0.3	0.2	0.5	5.8	**2.5**	7.9	5.7	7.5	7.8	**7.3**	8.6	6.4	8.6	1.7
W9577-6Y	***689***	43	18	1.070	**3.8**	2.6	0.9	0.8	1.8	0.5	5.1	3.3	7.3	5.9	7.0	7.3	6.6	8.6	5.3	8.3	2.1
W9577-8Y	516	33	13	***1.084***	**3.6**	2.4	7.8	0.3	2.9	0.3	4.0	**2.5**	7.9	6.6	7.3	7.3	6.6	8.9	5.0	7.9	1.9
W9579-2	***594***	70	12	1.065	7.2	2.8	7.5	0.3	0.2	0.5	5.1	3.0	7.9	6.1	7.5	7.8	**7.1**	8.9	4.9	7.9	1.9
W9587-4	347	41	10	1.072	**3.6**	2.0	0.5	0.6	0.2	0.3	4.8	3.6	6.8	5.8	6.2	7.1	6.1	8.9	5.9	7.9	2.2
W9599-3Y	473	40	13	1.073	8.0	2.8	10.3	0.3	0.8	0.3	4.5	3.0	7.9	**7.2**	6.7	7.5	6.8	8.9	5.3	7.9	2.0

Table 9. Results from Year 4 Replicated Trials, Hancock WI (cont'd)

Clone	Tuber Yield			Processing			Tuber Internal Defects					Tuber External Traits									
	A Yield (cwt/	B Size Yield (cwt/a)	Culls Yield (cwt/a	SG	Chip Color Dec3	Chip Stem End	IBS%	BC %	HH %	SED %	VD %	Tuber Length	Thickness	Tuber Size	Tuber Unif	Tuber Eye Depth	Stem /Butt Eye	Skinning	Skin Texture	Common Scab	Pref 1-5
W9603-10	422	52	14	1.067	6.6	2.2	1.1	0.4	0.3	0.3	3.1	3.6	7.1	5.7	7.0	7.3	6.8	8.9	5.2	6.0	2.4
W9612-3Y	470	***15***	16	***1.084***	**3.2**	**1.5**	0.8	0.3	0.2	0.3	2.7	**2.5**	7.9	6.6	7.5	7.3	6.8	8.9	5.6	8.6	1.8
W9617-1Y	***667***	***20***	20	1.065	6.0	2.4	4.6	0.3	0.2	0.3	5.4	2.7	7.9	**7.6**	6.2	6.4	5.6	7.3	5.4	6.6	2.1
W9619-1Y	***649***	31	7	1.072	4.1	3.2	50.1	0.8	1.2	0.3	2.9	3.8	7.6	**7.2**	7.3	7.3	6.6	8.9	5.2	8.3	1.9
W9629-3Y	***740***	25	7	1.069	5.9	2.6	21.5	0.6	0.2	0.3	3.7	3.3	7.4	**7.9**	7.3	7.5	6.6	7.5	5.6	8.5	1.9
W9630-2	533	***17***	14	***1.082***	4.8	2.7	3.4	0.6	5.0	1.2	4.4	3.3	6.8	**7.3**	6.7	7.1	5.6	7.8	4.8	8.5	1.9
W9636-1	420	42	10	***1.090***	**3.6**	1.9	2.4	0.6	0.7	0.3	3.9	3.6	6.3	5.5	6.7	6.6	5.4	8.9	5.3	7.1	2.2
W9638-3	422	53	8	1.073	5.3	2.7	82.3	0.8	0.2	0.3	3.2	3.3	6.6	5.1	6.7	7.1	6.3	8.6	4.8	8.3	2.4
Russets (All)	458	59	28	1.072	6.9	2.5	3.6	0.5	1.4	0.5	3.7	6.5	7.1	6.2	5.8	7.2	7.5	8.8	4.3	7.6	2.6
Russet Burbank	409	83	83	1.067	8.5	2.7	6.8	0.8	1.4	0.3	5.1	**7.7**	7.0	5.5	4.4	7.1	7.9	9.0	4.3	8.5	3.1
Russet Norkotah	448	62	***11***	1.061	7.5	2.2	1.0	0.3	0.9	0.3	3.9	6.1	7.5	6.5	**7.5**	7.7	7.9	9.0	4.3	7.4	**2.0**
AW06108-1rus	469	71	28	1.074	6.7	2.1	1.6	0.3	6.1	0.3	3.4	6.1	7.0	5.8	5.4	6.9	7.4	9.0	4.0	6.9	2.5
AW06756-1rus	***606***	51	66	1.074	8.9	2.3	1.0	0.6	2.3	0.6	3.8	6.6	7.0	**6.9**	3.8	6.6	6.6	9.0	3.3	4.5	3.1
AW06795-1rus	475	46	20	1.065	6.5	2.9	0.4	0.3	0.3	0.3	5.2	5.5	7.5	6.7	6.2	7.3	7.1	9.0	4.6	5.7	2.9
AW06874-1rus	500	72	27	***1.084***	7.0	2.5	0.4	0.3	0.3	0.3	3.2	6.9	7.0	6.3	5.7	7.3	7.6	8.7	4.3	5.7	3.0
AW06875-1rus	411	57	24	***1.092***	**4.2**	2.1	0.4	0.6	13.8	0.6	3.2	6.4	7.3	5.9	6.2	6.9	7.1	8.7	4.6	8.6	2.4
AW07005-3rus	368	***43***	***9***	1.070	8.6	3.2	2.2	0.3	10.9	0.3	5.3	7.7	7.0	6.6	**6.8**	7.5	7.9	9.0	4.8	8.5	**2.2**
AW07088-1rus	364	55	16	***1.081***	7.1	2.5	4.2	0.3	0.3	0.6	3.4	6.0	7.5	6.0	**6.8**	7.7	7.9	9.0	3.5	8.4	2.4
AW07096-1rus	341	108	***4***	1.075	6.4	**2.0**	1.6	1.2	0.3	0.3	3.1	6.1	**7.8**	5.5	**7.5**	7.7	7.9	9.0	4.1	8.6	**2.2**
AW071022-4rus	***615***	65	123	1.072	7.1	2.9	0.4	0.9	0.8	0.3	6.2	6.9	7.3	**6.9**	4.4	6.6	6.6	8.1	3.8	6.6	3.1
AW07967-2rus	407	112	138	***1.089***	7.0	2.9	0.4	0.3	0.3	0.3	3.6	5.3	7.3	4.6	3.8	6.6	6.9	8.4	4.6	6.6	3.5
AW07993-2rus	433	87	20	***1.088***	**4.5**	2.3	0.4	0.6	0.3	0.5	3.1	5.8	7.3	5.5	5.7	7.3	7.6	8.4	4.1	6.6	2.8
AW07025-1rus	***604***	44	14	1.066	9.5	3.4	1.0	0.6	0.3	0.3	3.7	6.5	7.5	6.5	5.7	7.1	7.4	9.0	4.3	8.3	2.4
AW07025-2rus	357	69	***11***	1.066	7.6	2.7	0.4	0.6	0.3	0.8	2.7	5.5	7.3	5.3	6.5	7.3	7.9	9.0	4.3	8.5	2.5
AW07966-1rus	***691***	52	23	***1.080***	**5.0**	2.6	1.6	1.0	0.3	0.3	3.8	5.5	7.0	6.6	4.9	7.1	6.6	8.7	5.9	6.7	2.9
AW07966-2rus	354	77	***11***	***1.081***	**4.9**	2.1	0.4	0.3	0.8	0.5	2.9	5.8	6.8	5.2	4.6	6.6	6.9	8.7	5.3	7.2	3.1
QSNDSU10rus	400	***31***	***11***	***1.078***	**5.3**	2.4	2.2	0.3	0.3	0.3	4.4	6.4	7.0	6.7	**6.8**	7.5	7.6	9.0	4.1	7.3	2.3
QSW03-4rus	363	62	21	1.061	8.0	**2.0**	2.0	0.9	0.3	0.3	4.9	6.9	7.0	**6.9**	6.2	7.3	7.6	8.7	4.9	8.6	2.4
QSW10-5rus	344	85	***12***	1.054	7.1	2.5	0.4	0.3	0.3	0.7	3.2	**7.4**	7.0	5.5	5.2	7.7	7.9	9.0	4.1	6.4	2.9
VW07087-1rus	***539***	***33***	***12***	1.063	7.6	2.2	22.1	0.3	0.3	0.3	4.1	6.4	7.0	6.5	6.5	6.0	7.1	9.0	4.8	8.5	**2.2**
W9483-1rus	467	80	36	1.069	**5.9**	3.1	3.1	0.3	0.3	0.5	6.1	**7.4**	7.5	6.3	5.4	7.3	7.9	8.7	4.1	8.6	2.4
W9518-1rus	313	94	***9***	1.063	8.6	**1.9**	0.4	0.3	0.3	0.3	2.4	5.8	7.0	5.2	6.0	6.9	7.4	8.7	3.8	8.4	2.5
W9519-1rus	***548***	61	20	***1.079***	7.0	2.9	0.4	0.3	0.3	0.3	3.9	6.9	7.0	**6.9**	6.0	7.5	7.9	9.0	3.7	6.7	2.6
W9519-3rus	509	***39***	35	1.064	6.4	2.0	5.4	0.3	1.3	0.3	3.3	**7.4**	6.8	**7.3**	6.2	7.5	7.6	8.7	3.5	8.6	2.3
W9523-1rus	439	***42***	***7***	1.063	7.3	2.8	0.4	0.3	0.3	0.3	2.4	6.4	**7.8**	6.2	**7.5**	7.5	7.9	9.0	4.1	8.3	**2.0**
W9530-1rus	369	45	36	1.069	7.7	3.1	1.4	0.3	1.9	0.3	4.3	6.4	7.5	6.2	6.5	7.7	7.9	8.4	4.0	7.2	2.6
W9533-1rus	***547***	***43***	15	1.069	7.0	2.3	2.5	0.3	1.1	0.3	2.8	6.8	7.0	6.6	6.2	6.9	7.4	8.7	4.1	8.6	**2.2**
W9536-1rus	406	45	34	1.064	8.5	2.5	17.8	0.3	0.8	0.3	2.9	6.8	7.0	6.3	6.5	7.7	7.9	9.0	4.6	8.6	2.4
W9546-1rus	404	50	14	1.062	7.5	2.5	4.8	0.3	0.3	2.2	3.0	6.1	6.5	6.2	5.2	7.5	7.6	9.0	4.6	6.7	2.4
W9549-2rus	406	45	53	1.073	6.4	2.6	1.3	0.3	8.7	0.3	2.4	6.6	6.2	**7.2**	4.6	7.7	7.6	9.0	4.0	8.5	3.0
W9553-2rus	405	***27***	15	***1.080***	6.2	2.6	1.4	0.3	0.3	0.7	3.6	**7.3**	6.5	**7.2**	5.4	6.6	7.6	9.0	4.0	8.3	2.4
W9558-3rus	442	56	29	***1.084***	**4.0**	**1.9**	2.2	0.8	0.8	0.5	3.1	6.9	5.5	5.8	5.4	7.3	7.6	9.0	4.3	8.3	3.0
W9558-5rus	***578***	***23***	16	1.072	6.4	2.5	1.0	0.3	0.3	0.3	3.4	5.1	6.5	6.5	5.7	7.5	7.1	9.0	4.0	8.5	2.5

4. Early Selection Strategy

4.1. National Chip Processing Trial

In 2012, our program entered 50 entries to the USPB National Chip Processing Trial (NCPT), this trial structure provided the opportunity to test advanced clones from year 4 and older in 10 locations, five in Northern states and five in Southern states. The main objective of this trial is to identify clones from US breeding programs that are well adapted and superior in performance to Snowden in the North and Atlantic in the South.

Results from three years of the NCPT have helped our program to select clones from different breeding programs for the North and the South. Table 10 shows clones with greater potential.

Table 10. Clones with best performance from the National Chip Processing Trial clones, average of two or three years from the U.S. Northern states of MI, MN, ND, NY and WI.

Clone	MN 2012 Common Scab	WI 2012 Common Scab	NORTH 2011 YIELD	North SG	ND 2012 SG	NORTH 2011 OTF	MI 2012 SED	NORTH 2011 HH	NORTH IBS	ND L Color	WI2011-12 Chip Color L oct31	WI2011-12 Chip Color a oct31	WI2011-12 Chip Color L June 1	WI2011-12 Chip Color a June 1	WI2011-12 Chip Color L Aug 2	WI2011-12 Chip Color a Aug 2	WI 2012 chip Nov30	WI 2012 SED Nov30
AF4648-2	2.5	1.2	19.1	1.082	1.102	1.4	2.0	2.4	2.2	49.8	51.9	6.9	54.4	2.8	52.2	3.5	4.0	1.8
NY148	3.0		23.4	1.085	1.098	1.6	2.0	0.0	1.7	48.8	51.2	6.5	54.0	2.6	56.4	1.3	4.3	3.0
A01143-3C	2.0	2.8	21.3	1.077	1.097	1.4	2.0	0.0	0.0	49.2	57.4	2.1	52.5	2.9	40.5	6.2	2.8	2.5
NYH25-4	4.0	2.7	19.8	1.080	1.103	1.1		0.8	0.0	51.4	58.2	5.0	55.9	2.5	54.9	2.6	3.5	2.5
AC00180-2W	5.5	4.0	16.3	1.077	1.098	1.1	2.0	0.0	0.0	49.8	49.9	7.4	46.9	5.6	55.3	3.4	4.0	2.3
CO02033-1W	6.0	4.0	19.7	1.079	1.107	1.3	2.5	1.3	7.5	49.8	55.1	3.1	55.3	2.5	53.1	1.7	4.0	1.8
MegaChip	3.5	2.0	21.9	1.080	1.103	1.4	2.5	4.4	0.8	49.6	49.8	7.0	51.4	4.5	49.6	4.4	6.5	2.5
MSM246-B	5.0	3.5	15.9	1.074	1.099	1.3	2.5	0.6	1.3	50.3	57.8	2.7	54.8	2.2	50.8	3.0	3.3	2.3
MSR127-2	3.5	1.5	23.5	1.083	1.104	1.7	2.0	0.8	1.3	50.1	55.0	3.0	49.9	4.3	53.0	5.7	4.0	2.8
MSR169-8Y	2.5	1.5	17.9	1.079	1.100	1.3	2.5	0.3	0.5	50.6	57.7	4.1	54.6	3.2	54.7	5.3	3.3	1.5
MSS165-2Y	4.5	2.8	21.8	1.083	1.102	1.3	2.0	0.8	6.5	49.3	51.0	5.8	50.2	4.4	46.1	4.3	3.8	2.5
NYH15-5	3.0	1.5	19.6	1.079	1.105	1.3	1.0	0.0	0.0	49.8	53.9	4.9	55.5	1.8	52.0	3.5	3.0	1.8
AC03452-2W	3.0	3.0	24.4	1.066	1.088	1.3	1.5	0.5	0.0	51.2	57.4	4.2	52.2	4.6			3.5	3.0
CO02024-9W	5.0	3.2	22.8	1.075	1.100	1.5	2.0	1.2	12.3	48.8	54.2	5.6	53.8	3.1	44.6	5.3	3.5	3.0
MSL292-A	2.5	3.2	18.0	1.078	1.102	1.3	2.0	4.2	8.3	50.1	54.5	5.8	48.8	5.2	53.2	2.2	3.8	1.5
MSR128-4Y	1.0	2.5	13.7	1.079	1.100	1.3	1.5	0.0	0.0	50.4	55.7	5.1	53.7	3.1			5.5	1.8
NYH15-17		2.0	22.4	1.078	1.103	1.4	2.5	1.7	0.0	50.1	45.7	8.2					3.8	2.0
W8822-1	1.5	2.5	22.6	1.083	1.104	1.6	3.5	0.0	0.0	47.7	47.7	7.9	47.0	5.3			6.5	2.8
W8822-2	1.5	2.5	22.3	1.079	1.099	1.5	3.0	0.4	0.8	50.6	55.5	4.8	47.0	5.9			6.0	1.8
W8822-3	2.0	2.8	20.1	1.083	1.100	1.3	2.5	1.5	0.0	50.1	52.2	5.4					6.5	2.8
Snowden	5.5	3.2	22.1	1.079	1.102	1.7	3.0	2.2	0.6	49.8	52.1	5.7	52.4	3.6	40.2	6.5	4.2	2.4

Note: Plots are 15 feet long and two replicates

Table 11. Clones with best performance from the National Chip Processing Trial clones of one year of evaluation in the U.S. Northern states of MI, MN, ND, NY and WI.

	Yield					Chip Evaluation					Specific Gravity					Tuber Internals				
Clones	North Yield	WI 2012 YIELD	MI 2012 Yield	NY 2012 Yield	OR 2012 Yield	WI 2012 chip Nov 30	WI 2012 SED Nov 30	MI 2012 OTF	MI 2012 SED	OR 2012 OTF	North SG	WI 2012 SG	NY 2012 SG	OR 2012 SG	MI 2012 SG	WI 2012 HH	OR 2012 HH	OR 2012 IBS	WI 2012 IBS%	WI 2012 Late Vigor
W2133-1	15.8	30.4				3.8	1.8				1.080	1.080				0.0			0.0	1.7
NYJ15-7	19.7	37.3	18.3	12.6	29.3	4.0	1.0	1.5	3.0	1	1.072	1.075	1.067	1.067	1.081	0.0	0	30	4.8	1.8
MSR093-4	15.5	37.0	9.5	9.5	20.4	7.0	2.0	2.0	3.0	1	1.078	1.076	1.078	1.078	1.080	0.0	0	0	0.0	1.7
MN07330BB-01	13.1	34.3	9.9	7.0		3.0	2.0	1.5	1.0		1.076	1.073	1.079		1.075	0.0			0.0	2.2
NYJ100-5	17.2	32.0	19.3	10.5	23.2	5.0	3.0	2.0	2.0	1	1.077	1.079	1.075	1.077	1.078	0.0	0	0	0.0	1.7
ND071378B-63	14.5	30.9	15.5	10.6		4.0	1.5	1.0	2.0		1.074	1.069	1.076		1.077	6.0			6.0	1.8
AF4740-1	16.2	29.2	14.0	12.8	23.8	3.0	1.0	2.0	2.0	1.5	1.082	1.078	1.084	1.084	1.083	0.0	90	0	0.0	2
W9200-13	13.9	27.4	15.1	9.8	16.4	2.5	2.0	1.5	1.0	1	1.082	1.081	1.078	1.081	1.089	0.0	0	0	0.0	1.3
NYJ107-5	14.5	26.3	12.8	10.2	22.3	5.5	2.5	2.0	3.0	1	1.079	1.083	1.077	1.075	1.080	0.0	0	0	4.0	2
NYJ5-2	17.2	24.0	19.8	10.9	30.3	4.0	1.5	1.5	3.0	1.5	1.078	1.074	1.078	1.083	1.078	0.0	0	0	0.0	1.5
AF4975-4	14.6	34.7	11.8	9.0	16.2	6.0	2.0	1.0	2.0	1	1.077	1.074	1.082	1.074	1.080	0.0	0	0	6.0	2.3
Snowden	21.0	40.2	15.0		27.8			1.5	2.0	1	1.078	1.076		1.076	1.081	0.0	0	0	2.0	1.2

Note: Plots are 15 feet long and one replicate. In WI augmented design using replicated standards.

Table 12. Clones with best performance from the National Chip Processing Trial clones, average of two or three years from the U.S. Southern states of CA, NC and Mo.

TIER 2 (2 Reps):	Yield						Specific Gravity					Chip Evaluation					Int. Defects			
	South Kg/15'	CA 2012 Kg/15'	CA 2011 Kg/15'	NC 2012 Kg/15'	NC 2011 Kg/15'	NC 2010 Kg/15'	CA 2012 SG	CA 2011 SG	NC 2012 SG	NC 2011 SG	NC 2010 SG	CA 2012 OTF	CA 2012 SED	NC 2012 OTF	NC 2011 OTF	NC 2010 OTF	NC 2011 IBS	MO 2011 IHN	NC 2010 HH	NC 2010 IHN
W2324-1	16.8	16.8	25.5	16.4	10.8	31.1	1.092	1.089	1.082	1.099	1.059	1.0	2.0	1.0	4.5	2.0	0.0	0.0	0.0	0.0
NY148 (E106-4)	13.1	10.3		14.9			1.097		1.084			1.5	2.0	2.0						
CO02033-1W	14.1	10.4	16.8	12.6	10.2		1.097	1.103	1.087	1.084		1.0	2.0	1.5	6.0		0.0	0.0		
MSR159-02	13.4	11.9	14.9	13.9	8.0		1.101	1.094	1.085	1.098		1.5	3.0	1.0	6.0		0.0	4.0		
NYH15-5	13.1	11.9	17.2	12.0	8.7		1.089	1.090	1.082	1.096		1.0	3.0	2.0	4.0		0.0	1.0		
NYH15-17	12.9	13.4	15.4	15.6	9.5		1.095	1.091	1.081	1.088		1.0	2.0	2.0	5.0		0.0	1.0		
MSR127-2	12.2	11.5	20.5	12.9	7.6	9.8	1.093	1.098	1.081	1.096	1.064	1.5	1.0	1.5	4.5	2.0	5.0	0.0	0.0	0.0
MSS165-2Y	11.3	10.4	19.5	10.7	8.5	10.6	1.102	1.103	1.083	1.089	1.074	1.5	1.0	2.0	5.0	2.0	0.0	0.0	0.0	0.0
CO03243-3W	13.6	13.0	18.7	13.1	12.7		1.086	1.093	1.076	1.082		1.5	2.0	2.0	7.0		0.0	0.0		
A00206-1C	13.4	23.2	19.3	12.6	10.8	4.2	1.069	1.088	1.068	1.075	1.061	1.5	2.0	2.0	3.0	2.0	0.0	0.0	0.1	0.0
MSQ086-3	12.6	12.2	12.1	17.0	8.6	17.5	1.087	1.087	1.075	1.084	1.052	1.0	1.0	1.5	5.0	3.0	0.0	1.0	0.0	0.4
CO02024-9W	12.0	11.1	17.5	13.0	10.3		1.088	1.089	1.074	1.081		1.5	2.0	2.0	6.0		0.0	1.5		
MSR058-1	11.8	7.8	15.3	10.1	8.8	14.2	1.095	1.092	1.079	1.092	1.060	1.5	3.0	2.0	5.5	3.0	0.0	0.0	0.0	0.0
MSN191-2Y	11.5		14.7		9.1			1.093		1.098					6.0		0.0	1.0		
NYH25-4	10.9	6.2	16.3	14.9	10.1		1.090	1.101	1.084	1.103		1.0	2.0	2.0	6.0		0.0	0.0		
W8822-2	10.7	18.3	16.9	9.7	10.6		1.095	1.085	1.082	1.095		1.5	2.0	2.0	4.0		0.0	0.0		
MegaChip	10.6	10.9		11.0		12.9	1.108		1.084		1.067	1.0	2.0	2.0		2.0			0.0	0.0
AF4147-1	10.6	11.2	15.7	11.5	9.7	10.0	1.091	1.099	1.087	1.084	1.069	1.0	2.0	2.5	6.0	3.0	0.0	1.0	0.0	0.0
W8822-3	10.4	10.8	17.0	11.1	11.3		1.099	1.088	1.083	1.092		1.5	2.0	2.0	3.0		0.0	0.0		
W8867-5	10.4	6.7	18.1	15.6	9.7		1.095	1.091	1.075	1.088		1.0	1.0	1.5	6.0		0.0	0.0		
NYH23-16	10.3	13.5	17.4	8.5	8.8		1.089	1.089	1.078	1.085		1.5	2.0	2.0	7.0		0.0	3.0		
W8822-1	10.2	12.7	17.0	15.0	9.1		1.089	1.086	1.082	1.102		1.0	2.0	2.5	7.0		0.0	0.0		
MSR157-1Y	10.2	8.6	16.5	10.0	8.2		1.091	1.097	1.085	1.092		1.5	3.0	1.5	5.0		0.0	8.0		
W8867-7	9.5	11.2	8.4	8.4	11.0		1.093	1.092	1.079	1.090		1.0	2.0	2.5	5.0		0.0	0.0		
CO05061-7W	9.3	12.7	14.3	9.6	10.0		1.095	1.088	1.083	1.087		1.5	2.0	2.0	7.0		20.0	1.0		
AF4130-7	8.7	5.3	9.6	8.0	7.4			1.098	1.077	1.097		1.5	2.0	2.0	4.0		0.0	0.0		
Atlantic	10.4	10.7	14.8	13.2	10.1	6.7	1.099	1.094	1.088	1.095	1.071	1.5	2.0	2.0	6.0	2.0	10.0	5.3	0.0	0.3

Note: Chip color: OTF = off the field. Rating scale: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

Table 13. Clones with best performance from the National Chip Processing Trial clones of one year of evaluation in the U.S. Southern states of FL, Mo and NC and Northern locations of WI and MN

Clones	South Yield	South SG	MO 2012 OTF	MO 2012 SED	FL 2012 OTF	FL 2012 SED	NC 2012 OTF	MO 2012 Kg/15'	MO 2012 SG	FL 2012 Kg/15'	FL 2012 SG	MN 2012 Common Scab	WI 2012 Common Scab	WI 2012 HH	WI 2012 IBS%
NYJ112-2	12.5	1.080	1.0	1.0	1.0	2.0		19.0	1.086	8.5	1.071	1.5	2.0	2.0	0.0
W9313-2	15.0	1.082	1.0	1.0	1.0	1.0		20.6	1.084	7.5	1.07	3	1.5	0.0	0.0
W10670-3 (QSW	13.9	1.084	1.0	1.0	1.0	1.0		22.6	1.084	4.5	1.069		3.0	0.0	0.0
NYJ4-3	14.3	1.080	1.0	2.0	1.5	0.0		21.1	1.080	8.1	1.074	4.5		0.0	0.0
NYJ2-29	12.1	1.089	1.0	2.0	1.0	1.0		16.9	1.102	7.2	1.071	4		0.0	0.0
NYJ2-27	12.3	1.090	1.5	2.0	1.0	1.0		20.3	1.098	6.7	1.07	3	1.5	0.0	0.0
AF4573-2	16.0	1.091	1.0	2.0	1.0	1.0	1.0	27.9	1.102	7.3	1.072	3	3.0	14.0	8.0
AF4552-5	14.6	1.081	1.5	2.0	1.0	3.0	1.5	26.7	1.085	5.0	1.068	2.5	3.0	0.0	0.0
AF4437-5	11.7	1.083	1.0	2.0	1.5	2.0		21.7	1.092	6.4	1.068	4.5	1.5	0.0	4.0
AF4386-16	13.4	1.085	1.5	2.0	1.5	1.0	2.0	13.5	1.092	10.2	1.072	4	3.0	0.0	0.0
A-32	9.5	1.082			1.0	1.0	1.5			6.2	1.072				
W9200-13	11.1	1.086	1.0	2.0	1.5	1.0		14.6	1.089	5.7	1.067	4.5	2.2	0.0	0.0
W8875-2	11.1	1.083	1.0	2.0	1.0	1.0	2.0	12.8	1.083	5.7	1.072	2		0.0	0.0
NYJ104-3	15.0	1.078	1.0	0.0	1.5	3.0		20.3	1.087	10.8	1.067	3.5	3.0	0.0	6.0
MSS428-2	12.6	1.085	1.0	2.0	1.0	1.0		19.9	1.099	6.3	1.067	4.5	1.5	8.0	2.0
MSR093-4	11.7	1.079	2.0	2.0	1.5	0.0		18.2	1.089	8.0	1.064	3.5	3.2	0.0	0.0
Atlantic	14.5	1.087	1.0	2.0	1.0	2.0						6	3.5	4.0	4.0

4.2. National French Fry Processing Trial

The National French Fry processing trial was conducted for the first time in 2011. This is a project coordinated by David Parish (AIS) and financially supported by the French fry processing industry. Eighty one clones were evaluated in 2011 and 88 in 2012. The initial objective of this project was to identify and help select clones with reduced acrylamide and asparagine content. Last year, a SCRI-USDA funded project led by A.J. Bussan and Paul Bethke secured federal funding that supplements the NFPT project. In 2011 a number of clones resulted low in acrylamide. In 2012 the industry added as an objective the selection of russet potato clones that are similar in processed quality to Russet Burbank. In addition to acrylamide and asparagines evaluations, tuber processing traits have been evaluated at East Grand Forks, and at Simplot's Caldwell, ID processing pilot plant. The eighty eight clones evaluated in 2012 were planted as single replicates, 30 hills plot in five locations: ID, ME, ND, WA and WI. Tubers were harvested, graded and sent to East Grand Forks, ND for initial storage and processing. A sample of each clones was then collected at East Grand Forks and sent to Caldwell ID for storage and processing. This result presents field data and acrylamide data generated the 2012 testing locations. Nine additional physical French fry attributes related to quick service restaurant applications (QSR) are being emphasized by quality assurance teams. In addition taste panels are used to determine flavor and aroma. In 2012, coordination between the NFPT, SCRI projects and breeding programs resulted in two workshops attended by breeders and industry. One of these workshops took place at East Grand Forks, N.D. on October 3, and the second at Caldwell, ID Dec 12-13, 2012. These activities are helping to better define the breeding and variety development agenda for French fry processing potatoes.

Table 14. National French Fry Processing Trial Results 2012, Hancock WI 2012 and Acrylamide results from WA, ID, ND & ME

	Yield and Grade							SG	Acrylamyde				Diseases				External Defects					External Appearance							Plant
	TOT Yield	MKT able Yield	% MKT able Yield	> 6oz Target 68-74	>10oz Target 28-40	% under size	% Loss to culls	SG	WA	ID	ND	ME	Early Vigor	Early Blight July25	Vert Wilt Jul25	Scab%	Hollow Heart%	Growth Crack %	Green %	VD%	IBS%	Tuber Size	Tuber Thick ness	Eye Depth	Tuber Text	Shape	Appear	Merit	Vine Mat
A0012-5	626	534	82%	**68%**	**38%**	15%	3%	1.065	355	175	149		2.6	3.1	1.2	6.8	51.2	0.5	0.4	**0.4**	0.8	5.4	2.0	3.3	**2.2**	3.6	3.5	3.8	8.3
A0073-2	443	326	73%	40%	3%	26%	1%	1.080	255	211	327	325	2.0	3.1	3.0	10.9	0.5	0.5	0.4	**0.4**	4.3	5.4	2.0	3.3	3.0	4.1	**6.8**	**1.6**	6.0
A01010-1	649	324	50%	24%	1%	50%	0%	**1.081**	564	198	483		**1.6**	3.9	1.6	4.4	4.2	0.9	0.4	5.3		5.4	2.6	3.8	**2.2**	**4.9**	**7.2**	**1.2**	7.4
A01325-1	612	494	78%	48%	13%	19%	2%	1.076	402	202	736		**1.8**	4.7	2.1	27.3	6.1	2.6	0.4	6.2	9.6	6.3	2.0	3.3	5.6	4.1	5.1	2.9	8.3
A02062-1TE	444	339	76%	52%	12%	24%	0%	1.067	352	279	310		2.3	4.3	3.0	2.7	0.5	0.5	0.4	**0.4**	0.8	5.9	**1.4**	3.3	**2.2**	**4.9**	**7.6**	**1.6**	6.8
A02138-2	485	329	66%	45%	7%	32%	2%	1.076	247	86			**1.8**	4.3	2.1	6.8	0.5	0.5	0.4	**0.4**	0.8	4.5	2.0	3.3	3.0	3.2	5.1	2.9	6.8
A02144-2	468	250	53%	39%	8%	56%	5%	1.060	222	307	177		2.3	4.7	3.0	10.9	0.5	0.5	0.4	**0.4**	0.8	5.4	**1.4**	3.3	3.0	4.1	5.9	2.5	5.8
A02424-83LB	686	458	54%	27%	3%	33%	13%	**1.086**	331	205	250		**1.3**	3.1	1.2	6.8	0.5	0.5	0.4	8.8	0.8	5.4	2.6	3.3	3.9	4.5	5.9	2.5	8.3
A02507-2LB	455	390	85%	**68%**	19%	14%	1%	**1.083**	199	198	181		3.6	3.1	1.6	2.7	0.5	0.5	0.4	3.9	3.5	6.3	2.0	3.8	**2.2**	4.1	**6.8**	**1.6**	8.3
A03921-2	673	475	70%	62%	19%	34%	4%	**1.089**	188	259	174		**1.8**	3.9	2.5	6.8	0.5	0.5	0.4	8.1	0.8	5.9	2.0	3.3	**2.2**	**4.9**	**6.8**	2.0	6.8
A06003-3TE	268	195	70%	46%	10%	27%	3%	1.060	108	330	193		2.6	4.3	2.1	2.7	5.4	0.5	0.4	10.7	4.8	4.5	2.0	3.3	**2.2**	4.1	3.5	2.9	6.6
AC00395-2RU	577	396	69%	62%	**25%**	35%	3%	**1.081**	367	274	259	452	**1.8**	3.1	1.6	2.7	4.7	0.5	0.4	4.8	4.2	5.4	2.6	4.3	**2.2**	4.1	5.1	2.9	7.2
AC96052-1RU	408	299	73%	**65%**	16%	33%	2%	1.068	455	212	522	381	2.5	3.5	2.1	2.7	0.5	0.5	0.4	**0.4**	0.8	5.9	2.0	3.3	**2.2**	4.1	**6.8**	2.0	7.2
AC99375-1RU	803	603	69%	45%	15%	25%	6%	**1.090**	182	149	94	148	**1.5**	3.5	1.6	2.7	4.2	2.6	3.2	8.1	6.7	6.1	2.0	3.6	3.0	**4.9**	5.1	2.0	8.3
AF3001-6	653	562	83%	**67%**	**35%**	14%	4%	1.073	218	109	159	265	2.3	3.5	1.6	27.3	4.0	0.5	0.4	4.1	0.8	4.9	2.0	3.3	3.9	**4.9**	5.9	**1.6**	8.3
AF3008-3	437	255	55%	31%	6%	42%	3%	1.076	473	267	465	373	2.3	4.7	1.2	10.9	0.5	0.5	1.5	**0.4**	0.8	5.4	2.0	3.3	3.9	4.1	5.9	2.5	5.4
AF3317-15	464	257	52%	33%	14%	45%	3%	**1.089**	586	207	793	427	**1.8**	3.9	1.2	2.7	0.5	0.5	0.4	**0.4**	18.3	6.3	2.0	4.3	3.0	**4.9**	4.3	2.9	8.3
AF3362-1	642	625	96%	**88%**	**70%**	3%	2%	1.066	635	264	355	329	2.0	3.5	2.5	2.7	0.5	0.5	0.4	7.0	8.3	**7.3**	2.0	3.3	**2.2**	**4.9**	**7.6**	**1.2**	6.8
AF4040-2	405	329	78%	63%	25%	19%	4%	1.068	340	158	158	185	2.3	4.7	2.5	10.9	4.2	1.4	0.4			6.6	2.6	3.3	3.9	4.5	5.1	2.0	**4.9**
AF4113-2	439	390	86%	**73%**	**36%**	11%	3%	1.060	541	345	250	403	2.0	5.1	2.1	27.3	4.2	0.9	1.0			6.3	2.0	3.3	6.4	4.5	5.1	2.9	**3.9**
AF4124-4	545	378	70%	52%	19%	40%	7%	1.066	452	267	121	473	**1.6**	5.1	2.5	2.7	0.5	0.5	1.5	15.0	0.8	6.3	2.6	3.3	3.0	4.1	**6.8**	2.0	**5.1**
AF4124-7	578	498	80%	**66%**	**31%**	14%	6%	1.057	608	308	205	1230	2.0	4.3	1.2	2.7	4.2	0.5	3.2			6.3	2.0	3.3	3.0	4.5	6.3	2.0	7.0
AF4172-2	501	248	48%	21%	5%	50%	1%	1.067	278	237	266	186	2.3	2.7	1.2	6.8	4.2	0.5	0.4			5.4	2.6	3.3	3.9	**4.9**	5.1	2.0	8.3
AF4198-2	388	359	93%					1.066	662	326	663	719	2.0	4.7	2.1	6.8	0.5	0.5	1.5	**0.4**	0.8	5.2	2.0	3.3	3.9	**4.9**	5.1	2.0	**4.3**
AF4222-5	453	342	70%	55%	24%	24%	6%	1.067	757	746	879	1420	2.3	3.1	3.9	2.7	4.2	1.4	0.4			5.9	2.0	3.3	3.0	3.2	5.1	2.0	6.2
AF4281-3	454	347	65%	41%	8%	24%	11%	1.070	573	277	445	790	2.0	3.5	1.6	2.7	6.4	0.5	0.4	0.4	0.8	6.3	2.0	3.6	4.7	4.1	5.1	2.9	7.0
AF4283-1	523	332	42%	24%	7%	37%	22%	1.061	437	208	511	595	**1.8**	3.5	3.4	43.7	0.5	0.5	3.2	10.7	4.8	5.4	2.0	3.3		4.1	5.1	3.8	6.2
AF4296-3	503	377	69%	40%	5%	25%	6%	1.065	196	136	546	229	**1.8**	3.5	2.1	35.5	0.5	0.5	0.4	**0.4**	0.8	6.3	**1.4**	4.3	2.2	**4.9**	**6.8**	2.9	5.8
AF4320-17	518	329	52%	25%	7%	37%	12%	1.074	299	238	420	406	2.0	4.3	3.4	15.0	0.5	0.5	0.4	**0.4**	4.2	5.4	2.0	3.3	3.0	4.1	5.9	2.0	5.4
AF4320-7	671	637	92%	**75%**	**43%**	5%	3%	1.078	406	246	188	502	2.5	3.5	1.6	8.5	3.8	0.5	0.4	11.0	3.5	6.3	2.0	3.3	3.0	4.5	**6.8**	2.0	8.3
AF4329-7	433	222	45%	22%	4%	49%	6%	1.052	946	566	1080	738	2.3	3.5	2.5	84.6	4.2	0.5	1.5			4.9	2.0	3.3	4.7	4.1	5.1	3.8	6.8
AF4342-3	581	414	56%	32%	14%	29%	15%	**1.085**	318	196	90	266	2.5	3.1	1.2	60.0	19.2	0.5	3.2	**0.4**	0.8	5.4	3.2	4.3	**2.2**	3.2	3.5	3.8	8.3
AF4347-1	508	461	89%	**68%**	**26%**	9%	2%	1.068	1430	1140	887	1600	**1.8**	4.3	1.6	6.8	0.5	0.5	0.4	**0.4**	0.8	5.9	2.0	4.7	3.0	4.1	5.9	2.0	6.2
Agila	518	439	81%	**66%**	**31%**	15%	4%	**1.085**	2850	1200	2220	1310	**1.8**	3.5	1.6	10.9	0.5	0.5	0.4	**0.4**	0.8	5.9	2.0	3.3	7.3	3.6	5.1	2.9	6.6
Alpine Russset	771	546	66%	42%	16%	29%	5%	1.073	347	410	183	304	2.0	3.5	1.2	2.7	0.5	0.5	0.4	65.3	0.8	6.3	2.0	3.3	3.9	**4.9**	5.1	2.5	8.3
Alturas	598	470	79%	59%	**26%**	21%	19%	**1.086**	650	370	291	467	2.3	2.3	1.2	2.7	44.9	2.6	3.2	**0.4**	0.8	5.4	2.0	3.3	5.6	4.5	3.5	2.9	8.3
AO00057-2	422	320	75%	50%	14%	24%	1%	1.080	115	121	326		2.0	3.5	3.0	2.7	4.2	0.5	0.4			5.9	2.0	4.3	3.0	4.5	**6.8**	2.0	7.9
AO01114-4	401	292	72%	38%	6%	27%	1%	1.075	581	346	535		2.3	4.3	1.2	2.7	4.7	0.5	0.4	**0.4**	0.8	5.4	**1.4**	3.3	**2.2**	4.1	**7.6**	2.0	5.3
AO02060-3	666	270	41%	19%	3%	76%	5%	**1.084**	208	129	162		2.5	4.7	1.6	2.7	0.5	0.5	1.5	4.8	0.8	6.3	**1.4**	4.3	**2.2**	**4.9**	**6.8**	**1.6**	**4.7**
AO02183-2	710	574	79%	59%	22%	19%	2%	**1.081**	130	98	257		**1.8**	2.7	1.2	2.7	11.9	0.5	0.4	39.2	5.4	6.3	**1.4**	4.3	**1.4**	**4.9**	**8.4**	**1.2**	8.3
AO96141-3	628	471	58%	37%	6%	25%	17%	1.074	165	226	251		**1.6**	3.9	1.2	2.7	0.5	0.5	0.4	**0.4**	0.8	6.3	**1.4**	3.3	3.0	**4.9**	1.8	3.8	7.0
AO96305-3	521	283	46%	21%	8%	46%	9%	1.073	242	492	527		2.3	3.5	1.6	23.2	0.5	0.5	0.4	**0.4**	0.8	6.3	1.7	3.3	3.0	**4.9**	4.3	2.9	7.9
Bannock Russet	565	520	85%	**75%**	**54%**	8%	7%	1.077	462	248	184	804	3.3	2.3	1.2	2.7	3.8	2.6	0.4	**0.4**	0.8	**7.0**	2.0	4.3	**2.2**	**4.9**	5.9	2.0	8.3
Blazer Russet	549	440	77%	56%	22%	20%	3%	1.068	391	242	316	342	**1.8**	4.7	3.0	2.7	10.7	1.8	0.4	14.7	6.2	6.3	2.0	4.3	3.0	4.1	**6.8**	2.0	5.4
Clearwater Russet	567	438	75%	48%	11%	23%	2%	**1.085**	477	458	209		2.8	3.1	1.6	2.7	0.5	0.5	3.2	**0.4**	28.2	5.4	2.6	3.3	**2.2**	4.5	5.9	2.0	8.3
CO03187-1RU	385	160	41%	20%	4%	58%	1%	1.064	741	659	769	391	**1.8**	4.7	3.9	2.7	4.2	1.4	0.4	5.3		5.4	**1.4**	3.3	3.0	4.5	**7.6**	**1.6**	**4.9**

Table 14. National French Fry Processing Trial Results 2012, Hancock WI 2012 and Acrylamide results from WA, ID, ND & ME (cont'd)

	Yield and Grade							SG	Acrylamyde				Diseases				External Defects					External Appearance							Plant
	TOT Yield	MKT able Yield	% MKT able Yield	> 6oz Target 68-74	>10oz Target 28-40	% under size	% Loss to culls	SG	WA	ID	ND	ME	Early Vigor	Early Blight July25	Vert Wilt Jul25	Scab%	Hollow Heart%	Growth Crack %	Green %	VD%	IBS%	Tuber Size	Tuber Thick ness	Eye Depth	Tuber Text	Shape	Appear	Merit	Vine Mat
CO03202-1RU	642	430	62%	36%	5%	33%	5%	1.076	800	656	631	764	2.8	2.7	1.2	2.7	13.8	0.5	0.4	**0.4**	0.8	6.3	2.6	3.3	**2.2**	**4.9**	5.1	2.9	7.9
CO03276-4RU	659	372	53%	37%	14%	44%	4%	1.067	498			322	**1.6**	4.7	3.0	2.7	8.6	2.6	1.0	8.8	0.8	6.6	2.0	4.3	3.0	**4.9**	5.9	2.0	7.7
CO03276-5RU	605	298	49%	33%	4%	65%	2%	1.067	451	412	244	253	**1.5**	5.1	2.5	2.7	0.5	0.5	0.4	4.6	0.8	4.9	2.0	3.3	3.0	**4.9**	**6.8**	2.9	5.4
CO95086-8RU	494	384	78%	71%	21%	27%	2%	1.066	632	517	442	381	**1.8**	4.7	3.0	2.7	0.5	0.5	0.4	7.5	0.8	6.3	1.7	3.3	**2.2**	**4.9**	**6.8**	**1.6**	6.8
CO97087-2RU	624	426	68%	61%	16%	37%	3%	1.070	364	186	507	422	**1.6**	2.3	3.4	2.7	0.5	0.5	0.4	9.2	0.8	5.9	2.6	3.3	3.0	**4.9**	**6.8**	**1.6**	6.2
Dakota Trailblazer	503	417	77%	55%	15%	17%	5%	**1.092**	375	133	70	208	2.8	2.7	1.2	31.4	9.8	0.5	0.4	10.1	0.8	6.3	2.0	3.3	**2.2**	**4.9**	5.9	2.9	8.3
Freedom Russet	721	545	73%	53%	15%	24%	3%	1.071	351	307	208	345	**1.9**	3.6	2.7	**0.9**	0.3	0.4	0.2	**0.2**	0.5	6.5	2.8	3.8	**1.6**	**4.9**	5.1	2.1	7.7
GemStar Russet	467	386	80%	62%	16%	17%	3%	1.075	199	326	216	483	2.3	3.5	1.2	2.7	18.2	0.5	1.0	**0.4**	0.8	6.3	2.3	3.8	**2.2**	4.5	**6.8**	**1.6**	7.4
MN18747	464	410	88%	**73%**	**39%**	12%	0%	1.066	129	107	349	210	2.1	3.9	3.9	2.7	4.2	0.5	0.4			5.4	2.0	5.2	6.4	3.6	5.1	2.0	**3.0**
MonDak Gold	624	392	56%	32%	6%	37%	7%						**1.3**	3.5	2.5	6.8	0.5	0.5	0.4	21.0	0.8	5.9	2.6	3.3	7.3	3.2	5.1	2.9	7.6
ND049423b-1Russ	556	324	56%	39%	18%	42%	2%	1.076	237	289	120	201	2.3	4.3	1.2	35.5	5.4	0.5	0.4	**0.4**	0.8	5.9	2.0	4.3	3.0	**4.9**	5.1	2.0	8.3
ND049517B-1 Rus	212	133	62%	34%	9%	37%	1%	1.080	274	100	103	124	3.3	3.5	2.1	2.7	4.2	0.5	0.4			5.4	2.0	3.3	3.3	2.8	**6.8**	3.8	7.0
ND059694B-20Rus	639	352	55%	40%	6%	38%	22%	**1.086**	330	175	343	394	2.3	3.1	1.2	2.7	13.2	0.5	0.4	**0.4**	0.8	5.4	2.0	**2.4**	3.0	4.1	1.8	3.8	8.3
ND060735-4Rus	535	339	61%	26%	2%	37%	2%	1.073	328	132	319	147	**1.8**	3.9	2.1	10.9	0.5	0.5	0.4	**0.4**	0.8	5.4	**1.4**	3.3	**2.2**	4.5	**6.8**	**1.6**	6.6
ND071078B-1Russ	537	488	85%	**73%**	**31%**	9%	6%	**1.082**	379	161	397	278	2.5	3.1	2.1	8.5	0.5	0.5	0.4	8.8	0.8	6.3	1.7	3.3	**2.2**	4.1	3.5	2.9	8.3
ND071302B-2Russ	250	28	11%	2%	2%	89%	0%	1.060	417	273	287	154	2.3	5.1	2.5	6.8	0.5	0.5	0.4	**0.4**	0.8	4.0	2.0	3.3	**2.2**	3.2	3.5	3.8	**3.9**
ND071387C-2Russ	473	292	54%	24%	2%	38%	7%	**1.089**	167	132	186	148	**1.5**	4.7	2.5	2.7	0.5	2.6	0.4	**0.4**	0.8	4.5	2.6	3.3	3.9	3.2	3.5	3.8	**5.1**
ND071392CB-2Rus	483	211	31%	15%	2%	56%	13%	1.083	1160	258	332	687	2.3	3.1	1.2	76.4	4.2	0.5	0.4			4.5	2.9	4.3	3.3	4.5	3.5	3.8	8.3
ND081476B-11Rus	558	477	81%	**65%**	**34%**	14%	4%	1.061	282	228	326	174	**1.8**	4.7	3.9	6.8	0.5	2.6	0.4	4.3	0.8	5.9	2.0	3.3	3.9	4.1	**6.8**	2.0	8.3
ND8068-5Rus	329	198	60%	32%	6%	40%	0%	1.072	492	351	578	118	**1.3**	4.3	3.0	19.1	4.2	0.5	0.4			5.4	2.0	3.3	5.6	4.1	5.1	2.5	8.3
ND8229-3	380	296	75%	47%	9%	22%	3%	1.074	234	216	178	165	2.8	3.1	3.0	2.7	0.5	0.5	3.2	**0.4**	8.2	5.4	1.4	3.3	3.0	4.1	**6.8**	2.0	7.2
Owyhee Russet	560	315	56%	40%	10%	55%	5%	1.078	320	274	632		2.3	3.1	1.2	2.7	4.2	0.5	0.4			5.9	1.4	4.3	**2.2**	**4.9**	**6.8**	2.0	8.3
Palisade Russet	497	349	68%	38%	6%	30%	2%	**1.093**	298	252	166		2.5	3.1	1.2	19.1	0.5	0.5	3.2	**0.4**	0.8	5.4	2.0	3.3	3.3	4.1	5.1	2.9	8.3
Premier Russet	572	467	80%	55%	14%	18%	2%	1.078	144	135	260	152	2.3	3.1	1.2	4.4	5.2	0.5	1.5	5.3	0.8	6.3	**1.4**	3.3	**2.2**	4.5	**7.6**	**1.6**	6.6
Sage Russet	546	450	78%	60%	**27%**	18%	4%	1.074	831	404	455	860	2.3	3.5	3.0	6.8	0.5	2.6	1.5	**0.4**	0.8	6.3	2.6	3.3	**2.2**	**4.9**	**6.8**	2.0	8.3
Teton Russet	384	336	80%	60%	17%	12%	7%						2.8	4.7	2.1	2.7	11.6	0.5	0.4	**0.4**	0.8	6.3	1.7	3.3	3.0	**4.9**	**7.6**	**1.2**	**3.9**
Umatilla Russet	707	403	52%	28%	3%	43%	5%	1.071	852	336	172	490	1.3	3.5	2.1	2.7	0.5	2.6	0.4	10.1	0.8	6.3	2.0	3.3	**2.2**	**4.9**	5.1	2.5	7.2
W10676-1rus	452	280	51%	27%	7%	38%	11%	1.071	273	160	185	183	2.0	4.3	3.0	27.3	0.5	0.5	0.4	4.4	6.9	4.5	2.0	3.3	4.7	4.1	5.1	2.9	6.8
W6234-4rus	501	366	70%	44%	4%	27%	3%	1.071	196	203	182	519	**1.9**	4.8	2.1	5.4	0.3	0.4	3.9	2.5	0.5	5.9	1.8	3.2	3.9	4.0	**6.6**	2.1	**4.7**
W6360-1rus	531	432	81%	**78%**	**32%**	20%	2%	1.075	351	224	198	724	3.2	**2.2**	0.8	**0.9**	2.2	0.4	0.2	2.1	0.5	6.5	2.6	4.1	**2.1**	**4.7**	5.5	2.1	8.6
W7449-1rus	713	528	70%	40%	11%	26%	4%	1.079	298	250	230	348	**1.8**	3.1	2.1	10.9	0.5	0.5	1.5	**0.4**	17.3	5.4	2.6	3.3	4.7	4.5	5.1	2.9	8.3
W8152-1rus	452	394	80%	62%	**32%**	13%	7%	1.071	120	99	67	135	**1.6**	5.0	2.4	5.4	9.4	2.4	1.3	**0.2**	0.5	**6.9**	1.6	3.2	**2.1**	4.5	**6.9**	2.1	7.0
W8743-1rus	375	215	55%	27%	2%	43%	3%	**1.086**	210	112	200	87	2.0	4.2	1.7	17.5	0.3	0.4	2.1	8.9	0.5	5.0	2.0	3.2	6.7	2.9	4.2	3.5	7.8
W8946-1rus	363	293	78%	56%	20%	19%	3%	1.067	469	192	375	351	**1.5**	3.9	3.0	2.7	4.3	0.5	0.4	**0.4**	3.9	4.5	2.0	3.3	3.0	4.1	3.5	3.8	8.3
W9135-1rus	488	421	85%	59%	**34%**	14%	1%	1.062	977	440	198	295	2.3	4.3	2.1	2.7	0.5	0.5	0.4	**0.4**	0.8	6.3	**1.4**	3.3	3.9	4.5	**6.8**	**1.6**	6.4
W9152-2rus	440	322	69%	43%	14%	27%	4%	1.065	136	210	324	170	**1.3**	5.5	4.8	6.8	0.5	0.5	1.5	9.7	4.3	5.4	2.0	3.3	4.7	4.5	5.1	2.9	3.9
W9161-3rus	376	153	39%	15%	2%	59%	2%	1.057	257	300		424	2.5	3.9	4.5	**0.9**	0.3	0.4	0.2	**0.2**	5.4	5.9	1.8	3.4	2.6	**4.9**	**7.1**	2.1	4.8
W9162-1rus	490	400	79%	54%	16%	19%	2%	1.061	171	112	114	126	**1.8**	5.1	3.0	4.4	0.5	0.5	**3.2**	8.5	0.8	5.9	2.0	3.3	5.6	3.6	4.3	3.3	5.3
W9162-3rus								1.072	298	123	93	168	2.0	4.7	2.1	2.4	0.5	0.5	0.4	11.3	0.8	5.9	2.6	4.2	3.9	3.2	3.5	3.9	5.8
W9604-1rus	610	318	49%	22%	8%	48%	4%	**1.082**	139	141	284	173	**1.5**	3.1	1.2	23.2	4.5	0.5	2.1	4.6	4.0	5.4	**1.4**	3.3	**2.2**	4.1	**6.8**	2.9	8.3
Burbank	768	338	33%	17%	3%	56%	11%	1.068	821	674	546	689	**1.4**	**2.4**	1.8	**0.7**	3.4	9.4	0.2	7.7	2.9	5.0	2.0	4.6	**2.4**	**5.0**	3.2	3.6	6.6
Ranger	475	265	54%	21%	2%	44%	2%	1.081	527	382	417	453	2.0	3.7	3.0	19.3	2.1	0.3	0.2	3.9	2.1	5.2	1.7	4.1	**2.4**	**5.0**	5.0	2.3	8.7

Wisconsin clones had outstanding performance for low acrylamide in 2011-12. Reducing acrylamide levels in processing French fry potatoes was the main initial goal, ***however, French fry products are also expected to have quick service restaurant (QSR) profile*** acceptable to McDonald's and other food chains. Russet Burbank is the main variety providing the desired profile. Additional efforts are required to select varieties more suitable for the QSR industry. Our program is closely involved with the russet processing industry through the NFPT and SCRI initiatives. In 2013 we expect to incorporate key evaluation that may help select clones better suited to the processing industry.

4.3 Progress on Early Years of Selection

For each of our breeding objectives, we select breeding lines that satisfy or exceed the standards for tuber external and internal quality required by the fresh market and processing industry. Selection is also emphasized for plant and tuber traits that will make our future varieties a good fit for the grower's environment. Among the traits we select for are resistance to diseases (common scab, early blight, verticillium wilt, PVY and others), and internal quality such as hollow heart and internal brown spot.

Table 15. Number of clones evaluated to meet objectives outlined above from the greenhouse seedling stage up to year 5 in the selection scheme

Variety Development Objective	Number of Early Year Clones Planted in 2012					
	Seedling Tubers	Year 1	Year 2	Year 3	Year 4	Year 5
Processing and Fresh Market Russets	9,994	31,250	776	301	34	19
Chips or round white	26,466	28,926	1,237	221	53	30
Fresh market reds and Specialty	9,046	15,865	930	136	9	7
Yellow Flesh, Disease Resistant	4,705	8,867	-	37		
Totals	49685	70,656	2,167	695	96	56

Note: Seedling tubers represent only those produced in WI in 2012, approximately 20-30,000 are usually obtained by seedling tuber exchanges with breeding programs from ID, CO, ME, NB, ND, NY and Tx scheduled to be received in March of 2013.

In previous reports, we have presented evidence of the importance of selection in early generations for processing traits that was obtained after studying the correlation of specific gravity evaluated in Year 2 and Year 3 clones with performance in later years of selection. For the early selection work we receive collaboration from researchers at East Grand Forks, MN, Results of these procedures have facilitated significant gains in selection for processing traits in chipping clones and processing russets; the most prominent are:

- *Selection in early years for processing traits has improved our efficiency to detect processing potential of potato varieties up to ~50% for specific gravity and ~70% for fry color.*

- In 2012, more than 1,000 processing clones of the russet and chip types are stored at 45°F, fried and evaluated for specific gravity in late January or early February. These data will be used together with available data for tuber internal and external traits, disease resistance and plant type and vigor to decide what clones are advanced to Year 4 replicated trials.
- Two populations, one from a cross of Bannock Russet x Tundra, and another of Liberator (scab resistant) x W4013-1 from year 1 and year 2 respectively are being similarly processed as a part of Kyle Rak's graduate project. In 2012, we have validated **molecular markers associated with enzymes that regulate sugar profile of processing clones. These markers and enzymes are closely associated with the fry color of processing chips and russet fried out of cold storage.**

4.4 Early Generation Selection Efforts

Selection for Stable Common Scab Resistance under High Disease Pressure

The need for common scab resistant varieties as a mean to manage this disease is a well established fact in Wisconsin. Popular varieties of all commercial types are frequently affected by this disease. In previous years, we compiled evidence of a successful screening strategy initiated in 2006 to evaluate Wisconsin potato breeding lines under high common scab pressure. Through collaborations with Charlie Higgins at Heartland Farms and Eugenia Banks at OMAFRA (Ontario, Canada) we have been able to continue this critical project. Our results, so far have indicated that:

- The use of three locations for evaluate common scab is providing great screening efficiency to identify common scab resistance.
- Common scab performance of clones at one location is in general in agreement with performance at other locations, although some differences are also observed.
- Common scab performance of clones is more highly correlated with their performance in other years at the same location
- The heritability, a predictor of performance for common scab was between 0.50 and 0.70.
- Evaluations under low common scab pressure tend to yield unreliable common scab scores.

An analysis of the stability of breeding clones classified the stability of WI breeding clones. Stable clones were identified. This methodology will better help how stable us a variety for resistance to scab. Table 16 shows the classification of breeding clones according to their stability for resistance to common scab.

Table 16: Stability of common scab performance, WI breeding clones

		Common Scab Score by Disease Severity				Eberhart and Russell 1966		Class
Clone	Type	Light	Moderate	High	Average	Slope	Variance	
Pike	chip	2.0	2.0	2.3	2.1	0.5		stable
MegaChip	chip	1.8	2.4	2.8	2.4	1.7		~stable, but affected
Nicolet	chip	2.1	2.4	3.0	2.5	1.7		
Tundra	chip	2.3	2.9	2.9	2.7	1.0		
Lelah	chip	2.6	2.8	3.2	2.9	1.1		
Atlantic	chip	2.8	3.1	3.3	3.1	0.9		
W6609-3	chip	1.9	1.7	2.1	1.9	0.2		very stable
W5955-1	chip	2.0	1.8	2.3	1.9	0.4		very stable
W5015-5	chip	2.4	2.6	2.8	2.6	0.5		
W5015-12	chip	2.3	3.3	3.0	3.0	1.3		
Accumulator	chip	3.5	3.6	3.5	3.6	0.0		very susceptible
Red Pearl	red	2.3	1.7	1.8	1.9	-0.8		stable resistance
W2609-1R	red	1.9	2.1	2.2	2.1	0.6		stable
Dark Red Norland	red	2.1	2.3	2.4	2.3	0.6		stable, not very resistant
W6002-1R	red	2.4	2.3	2.7	2.4	0.2		
Villetta Rose	red	2.1	2.7	2.9	2.6	1.4		
Freedom Russet	rus	1.4	1.6	1.7	1.6	0.5		very stable
W8593-2rus	rus	1.7	1.8	1.5	1.7	-0.5		stable
W6197-2rus	rus	1.1	2.1	1.8	1.7	1.2		stable
Goldrush	rus	1.5	1.6	2.0	1.7	1.3		very stable
Millennium Russet	rus	1.4	1.8	1.9	1.7	0.7		very stable
Russet Burbank	rus	1.8	2.2	2.2	2.1	0.8		stable
Russet Norkotah	rus	2.4	2.5	2.7	2.6	0.9		
W8152-1rus	rus	2.7	3.2	2.8	2.9	0.2		
W6234-4rus	rus	3.4	2.7	3.2	3.0	-0.7		
Superior	rdw	2.2	1.8	1.8	1.9	-0.9		very stable
W6703-1Y	yf	1.7	1.7	2.3	1.9	0.7		stable
W6703-5Y	yf	1.7	1.8	2.4	2.0	0.8		stable
Yukon Gold	yf	3.6	3.5	3.3	3.4	-0.7		susceptible
All Clones		2.3	2.6	2.8	2.6			

4.5. Selection for Resistance to Potato Virus Y (PVY)

In 2010, we started a collaborative effort with Amy Charkowski to identify resistance to PVY from several sources, from wild to cultivated clones from different geographic origins. This project was partially funded by a WPVGA competitive grant. In 2011, two populations originated from the crosses of Nicolet x White Lady, and Tundra x White Lady were screened for molecular markers associated with PVY resistance and also inoculated with the virus. White Lady is a European variety that exhibits extreme resistance to PVY. The goal is to use molecular markers associated to the PVY resistance observed in White Lady to accelerate selection for resistance. In 2012, ***we have validated molecular markers for extreme resistance to PVY. We are now in a position to launch a marker assisted selection program to increase our efficacy and efficiency in selecting PVY resistant varieties.*** More details may be provided in the joint WPVGA competitive proposal submitted to continue this project.

5. Parental Selection and Unselected Clone Exchange.

5.1. Parental Selection

Varieties used for crossing are carefully chosen according to the desirable and undesirable traits they carry. Similarly populations are built by crossing parents within and sometimes among different market categories to complement the attributes of one another. These populations will have a greater chance to containing ideal potato type (ideotype). Besides, through interchanges with other programs in the US, Canada, Mexico, South America and Europe, deficient traits are supplemented and the genetic base of our future varieties is broadened.

2.2. Exchange of Unselected Clones with other Breeding Programs

In addition to our own crossing strategies, our program interchanges unselected breeding materials with other programs. We specifically approach other breeders and request materials that complement our efforts. Figure 21 depicts the proportion of the 70,656 unselected clones available for planting in year 1 according to their origin. The breeders providing these clones and the objectives for the crosses requested are given below:

a. **Rich Novy**, University of ID/tri-state Program: processing and fresh market russets, virus and late blight resistance.
b. **Benoit Bizimungu**, AB, Canada: russets: Late blight, processing and fresh market traits
c. **Gregory Porter:** Processing russets, and chippers, common scab, potato nematode resistance.
d. **Susie Thompson, ND.** Processing russets and reds
e. **Wisconsin:** Main objectives as in Table 15, background traits: common scab, verticillium wilt, late blight, early blight, internal and external quality in all fresh market and processing clones.

Fig. 21. Contribution of Wisconsin potato breeding program and collaborators to the make-up of Year 1 clones and distribution by tuber type of 70,656 Year 1 clones planted by the UW-potato breeding program.