

SPUDPRO – A Wisconsin Idea

B. Bowen¹, C. Kostichka², F. Navarro¹ and J. Palta³

Rhineland Ag. Research Station¹, Hancock Ag. Research Station²
Leader UW-Madison Potato Breeding Program³

As the *SPUDPRO* program enters its seventh year it seems to be an appropriate point in time to step back and ask the question, “Are we accomplishing what we set out to do?” The **Mission Statement** developed by the program’s Advisory Committee states that the central objective is:

“To advance Wisconsin potato breeding lines to variety status by providing Foundation Seed as a platform for industry review, adoption and commercialization.”

The philosophy behind *SPUDPRO* suggests that to advance and prove a new variety it has to be grown and experienced by key players, from producers and other business partners all the way out to the end user - the consumer. This was envisioned as a participatory strategy to select and release of potato varieties with potential success. Developing a seed base that allows this to take place is instrumental to bringing a variety forward. Without seed and subsequent promotion it cannot happen. A review of each element of *SPUDPRO*’s mission statement will provide for a good assessment of program progress to date. This article will examine three elements within the mission statement, 1) Wisconsin potato breeding lines, 2) Foundation seed production and 3) Industry review, adoption and commercialization.

1. “Wisconsin potato breeding lines”: *SPUDPRO* has been dedicated to moving Wisconsin breeding lines out of the research phase and into early commercial production. The Advisory Committee is the body responsible for reviewing the merits of advanced selections which are under consideration for promotion. The committee currently consists of 23 members representing seed, commercial-fresh, commercial-process, consultants, processing, UW personnel and WARF (Wisconsin Alumni Research Foundation).

In March of each year, the *SPUDPRO* Advisory committee meets with the Breeding program personnel to review characteristics and performance of lines presented as *SPUDPRO* candidates. This meeting is held at the Rhineland Breeding Station; besides reviewing new information about the candidate lines, raw and processed tuber samples are displayed to the committee. In most cases lines are profiled with the committee for two years before being dropped from the portfolio. Multiple years of research plot data along with feedback from preliminary on-farm plots are discussed. This information and resulting conclusions form the basis of decision making for the lines presented. Comparison of the collective attributes of new selections is made to standard varieties of similar market type. Potato lines are chosen taking into consideration the lines promoted in previous years to address the major Wisconsin market types.

A history of actions taken by the Advisory committee to move WI lines into Foundation seed production is provided in Table 1. From 2001-2006, seven lines have been nominated into the program. Four have been advanced through the State Farm system onto private farms and three numbered lines are early in early stages of the production system (Table 2). The first four lines promoted, W1201, W1348rus, W1836-3rus and W2275-3R were released and named by the breeding program as MegaChip, Millennium Russet, Freedom Russet and Villetta Rose respectively while resident in the SPUDPRO system. In this respect, SPUDPRO has achieved moving these lines to “variety status”, another objective of the Mission Statement. This is not expected to happen with every line moving through SPUDPRO, but will certainly take place if and when commercial interest is appropriately positive. The word “YES” in Table 1 indicates the nomination of a line for seed production and the year it was entered.

Table 1. Advanced selections considered by the SPUDPRO Advisory committee for Elite Foundation seed production from 2001 to 2006.

Lines Offered	Type	2001	2002	2003	2004	2005	2006
W1201	chip	YES (MegaChip)					
W1348rus	fresh/proc.	YES (Millennium Russet)					
W1836-3rus	fresh/proc.		YES (Freedom Russet)				
W2275-3R	fresh/can.		YES (Villetta Rose)				
W1368	chip		x	x			
W1386	chip		x	x			
W1431	chip	x	x				
W1443	chip	x	x	x	x		
W1773-7	chip	x	x	x	x		
W1782-5	chip		x	x			
W1980-4	chip			x			
W2062-1	chip			x			
W1879-1rus	fresh-russet				YES		
W2275-9R	fresh-red			x	x		
W2324-1	chip			x	YES		
W2128-8	chip				x	x	x
W2133-1	chip				x	YES	
W2154-1	chip					x	x
W2249-4rus	fresh-russet					x	x
W2799-1R	fresh-red					x	x
W2303-8R	fresh-red					x	x
W2301-3P	spec.-purple					x	x
W2279-4R	fresh-red						x
W2309-7	chip						x
W2310-3	chip						x
W2890-1Y	spec.-yf						x
W2683-2rus	fresh-proc.						x
W3328-1rus	fresh						x

2. “Foundation seed production”: The Wisconsin Seed Potato Certification Program has been a crucial mechanism to take the nominated advanced selections and generate a target volume of 160cwt of Elite Foundation seed over a four year period. This process

starts with meristem cleaning and plantlet production in the Certification program’s tissue culture lab at the UW-Madison campus. This is followed by mini-tuber and field seed production at the Rhinelander State Farm. The financial support for this undertaking has been provided by the WPVGA Industry Board at a rate of \$5,000 per entry. Foundation seed has been sold at a discounted rate of \$10/cwt with proceeds returning to the program to underwrite costs of future advanced line nominations.

During the production of the first four lines/varieties, excess capacity was available beyond the 160cwt target. In three out of four cases, grower interest requested having the excess potential produced. Table 2 reports the volume of seed sold as of the spring of 2006. This is the seed that provides a “*platform for industry review.*”

Table 2. Wisconsin varieties and advanced selections promoted by SPUDPRO since 2001.

Year Introd.	Amount	Advanced Lines	Type	Projected State Farm Seed Avail.	Target Cwt.	Excess Cwt.
2001	\$10,000	Millennium Russet MegaChip	Dual P. Chip	2005-sold 2006-sold	160 160	0 600
2002	\$10,000	Freedom Russet Villetta Rose	Dual P. Red/Dual P.	2006-sold 2006-sold	160 160	450 300
2004	\$10,000	W1879-1rus W2324-1	Fresh Chip	2009	N/A	N/A
2005	\$5,000	W2133-1	Chip	2010	N/A	N/A
Total \$	\$35,000		Total Production Sold		640	1300

3. Industry review, adoption and commercialization: This is the final element of the mission statement. Through the availability of clean seed, seed producers have been able to multiply four advanced lines as named varieties. This is providing for adequate commercial acreage on multiple farms to reasonably test and demonstrate commercial potential. Not every experience has been positive, as was expected. This is part of the review process. At the same time certain strengths are being demonstrated and a balanced outcome will judge appropriate market fit or shortcomings. If only one of the four initial entries to SPUDPRO were established in the marketplace we would be successful. Currently, 3000 commercial acres of lines promoted through SPUDPRO are expected to be planted in 2007, representing a positive outcome of the program. Participation of this nature involves players at every level of the industry. Intentional cooperation at the commercial testing level coupled with consistency will eventually produce results.

A brief discussion of Plant Variety Protection (PVP), licensing and royalties should be considered an important component of commercialization. The subject of protection through licenses has become common in the potato industry, including for varieties released by public universities. The UW and the Wisconsin Alumni Research Foundation (WARF) have worked closely with industry in the context of the SPUDPRO committee to develop a fair and equitable licensing policy. Principles operating in current policy are intended to provide advantage to Wisconsin Growers. This advantage can be measured in the sense of early access in time and lower royalty rates compared to out of state business. Because Wisconsin growers have invested in the state’s breeding

research through tax dollars and industry contributions it is reasonable that they have an advantage on the process. Growers have had direct input to these policies and will continue to make recommendations to WARF for future developments as they occur. A complete discussion of licensing policy and other information related to SPUDPRO can be found on the UW Breeding Program website at: www.uwpotatoes.wisc.edu.

There have been many spin-off effects of the SPUDPRO dialogue. Two that have notable significance will be mentioned here. The first is the development of a special research trial aimed at providing the SPUDPRO Advisory Committee with improved data for making final promotion decisions. This trial is conducted on the Hancock Research Station and involves the most promising lines from the UW Breeding Program. These plots are replicated and are more than double the size of standard plots. They allow for collection of vegetative measures in the field (set and stem #), yield and grade data, as well as storage information. Tables 4 and 5 provide some information from the 2006 trial. Additional information can be found on the program website mentioned above.

A second aspect that relates to SPUDPRO is the focused effort by several UW researchers to develop production management recommendations for all lines entered into SPUDPRO seed production. The compiling of this data into management profiles is the result of many years of research that suggests how to optimize performance in the commercial testing phase. The interpretation of this information also takes into account the experiences of growers who have planted SPUDPRO lines on their private farms in a pre-commercial stage.

In conclusion, the need of a more formal promotion mechanism, recognized in the decade of the 1990, led to the development of *SPUDPRO*. This variety promotion strategy has set the stage for a more effective cooperation among many key partners (Table 3). The most significant issue that this program has addressed was the need to develop a clear path to bring potential varieties forward to the industry. *SPUDPRO* has defined that path in Wisconsin for our public-private partnership. With the continued involvement of necessary partners, the successes of the future can bring benefit to many.

Table 3. SPUDPRO partnerships and contributions.

PARTNERS	CONTRIBUTION
UW-Breeding Program UW-Potato Research	Variety Development and Performance Screening
UW-Certification (State Farm)	Foundation Seed Production
Wisconsin Potato and Vegetable Growers Assoc.	Financial Input Advisory Committee
Private Growers	On-Farm Testing
Wisconsin Alumni Research Foundation	Licensing Management

Table 4. Results from the SpudPro early harvest (vine kill 100DAP) conducted at the Hancock WI Agricultural Research Station.

SPUDPRO TRIAL, EARLY HARVEST, HANCOCK :																	1=round					
100 DAYS, PLANTING TO VINE KILL																	3=rd/ov					
																		5=oval				
																		7=long	1=small	1=best	1=100%	
																		9=v. long	9=large	5=worst	9=none	
		Tuber Yield					Tuber Internal Defects							Tuber External Defects				Comments				
Clone	Mkt	Total	A	B	Cull	US#1	Spec.	Br.C.	HH	IBS	VD	Bruise	Free*	Shape	Size	Prefer	Scab					
	Type	cwt/a				%	grav.	%	%	%	%	%	%	%	1 to 9	1 to 9	1 to 5	1 to 9				
Chips (All)	chip	442	353	4	18	79	1.073	1.2	0.7	1.9	0.5	8.5	85.5	3.1	5.9	2.4	7.6					
Atlantic	chip	498	346	2	<u>27</u>	71	1.078	<u>6.4</u>	<u>2.0</u>	2.1	0.5	12.2	<u>75.9</u>	3.1	6.5	2.4	6.7	Good size, scab and rhizoc				
Dakota Pearl	chip	455	382	3	14	83	1.070	<u>5.1</u>	<u>6.8</u>	2.4	0.5	7.0	81.3	3.4	5.8	2.2	8.1	Nice white, var. size, pear shape, some scab				
W2438-3Y	chip	474	376	2	19	80	1.072	0.7	0.1	1.9	0.5	8.3	87.1	3.4	<u>7.7</u>	2.3	8.1	~rough, deep eyes, large, var. size				
W2564-2	chip	<u>514</u>	437	2	13	85	1.066	1.1	0.6	2.5	0.5	7.7	84.7	2.9	8.0	2.0	8.1	Large, shallow eyes, watch scab				
W2717-5	chip	<u>382</u>	326	2	15	83	1.080	2.0	0.6	1.8	0.5	7.6	87.8	2.6	<u>5.2</u>	2.5	7.9	Uniform, smooth, smaller than D. Pearl, pigtails				
W2841-1	chip	441	373	2	14	84	<u>1.068</u>	0.2	0.1	1.8	0.5	7.2	89.8	3.0	6.2	2.1	7.9	Very nice, uniform size, watch scab				
W2982-1	chip	<u>540</u>	387	4	23	73	<u>1.066</u>	0.2	0.1	1.8	0.5	8.3	87.6	3.0	5.4	<u>2.7</u>	6.6	Variable size, pitscab-drop				
W4013-1	chip	<u>322</u>	<u>242</u>	<u>11</u>	19	72	1.077	0.2	0.1	1.7	0.5	13.1	80.6	3.0	<u>3.5</u>	<u>2.8</u>	7.4	too small, scab				
W4016-4	chip	431	330	4	20	76	1.074	0.2	1.0	1.8	0.5	9.4	85.6	3.3	<u>4.7</u>	<u>2.7</u>	6.6	small, scab, rihzoc, variable net				
W4132-1	chip	474	397	5	12	83	<u>1.069</u>	0.2	0.1	1.9	0.5	10.1	84.2	3.1	5.8	2.4	8.2	Variable shape, ~flat, fresh only				
W5787-4Y	chip	404	<u>247</u>	3	<u>34</u>	<u>62</u>	1.093	0.2	0.1	1.8	0.5	8.3	88.0	2.6	5.2	<u>2.8</u>	<u>5.2</u>	Round shape, yellow skin, scab-drop				
Red (All)	red	442	353	6	14	80	1.061	1.2	0.6	1.0	0.4	8.5	90.2	4.3	5.9	2.4	7.6					
D. R. Norland	red	492	407	3	13	83	1.058	1.1	0.6	1.0	0.4	7.3	91.7	4.7	6.0	2.6	8.5	Poor color, good size, some oval				
W3565-5R	red	517	373	<u>9</u>	17	74	1.060	0.3	0.1	1.0	0.4	7.7	91.7	<u>5.2</u>	5.7	2.5	7.0	Excell. color, deep pit scab, long tubers				
W3882-1R	red	418	350	5	12	83	1.060	0.7	0.6	0.9	0.4	6.7	93.0	<u>2.8</u>	<u>4.4</u>	2.1	7.6	Medium size, good color, late?				
Russets (All)	rus	439	353	7	10	82	1.065	1.2	0.6	0.9	0.6	8.5	89.1	6.8	6.1	2.4	7.6					
Rus. Burbank	rus	433	337	9	13	78	1.070	<u>3.3</u>	0.6	0.9	0.6	7.4	89.0	7.1	5.8	2.5	8.5	Variable russetting, small to medium size				
W2466-9rus	rus	446	376	8	8	84	1.062	0.2	0.1	0.9	0.6	6.9	91.0	6.8	6.3	2.5	7.8	Long white, lenticels,				
W2683-2rus	rus	414	341	7	10	82	1.065	0.2	0.1	0.8	0.6	7.2	92.2	7.1	6.8	2.2	8.5	V. nice, watch skinning, nice russet, some flat				
W3140-3rus	rus	488	423	4	8	87	1.060	0.7	0.1	0.8	0.6	6.5	92.4	6.6	7.1	2.5	8.3	Uniform blocky shape, Superior net, ~rot				
W3160-5rus	rus	<u>276</u>	<u>235</u>	<u>15</u>	6	80	1.066	0.7	0.1	0.9	0.6	7.3	91.0	6.4	5.5	2.6	8.5	too flat, small, pigtails				
W3162-3rus	rus	<u>373</u>	<u>323</u>	5	9	85	1.066	0.2	0.1	0.9	0.6	6.5	91.9	6.7	6.6	2.2	8.4	Needs size, var. russetting, coarse net, blocky				
W3328-1rus	rus	461	394	3	10	85	1.062	0.2	0.1	0.8	0.6	15.0	<u>78.8</u>	7.0	7.4	2.1	<u>5.2</u>	Gd. size, blocky, drk-coarse net, some stolons				

Note: Boldfaced underlined numbers are means with highly significant favorable differences from the means of their type (chip, red and russet).
 Boldfaced numbers are means with significant favorable differences from the means of their type
 Normal font number are means with no significant differences from the mean of their type
 Normal font underlined are means with significant unfavorable differences from the means of their type
 * Tuber defects free % also include account stem end discoloration

Table 5. Results from the SpudPro early harvest (vine kill 130DAP) conducted at the Hancock WI Agricultural Research Station.

SPUDPRO TRIAL, LATE HARVEST, HANCOCK :															1=round				
130 DAYS, PLANTING TO VINE KILL															3=rd/ov				
															5=oval				
															7=long	1=small	1=100%	1=best	1=100%
															9=v. long	9=large	9=0%	5=worst	9=none
		Plants			Tuber Yield					Tuber Internal Defects					Tuber External Defects				
Clone	Mkt	Stem	Tuber	Total	A	B	Cull	US#1	Spec.	Br.C.	HH	IBS	VD	Free*	Shape	Size	Skinning	Prefer	Scab
	Type	No./hill	No./hill	cwt/a	cwt/a	cwt/a	cwt/a	%	grav.	%	%	%	%	%	1 to 9	1 to 9	1 to 9	1 to 5	1 to 9
Chips (All)	chip	2.65	20.3	489	382	20	81	78	1.076	0.9	0.6	13.3	1.1	83.8	3.1	6.0	8.7	3.1	7.2
Atlantic	chip	2.39	20.0	497	380	10	102	77	1.084	1.1	0.9	13.8	1.2	80.2	3.0	7.1	8.7	2.8	6.5
Dakota Pearl	chip	2.17	20.1	438	354	19	68	80	<u>1.072</u>	<u>5.2</u>	0.6	<u>25.0</u>	1.7	<u>65.7</u>	2.9	6.2	8.8	2.6	7.7
W2438-3Y	chip	2.54	19.7	424	336	6	83	79	<u>1.070</u>	0.6	0.6	<u>26.6</u>	0.9	<u>72.4</u>	3.0	7.0	8.8	3.4	7.2
W2564-2	chip	2.24	19.9	678	548	7	105	82	<u>1.072</u>	0.6	0.7	13.4	0.9	84.9	3.6	7.9	8.7	3.0	8.2
W2717-5	chip	2.62	20.5	<u>410</u>	356	19	44	85	1.083	1.5	0.7	0.6	1.0	95.8	2.1	<u>5.4</u>	8.5	2.6	7.6
W2841-1	chip	2.09	19.2	509	438	11	59	86	1.078	0.2	0.6	0.6	1.5	95.8	<u>3.8</u>	6.6	8.8	2.6	7.6
W2982-1	chip	2.91	21.3	577	405	26	<u>133</u>	72	<u>1.070</u>	0.2	0.6	0.6	0.9	99.0	3.0	5.5	8.7	3.1	<u>6.2</u>
W4013-1	chip	3.14	20.9	<u>379</u>	284	<u>48</u>	59	74	1.076	0.2	0.6	1.1	0.9	98.4	3.0	<u>4.2</u>	8.7	<u>3.4</u>	7.0
W4016-4	chip	2.84	20.6	531	395	15	112	75	1.075	0.6	0.6	<u>34.6</u>	1.0	<u>64.1</u>	<u>3.9</u>	5.8	8.7	<u>3.4</u>	<u>4.7</u>
W4132-1	chip	<u>3.73</u>	20.5	552	487	18	46	88	1.075	0.6	0.6	<u>61.1</u>	1.2	<u>37.1</u>	3.3	6.5	8.8	3.3	8.6
W5787-4Y	chip	2.91	20.3	<u>381</u>	<u>245</u>	18	<u>119</u>	<u>63</u>	1.089	1.1	0.6	1.6	1.0	95.8	2.7	5.8	8.7	3.0	<u>4.7</u>
Red (All)	red	2.65	19.4	489	382	31	81	78	1.059	0.6	0.6	7.1	1.1	90.8	4.5	6.0	8.4	3.1	7.2
D. R. Norland	red	2.99	19.6	512	433	15	61	84	1.055	0.6	0.6	0.3	1.4	96.8	5.0	6.0	8.2	3.3	7.7
W3565-5R	red	2.99	19.5	545	362	<u>53</u>	<u>125</u>	<u>67</u>	1.063	0.6	0.6	0.3	1.6	95.8	<u>5.9</u>	5.7	8.4	3.3	<u>6.0</u>
W3882-1R	red	2.54	20.0	<u>389</u>	<u>309</u>	32	58	78	1.058	0.6	0.6	0.3	0.9	98.4	2.5	<u>5.2</u>	8.4	3.1	7.6
Russets (All)	rus	2.56	20.4	489	382	34	81	78	1.068	0.4	0.6	8.0	1.1	90.2	6.6	6.0	8.5	3.1	7.2
Rus. Burbank	rus	2.20	20.0	543	363	<u>58</u>	<u>119</u>	<u>68</u>	1.075	0.1	0.6	6.7	1.0	92.6	7.0	<u>5.2</u>	8.6	<u>3.8</u>	7.7
W2466-9rus	rus	2.42	20.4	545	395	38	107	73	1.067	0.1	0.6	1.4	1.1	96.8	6.5	5.8	8.3	3.3	6.6
W2683-2rus	rus	2.79	19.9	491	414	24	56	84	1.070	0.1	0.6	0.4	0.9	98.8	6.3	6.2	8.3	3.0	8.7
W3140-3rus	rus	2.50	20.3	538	458	39	44	85	<u>1.062</u>	0.1	0.6	7.3	1.2	91.0	6.5	5.7	8.7	2.9	8.2
W3160-5rus	rus	2.20	20.6	<u>385</u>	320	<u>51</u>	31	82	1.066	0.1	0.6	<u>26.4</u>	0.9	73.9	7.0	<u>5.5</u>	8.5	2.8	8.7
W3162-3rus	rus	2.12	20.5	447	315	24	108	70	1.070	0.5	0.7	0.9	1.4	94.7	6.5	6.0	8.7	3.1	<u>5.7</u>
W3328-1rus	rus	2.65	20.3	504	432	17	56	85	1.066	0.1	0.7	0.4	1.1	96.8	6.5	6.5	8.7	2.7	7.3

Note: Boldfaced underlined numbers are means with highly significant favorable differences from the means of their type (chip, red and russet).
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 Normal font underlined are means with significant unfavorable differences from the means of their type
 * Tuber defects, % free also includes stem end discoloration