

# **Pennsylvania Potato Research Report, 2019**

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## EXECUTIVE SUMMARY

Penn State's Department of Plant Pathology & Environmental Microbiology potato research program can be categorized into four areas: 1) variety breeding and evaluation, 2) breeding for disease resistance (focused on early and late blight and common and powdery scab), 3) biology and genetic variability of potato pathogens (focused on early and late blight and common scab), and 4) integrated pest management of potatoes. Many of these projects are long term and only results of 2019 trials are presented here.

### 1. Variety Breeding and Evaluation

Potato variety evaluation trials were conducted at four locations in PA. At the Rock Springs location the variety trial included 98 round whites with a few yellow flesh, 31 red-skinned (a few purple skinned) and 29 russet or long white types. An early variety trial of 38 varieties were conducted at Rock Springs. The Lehigh location and Erie location had 34 and 38 varieties, respectively. Snack Food Association trial of 7 chipping varieties was conducted in Chambersburg. Breeding lines were contributed by the USDA-ARS, New York, Maine, North Carolina, Michigan, Idaho, Colorado and a few other sources. See **Pennsylvania Regional Potato Germplasm Evaluation Program, 2019 on pages 1-2, and tables from different locations on pages 3-36, management information for each sites on page 37; descriptions of promising varieties for Pennsylvania on pages 38-40; supplemental progress report on pages 45-46 and tables from different locations on pages 47-55; and notes on fresh colors of potato varieties/lines on pages 56-57.**

### 2. Breeding for Disease Resistance

In three separate field trials, 33 potato varieties and advanced breeding lines were evaluated for resistance to common scab, late blight and early blight, respectively at Rock Springs.

In common scab screening trial, cultivars Russet Burbank and Shepody were included as a tolerant and a susceptible check for common scab, respectively. Numerically, although not statistically, four cultivars/lines had a lower disease severity index and disease incidence than Russet Burbank and were characterized as resistant or as moderately resistant as the tolerant check: Reveille Russet, TX08352-5Ru, AF5468-5, and Superior. Only a few small superficial lesions were observed on some tubers of these cultivars/lines. See **Evaluation of potato cultivars and breeding lines for resistance to common scab, 2019 on page 41.**

In late blight screening trial, disease pressure from late blight was high and the most susceptible plots reached 100% disease severity by the end of the season. Cultivar Kennebec was the moderately resistant check. Based on AUDPC, one line, AF5406-7, was significantly better than Kennebec. Six other cultivar/lines were considered

statistically comparable to cv. Kennebec: NY165, AF5412-3, AF5414-1, Russet Burbank, NY152 (Niagara) and AF5225-1. See **Evaluation of potato cultivars and breeding lines for resistance to late blight, 2019 on page 42.**

In early blight screening trial, disease pressure from early blight was high and the most susceptible plots reached 100% disease severity by the end of the season. Cultivars Kennebec and Russet Burbank were included as moderately resistant checks. Thirteen other cultivars/lines were characterized as moderately resistant based on their AUDPC values: AF5406-7, Snowden, Katahdin, WAF10664-3, NY151, Atlantic, AF5414-1, AF5225-1, AF5164-19, Chieftain, NY165, AF5040-8 and AF5412-3. See **Evaluation of potato cultivars and breeding lines for resistance to early blight, 2019 on page 43.**

## **Progress Report---December 2019**

### **Pennsylvania Regional Potato Germplasm Evaluation Program, 2019**

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The objective of this project is to find new breeding lines that have adaptation to Pennsylvania potato growing regions, and have qualities that are suitable for either processing or tablestock use. We cooperate with the project leaders of several other potato breeding programs from the Northeast US and a few programs from the Midwest US and Canada by evaluating their potato germplasm. Data from this project helps breeders determine which lines to focus on for potential release as new varieties and also allows you to focus on very specific lines that may be released in the near future.

Replicated and non-replicated variety evaluation plots were established at the following locations: Lehigh Co. (Tables 1- 2), Erie Co. (Tables 3-4) and Rock Springs, Centre Co. (Tables 5-12). The Lehigh location and Erie location had 34 and 38 varieties/lines in non-replicated trial, respectively. At the Rock Springs location the trials included 53 round whites with a few yellow flesh, 16 red-skinned (a few purple skinned) and 14 russet or long white types in replicated plots, and an additional 45 whites, 15 red-skinned and 15 russet or long white types planted in non-replicated observational plots. At Lehigh Co. and Erie locations, the seed spacing was 8-inch within a 20-ft plot except for the russets that were at 10-inch. At Rock Springs location, the seed spacing was 8-inch within a 10-ft plot except for the russets and some whites that were at 10-inch. An early variety trial of 38 varieties was conducted at Rock Springs, Centre Co. (Tables 13-14). Snack Food Association trial of 7 chipping varieties was conducted by PA co-op at Bryan Bender's Farm in Chambersburg (Tables 15-16). Management information for each site is provided in Table 17. All of the seed for the variety trials was treated with PM223 before planting. It was the first year we treated our seed. We assessed yield, tuber size, internal defects and external defects, skin color, texture, tuber shape, specific gravity and overall appearance. French Fry and chip quality tests and culinary tests will be conducted over the next few months.

Descriptions of promising varieties for Pennsylvania are in Table 18.

To interpret this data, one needs to know the yields for the check cultivars such as Atlantic, Snowden, Katahdin, Chieftain, Dark Red Norland, Russet Norkotah or Superior on your farm. Then compare the typical yield for this year on your farm to the data presented here. The yields tend to be inflated from these small plots but the ranking of the yields over the cultivars/lines usually is fairly consistent. Also the same method can be used to compare specific gravity and some of the other parameters. There are a few lines that will be very specific to certain environments so make the comparison to the location that best matches your own or use the Rock Springs location as a fairly typical area for most of PA.

#### **Results:**

##### **Lehigh county trial:**

In the Lehigh location the following lines had marketable yield higher than Atlantic: Chieftain, AF5225-1, AF5563-5, NY161, NC606-23, and Belmonda.

**Erie county trial:**

In the Erie location the following lines had marketable yield higher than Atlantic: Snowden, AF5225-1, AF5819-2, NY149, NY161, Connect, AF4831-2, AF5414-1, B2152-17, NC502-10, AF5040-8, NY152, NY162, NY163, NY165, NY166, Huron Chipper, MSZ120-4, A08422-4sto, A12305-2adg, A08510-1LB, AF5468-5, and Belmonda.

**Round white planted 8-inch apart in Rock Springs:**

Based on data of replicated trials at Rock Springs, there were 20 round white clones with marketable yields significantly higher than Atlantic: AF5225-1, NY151, Reba, AF5819-2, MSAFB609-12, MSAFB635-3, WAF13058-1, B3168-3, BNC182-5, BNC369-4, NY163, NY166, MSY111-1, Huron Chipper, MSV093-1Y, MSV179-1, MSX156-1Y, MSZ120-4, Connect, and Melody; there were another 20 round white clones with marketable yields higher than Atlantic. In non-replicated trial, there were 38 round white clones with marketable yields higher than Atlantic.

**Red-skinned planted 8-inch apart in Rock Springs:**

Based on data of replicated trials at Rock Springs, Cerata had marketable yields significantly higher than Chieftain; there were another 2 red-skinned or purple-skinned clones with marketable yields higher than Chieftain: AF5414-1 and NDAF113484B-1. In non-replicated trial, there were 7 red-skinned or purple-skinned clones with marketable yields higher than Chieftain: AF6052-1, AF6289-2, NDAF13136Y-5, NDAF13158BY-2, NDAF13296Y-3, BNC718-1, and BNC839-5.

**Russet-skinned or white planted 10-inch apart in Rock Springs:**

Based on data of replicated trials at Rock Springs, AF5164-19, AF5468-5, and A12305-2adg had marketable yield significantly higher than Russet Norkotah; there were another 12 clones with marketable yields higher than Russet Norkotah. In non-replicated trial, WAF14006-6, AAF11263-1, AF6340-6, AF6347-3, AF6357-2, AF6384-2 and NDAF13242B-8 had marketable yields higher than Russet Norkotah.

**Early season variety trial in Rock Springs:**

Based on data of replicated trials at Rock Springs, Dark Red Norland, AF4831-2, Peter Wilcox, CO05037-3W/Y, B2152-17, Belmonda, NC502-10 and AF5412-3 had marketable yields higher than Superior. In non-replicated trial, BNC716-1, AF6052-1, BNC718-1, WAF14096-5, B3424-4, NDAF13296Y-3, AF6289-2, NDAF13136Y-5, NDAF13296Y-4, BNC833-2 and B3355-6 3 had marketable yields higher than Superior.

The results of chipping, French fry and culinary quality tests will be available in March 2020.

**The Pennsylvania Potato Research Program, the Pennsylvania Department of Agriculture and USDA funded this research in conjunction with donations. This research is the result of cooperation of growers, industry and PSU staff. The growers hosting the plots provided contributions (land, fertilizer, pesticides, time, etc.). University of Maine, Cornell University, USDA Beltsville, USDA Idaho, Colorado State University, Michigan State University, North Carolina State University potato breeding programs and Solanum International, Hanse Seed companies provided seed. Special thanks to Bob Leiby who made sure this project was completed. Bob Leiby and Potato Co-op provided PM223 for seed treatment and truck for county trial travels, and helped planting county trials and grading tubers.**

Table 1. Total yield, greater than 1 7/8" yield, percent of standard, size distribution, percent pick outs and specific gravity for potato evaluation trial in Forrest Wessner Farm, Lehigh County, 2019

Variety/Line	Yield (cwt/A) <sup>1</sup>		% US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity
	Total	>1 7/8"			2	3	4	5			
Atlantic	369	329	89	100	43	39	8	0	7	1.099	
Katahdin	266	210	79	64	55	24	0	0	11	1.072	
Snowden	329	297	90	90	58	30	3	0	1	1.090	
Superior	273	260	95	79	58	37	0	0	1	1.079	
Yukon Gold <sup>y</sup>	307	257	84	78	33	47	3	0	12	1.086	
Chieftain	398	342	86	104	45	41	0	0	7	1.071	
Reba	376	316	84	96	48	30	6	0	7	1.081	
AF5225-1	403	334	83	102	62	21	0	0	2	1.080	
AF5280-5	321	290	90	88	44	42	5	0	4	1.069	
NDAF202629C-2	237	209	88	64	67	22	0	0	1	1.078	
AF5563-5	386	369	96	112	17	56	22	0	2	1.086	
WAF10664-3	262	182	70	55	37	32	0	0	23	1.081	
B3148-12 <sup>y</sup>	284	205	72	62	40	30	2	0	16	1.077	
BNC369-4	291	258	89	79	56	33	0	0	4	1.086	
NY161	517	449	87	137	54	31	2	0	3	1.072	
MSV093-1Y <sup>y</sup>	374	315	84	96	48	32	4	0	10	1.076	
AF4831-2	267	191	72	58	57	15	0	0	5	1.061	
B2152-17 <sup>y</sup>	383	286	75	87	56	18	2	0	2	1.074	
NY164	207	153	74	47	54	16	5	0	16	1.072	
NCB2607-3 <sup>y</sup>	249	222	89	68	61	28	0	0	4	1.081	
NC502-10 <sup>p</sup>	164	135	82	41	58	24	0	0	6	1.085	
MSX324-2R	275	221	80	67	69	11	0	0	3	1.075	
MSX324-1P	247	218	89	66	66	23	0	0	0	1.089	
NY152	267	203	76	62	63	13	0	0	4	1.080	
NY162	313	301	96	92	35	50	11	0	2	1.103	
NY163	222	161	72	49	57	15	0	0	2	1.098	
NY165	391	305	78	93	50	28	0	0	7	1.083	

Variety/Line	Yield (cwt/A) <sup>1</sup>		% of US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity
	Total	>1 7/8"			2	3	4	5			
NY166	267	238	89	72	61	26	2	0	2	1.088	
MSAFB635-3	325	299	92	91	49	35	7	0	3	1.091	
B3012-1	302	260	86	79	64	23	0	0	4	1.083	
NC606-23 <sup>y</sup>	389	335	86	102	53	28	5	0	2	1.067	
Belmonda <sup>y</sup>	398	347	87	106	55	33	0	0	5	1.093	
Caribou Russet	191	158	83	48	50	30	3	0	6	1.079	
Norkotah Russet	135	98	72	30	40	28	4	0	17	1.080	

<sup>1</sup>Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup>Percentage of the standard, Atlantic, for >1 7/8" yield.

<sup>3</sup>Percentage of total yield according to size class. 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>4</sup>Percentage of total that are pickouts.

Non-replicated trial.

Russet varieties were planted 10-in. apart with 24 seed pieces per 20-ft plot, all other varieties were spaced 8-in. apart with 30 seed pieces per 20-ft plot.

Varieties with colored flesh are indicated by <sup>y</sup> for yellow, <sup>p</sup> for purple.



Table 2. Tuber characteristics, internal defects for potato evaluation trial in Forrest Wessner Farm, Lehigh County, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>					Internal Defects <sup>2</sup>		Reasons for Pickouts	
	TA	C	TX	Sh	TED	TCS	% HH		% IB
Atlantic	5	6	5	2	5	5	30	50	Growth cracks, green
Katahdin	5	7	7	3	6	5	0	0	Green
Snowden	5	6	5	2	5	5	20	0	Scab
Superior	4	7	6	3	6	4	0	0	
Yukon Gold	5	7	7	3	6	5	20	0	Stem end rot, scab, growth cracks
Chieftain	4	3	7	3	5	5	0	0	2nd tubers, green
Reba	5	7	7	3	5	5	20	0	Green, scab
AF5225-1	5	7	6	2	5	5	0	20	Green
AF5280-5	5	7	7	3	5	5	0	0	Misshape
NDAF202629C-2	5	8	8	2	7	5	10	0	Green
AF5563-5	4	8	7	3	4	5	40	0	Growth cracks
WAF10664-3	4	7	7	2	5	6	10	30	Green, 2nd Tubers
B3148-12	5	7	7	2	5	6	0	10	Green, stem end rot
BNC369-4	6	7	7	3	5	6	0	0	Green
NY161	5	9	8	3	5	5	0	0	Growth cracks, green
MSV093-1Y	5	6	6	2	6	6	0	0	Green, knobs
AF4831-2	6	2	7	3	6	5	0	0	Green
B2152-17	4	2	8	3	6	5	0	0	Green
NY164	4	2	8	3	5	5	0	0	Misshape, green
NCB2607-3	6	2	8	2	6	6	0	0	Misshape
NC502-10	3	1	7	3	6	4	0	0	Misshape
MSX324-2R	6	2	7	2	5	5	0	0	Green
MSX324-1P	3	1	7	2	4	5	0	0	
NY152	5	6	6	2	6	5	0	0	Green
NY162	5	7	6	3	6	6	10	0	Green
NY163	5	7	7	3	5	5	0	0	Green
NY165	5	6	6	2	5	5	0	0	Green, misshape

Variety/Line	Tuber Characteristics <sup>1</sup>						Internal Defects <sup>2</sup>			Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB		
NY166	5	7	6	3	7	5	0	0	Green	
MSAFB635-3	5	7	7	2	6	6	10	10	Green	
B3012-1	5	7	6	3	5	4	0	0	Misshape	
NC606-23	4	6	7	3	6	4	0	20	Scab	
Belmonda	6	9	8	3	7	6	0	0	Green	
Caribou Russet	6	6	4	5	7	4	0	60	Green, misshape	
Norkotah Russet	3	5	1	4	7	4	0	10	Misshape	

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very smooth.

Sh = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow. TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 10 tubers. 0 = not observed.

Table 3. Total yield, greater than 1 7/8" yield, percent of standard, size distribution, percent pickouts and specific gravity for potato evaluation trial in Mark Troyer Farm, Erie County, 2019

Variety/Line	Yield (cwt/A) <sup>1</sup>		US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity
	Total	>1 7/8"			2	3	4	5			
Atlantic	388	252	65	100	16	36	13	0	31	1.077	
Katahdin	371	192	52	76	10	23	19	0	46	1.061	
Snowden	405	271	67	108	18	31	18	0	28	1.073	
Superior	373	236	63	94	16	33	14	0	34	1.058	
Chieftain	359	184	51	73	13	22	14	2	46	1.055	
Yukon Gold <sup>y</sup>	340	167	49	66	3	23	17	6	48	1.070	
AF5225-1	468	307	66	122	15	39	11	0	30	1.066	
AF5563-5	309	176	57	70	6	24	27	0	41	1.070	
AF5819-2	548	437	80	174	12	35	33	0	17	1.065	
NY149 <sup>y</sup>	486	324	67	129	15	33	18	0	27	1.067	
NY161 <sup>y</sup>	575	340	59	135	12	33	14	0	37	1.065	
MSX156-1Y <sup>y</sup>	344	120	35	48	2	7	23	3	65	1.059	
MSY111-1	323	181	56	72	13	34	9	0	40	1.064	
Connect <sup>y</sup>	494	386	78	153	24	46	8	0	14	1.070	
AF4831-2	510	354	69	141	33	28	8	0	27	1.062	
AF5414-1 <sup>r</sup>	486	344	71	137	14	32	24	0	26		
B2152-17 <sup>y</sup>	648	510	79	203	24	31	23	1	16	1.065	
NCB2607-3 <sup>y</sup>	300	193	64	77	40	22	2	0	25	1.068	
NC502-10 <sup>p</sup>	480	350	73	139	38	30	5	0	12		
AF5040-8	549	413	75	164	8	45	22	0	23	1.088	
NY152	623	451	72	179	25	35	13	0	22	1.072	
NY162	498	353	71	140	18	38	15	0	27	1.074	
NY163	434	262	60	104	18	34	8	0	36	1.081	
NY165	445	333	75	133	18	36	22	0	23	1.076	
NY166	474	346	73	138	11	41	19	2	24	1.073	
Huron Chipper	541	445	82	177	23	44	15	0	14	1.080	
MSZ120-4	453	332	73	132	17	37	20	0	20	1.073	

Variety/Line	Yield (cwt/A) <sup>1</sup>		US#1	%	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity
	Total	>1 7/8"				2	3	4	5			
Norkotah Russet	404	211	52	84	12	21	17	3	42	1.061		
A08422-4sto	530	372	70	148	22	27	22	0	27	1.076		
A09022-4	383	232	61	92	21	24	15	0	35	1.078		
A12305-2adg	538	272	51	108	11	14	18	8	45	1.076		
A08510-1LB	444	335	75	133	22	35	19	0	13	1.077		
TX08352-5Ru	293	107	37	43	15	7	14	0	57	1.051		
AF5164-19	467	238	51	95	7	15	30	0	46	1.067		
AF5468-5	458	343	75	136	19	29	27	0	22	1.066		
AF5406-7	343	194	57	77	16	14	11	15	38	1.061		
Reveille Russet	353	188	53	75	12	23	19	0	43	1.079		
Belmonda	547	361	66	143	9	38	17	2	32	1.079		

<sup>1</sup>Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup>Percentage of the standard, Atlantic, for >1 7/8" yield.

<sup>3</sup>Percentage of total yield according to size class. 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>4</sup>Percentage of total that are pickouts.

Non-replicated trial.

Russet varieties were planted 10-in. apart with 24 seed pieces per 20-ft plot, all other varieties were spaced 8-in. apart with 30 seed pieces per 20-ft plot.

Varieties with colored flesh are indicated by <sup>y</sup> for yellow, <sup>p</sup> for purple, <sup>r</sup> for red.

Table 4. Tuber characteristics, internal defects for potato evaluation trial in Mark Troyer Farm, Erie County, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>				Internal Defects <sup>2</sup>		Reasons for Pickouts		
	TA	C	TX	Sh	TED	TCS		% HH	% IB
Atlantic	5	6	5	2	5	5	90	0	Green, knobs
Katahdin	4	7	7	3	5	4	20	10	Green, scab, misshape
Snowden	5	5	5	2	5	5	30	0	Green, scab
Superior	3	6	5	3	4	3	0	0	Green, knobs
Chieftain	4	2	7	3	5	4	0	0	Green, knobs
Yukon Gold	3	9	7	3	4	3	40	10	Green, knobs
AF5225-1	6	8	7	3	6	6	20	0	Green
AF5563-5	4	8	8	3	3	4	30	0	Green, knobs
AF5819-2	5	7	7	2	4	5	0	0	Green
NY149	5	7	6	3	6	5	0	0	Green
NY161	4	9	7	3	3	4	30	0	Green
MSX156-1Y	4	7	7	2	5	4	30	20	Green, knobs
MSY111-1	4	6	5	2	6	4	0	20	Green, growth crack
Connect	6	9	7	3	7	6	20	0	Green, knobs
AF4831-2	5	2	7	3	6	5	0	0	Green, knobs
AF5414-1	4	2	7	3	5	4	0	0	Green, knobs
B2152-17	6	2	7	2	6	6	0	0	Green
NCB2607-3	7	2	7	2	7	7	0	0	Green, misshape
NC502-10	6	1	8	3	5	6	0	0	Knobs
AF5040-8	5	7	6	2	3	5	0	0	Green, scab
NY152	6	6	5	2	5	6	20	0	Green
NY162	5	7	6	3	6	5	30	10	Green
NY163	5	8	7	2	5	5	0	10	Green, knobs
NY165	5	7	5	2	5	5	0	10	Green
NY166	4	7	6	3	5	4	70	0	Green
Huron Chipper	6	7	6	2	5	6	50	20	Green, scab
MSZ120-4	4	8	7	2	4	4	30	0	Green

Variety/Line	Tuber Characteristics <sup>1</sup>							Internal Defects <sup>2</sup>		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB		
Norkotah Russet	4	5	3	5	5	4	0	0	Green, knobs, misshape	
A08422-4sto	5	5	3	4	6	5	0	10	Green, growth crack	
A09022-4	3	6	6	4	7	3	50	0	Green, knobs	
A12305-2adg	3	5	3	5	7	3	50	10	Knobs, green	
A08510-1LB	5	6	4	4	7	5	20	20	Green, knobs	
TX08352-5Ru	3	5	3	5	7	3	10	0	Green, knobs	
AF5164-19	3	6	1	4	5	3	10	10	Green	
AF5468-5	5	5	3	5	7	5	40	0	Green	
AF5406-7	4	6	4	5	7	4	40	10	Green, knobs	
Reveille Russet	3	5	3	4	5	3	10	0	Green, knobs	
Belmonda	5	9	6	3	6	5	50	10	Green, scab, misshape	

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very smooth.

Sh = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow. TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 10 tubers. 0 = not observed.

Table 5. Total yield, greater than 1 7/8" yield, percent of standard, size distribution, percent pickouts, and specific gravity for round white potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Yield (cwt/A) <sup>1</sup>		% US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity	Vine Maturity
	Total	>1 7/8"			2	3	4	5				
<b>Replicate</b>												
Atlantic	256	232	91	100	24	47	20	0	6	1.083	ML	
Katahdin	266	218	82	94	31	44	7	0	14	1.064	ML	
Snowden	324	297	91	128	49	41	1	0	1	1.081	ML	
Superior	261	204	78	88	40	36	2	0	11	1.070	ME	
Yukon Gold <sup>y</sup>	237	148	64	64	15	25	24	0	35	1.075	ME	
AF5040-8 <sup>y</sup>	239	194	81	84	57	24	0	0	10	1.085	ME	
AF5225-1	376	332	88	143	31	50	7	0	5	1.071	ML	
AF5280-5	340	314	92	135	43	48	1	0	4	1.061	E	
AF5563-5	245	193	79	83	15	49	15	0	19	1.071	ME	
AF5677-4	342	298	87	129	37	49	1	0	5	1.076	ME	
B3012-1	344	242	70	105	54	16	0	0	9	1.077	E	
NDAF102629C-4	263	233	88	101	21	57	10	0	6	1.067	ME	
NY149 <sup>y</sup>	328	273	83	118	43	35	5	0	4	1.069	M	
NY151	450	391	87	169	27	49	11	0	5	1.063	ME	
NY152	389	310	79	134	60	19	0	0	7	1.077	M	
Reba	394	358	91	155	24	48	17	2	7	1.068	M	
NY165	222	198	90	85	33	41	16	0	6	1.079	ML	
WAF10664-3	363	312	86	135	28	47	11	0	9	1.075	M	
AF5648-3	265	216	82	93	45	37	0	0	8	1.081	ME	
AF5819-2	406	321	79	139	39	37	2	0	13	1.073	E	
AF5891-1	428	272	64	118	33	30	1	0	27	1.067	E	
MSAFB605-4	319	280	87	121	31	50	6	0	6	1.076	ML	
MSAFB609-12	429	359	84	155	32	46	5	0	9	1.080	ML	
MSAFB635-3	373	337	91	146	36	46	9	0	4	1.078	ME	
MSAFB635-15	305	235	77	101	56	19	1	0	5	1.086	M	
MSAFB636-1	382	281	74	121	46	27	0	0	9	1.075	M	
WAF13058-1 <sup>y</sup>	425	361	85	156	33	46	6	0	8	1.069	E	
B2869-29	355	280	79	121	35	44	0	0	14	1.089	E	
B3083-4	456	245	53	106	6	31	16	0	46	1.068	E	

Variety/Line	Yield (cwt/A) <sup>1</sup>		US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity	Vine Maturity
	Total	>1 7/8"			2	3	4	5				
B3148-12 <sup>y</sup>	327	289	88	125	38	48	3	0	7	1.074	E	
B3168-3	390	342	88	147	44	42	1	0	2	1.069	E	
BNC182-5	447	387	86	167	21	45	20	0	10	1.079	ML	
BNC369-4	465	415	89	179	36	49	4	0	6	1.073	ML	
B3175-8	291	216	75	93	34	39	2	0	17	1.080	ME	
NY161 <sup>y</sup>	402	307	77	132	54	22	1	0	10	1.070	E	
NY163	396	319	81	138	56	25	0	0	6	1.082	E	
NY166	430	344	79	149	32	43	4	0	14	1.074	M	
NY167	373	310	83	134	29	38	16	0	14	1.067	ME	
NCB3171-7	218	150	68	65	37	21	10	0	20	1.078	ME	
NC606-23 <sup>y</sup>	294	196	66	84	52	13	1	0	15	1.063	ME	
MSY111-1	380	340	89	147	32	48	9	0	4	1.063	ML	
MSV358-3	273	240	88	104	35	46	6	0	6	1.067	E	
Huron Chipper	403	363	90	157	41	43	7	0	3	1.082	ML	
MSZ022-19	285	238	83	103	20	43	21	0	13	1.073	ML	
MSV093-1Y <sup>y</sup>	395	320	81	138	30	41	9	0	15	1.068	ML	
MSV179-1	325	317	98	137	16	49	33	0	1	1.067	M	
MSX156-1Y <sup>y</sup>	503	442	88	191	11	41	31	6	10	1.066	M	
MSZ120-4	514	466	91	201	31	46	14	0	4	1.079	L	
ACO3433-1W	162	61	38	26	18	20	0	0	55	1.068	ML	
CO7070-13W	213	169	78	73	44	34	0	0	9	1.074	E	
Connect <sup>y</sup>	573	383	66	166	24	36	6	0	29	1.083	L	
Krone	474	309	66	133	52	13	1	0	19	1.072	ML	
Melody <sup>y</sup>	556	465	84	201	34	36	14	0	8	1.071	L	
<b>Non-replicate</b>												
Atlantic	274	227	83	100	37	36	10	0	12	1.082	ML	
AF5960-4	379	240	63	106	41	23	0	0	24	1.084	ME	
AF5931-1	419	363	86	160	33	48	5	0	8	1.066	E	
WAF14067-6	402	328	82	145	40	34	8	0	11	1.087	ML	
WAF14096-5 <sup>y</sup>	559	464	83	204	46	34	3	0	8	1.072	ML	
AF6197-8	388	320	83	141	45	35	2	0	14	1.078	ML	
AF6198-2 <sup>y</sup>	340	312	92	138	41	50	0	0	4	1.077	ME	



Variety/Line	Yield (cwt/A) <sup>1</sup>		% US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity	Vine Maturity
	Total	>1 7/8"			2	3	4	5				
AF6200-7	357	338	95	149	33	45	16	0	4	1.093	E	
AF6225-5	325	311	96	137	43	43	10	0	0	1.071	E	
AF6226-6 <sup>y</sup>	372	329	88	145	28	45	15	0	6	1.082	ML	
AF6237-3	288	235	82	104	52	30	0	0	2	1.082	ME	
AF6245-6	409	354	87	156	44	40	3	0	5	1.083	E	
AF6261-2	452	398	88	175	56	32	0	0	4	1.072	ME	
WAF15221-2	360	299	83	132	19	34	30	0	12	1.082	ML	
COAF14207-3 <sup>y</sup>	525	334	64	147	34	24	6	0	25	1.063	M	
AF6194-4	319	278	87	123	33	46	8	0	7	1.071	M	
AF6259-1	370	323	87	142	40	33	15	0	7	1.075	M	
COAF14206-3 <sup>y</sup>	564	393	70	173	54	16	0	0	7	1.064	ML	
B3292-5	273	179	66	79	31	35	0	0	28	1.069	M	
B3295-5	453	345	76	152	18	40	18	0	23	1.075	L	
B3297-5	366	295	81	130	48	33	0	0	1	1.078	E	
BNC723-4	323	276	86	122	40	42	3	0	8	1.072	E	
BNC726-5	287	192	67	85	57	10	0	0	2	1.091	E	
BNC742-2	303	259	86	114	61	25	0	0	0	1.080	E	
BNC811-22	360	295	82	130	57	25	0	0	2	1.083	ME	
BNC811-33	399	343	86	151	43	35	8	0	8	1.082	ME	
BNC811-35	467	400	86	176	34	47	4	0	9	1.075	ML	
BNC815-6	462	312	68	138	21	29	18	0	26	1.082	VL	
BNC815-7	409	327	80	144	66	14	0	0	0	1.073	ME	
BNC816-3	285	173	61	76	55	6	0	0	0	1.071	E	
BNC818-9	397	369	93	163	39	47	7	0	1	1.078	M	
BNC819-2	408	388	95	171	43	45	7	0	0	1.088	ML	
BNC821-9	349	290	83	128	25	54	4	0	10	1.078	ME	
B3379-1	302	178	59	79	53	7	0	0	0	1.083	E	
B3379-2	324	235	72	103	61	12	0	0	0	1.093	E	
B3381-4 <sup>y</sup>	337	224	67	99	54	12	0	0	12	1.087	M	
B3382-8	465	358	77	158	63	14	0	0	6	1.081	ME	
B3385-2	378	312	83	138	31	38	14	0	12	1.076	ME	
B3390-6	376	275	73	121	44	30	0	0	12	1.072	E	
B3397-1	474	405	85	178	37	46	2	0	10	1.079	ML	

Variety/Line	Yield (cwt/A) <sup>1</sup>		% US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					Specific Gravity	Vine Maturity
	Total	>1 7/8"			2	3	4	5	%PO <sup>4</sup>		
B3403-6	305	247	81	109	65	16	0	0	0	1.081	ME
B3410-12 <sup>y</sup>	369	302	82	133	22	41	19	0	17	1.072	E
B3421-1	366	330	90	145	47	43	0	0	4	1.083	E
B3423-9	415	397	96	175	30	61	5	0	0	1.076	ML
LSD	72	83	14		13	14	10	2	14		

<sup>1</sup>Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup>Percentage of the standard, Atlantic, for >1 7/8" yield.

<sup>3</sup>Percentage of total yield according to size class. 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>4</sup>Percentage of total that are pickouts.

Planted 8-in. apart with 15 seed pieces per 10-ft plot. Yellow flesh varieties are indicated with <sup>y</sup>.

Replicated trials are the average of 3 replicates and the rest are non-replicated.

LSD indicates least significant difference ( $P = 0.05$ ), calculated for replicated varieties.

Table 6. Tuber characteristics, internal defects for round white potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>					Internal Defects <sup>2</sup>			Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
<b>Replicate</b>									
Atlantic	4	6	5	3	4	5	42	0	Growth cracks
Katahdin	4	8	8	2	5	5	0	0	Scab
Snowden	4	5	5	2	3	6	0	0	Scab
Superior	4	7	6	3	4	4	0	0	Growth cracks, Misshape
Yukon Gold	4	7	6	2	4	5	8	0	Scab
AF5040-8	4	7	6	2	4	5	0	0	Scab, Green
AF5225-1	5	7	6	2	6	5	0	0	Scab
AF5280-5	5	7	6	2	6	5	0	0	Misshape
AF5563-5	5	8	7	2	5	5	8	0	Scab
AF5677-4	5	8	7	2	5	5	0	0	Scab
B3012-1	3	6	5	2	6	4	0	0	Scab
NDAF102629C-4	5	8	7	2	6	5	0	0	Misshape
NY149	4	9	6	3	6	5	0	0	
NY151	4	7	6	2	6	6	0	0	Green
NY152	6	7	5	2	5	6	0	0	Green, Scab
Reba	4	7	6	3	5	5	0	0	Scab, green
NY165	5	6	6	2	6	4	8	0	Scab
WAF10664-3	4	7	6	2	4	5	0	0	Green, Scab
AF5648-3	4	7	6	2	5	6	8	0	Scab
AF5819-2	5	7	7	2	5	6	0	0	Pink eye, scab
AF5891-1	5	9	7	4	5	5	0	25	Scab
MSAFB605-4	5	5	5	2	5	5	0	0	Green
MSAFB609-12	5	7	6	2	6	5	0	0	Green, scab
MSAFB635-3	4	7	6	2	6	6	0	0	Misshape
MSAFB635-15	3	6	5	2	5	5	0	0	Scab
MSAFB636-1	4	6	6	2	6	6	0	0	Scab
WAF13058-1	4	7	7	3	5	6	0	0	Growth cracks, green
B2869-29	4	7	6	2	4	5	0	0	Misshape, Scab
B3083-4	4	7	7	2	7	5	8	0	Growth cracks, Scab

Variety/Line	Tuber Characteristics <sup>1</sup>						Internal Defects <sup>2</sup>			Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB		
B3148-12	5	9	7	2	6	6	0	0	Green, Scab	
B3168-3	4	7	6	2	5	5	0	0	Green	
BNC182-5	5	6	5	2	5	5	0	0	Green	
BNC369-4	5	6	5	3	5	5	8	0	Green, Scab	
B3175-8	5	8	8	3	5	5	0	0	Growth cracks, Scab	
NY161	5	9	6	2	5	5	0	0	Scab	
NY163	5	7	7	2	6	6	0	0	Scab, Green	
NY166	5	7	6	3	6	5	0	0	Scab	
NY167	5	6	6	2	5	5	0	0	Scab, misshape	
NCB3171-7	4	7	7	2	7	5	25	0	Scab	
NC606-23	5	9	7	2	6	5	0	0	Green	
MSY111-1	4	6	5	2	5	6	0	0	Green	
MSV358-3	4	6	5	2	5	6	0	0	Green	
Huron Chipper	3	6	5	2	5	5	17	0	Green	
MSZ022-19	6	7	7	2	5	6	0	0	Growth cracks	
MSV093-1Y	4	6	6	2	6	5	0	0	Green, scab	
MSV179-1	4	6	5	2	5	5	0	0	Green, scab	
MSX156-1Y	5	6	7	3	6	6	0	0	Green	
MSZ120-4	5	7	6	2	5	6	8	0	Green	
ACO3433-1W	5	6	7	2	5	6	8	0	Growth cracks	
CO7070-13W	6	6	6	2	6	6	17	0	Growth cracks, Scab	
Connect	4	9	6	3	6	4	0	0	Misshape	
Krone	4	9	7	3	6	4	0	0	Misshape	
Melody	5	9	8	3	6	5	25	0	Green, misshape	
<b>Non-replicate</b>										
Atlantic	4	6	5	2	5	5	0	0	Green, growth cracks	
AF5960-4	4	6	5	3	4	5	0	0	Misshape	
AF5931-1	5	8	8	2	5	6	0	0	Scab ,green	
WAF14067-6	4	5	5	2	6	5	0	0	Scab	
WAF14096-5	6	9	6	2	6	6	0	0	Misshape, green	
AF6197-8	3	7	6	2	3	5	0	0	Growth cracks	
AF6198-2	4	7	6	2	6	4	0	0	Green	

Variety/Line	Tuber Characteristics <sup>1</sup>						Internal Defects <sup>2</sup>			Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB		
AF6200-7	5	6	5	2	6	5	0	0	0	Misshape
AF6225-5	4	7	7	2	3	6	0	0	0	
AF6226-6	5	9	7	2	4	5	0	0	0	Misshape
AF6237-3	6	6	6	3	6	4	0	0	0	Green
AF6245-6	6	6	5	2	6	5	0	0	0	Green, misshape
AF6261-2	5	7	6	3	6	5	0	0	0	Misshape
WAF15221-2	3	6	5	2	4	5	0	0	0	Misshape
COAF14207-3	4	9	8	2	5	6	0	0	0	2nd tubers, scab, green
AF6194-4	6	7	6	3	6	5	0	0	0	Misshape
AF6259-1	4	7	6	2	5	6	25	0	0	Misshape, green
COAF14206-3	5	9	8	2	5	5	0	0	0	Misshape, green
B3292-5	4	6	5	2	6	6	0	0	0	Misshape, growth cracks
B3295-5	4	7	7	3	7	5	50	0	0	Scab, misshape
B3297-5	5	6	5	2	5	6	0	0	0	
BNC723-4	5	7	7	3	7	5	0	0	0	Green
BNC726-5	3	6	5	2	6	5	0	0	0	
BNC742-2	6	6	5	2	6	5	0	0	0	
BNC811-22	4	7	6	2	4	5	0	0	0	Green
BNC811-33	4	6	6	2	5	5	0	0	0	Growth cracks, misshape
BNC811-35	5	6	6	2	6	6	0	0	0	Green, scab
BNC815-6	5	7	6	3	6	6	50	0	0	Green, growth cracks
BNC815-7	6	6	5	2	6	5	0	0	0	
BNC816-3	5	6	5	2	5	5	0	0	0	
BNC818-9	4	6	6	2	6	5	0	0	0	Green
BNC819-2	6	6	5	2	3	6	0	0	0	
BNC821-9	4	6	5	2	6	5	0	0	0	Green, scab
B3379-1	6	6	5	2	6	5	0	0	0	
B3379-2	5	7	6	2	6	7	0	0	0	
B3381-4	5	6	5	2	6	6	0	0	0	Scab
B3382-8	5	6	5	2	5	5	0	0	0	Green
B3385-2	5	7	7	2	6	4	0	0	0	Growth cracks, green
B3390-6	4	5	5	3	6	4	0	0	0	Green, growth cracks
B3397-1	4	7	6	2	5	4	25	0	0	

Variety/Line	Tuber Characteristics <sup>1</sup>					Internal Defects <sup>2</sup>		Reasons for Pickouts	
	TA	C	TX	Sh	TED	TCS	% HH		% IB
B3403-6	6	5	5	2	7	6	0	0	
B3410-12	4	9	8	2	5	5	50	0	Green, misshape
B3421-1	6	7	6	2	6	6	0	0	Green
B3423-9	5	8	7	3	6	5	0	0	

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very

Sh = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow. TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 12 tubers for replicated trials and total number out of 4 for non replicated trials. 0 = not observed.

Table 7. Total yield, greater than 1 7/8" yield, percent of standard, size distribution, percent pickouts, and specific gravity for red or purple skinned potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Yield (cwt/A) <sup>1</sup>		%	US#1	% of Standard <sup>2</sup>					%PO <sup>4</sup>	Specific Gravity	Vine Maturity
	Total	>1 7/8"			2	3	4	5				
<b>Replicate</b>												
Chieftain	351	296	84	100	34	38	12	0	9	1.065	ML	
DK Rd Norland	291	238	82	80	61	21	0	0	4	1.059	E	
AF4831-2	393	272	69	92	49	19	0	0	9	1.061	E	
AF5245-1	333	274	83	93	40	38	4	0	6	1.071	E	
AF5412-3 <sup>P</sup>	306	236	77	80	31	41	5	0	15	1.058	E	
AF5414-1 <sup>r</sup>	407	342	84	116	38	36	11	0	9	1.069	E	
NDAF113484B-1	353	312	88	105	38	50	0	0	5	1.060	ME	
B2152-17 <sup>y</sup>	368	269	73	91	58	16	0	0	0	1.069	E	
NCB2607-3 <sup>y</sup>	259	181	70	61	60	10	0	0	11	1.075	E	
NC502-10 <sup>P</sup>	309	224	72	76	46	26	0	0	16	1.075	E	
NC509-16 <sup>P</sup>	244	171	71	58	38	31	1	0	19	1.074	ML	
MSX324-1P	251	201	81	68	51	28	2	0	4	1.082	E	
MSX324-2R	245	175	72	59	48	23	0	0	13	1.068	E	
Cerata	489	369	75	125	36	33	6	0	10	1.067	L	
BNC559-1	371	181	49	61	38	11	0	0	34	1.060	E	
<b>Non-replicate</b>												
Chieftain	350	304	87	100	26	48	13	0	7	1.062	ML	
AF6052-1	367	345	94	114	40	46	8	0	0	1.058	E	
AF6280-1 <sup>r</sup>	289	202	70	66	56	14	0	0	7	1.064	ML	
AF6289-2	471	404	86	133	32	42	12	0	9	1.065	E	
NDAF13136Y-5	355	339	95	112	59	37	0	0	0	1.066	E	
NDAF13158BY-2	533	402	75	133	36	34	6	0	19	1.068	ME	
NDAF13296Y-3	494	424	86	139	15	41	30	0	11	1.061	ME	
NDAF13296Y-4	319	298	93	98	47	47	0	0	1	1.064	ME	
BNC716-1 <sup>y</sup>	355	232	65	76	17	49	0	0	33	1.051	ME	

Variety/Line	Yield (cwt/A) <sup>1</sup>		US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity	Vine Maturity
	Total	>1 7/8"			%	2	3	4	5			
BNC718-1 <sup>y</sup>	354	337	95	111	59	36	0	0	0	0	1.067	E
BNC833-2 <sup>p</sup>	320	283	89	93	61	20	8	0	0	0	1.060	E
BNC839-5	370	333	90	110	50	35	5	0	2	2	1.067	ME
B3355-6 <sup>p</sup>	280	194	69	64	61	9	0	0	0	0	1.062	E
B3364-3 <sup>p</sup>	397	228	57	75	39	18	0	0	15	15	1.061	E
B3372-1 <sup>p</sup>	405	267	66	88	53	13	0	0	9	9	1.067	E
LSD	61	50	10		14	13	7	0	0	11		

<sup>1</sup>Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup>Percentage of the standard, Chieftain, for >1 7/8" yield.

<sup>3</sup>Percentage of total yield according to size class. 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>4</sup>Percentage of total that are pickouts.

Replicated trials are the average of 3 replicates and the rest are non-replicated.

LSD indicates least significant difference (P = 0.05), calculated for replicated varieties.

Varieties with colored flesh are indicated by <sup>y</sup> for yellow, <sup>p</sup> for purple, <sup>r</sup> for red..

Plots consisted of 10-ft rows with 15 seed pieces spaced 8-in. apart.



Table 8. Tuber characteristics, internal defects for red skinned potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>				Internal Defects <sup>2</sup>		Reasons for Pickouts		
	TA	C	TX	Sh	TED	TCS		% HH	% IB
<b>Replicate</b>									
Chieftain	4	3	7	2	4	5	0	0	Scab, Green
DK Rd Norland	5	2	7	3	6	5	0	0	Scab, misshape
AF4831-2	5	2	8	3	6	5	0	0	Scab
AF5245-1	5	1	7	2	5	5	17	0	Misshape
AF5412-3	3	1	7	3	5	5	0	0	Misshape
AF5414-1	4	2	7	3	6	5	0	0	Misshape
NDAF113484B-1	4	2	7	2	4	5	0	0	Green
B2152-17	4	1	8	3	5	4	0	0	Scab
NCB2607-3	6	2	7	2	6	6	0	0	Scab
NC502-10	4	1	7	3	4	4	0	0	Misshape
NC509-16	5	1	7	2	6	4	0	0	Scab
MSX324-1P	4	1	7	2	4	5	0	0	Growth cracks
MSX324-2R	4	2	7	2	5	4	0	0	Scab
Cerata	4	2	7	3	4	5	0	0	Growth cracks
BNC559-1	4	1	8	3	5	4	0	0	Scab
<b>Non-replicate</b>									
Chieftain	4	2	7	3	5	4	0	0	2nd tubers
AF6052-1	3	2	8	2	4	4	0	0	Misshape
AF6280-1	4	2	6	3	6	4	0	0	Scab, green
AF6289-2	4	2	7	2	5	5	0	0	Scab, green
NDAF13136Y-5	4	2	7	3	6	5	0	0	Misshape
NDAF13158BY-2	4	2	7	3	5	5	0	0	PO: Green
NDAF13296Y-3	4	3	7	2	5	5	0	0	Growth cracks, scab, green
NDAF13296Y-4	4	2	7	2	6	4	0	0	
BNC716-1	5	2	6	2	5	6	0	0	

Variety/Line	Tuber Characteristics <sup>1</sup>					Internal Defects <sup>2</sup>		Reasons for Pickouts	
	TA	C	TX	Sh	TED	TCS	% HH		% IB
BNC718-1	4	1	7	2	4	5	0	0	Growth cracks
BNC833-2	5	1	8	3	6	5	0	0	
BNC839-5	5	2	7	2	6	6	0	0	
B3355-6	5	1	7	2	5	5	0	0	
B3364-3	4	1	8	3	7	4	0	0	Misshape, growth cracks
B3372-1	4	1	7	3	7	5	0	0	Growth cracks

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very smooth.

Sh = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow. TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 12 tubers for replicated trials and total number out of 4 for non replicated trials. 0 = not observed.

Table 9. Total yield, greater than 1 7/8" yield, percent of standard, size distribution, percent pickouts, and specific gravity for russet skinned or white potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Yield (cwt/A) <sup>1</sup>		% US#1	% of Standard <sup>2</sup>		% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity		Vine Maturity	
	Total	>1 7/8"		Standard <sup>2</sup>	Standard <sup>2</sup>	2	3	4	5	Gravity		Gravity			
<b>Replicate</b>															
Russet Norkotah	227	140	61	100	37	21	3	0	28	1.066		E			
Reveille Russet	311	195	62	139	33	25	4	0	29	1.063		ML			
Russet Burbank	460	191	41	136	18	17	6	0	54	1.081		L			
AF5164-19	362	230	64	164	13	30	22	0	32	1.070		L			
AF5406-7	336	203	60	145	27	27	7	0	35	1.070		ML			
AF5468-5	346	240	68	171	21	31	16	0	26	1.066		ML			
ND8068-5Russ	152	107	71	77	55	10	6	0	13	1.078		E			
TX08352-5RU	235	169	67	121	24	38	5	0	24	1.057		E			
A08510-ILB	359	207	57	147	36	18	4	0	24	1.083		ML			
A09022-4	274	143	52	102	35	15	2	0	36	1.076		ML			
COA11013-2	340	189	56	135	30	16	10	0	32	1.057		ME			
A09136-9LB	346	184	53	131	18	19	16	0	43	1.088		ML			
A12305-2adg	458	291	63	207	17	24	21	1	34	1.079		L			
A08422-4sto	332	216	64	154	24	26	14	0	32	1.075		E			
<b>Non-replicate</b>															
Russet Norkotah	293	211	72	100	39	14	19	0	20	1.059		E			
AF6104-6	248	172	69	81	27	33	10	0	17	1.074		M			
AF6118-5	371	194	52	92	29	15	8	0	37	1.082		ML			
WAF14006-6	444	329	74	156	20	40	15	0	23	1.067		ML			
WAF14010-3	271	122	45	58	30	15	0	0	49	1.068		E			
A AF11263-1	328	268	82	127	23	50	10	0	15	1.086		ML			
AF6307-3	295	187	63	88	42	22	0	0	31	1.076		E			
AF6318-3	288	180	62	85	36	27	0	0	26	1.073		E			
AF6340-6	287	238	83	113	46	17	20	0	8	1.066		E			
AF6347-3	307	237	77	112	45	32	0	0	11	1.073		ML			
AF6357-2	344	219	64	104	19	14	31	0	33	1.075		ME			

Variety/Line	Yield (cwt/A) <sup>1</sup>		% US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity	Vine Maturity
	Total	>1 7/8"			2	3	4	5				
AF6370-1	251	188	75	89	37	20	18	0	14	1.069	ME	
AF6384-2	332	236	71	112	14	27	30	0	27	1.080	ML	
NDAF13242B-3	218	184	84	87	29	30	26	0	16	1.081	ML	
NDAF13242B-8	318	240	75	113	25	39	12	0	22	1.078	ML	
LSD	96	88	17		13	16	11	1	14			

<sup>1</sup>Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup>Percentage of the standard, Russet Norkotah for >1 7/8" yield.

<sup>3</sup>Percentage of total yield according to size class: 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>4</sup>Percentage of total that are pickouts.

Replicated trials are the average of 3 replicates and the rest are non-replicated.

LSD indicates least significant difference ( $P = 0.05$ ), calculated for replicated varieties.

Plots consisted of 10-ft rows with 12 seed pieces spaced 10-in. apart.

Table 10. Tuber characteristics, internal defects for russet skinned or white potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>				Internal Defects <sup>2</sup>		Reasons for Pickouts		
	TA	C	TX	Sh	TED	TCS		% HH	% IB
<b>Replicate</b>									
Russet Norkotah	5	5	3	5	7	5	8	0	Misshape
Reveille Russet	5	5	3	4	7	5	0	0	Misshape, knobs
Russet Burbank	3	5	3	5	6	4	58	0	Knobs, misshape, growth cracks
AF5164-19	3	5	3	4	6	5	0	0	Growth cracks, misshape
AF5406-7	3	6	3	4	6	4	0	0	Knobs, misshape
AF5468-5	3	5	4	4	7	5	0	0	Misshape
ND8068-5Russ	5	6	5	4	6	4	0	0	Misshape
TX08352-5RU	4	5	3	4	7	5	8	0	Misshape
A08510-1LB	4	6	4	4	7	5	0	0	Scab, misshape
A09022-4	4	6	6	4	6	5	0	0	Misshape, green
COA11013-2	4	5	4	4	6	4	0	0	Growth cracks, knobs
A09136-9LB	3	6	3	4	7	4	17	0	Misshape, knobs
A12305-2adg	4	5	3	4	7	5	25	0	Misshape, knobs
A08422-4sto	3	6	4	4	6	4	0	0	Misshape, growth cracks
<b>Non-replicate</b>									
Russet Norkotah	5	5	3	4	7	4	0	0	Misshape
AF6104-6	3	5	3	3	7	5	0	0	Misshape
AF6118-5	3	6	1	4	7	5	0	0	Misshape
WAF14006-6	4	5	3	4	6	5	0	25	Misshape, growth cracks
WAF14010-3	3	5	3	4	6	4	0	0	Misshape
AAF11263-1	3	6	5	4	7	5	0	0	Knobs
AF6307-3	4	6	4	4	7	4	0	0	Scab, misshape
AF6318-3	4	5	3	4	7	4	0	0	Misshape, growth cracks
AF6340-6	5	6	4	4	5	5	0	0	Misshape
AF6347-3	3	6	4	3	6	5	0	0	Scab
AF6357-2	5	5	3	4	7	4	0	0	Misshape, growth cracks

Variety/Line	Tuber Characteristics <sup>1</sup>						Internal Defects <sup>2</sup>		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
AF6370-1	4	5	3	4	7	5	0	0	Misshape
AF6384-2	4	6	4	4	7	5	0	0	Misshape
NDAF13242B-3	5	6	4	4	7	4	0	0	Misshape
NDAF13242B-8	3	6	4	4	6	4	0	0	Misshape

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very smooth.

Sh = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow. TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 12 tubers for replicated trials and total number out of 4 for non replicated trials (marked with \*). 0 = not observed.

Table 11. Total yield, greater than 1 7/8", percent of standard, size distribution, percent pickouts, specific gravity and merit score for NE1731<sup>1</sup> potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Yield (cwt/A) <sup>2</sup>		US#1	%	% of Standard <sup>3</sup>	% by size class <sup>4</sup>					%PO <sup>5</sup>	Specific Gravity	Vine Maturity	Merit Score <sup>6</sup>
	Total	>1 7/8"				2	3	4	5					
Atlantic	262	239	91	100	21	49	22	0	6	1.083	ML	2		
Katahdin	279	230	82	96	28	44	10	0	14	1.064	ML	2		
Snowden	348	320	92	134	47	44	1	0	1	1.081	ML	1		
Superior	246	194	79	81	42	35	1	0	10	1.070	ME	3		
Yukon Gold <sup>y</sup>	257	183	70	77	14	31	26	0	28	1.075	ME	3		
AF5040-8 <sup>y</sup>	258	210	81	88	51	30	0	0	11	1.085	ME	2		
AF5225-1	410	347	85	145	32	46	8	0	8	1.071	ML	1		
AF5280-5	352	322	92	135	46	45	1	0	4	1.061	E	1		
AF5563-5	255	214	83	89	15	52	16	0	14	1.071	ME	2		
AF5677-4	349	311	89	130	33	50	6	0	5	1.076	ME	1		
B3012-1	344	246	71	103	55	17	0	0	9	1.077	E	3		
NDAF102629C-4	257	227	88	95	29	50	9	0	6	1.067	ME	2		
NY149 <sup>y</sup>	325	269	83	113	44	34	5	0	5	1.069	M	2		
NY151	452	389	86	163	27	46	14	0	7	1.063	ME	2		
NY152	379	301	79	126	61	18	0	0	6	1.077	M	1		
NY165	233	206	90	86	31	44	14	0	6	1.079	ML	3		
WAF10664-3	356	306	86	128	29	48	9	0	8	1.075	M	2		
Chieftain	359	298	83	124	36	37	10	0	10	1.065	ML	2		
DK Rd Norland	299	250	83	105	60	23	0	0	3	1.059	E	2		
AF4831-2	407	279	69	117	50	19	0	0	7	1.061	E	2		
AF5245-1	329	275	84	115	41	39	4	0	6	1.071	E	3		
AF5412-3 <sup>p</sup>	310	235	76	98	35	37	4	0	14	1.058	E	3		
AF5414-1 <sup>r</sup>	406	347	85	145	37	38	10	0	8	1.069	E	2		
NDAF113484B-1	349	313	90	131	38	51	1	0	5	1.060	ME	2		
Reveille Russet	296	185	62	77	30	27	5	0	29	1.063	ML	2		
Russet Burbank	445	200	45	84	20	19	7	0	50	1.081	L	4		
AF5164-19	367	231	64	97	13	31	20	0	34	1.070	L	3		

Variety/Line	Yield (cwt/A) <sup>1</sup>		US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity	Vine Maturity	Merit Score <sup>5</sup>
	Total	>1 7/8"			2	3	4	5					
AF5406-7	311	200	65	83	26	31	8	0	30	1.070	ML	3	
AF5468-5	345	236	68	99	20	29	19	0	27	1.066	ML	3	
ND8068-5Russ	137	97	71	41	57	10	4	0	15	1.078	E	4	
TX0832-5RU	226	152	63	63	25	34	4	0	28	1.057	E	3	
LSD	62	57	11		12	13	9	1	10				

<sup>1</sup>NE1731 is an integrated, seven-state (Florida, Maine, North Carolina, New York, Ohio, Pennsylvania, and Virginia) potato breeding and variety development project for the eastern U.S. This project focuses on systematic cooperation of potato variety breeding and screening efforts. Varieties like Lamoka, Waneta, Caribou Russet, Lehigh have all been released by eastern university potato breeders from this group.

<sup>2</sup>Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>3</sup>Percentage of the standard, Atlantic, for >1 7/8" yield.

<sup>4</sup>Percentage of total yield according to size class. 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>5</sup>Percentage of total that are pickouts.

<sup>6</sup>Merit score: 1 = outstanding; 2 = keep; 3 = marginal; 4 = drop.

Replicated trials are the average of 4 replicates. LSD indicates least significant difference ( $P=0.05$ ).

Russets were planted 10-in. apart with 12 seed pieces per 10-ft plot, all other varieties were spaced 8-in. apart with 15 seed pieces per 10-ft plot.

Varieties with colored flesh are indicated by <sup>y</sup> for yellow, <sup>p</sup> for purple and <sup>r</sup> for red.



Table 12. Tuber characteristics, internal and external defects for NE1731 potato evaluation trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>										Internal Defects <sup>2</sup>				External Defects <sup>3</sup>							Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	R	H	Gr	K	G	Sc	Sp	T						
Atlantic	4	6	5	3	4	5	38	0	2	0	1	0	1	2	0	0	Growth cracks					
Katahdin	4	8	8	2	5	5	0	0	2	0	1	0	1	2	0	0	Scab					
Snowden	4	5	5	2	3	6	0	0	1	0	0	0	0	1	0	0	Scab					
Superior	4	7	6	3	4	4	0	0	1	0	2	0	0	1	0	0	Growth cracks, Misshape					
Yukon Gold	4	7	6	2	4	5	6	0	2	0	0	1	0	2	0	0	Scab					
AF5040-8	4	7	6	2	4	5	0	0	1	0	0	0	1	2	0	0	Scab, Green					
AF5225-1	5	7	6	2	6	5	0	0	2	0	0	0	1	2	0	0	Scab					
AF5280-5	5	7	6	2	6	5	0	0	2	0	0	0	0	1	0	0	Misshape					
AF5563-5	5	8	7	2	5	5	6	0	1	0	0	0	0	2	0	0	Scab					
AF5677-4	5	8	7	2	5	5	0	0	2	0	0	0	0	1	0	0	Scab					
B3012-1	3	6	5	2	6	4	0	0	1	0	0	0	0	2	0	0	Scab					
NDAF102629C-4	5	8	7	2	6	5	0	0	2	0	0	0	0	0	0	0	Misshape					
NY149	4	9	6	3	6	5	0	0	2	0	0	0	0	2	0	0						
NY151	4	7	6	2	6	6	0	0	3	0	0	0	2	1	0	0	Green					
NY152	6	7	5	2	5	6	0	0	2	0	0	0	2	2	0	0	Green, Scab					
NY165	5	6	6	2	6	4	6	0	2	0	0	0	1	1	0	0	Scab					
WAF10664-3	4	7	6	2	4	5	0	0	2	0	0	0	1	2	1	0	Green, Scab					
Chieftain	4	3	7	2	4	5	0	0	3	0	0	0	1	1	0	1	Scab, Green					
DK Rd Norland	5	2	7	3	6	5	0	0	1	0	0	0	1	0	0	0						
AF4831-2	5	2	8	3	6	5	0	0	1	0	0	0	1	1	2	0	Scab, misshape					
AF5245-1	5	1	7	2	5	5	13	0	2	0	1	0	1	1	0	0	Scab					
AF5412-3	3	1	7	3	5	5	0	0	2	0	0	0	0	1	0	0	Misshape					
AF5414-1	4	2	7	3	6	5	0	0	1	0	0	1	1	0	0	0	Misshape					
NDAF113484B-1	4	2	7	2	4	5	0	0	1	0	0	0	1	0	0	0	Green					
Reveille Russet	5	5	3	4	7	5	0	0	1	0	2	1	1	0	0	0	Misshape, knobs					
Russet Burbank	3	5	3	5	6	4	63	0	1	0	2	3	0	0	0	0	Knobs, misshape, growth cracks					
AF5164-19	3	5	3	4	6	5	0	0	4	0	2	0	1	0	0	0	Growth cracks, misshape					

Variety/Line	Tuber Characteristics <sup>1</sup>					Internal Defects <sup>2</sup>				External Defects <sup>3</sup>							Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	R	H	Gr	K	G	Sc	Sp	T	
AF5406-7	3	6	3	4	6	4	0	0	3	0	2	2	0	0	0	0	Knobs, misshape
AF5468-5	3	5	4	4	7	5	0	0	2	0	1	0	0	0	0	0	Misshape
ND8068-5Russ	5	6	5	4	6	4	6	0	1	0	0	0	0	0	0	0	Misshape
TX08352-5RU	4	5	3	4	7	5	6	0	2	1	1	0	0	0	0	0	Misshape

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very smooth.

SH = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow. TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 16 tubers (4 per replication). 0 = not observed.

<sup>3</sup>External Defects: R = Rhizoctonia, H = hairline cracks, Gr = growth cracks, K = knobs, G = sunburn, Sc = scab, Sp = sprouts, T = secondary tubers.

Scale = 0-4, with 0 = not observed, 1 = slight to 4 = very severe.

Russets were planted 10-in. apart with 12 seed pieces per 10-ft plot, all other varieties were spaced 8-in. apart with 15 seed pieces per 10-ft plot.

Table 13. Total yield, greater than 1 7/8", size distribution, percent pickouts, and specific gravity for potato early variety trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Yield (cwt/A)		US#1	% of Standard <sup>2</sup>					%PO <sup>4</sup>	Specific Gravity
	Total	>1 7/8"		%	2	3	4	5		
<b>Replicate</b>										
Superior	316	279	89	100	32	38	18	0	6	1.072
Dark Red Norland	336	285	84	102	28	46	10	0	11	1.063
Yukon Gold <sup>y</sup>	184	161	86	58	26	48	12	0	6	1.075
AF4831-2	408	325	80	117	53	27	0	0	7	1.062
Peter Wilcox <sup>y</sup>	332	312	94	112	46	46	2	0	2	1.074
Noya	219	168	76	60	65	11	0	0	1	1.068
Erika <sup>y</sup>	336	246	73	88	52	21	0	0	9	1.070
Queen Anne <sup>y</sup>	309	230	73	83	42	26	5	0	11	1.065
Red Apple <sup>y</sup>	276	166	59	60	51	9	0	0	8	1.073
Autumn Rose	321	181	56	65	44	12	0	0	20	1.073
NCB2607-3 <sup>y</sup>	270	220	81	79	44	32	5	0	9	1.073
Isle Royale	184	158	89	57	18	40	31	0	6	1.057
CO98012-5R	137	99	74	36	53	21	0	0	5	1.067
CO05037-3W/Y <sup>y</sup>	409	306	75	110	54	19	2	0	5	1.072
B2152-17 <sup>y</sup>	423	359	85	129	46	35	4	0	4	1.096
Belmonda <sup>y</sup>	398	310	78	111	41	32	5	0	13	1.078
SunShine <sup>y</sup>	282	202	71	72	31	30	10	0	21	1.059
Prada <sup>y</sup>	348	275	79	99	29	40	9	0	16	1.065
Bonnate <sup>y</sup>	299	214	70	77	48	22	0	0	17	1.066
NC502-10 <sup>P</sup>	377	301	80	108	60	19	0	0	0	1.078
AF5412-3 <sup>P</sup>	305	284	93	102	44	41	9	0	2	1.062
NY164	308	241	79	86	47	31	1	0	8	1.060
LSD	129	113	12		13	15	14	0	8	

Variety/Line	Yield (cwt/A) <sup>1</sup>		US#1	%	% of		% by size class <sup>3</sup>					%PO <sup>4</sup>	Specific Gravity
	Total	>1 7/8"			Standard <sup>2</sup>	Standard <sup>2</sup>	2	3	4	5			
<b>Non-replicate</b>													
Superior	315	236	75	100	26	31	17	0	21	1.075			
B3372-1 <sup>P</sup>	434	210	48	89	40	8	0	0	36	1.096			
BNC716-1 <sup>Y</sup>	465	340	73	144	17	36	20	0	25	1.055			
AF6052-1	443	360	81	153	22	41	19	0	15	1.059			
AF6280-1 <sup>pk</sup>	274	93	34	40	34	0	0	0	6	1.061			
BNC718-1	327	290	89	123	28	58	3	0	8	1.069			
BNC831-8 <sup>r</sup>	288	207	72	88	61	11	0	0	6	1.071			
WAF14096-5 <sup>y</sup>	393	320	81	136	45	36	0	0	1	1.071			
B3424-4 <sup>y</sup>	323	253	78	107	54	25	0	0	0	1.075			
NDAF13296Y-3	313	281	90	119	32	52	6	0	5	1.066			
B3372-6 <sup>P</sup>	366	229	63	97	57	6	0	0	0	1.061			
AF6289-2	406	357	88	151	29	59	0	0	7	1.071			
NDAF13136Y-5	362	331	91	140	43	34	15	0	7	1.069			
NDAF13296Y-4	439	407	93	173	27	49	16	0	4	1.070			
BNC833-2 <sup>P</sup>	312	272	87	115	39	27	21	0	4	1.065			
B3355-6	307	260	85	110	60	25	0	0	5	1.066			

<sup>1</sup>Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup>Percentage of the standard, Superior, for >1 7/8" yield.

<sup>3</sup>Percentage of total yield according to size class. 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>4</sup>Percentage of total that are pickouts. Varieties with colored flesh are indicated by <sup>y</sup> for yellow, <sup>r</sup> for red, <sup>p</sup> for purple, <sup>pk</sup> for pink.

Replicated trials are the average of 3 replicates and the rest are non-replicated. . LSD indicates least significant difference (P = 0.05) for replicated trial. Planted 8-in. apart with 15 seed pieces per 10-ft plot.

Table 14. Tuber characteristics, internal defects for potato early variety trial in Plant Pathology Farm, Rock Springs, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>				Internal Defects <sup>2</sup>		Reasons for Pickouts		
	TA	C	TX	Sh	TED	TCS		% HH	% IB
<b>Replicate</b>									
Superior	3	7	6	3	4	5	0	0	Misshape, green
Dark Red Norland	4	2	7	3	5	5	0	0	Green
Yukon Gold	4	9	7	2	6	6	0	0	Green
AF4831-2	6	2	7	2	6	6	0	8	Growth cracks
Peter Wilcox	5	1	7	2	5	5	8	0	
Noya	5	8	7	2	6	6	0	0	
Erika	5	9	8	3	7	5	0	8	Green, misshape
Queen Anne	4	9	7	3	7	5	0	0	Green, misshape
Red Apple	4	2	7	3	6	5	0	0	Misshape
Autumn Rose	3	2	7	3	6	5	0	0	Growth cracks, green
NCB2607-3	5	2	7	2	6	6	0	0	Growth cracks, misshape
Isle Royale	5	2	7	3	5	5	0	0	
CO98012-5R	5	2	8	2	5	5	0	0	
CO05037-3W/Y	5	9	6	3	6	5	0	0	Green
B2152-17	5	2	7	2	5	5	0	0	Green
Belmonda	5	9	8	3	6	5	0	0	Green, misshape
SunShine	5	9	8	3	7	4	0	0	Green, misshape
Prada	4	9	7	3	6	4	0	0	Misshape, green
Bonnate	5	9	8	2	6	5	0	0	Misshape
NC502-10	3	1	7	3	5	4	0	0	
AF5412-3	3	1	7	3	6	5	0	0	
NY164	5	2	7	2	6	5	0	0	Misshape

Variety/Line	Tuber Characteristics <sup>1</sup>					Internal Defects <sup>2</sup>			Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
<b>Non-replicate</b>									
Superior	4	7	6	3	3	5	0	0	Growth cracks
B3372-1	4	1	7	3	5	6	0	0	Growth cracks
BNC716-1	5	2	6	2	5	6	0	25	Growth cracks
AF6052-1	4	2	7	3	3	4	0	0	Growth cracks, green
AF6280-1	6	2	6	3	6	5	0	0	Misshape
BNC718-1	5	1	7	2	5	5	0	0	Misshape
BNC831-8	4	2	7	3	6	5	0	0	Green, misshape
WAF14096-5	6	9	7	2	6	7	0	0	Green, red splash on bud end
B3424-4	3	1	7	2	6	4	0	0	
NDAF13296Y-3	5	2	7	2	5	5	0	0	Green, misshape
B3372-6	4	1	7	2	6	5	0	0	
AF6289-2	5	2	7	3	6	5	0	0	Green
NDAF13136Y-5	5	2	7	2	6	6	0	0	
NDAF13296Y-4	6	2	7	3	4	5	0	0	Green
BNC833-2	4	1	7	3	6	5	0	0	Growth cracks
B3355-6	4	1	7	3	5	5	0	0	Misshape

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very smooth.

Sh = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow. TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 12 tubers for replicate trial and 4 tubers for non replicated trial. 0 = not observed.

Table 15. Total yield, greater than 1 7/8" yield, percent of standard, size distribution, percent pickout, merit score and specific gravity for Snack Food Association Trial in Bryan Bender's Farm, Chambersburg, PA, 2019

Variety/Line	Yield (cwt/A) <sup>1</sup>		% US#1	% of Standard <sup>2</sup>	% by size class <sup>3</sup>					% PO <sup>4</sup>	Merit Score <sup>5</sup>
	Total	>1 7/8"			2	3	4	5			
AORO9034-3	426	350	82	107	31	44	7	0	15		
MSW075-2	325	299	92	91	41	44	6	0	2	3	
MSZZ19-4	303	295	97	90	38	49	11	0	0		
MSX540-4	321	285	89	87	37	48	4	0	9	5	
Lamoka	365	337	93	103	37	44	11	0	4		
Snowden	374	328	88	100	43	39	5	0	8	3	
ND7519-1	354	327	92	100	47	44	1	0	2		
LSD <sup>6</sup>	49	56	7		11	11	11	0	5		

<sup>1</sup>Yield Total = all yield including pickouts. US#1 Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup>Percentage of the standard, Snowden, for >1 7/8" yield.

<sup>3</sup>Percentage of total yield according to size class. 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

<sup>4</sup>Percentage of total that are pickouts.

<sup>5</sup>Merit Score: 1 = excellent; 2 = very good; 3 = good; 4 = fair; 5 = poor.

<sup>6</sup>LSD indicates least significant difference ( $P=0.05$ ). 3 replications.

Table 16. Tuber characteristics and internal defects for Snack Food Association Trial in Bryan Bender's Farm, Chambersburg, PA, 2019

Variety/Line	Tuber Characteristics <sup>1</sup>						Internal Defects <sup>2</sup>	
	TA	C	TX	Sh	TED	TCS	% HH	% IB
AORO9034-3	5	6	6	3	5	5	0	20
MSW075-2	4	7	6	3	7	4	0	0
MSZZ19-4	6	6	5	2	3	7	13	0
MSX540-4	2	7	6	3	3	4	0	20
Lamoka	6	7	6	3	5	4	0	20
Snowden	5	6	5	2	5	6	0	13
ND7519-1	5	6	5	3	6	5	0	13

<sup>1</sup>Tuber Characteristics: TA = tuber appearance: 1 = very poor, 5 = fair, 9 = excellent.

C = skin color: 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 = buff, 8 = white, 9 = cream.

TX = skin texture: 1 = partial russet, 2 = heavy russet, 3 = mod. russet, 4 = light russet, 5 = netted, 6 = slight net, 7 = mod. smooth, 8 = smooth, 9 = very smooth.

Sh = tuber shape: 1 = round, 2 = mostly round, 3 = round-oblong, 4 = mostly oblong, 5 = oblong, 6 = oblong-long, 7 = mostly long, 8 = long, 9 = cylindrical.

TED = tuber eye depth: 1 = very deep, 5 = medium, 9 = very shallow.

TCS = tuber cross section: 1 = very flat, 5 = intermediate, 9 = very round.

<sup>2</sup>Internal Defects: HH = hollow heart, IB = internal browning. Total number observed out of 30 tubers (10 tubers per rep, 3 reps). 0 = not observed.



Table 17: Management of evaluation trials, 2019

**Rock Springs**

Trial	Germplasm and Spacing trials
Planting Date:	23 May
Harvest Date:	2-11 October
Previous Crop:	Wheat
Fertilizer Rate/A:	24 April: top dress Gypsum at 885 lb/A with 10 ft Gandy 7 May: top dress 0-0-62 (N-P-K) at 340 lb/A with 10 ft Gandy 23 May: 911 lb/A of 10-10-10 (N-P-K) with planter
Herbicide:	Eptam 7E, Medal EC, Omnin750D, Matrix
Fungicide:	Elatus, AFrame, Manzate Pro-Stick, Scala SC, Curzate 60 DF, Tanos, Revus Top, Quadris Opti, Orondis Opti
Insecticide:	Admire Pro, Lambda T2, Agri-Mek, PBO, FulFill
Vine Kill:	10 and 16 September
Rainfall (inches):	June (3.76), July (2.83), August (3.16), September (1.82)
Trial	Early variety trial
Planting Date:	4 June
Harvest Date:	17 September
Previous Crop:	Wheat
Fertilizer Rate/A:	9 May: top dress 0-0-60 (N-P-K) at 340 lb/A with 10 ft Gandy 4 June: 911 lb/A 10-10-10 (N-P-K) with planter
Herbicide:	Lambda T2, Agri-Mek, PBO, Medal EC, Omni 75DF, Matrix
Fungicide:	AFrame, Manzate Pro-Stick, Scala SC, Curzate 60 DF, Tanos, Revus Top, Quadris Opti
Insecticide:	Admire Pro, Lambda T2, Agri-Mek, PBO, Avaunt, FullFill
Vine Kill:	30 August and 5 September
Rainfall (inches):	June (3.76), July (2.83), August (3.16), September (1.82)

Table 18. Descriptions of promising varieties for Pennsylvania.

## FRESH MARKET

### **Connect** from Solanum International

- A late season variety, with moderately smooth skin and oval shape tubers. It is a yellow flesh variety; the yellow flesh is darker than Yukon Gold.
- At Rock Springs over 4 years, marketable yield average 137% of Atlantic, 128% of Katahdin and 160% of Yukon Gold. Tubers in the 1 $\frac{7}{8}$ " to 3 $\frac{1}{4}$ " size average 65% compared to Katahdin 68% and Yukon Gold 41% in the same size class. Specific Gravity average 1.072 compared to Katahdin 1.062.
- In Erie County over two years Connect average 165% of Atlantic and 142% of Katahdin. Specific Gravity average 1.063 compared to Katahdin 1.066.
- One year in the Lehigh County trial Connect was 71% of Atlantic and 76% of Katahdin. Specific Gravity for Connect was 1.080 and Katahdin 1.066.

### **NY151** from Cornell University

- A medium late variety with moderately smooth skin and mostly round tubers.
- At Rock Springs over 9 years, marketable yield average 126% of Atlantic and 135% of Katahdin. Specific Gravity average 1.062 compared to Atlantic 1.084 and Katahdin 1.068. Tubers in the 2 $\frac{1}{2}$ " to 4" average 58% compared to Katahdin 62% in the same size class.
- In Erie County over 4 years NY151 average 73% of Atlantic and 94% of Katahdin. Tubers in the 2 $\frac{1}{2}$ " to 4" average 38% compared to Katahdin 43% in the same size class.
- In the Lehigh County trial over 5 years NY151 average 110% of Atlantic and 111% of Katahdin. Tubers in the 2 $\frac{1}{2}$ " to 4" average 46% compared to Katahdin 52% in the same size class.
- Has moderate resistance to common scab.

### **AF5225-1** from University of Maine

- A medium late season variety with slightly netted skin and oval shape tubers.
- At Rock Springs over 5 years, marketable yield average 161% of Atlantic and 162% of Katahdin. Specific Gravity average 1.071 compared to Atlantic 1.083 and Katahdin 1.065. Tubers in the 2 $\frac{1}{2}$ " to 4" average 60% compared to Katahdin 58% in the same size class.
- In Erie County over 3 years AF5225-1 average 152% of Atlantic and 183% of Katahdin. Specific Gravity average 1.056 compared to Katahdin 1.053.
- In Lehigh County over 5 years AF5225-1 average 116% of Atlantic and 130% of Katahdin. Specific Gravity average 1.065 compared to Katahdin 1.061.

### **AF5280-5** from University of Maine

- A medium season variety with slightly netted skin and round to oval shape tubers.
- At Rock Springs in 2019, marketable yield average 135% of Atlantic and 144% of Katahdin. Specific Gravity was 1.061 compared to Atlantic 1.083 and Katahdin 1.064. Tubers in the 1 $\frac{7}{8}$ " to 3 $\frac{1}{4}$ " size were 91% compared to Katahdin 71% in the same size class. Pickouts were 4% compared to Katahdin at 14%.

**NY167** from Cornell University

- A medium early season variety with slightly netted skin and mostly round shape tubers.
- At Rock Springs in 2019, marketable yield average 134% of Atlantic and 142% of Katahdin. Specific Gravity was 1.067 compared to Atlantic 1.083 and Katahdin 1.064. Tubers in the 2½" to 4" were 54% compared to Katahdin 51% in the same size class. Pickouts were 14% compared to Katahdin at 14%

**MSX156-1Y** from Michigan State University

- A medium season variety with moderately smooth skin and oval shape tubers and yellow flesh.
- At Rock Springs in 2019, marketable yield average 191% of Atlantic and 203% of Katahdin. Specific Gravity was 1.066 compared to Atlantic 1.083 and Katahdin 1.064. Tubers in the 2½" to 4" were 72% compared to Katahdin 51% in the same size class. Pickouts were 10% compared to Katahdin at 14%

**REDS**

**AF4831-2** from University of Maine

- A medium early variety, with smooth skin and oval shape tubers.
- At Rock Springs over 6 years, marketable yield average 97% of Chieftain and 124% of Dark Red Norland. Tubers in the 1⅞" to 3¼" size average 76% compared to Dark Red Norland 75% in the same size class. Specific Gravity average 1.062 compared to 1.059 for Dark Red Norland.
- In Erie County over 2 years AF4831-2 average 141% of Atlantic and 120% of Chieftain. Specific Gravity average 1.041 compared to Chieftain 1.043.
- In Lehigh County over 3 years AF4831-2 average 56% of Atlantic and 53% of Chieftain. Specific Gravity average 1.050 compared to Chieftain 1.052.

**Cerata** from Solanum International

- A late season variety with moderately smooth skin and oval shape tubers.
- At Rock Springs over 2 years, marketable yield average 122% of Chieftain and 147% of Dark Red Norland. Tubers in the 1⅞" to 3¼" size average 70% compared to Chieftain 79% and Dark Red Norland 79% in the same size class. Specific Gravity average 1.050 compared to Chieftain 1.053 and Dark Red Norland 1.047.

**NDAF113484B-1** from University of Maine

- A medium early variety, with moderately smooth skin and mostly round shape tubers.
- At Rock Springs in 2019, marketable yield average 105% of Chieftain and 131% of Dark Red Norland. Specific Gravity was 1.060 compared to Chieftain 1.065 and Dark Red Norland 1.059. Tubers in the 1⅞" to 3¼" were 88% compared to Dark Red Norland 82% in the same size class. Pickouts were 5% compared to Chieftain at 9% and Dark Red Norland at 4%

**CHIPPING**

**Lady Liberty (NY152)** from Cornell University

- A medium late season variety with slightly netted skin.

- At Rock Springs over 5 years the marketable yield average 134% of Atlantic and 110% of Snowden. Tubers in the 1 $\frac{1}{8}$ " to 3 $\frac{1}{4}$ " size average 76% compared to Atlantic 59% and Snowden 81% in the same size class. Specific gravity for Lady Liberty over 5 years average 1.070 compared to Atlantic 1.079 and Snowden 1.077.
- In Erie County over 3 years Lady Liberty marketable yield average 142% of Atlantic and 127% of Snowden.
- In Lehigh County over 3 years Lady Liberty marketable yield average 83% of Atlantic and 91% of Snowden.
- Chip color has been equal to Snowden.
- Moderate to good resistance to common scab.

#### **NY163** from Cornell University

- An early season variety with moderately smooth skin and mostly round shape tubers.
- At Rock Springs in 2019, marketable yield was 138% of Atlantic and 107% of Snowden. Specific Gravity was 1.082 compared to Atlantic 1.083 and Snowden 1.081. Tubers in the 1 $\frac{1}{8}$ " to 3 $\frac{1}{4}$ " were 81% compared to Atlantic 71% and Snowden 90% in the same size class. Pickouts were 6% compared to Atlantic 6% and Snowden 1%.

#### **MSAFB605-4** from University of Maine

- A medium late season variety with netted skin and mostly round shape tubers.
- At Rock Springs in 2019, marketable yield was 121% of Atlantic and 94% of Snowden. Specific Gravity was 1.076 compared to Atlantic 1.083 and Snowden 1.081. Tubers in the 1 $\frac{1}{8}$ " to 3 $\frac{1}{4}$ " were 81% compared to Atlantic 71% and Snowden 90% in the same size class. Pickouts were 6% compared to Atlantic 6% and Snowden 1%.

### **EARLY SEASON – 87 days**

#### **Belmonda** from Hanse Seed

- Has moderately smooth skin, oval shape tubers, with yellow flesh. The yellow flesh color is darker than Yukon Gold.
- At Rock Springs over 2 years the marketable yield average 116% of Superior. Tubers in the 1 $\frac{1}{8}$ " to 3 $\frac{1}{4}$ " size average 64% compared to 65% for Superior in the same size class. Specific gravity average 1.075 compared to 1.071 for Superior. Pickouts average 22% compared to 13% for Superior. Pickouts for Belmonda were mostly green with a few misshapes.

#### **CO05037-3W/Y** from Colorado State University

- Has moderately smooth skin, oval shape tubers, with yellow flesh. The yellow flesh color is darker than Yukon Gold.
- At Rock Springs over 3 years the marketable yield average 90% of Superior. Tubers in the 1 $\frac{1}{8}$ " to 3 $\frac{1}{4}$ " size average 64% compared to 71% for Superior in the same size class. Specific gravity average 1.058 compared to 1.059 for Superior. Pickouts average 15% compared to 12% for Superior. Pickouts for CO05037-3W/Y were mostly green.

### Evaluation of potato cultivars and breeding lines for resistance to common scab, 2019.

Thirty-three potato cultivars and advanced breeding lines were planted in a naturally infested field at The Pennsylvania State University Russell E. Larson Agricultural Research Center in Pennsylvania Furnace, PA on 5 Jun. The soil type was a Hagerstown silty clay loam. The experimental design was a randomized complete block design with two replications. The plots were 4-ft long with 5 seed pieces planted in each plot and 4-ft breaks between plots within a row. Precipitation was 3.76, 2.83, 3.16, and 1.82 inches for Jun, Jul, Aug, and Sep, respectively. Standard crop management practices, and a recommended fungicide program for the management of early and late blight in Pennsylvania, were followed. Plants were vine killed on 17 and 23 Sep with Reglone (2.0 pt/A). Tubers were harvested on 14 Oct and were visually assessed on 4 and 5 Nov. Predominant lesion type was scored for each tuber on a 0 to 3 ordinal scale: 0 = no symptom, 1 = superficial, 2 = raised, and 3 = pitted. Percent lesion coverage for each tuber was scored on a 0 to 6 ordinal scale, where 0 = no scab, 1 = > 0 – 2%, 2 = >2 – 5%, 3 = >5 – 10%, 4 = >10 – 25%, 5 = >25 – 50%, and 6 = >50%. The disease severity index in each plot was calculated as follows:  $[\Sigma(\text{Percent lesion coverage} \times \text{predominant lesion type} \times \text{number of tubers in each category}) / (18 \times \text{total number of potato tubers evaluated})] \times 100$ . Disease incidence was expressed as the percentage of tubers with common scab symptoms in each plot. Disease data were subjected to an analysis of variance test, and means were separated using Fisher's protected least significant difference test (SAS v. 9.4, SAS Institute, Cary, NC).

Cultivars Russet Burbank and Shepody were included as a tolerant and a susceptible check for common scab, respectively. Numerically, although not statistically, four cultivars/lines had a lower disease severity index and disease incidence than Russet Burbank and were characterized as resistant or as moderately resistant as the tolerant check: Reveille Russet, TX08352-5Ru, AF5468-5, and Superior. Only a few small superficial lesions were observed on some tubers of these cultivars/lines.

Cultivar/Line	Common scab severity	Common scab incidence (%)	Cultivar/Line	Common scab severity	Common scab incidence (%)
Reveille Russet	0.3 h*	5.3 i	Katahdin	5.1 d-h	56.8 a-g
TX08352-5Ru	0.5 gh	8.3 hi	AF4831-2	5.3 c-h	43.3 c-i
AF5468-5	0.8 gh	11.5 hi	AF5406-7	5.3 c-h	55.4 a-g
Superior	1.1 gh	16.3 ghi	AF5677-4	6.2 c-h	40.3 d-i
Russet Burbank	1.3 gh	17.0 ghi	AF5245-1	6.3 c-h	54.2 a-g
Dark Red Norland	1.7 gh	30.7 d-i	NY151	6.4 c-h	61.1 a-e
NDAF113484B-1	2.0 gh	29.4 d-i	NY152 (Niagara)	6.5 c-h	44.2 c-i
NDAF102629C-4	2.1 gh	29.7 d-i	NY165	6.9 c-h	63.3 a-e
NY149	2.2 gh	30.3 d-i	AF5412-3	8.8 b-g	58.3 a-f
AF5164-19	2.4 gh	27.5 e-i	Kennebec	11.1 b-f	90.0 a
AF5280-5	2.5 gh	19.3 f-i	Yukon Gold	11.9 b-e	82.2 abc
AF5414-1	2.6 gh	27.8 d-i	Snowden	12.3 bcd	63.9 a-e
ND8068-5Russ	2.7 fgh	16.3 ghi	Atlantic	12.4 bcd	68.3 a-d
B3012-1	3.3 fgh	26.6 e-i	AF5040-8	13.6 bc	81.3 abc
Chieftain	3.5 e-h	48.7 b-h	AF5225-1	16.2 ab	83.7 abc
WAF10664-3	3.6 e-h	54.2 a-g	Shepody	22.1 a	88.7 ab
AF5563-5	4.8 d-h	44.4 c-i			

\* Means followed by the same letter are not significantly different at  $P = 0.05$  as determined by Fisher's protected least significant difference test (LSD = 8.4 for severity and 40.6 for incidence).

### Evaluation of potato cultivars and breeding lines for resistance to late blight, 2019.

Thirty-two potato cultivars and advanced breeding lines were evaluated at The Pennsylvania State University Russell E. Larson Agricultural Research Center in Pennsylvania Furnace, PA. The soil type was a Hagerstown silty clay loam. Potatoes were planted on 12 Jul. The experimental design was a randomized complete block with three replicates. The plots were 4-ft long with five seed pieces planted in each plot and 5-ft breaks between plots within a row. Each treatment row had an adjacent row of the susceptible cv. Atlantic as a spreader row. Precipitation was 3.76, 2.83, 3.16, and 1.82 inches for Jun, Jul, Aug, and Sep, respectively. On 15 Aug, spreader rows were spray-inoculated with a mixture of four isolates of *Phytophthora infestans* clonal lineage US-23, at a concentration of  $2.3 \times 10^4$  sporangia/ml, to promote uniform spread of the pathogen to all treatment plots. Overhead sprinklers were used for approximately one hour daily when the weather was dry and hot to increase humidity in the plant canopy after infection. Disease ratings were determined by visually assessing each 4-ft plot and estimating the percentage of late blight symptomatic foliage on a 0 to 100% scale. Ratings were taken on 26 and 30 Aug and 5 and 12 Sep. Disease data were expressed as area under the disease progress curve (AUDPC), subjected to analysis of variance, and means were separated using Fisher's protected least significant difference test (SAS v. 9.4, SAS Institute, Cary, NC).

Disease pressure from late blight was high and the most susceptible plots reached 100% disease severity by the end of the season. Cultivar Kennebec was the moderately resistant check. Based on AUDPC, one line, AF5406-7, was significantly better than Kennebec. Six other cultivar/lines were considered statistically comparable to cv. Kennebec: NY165, AF5412-3, AF5414-1, Russet Burbank, NY152 (Niagara) and AF5225-1.

Cultivar/Line	AUDPC*	Cultivar/Line	AUDPC
AF5406-7	49 n**	NDAF102629C-4	735 gh
NY165	80 mn	Atlantic	767 fg
AF5412-3	119 mn	Superior	775 efg
AF5414-1	182 lmn	NY149	803 d-g
Russet Burbank	203 lmn	Chieftain	823 d-g
NY152 (Niagara)	217 lm	AF5468-5	832 d-g
Kennebec	226 lm	Yukon Gold	840 d-g
AF5225-1	298 kl	AF4831-2	901 c-f
AF5677-4	409 jk	TX08352-5Ru	909 b-f
Katahdin	441 ijk	AF5563-5	930 b-e
NY151	474 ij	AF5245-1	961 bcd
Snowden	483 ij	NDAF113484B-1	1004 bc
AF5164-19	555 ij	AF5280-5	1034 abc
AF5040-8	556 ij	ND8068-5Russ	1060 abc
WAF10664-3	588 hi	Dark Red Norland	1061 ab
Reveille Russet	591 hi	B3012-1	1181 a

\* AUDPC = Area under the disease progress curve was calculated from 26 Aug to 12 Sep according to the formula:  $\sum_{i=1}^n [(R_{i+1} + R_i)/2] [t_{i+1} - t_i]$ , where  $R$  = disease severity rating (% of leaf surface affected) at the  $i$ th observation,  $t_i$  = time (days) since the previous rating at the  $i$ th observation, and  $n$  = total number of observations.

\*\* Means followed by the same letter are not significantly different at  $P = 0.05$  as determined by Fisher's protected least significant difference test (LSD = 160).

### Evaluation of potato cultivars and breeding lines for resistance to early blight, 2019.

Thirty-two potato cultivars and advanced breeding lines were evaluated at The Pennsylvania State University Russell E. Larson Agricultural Research Center in Pennsylvania Furnace, PA. The soil type was a Hagerstown silty clay loam. Potatoes for each entry were planted on 4 Jun in plots arranged in a randomized complete block design with three replicates per entry. Plots consisted of a single 4-ft long row with five seed pieces planted in each plot, with a 4-ft break between plots. Each entry had an adjacent row of the susceptible cv. Dark Red Norland as a spreader row. Precipitation was 3.76, 2.83, 3.16, and 1.82 inches for Jun, Jul, Aug, and Sep, respectively. On 25 Jul, spreader rows were spray-inoculated with a conidial mixture of two isolates of *Alternaria solani*, at a concentration of  $7.5 \times 10^4$  conidia/ml, to promote uniform spread of the pathogen to all treatment plots. For each plot, the percentage of symptomatic foliage was visually assessed on a 0 to 100% scale on 12, 19, 25 and 29 Aug and 3 Sep. Disease data were compared by calculating the area under the disease progress curve (AUDPC), subjected to analysis of variance, and means were separated using Fisher's protected least significant difference test (SAS v. 9.4, SAS Institute, Cary, NC).

Disease pressure from early blight was high and the most susceptible plots reached 100% disease severity by the end of the season. Cultivars Kennebec and Russet Burbank were included as moderately resistant checks. Thirteen other cultivars/lines were characterized as moderately resistant based on their AUDPC values: AF5406-7, Snowden, Katahdin, WAF10664-3, NY151, Atlantic, AF5414-1, AF5225-1, AF5164-19, Chieftain, NY165, AF5040-8 and AF5412-3.

Cultivar/Line	AUDPC*	Cultivar/Line	AUDPC
Russet Burbank	84 n**	Reveille Russet	447 d-l
Kennebec	94 n	NY152 (Niagara)	463 d-k
AF5406-7	125 mn	AF5468-5	467 d-j
Snowden	154 mn	NDAF102629C-4	497 c-i
Katahdin	161 lmn	Superior	527 b-h
WAF10664-3	180 k-n	AF5280-5	530 b-g
NY151	190 j-n	AF5245-1	541 b-g
Atlantic	205 j-n	AF5677-4	551 b-g
AF5414-1	210 j-n	NDAF113484B-1	567 b-f
AF5225-1	221 i-n	Yukon Gold	616 b-e
AF5164-19	243 h-n	AF4831-2	683 bcd
Chieftain	280 g-n	AF5563-5	774 bc
NY165	295 f-n	TX08352-5Ru	776 bc
AF5040-8	360 e-n	B3012-1	797 b
AF5412-3	361 e-n	Dark Red Norland	1196 a
NY149	410 d-m	ND8068-5Russ	1301 a

\* AUDPC = area under the disease progress curve was calculated from 12 Aug to 3 Sep according to the formula:  $\sum_{i=1}^n [(R_{i+1} + R_i)/2] [t_{i+1} - t_i]$ , where  $R$  = disease severity rating (% of leaf surface affected) at the  $i$ th observation,  $t_i$  = time (days) since the previous rating at the  $i$ th observation, and  $n$  = total number of observations.

\*\* Means followed by the same letter are not significantly different at  $P = 0.05$  as determined by Fisher's protected least significant difference test (LSD = 286).

POTATO (*Solanum tuberosum*); Weed Control  
D.D. Lingenfelter and J.M. Wallace  
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**Gowan herbicides for weed control in white potato**

Gowan sponsored this protocol to study the effect of Sonalan HFP on weed control and injury in white potato. Other programs were included as a comparison. Sonalan was applied post-plant and surface incorporated by hand garden rakes on those plots thus complete and effective weed control might not have been obtained as with a machine on a larger scale operation. Yield data was also collected in this study and significant differences were likely due to competition from weeds and not herbicide injury. Alite27 is not currently labeled for use in potato; the active ingredient isoxaflutole has been tested in potato by IR4 in the past.

Penn State University		Gowan herbicides for weed control in white potato													
D. Lingenfelter and J. Wallace		Trial Y 2019													
Trial ID: POTATOHF19		Trial Y 2019													
Protocol II potato19															
Pest Type		W Weed		W Weed		W Weed		W Weed		W Weed		W Weed		W Weed	
Pest Code		SETFA		DIGSA		CHEAL		AMARE		SOLNI		AMARE		SOLNI	
Pest Name		Giant foxtail		large crabgrass		common lambsqu		Redroot pigweed		Black nightsha		Redroot pigweed		Black nightsha	
Crop Type, Code		C - -		C - -		C - -		C - -		C - -		C - -		C - -	
Crop Name		Potato		Potato		Potato		Potato		Potato		Potato		Potato	
Rating Date		8/9/2019		8/9/2019		8/9/2019		8/9/2019		8/9/2019		8/9/2019		8/9/2019	
Rating Type		CONTRO		CONTRO		CONTRO		CONTRO		CONTRO		CONTRO		CONTRO	
Rating Unit		%		%		%		%		%		%		%	
Trt		Treatment		Rate		Other		Other		Apppl		Apppl		Apppl	
No.		Name		Rate Unit		Rate		Rate Unit		Code		Code		Description	
1	Untreated									0 d		0 d		0 e	0 d
2	Sonalan HFP	2 pt/a	0.75 lb ai/a	A	POSTPLANT PRE mech incorp. 1-2"	114.0093				89.3 c	80.3 b	81 d		87.7 c	87.7 c
3	Sonalan HFP	2 pt/a	0.75 lb ai/a	A	POSTPLANT PRE mech incorp. 1-2"	235.4187 b				93 bc	84.3 b	88.3 c		88.3 bc	88.3 bc
	Metribuzin	8 oz/a	0.375 lb ai/a	A	POSTPLANT PRE mech incorp. 1-2"	243.756 ab									
4	Sonalan HFP	2 pt/a	0.75 lb ai/a	A	POSTPLANT PRE mech incorp. 1-2"	276.7107 ab				98.3 a	93 a	92.3 b		94.3 ab	94.3 ab
	Boundary	2 pt/a	1.63 lb ai/a	A	POSTPLANT PRE mech incorp. 1-2"										
5	Boundary	2 pt/a	1.63 lb ai/a	B	POSTPLANT PRE	256.484 ab				96.3 ab	94.7 a	94.7 ab		95 a	95 a
6	Boundary	2 pt/a	1.63 lb ai/a	B	POSTPLANT PRE	253.968 ab				99 a	96.7 a	96.7 a		99 a	99 a
	Reflex	1 pt/a	0.25 lb ai/a	B	POSTPLANT PRE										
7	Prowl H2O	2 pt/a	0.95 lb ai/a	B	POSTPLANT PRE	287.0707 a				98.3 a	96.3 a	96.3 a		99 a	99 a
	Metribuzin	7.04 oz/a	0.33 lb ai/a	B	POSTPLANT PRE										
8	Boundary	2 pt/a	1.63 lb ai/a	B	POSTPLANT PRE	281.1014 ab				99 a	98 a	98 a		99 a	99 a
	Prowl H2O	2 pt/a	0.95 lb ai/a	B	POSTPLANT PRE										
	Reflex	1 pt/a	0.25 lb ai/a	B	POSTPLANT PRE										
9	Boundary	2 pt/a	1.63 lb ai/a	B	POSTPLANT PRE	269.804 ab				99 a	96.3 a	96.3 a		99 a	99 a
	Alite27	2 fl oz/a	0.064 lb ai/a	B	POSTPLANT PRE										
LSD P=05						47.4295		4.43		4.11	5.77	3.5		6.09	6.09
CV						10.3		2.99		2.78	4.06	2.44		4.16	4.16

Means followed by same letter or symbol do not significantly differ (P=05, LSD).



## **Supplemental Progress Report, 2019-----March 12, 2020**

### **Pennsylvania Regional Potato Germplasm Evaluation Program, 2019**

**Xinshun Qu and Michael Peck**

**Department of Plant Pathology & Environmental Microbiology**

**The Pennsylvania State University**

The objective of this project is to find new breeding lines that are well adapted to Pennsylvania potato growing conditions and have qualities that are suitable for either processing or tablestock use. We cooperate with the directors of several other potato breeding programs from the Northeast US and a few programs from outside the Northeast by evaluating their potato germplasm. Data from this project helps breeders determine which lines to consider for potential release as new varieties, thereby bringing about new potato varieties for you.

Regional trials were established in three counties across Pennsylvania: Lehigh Co., Erie Co., and the Russell E. Larson Agricultural Research Center at Rock Springs, Centre Co. Please see the Progress Report from January 2020 for details. During the winter months, tests were performed to evaluate germplasm for chip and French fry processing. Presented in this report are the chip processing results (Tables 1-4) and French fry results (Tables 5-8). The data are collected from small samples, which may not reflect all possible variations one may see within a commercial harvest.

#### **Materials and Methods**

From harvest until November, tuber samples were placed in a pole barn where they were subjected to fluctuating temperatures. We did not perform out of the field chip testing this year. Storage temperatures are listed at the bottom of each table. The chipping procedure at the PSU Chip Lab was as follows. Four tubers from each breeding line/variety were peeled, cut in half, and sliced. Eight slices from the center of each half were used for chipping. Slices were fried at 365°F. The chip samples were rated on a scale of 1-10, which is in accordance with the Snack Food Color Chart. The oil used for chipping was soy-based oil (Bakers Chef heavy-duty oil). French fry tests were conducted as follows. Four tubers were peeled and cut into strips. Center strips (36 over the 4 tubers) were blanched in water for 3 minutes at 185°F then fried for 3 minutes at 365°F. The samples were rated using the USDA scale.

#### **Results**

Yield results and listings of noteworthy varieties/lines were provided in the January 2020 progress report.

#### **Chipping (Tables 1-4)**

There was no chipping directly out of the field (within two-three days of harvesting). Atlantic and Snowden are the standard varieties to use for comparing the chip color of the other lines.

There were a few noteworthy lines from the short term storage chipping in December. At Rock Springs, Atlantic, Snowden, AF5563-5, NDAF102629C-4, Lady Liberty, AF5819-2, MSAFB605-4, B3175-8, NY163, MSV358-3, ACO3433-1W, CO7070-13W, AF6200-7, AF6194-4, BNC723-4,

BNC742-2, BNC816-3, BNC819-2, BNC821-9 and B3385-2 had the best color; there were another 43 lines with color scores  $\leq 5$  and these lines had acceptable color. At Lehigh County, NDAF202629C-4, NY163, NY165, NY166 and MSAFB635-3 had the best color; Atlantic, Snowden, AF5563-5, WAF10664-3, B3148-12, Lady Liberty and NY162 had acceptable color. At Erie County, Snowden, AF5563-5, AF5040-8, Lady Liberty, NY162, NY163, NY165, NY166 and Huron Chipper had the best color; Atlantic, AF5819-2, NY161, MSY111-1 and MSZ120-4 had acceptable color.

From the results of the 3 week reconditioning the noteworthy lines are: At Rock Springs, Snowden, AF5280-5, AF5563-5, B3012-1, MSAFB605-4, MSAFB635-3, MSAFB635-15, B3175-8, NY163, MSV358-3, ACO3433-1W, CO7070-13W, AF6200-7, AF6237-3, AF6259-1, BNC811-22, BNC821-9, B3379-2, B3382-8 and B3403-6 had the best color; there were another 45 lines with color scores  $\leq 5$  and these lines had acceptable color. At Lehigh County, NDAF202629C-4, Lady Liberty, NY163 and NY166 had the best color; Atlantic, Snowden, AF5563-5, NY162, NY165 and MSAFB635-3 had acceptable color. At Erie County, Snowden, AF5819-2, Lady Liberty, NY162, NY163 and NY165 had the best color; Atlantic, AF5563-5, NY161, MSY111-1, AF5040-8, NY166, Huron Chipper and MSZ120-4 had acceptable color.

From the results of the 6 week reconditioning the noteworthy lines are: At Rock Springs, Snowden, AF5563-5, NY165, MSAFB605-4, NY163, NCB3171-7, ACO3433-1W, AF6197-8, BNC811-22, BNC818-9, BNC821-9, B3382-8, B3385-2 and B3423-9 had the best color; there were another 32 lines with color scores  $\leq 5$  and these lines had acceptable color. At Lehigh County, Snowden, AF5563-5, Lady Liberty, NY163, NY165 and MSAFB635-3 had the best color; Atlantic, NDAF202629C-4, WAF10664-3, NY162 and NY166 had acceptable color. At Erie County, Snowden, Lady Liberty, NY163 and NY165 had the best color; AF5563-5, NY162, NY166, Huron Chipper and MSZ120-4 had acceptable color.

From the results of the chipping directly from 45°F the noteworthy lines are: At Rock Springs, Snowden, AF5040-8, AF5563-5, NY165, MSAFB605-4, MSAFB635-3, NY163, NCB3171-7, ACO3433-1W, AF6237-3, BNC811-22 and B3385-2 had the best color; there were another 27 lines with color scores  $\leq 5$  and these lines had acceptable color. At Lehigh County, NY166 had the best color; Snowden, NDAF202629C-4, AF5563-5, Lady Liberty, NY162, NY163, NY165 and MSAFB635-3 had acceptable color. At Erie County, Lady Liberty, NY163 and NY166 had the best color; Snowden, AF5563-5, NY162, NY165 and Huron Chipper had acceptable color.

### **French fry Tests (Tables 5-8)**

At Rock Springs, ND8068-5Russ, A09022-4, A09136-9LB, AF6104-6, AF6118-5, WAF14010-3, AF6318-3, AF6340-6, AF6347-3, AF6357-2, AF6384-2 had the best French fry color. At Erie County, A09022-4, A12305-2adg, and AF5164-19 had the best color.

**The Pennsylvania Potato Research Program, the Pennsylvania Department of Agriculture and USDA funded this research in conjunction with donations. This research is the result of cooperation of growers, industry and PSU staff. The growers hosting the plots provided contributions (land, fertilizer, pesticides, time, etc.). University of Maine, Cornell University, USDA Beltsville, USDA Idaho, Colorado State University, Michigan State University, North Carolina State University potato breeding programs and Solanum International, Hanse Seed companies provided seed. Special thanks to Bob Leiby who made sure this project was completed. Bob Leiby and Potato Co-op provided PM223 for seed treatment and truck for county trial travels, and helped planting county trials and grading tubers.**

**Table 1.** Chip color results of potato evaluation in Plant Pathology & Environmental Microbiology Farm, Centre County, 2019.

Variety/ Line	Specific Gravity	Chip Color			
		Dec. <sup>1</sup>	Feb. <sup>2</sup>	Feb. <sup>3</sup>	Feb. <sup>4</sup>
Atlantic	1.083	3	4	5	5
Katahdin	1.064	6	6	-	-
Snowden	1.081	3	3	3	3
Superior	1.070	5	5	-	-
Yukon Gold <sup>y</sup>	1.075	5	7	-	-
AF5040-8 <sup>y</sup>	1.085	4	4	4	3
AF5225-1	1.071	6	7	-	-
AF5280-5	1.061	4	3	-	-
AF5563-5	1.071	3	3	3	3
AF5677-4	1.076	5	5	6	6
B3012-1	1.077	4	3	4	5
NDAF102629C-4	1.067	3	4	-	-
NY149 <sup>y</sup>	1.069	7	6	-	-
NY151	1.063	8	8	-	-
Lady Liberty	1.077	3	4	5	5
NY165	1.079	4	4	3	3
WAF10664-3	1.075	4	4	4	5
AF5819-2	1.073	3	4	-	-
MSAFB605-4	1.076	3	3	3	3
MSAFB609-12	1.080	4	4	4	4
MSAFB635-3	1.078	4	3	4	3
MSAFB635-15	1.086	6	3	4	5
WAF13058-1 <sup>y</sup>	1.069	5	4	5	7
B2869-29	1.089	4	5	6	7
B3083-4	1.068	8	7	8	9
B3148-12 <sup>y</sup>	1.074	7	5	6	6
B3168-3	1.069	5	4	4	5
BNC182-5	1.079	4	4	5	7
BNC369-4	1.073	7	5	4	6
B3175-8	1.080	3	3	5	4
NY161 <sup>y</sup>	1.070	6	5	-	-
NY163	1.082	3	3	3	3
NY166	1.074	4	4	4	4
NY167	1.067	4	4	-	-
NCB3171-7	1.078	4	4	3	3
NC606-23 <sup>y</sup>	1.063	6	6	7	-
MSY111-1	1.063	5	6	-	-
MSV358-3	1.067	3	3	4	5
Huron Chipper	1.082	4	4	5	4
MSZ022-19	1.073	4	3	4	5
MSV093-1Y <sup>y</sup>	1.068	5	4	-	-
MSV179-1	1.067	4	4	4	6
MSX156-1Y <sup>y</sup>	1.066	7	8	-	-
MSZ120-4	1.079	4	3	5	5
ACO3433-1W	1.068	3	4	3	3
CO7070-13W	1.074	3	3	4	4
AF5931-1	1.066	5	3	-	-
WAF14096-5 <sup>y</sup>	1.072	6	5	-	-
AF6197-8	1.078	4	4	3	4
AF6200-7	1.093	3	3	4	5

**Table 1.** Continued

Variety/ Line	Specific Gravity	Chip Color			
		Dec. <sup>1</sup>	Feb. <sup>2</sup>	Feb. <sup>3</sup>	Feb. <sup>4</sup>
AF6225-5	1.071	4	4	-	-
AF6237-3	1.082	4	3	4	3
AF6245-6	1.083	6	7	6	7
WAF15221-2	1.082	5	4	5	5
AF6194-4	1.071	3	4	-	-
AF6259-1	1.075	5	3	-	-
B3292-5	1.069	6	5	5	6
B3295-5	1.075	6	7	6	-
B3297-5	1.078	7	6	-	-
BNC723-4	1.072	3	4	5	4
BNC726-5	1.091	4	4	4	-
BNC742-2	1.080	3	4	4	4
BNC811-22	1.083	4	3	3	3
BNC811-33	1.082	5	5	6	6
BNC811-35	1.075	5	4	5	4
BNC815-6	1.082	6	6	-	-
BNC815-7	1.073	7	7	-	-
BNC816-3	1.071	3	4	-	-
BNC818-9	1.078	4	5	3	5
BNC819-2	1.088	3	4	5	4
BNC821-9	1.078	3	3	3	5
B3379-1	1.083	4	4	-	-
B3379-2	1.093	4	3	-	-
B3381-4 <sup>y</sup>	1.087	5	6	-	-
B3382-8	1.081	5	3	3	5
B3385-2	1.076	3	5	3	3
B3390-6	1.072	5	5	4	6
B3397-1	1.079	4	5	6	6
B3403-6	1.081	4	3	4	4
B3410-12 <sup>y</sup>	1.072	5	5	6	6
B3421-1	1.083	4	4	5	5
B3423-9	1.076	4	5	3	4

<sup>1</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and chipped on December 2 & 3, 2019.

<sup>2</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to chipping on February 3 & 4, 2020.

<sup>3</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to chipping on February 24 & 25, 2020.

<sup>4</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 and chipped on February 25 & 26, 2020.

Chip color is based on a 1 – 10 scale with 1 = lightest, 10 = darkest, 1 – 5 = acceptable chip color.

y = Yellow Flesh

**Table 2.** Chip color results of potato evaluation in Forrest Wessner Farm, Lehigh County, 2019.

Variety/ Line	Specific Gravity	Chip Color			
		Dec. <sup>1</sup>	Feb. <sup>2</sup>	Feb. <sup>3</sup>	Feb. <sup>4</sup>
Atlantic	1.099	5	4	4	6
Snowden	1.090	4	4	3	4
AF5225-1	1.080	7	7	-	-
AF5280-5	1.069	6	6	-	-
NDAF202629C-4	1.078	3	3	4	4
AF5563-5	1.086	4	4	3	4
WAF10664-3	1.081	5	6	5	7
B3148-12 <sup>y</sup>	1.077	5	8	-	-
BNC369-4	1.086	6	6	-	-
NY161	1.072	6	6	-	-
MSV093-1Y <sup>y</sup>	1.076	6	6	-	-
Lady Liberty	1.080	4	3	3	4
NY162	1.103	4	4	4	5
NY163	1.098	3	3	3	4
NY165	1.083	3	4	3	4
NY166	1.088	3	3	4	3
MSAFB635-3	1.091	3	4	3	4
B3012-1	1.083	7	6	-	-
NC606-23 <sup>y</sup>	1.067	7	7	-	-

<sup>1</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and chipped on December 4, 2019.

<sup>2</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to chipping on February 5, 2020.

<sup>3</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to chipping on February 25, 2020.

<sup>4</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 and chipped on February 26, 2020.

Chip color is based on a 1 – 10 scale with 1 = lightest, 10 = darkest, 1 – 5 = acceptable chip color.

y = Yellow Flesh

**Table 3.** Chip color results of potato evaluation in Mark Troyer Farm, Erie County, 2019.

Variety/ Line	Specific Gravity	Chip Color			
		Dec. <sup>1</sup>	Feb. <sup>2</sup>	Feb. <sup>3</sup>	Feb. <sup>4</sup>
Atlantic	1.077	4	4	6	6
Snowden	1.073	3	3	3	4
AF5225-1	1.066	8	7	-	-
AF5563-5	1.070	3	4	5	4
AF5819-2	1.065	4	3	-	-
NY149 <sup>y</sup>	1.067	6	6	-	-
NY161 <sup>y</sup>	1.065	5	5	-	-
MSX156-1Y <sup>y</sup>	1.059	7	7	-	-
MSY111-1	1.064	4	4	-	-
AF5040-8 <sup>y</sup>	1.088	3	4	6	6
Lady Liberty	1.072	3	3	3	3
NY162	1.074	3	3	5	5
NY163	1.081	3	3	3	3
NY165	1.076	3	3	3	4
NY166	1.073	3	4	4	3
Huron Chipper	1.080	3	4	4	5
MSZ120-4	1.073	4	5	4	6

<sup>1</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and chipped on December 4, 2019.

<sup>2</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to chipping on February 5, 2020.

<sup>3</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to chipping on February 25, 2020.

<sup>4</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 and chipped on February 26, 2020.

Chip color is based on a 1 – 10 scale with 1 = lightest, 10 = darkest, 1 – 5 = acceptable chip color.

y = Yellow Flesh

**Table 4.** Chip color results of NE1731 potato evaluation in Plant Pathology & Environmental Microbiology Farm, 2019.

Variety/ Line	Specific Gravity	Chip Color			
		Dec. <sup>1</sup>	Feb. <sup>2</sup>	Feb. <sup>3</sup>	Feb. <sup>4</sup>
Atlantic	1.083	3	4	5	5
Katahdin	1.064	6	6	-	-
Snowden	1.081	3	3	3	3
Superior	1.070	5	5	-	-
Yukon Gold <sup>y</sup>	1.075	5	7	-	-
AF5040-8 <sup>y</sup>	1.085	4	4	4	3
AF5225-1	1.071	6	7	-	-
AF5280-5	1.061	4	3	-	-
AF5563-5	1.071	3	3	3	3
AF5677-4	1.076	5	5	6	6
B3012-1	1.077	4	3	4	5
NDAF102629C-4	1.067	3	4	-	-
NY149 <sup>y</sup>	1.069	7	6	-	-
NY151	1.063	8	8	-	-
Lady Liberty	1.077	3	4	5	5
NY165	1.079	4	4	3	3
WAF10664-3	1.075	4	4	4	5

<sup>1</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and chipped on December 2 & 3, 2019.

<sup>2</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to chipping on February 3 & 4, 2020.

<sup>3</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to chipping on February 24 & 25, 2020.

<sup>4</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 and chipped on February 25 & 26, 2020.

Chip color is based on a 1 – 10 scale with 1 = lightest, 10 = darkest, 1 – 5 = acceptable chip color.

y = Yellow Flesh

**Table 5.** Total yield, greater than 1 7/8” yield, specific gravity, and French fry color for russet skinned or long white potato evaluation trial in Centre County, Plant Pathology & Environmental Microbiology Farm, 2019.

Variety/ Line	Yield (cwt/A) <sup>1</sup>		% of Standard <sup>2</sup>	Percent <sup>3</sup> Pickouts	Specific Gravity	French Fry Color <sup>4</sup>		
	Total	>1 7/8”				Dec. <sup>5</sup>	Jan. <sup>6</sup>	Feb. <sup>7</sup>
<b>Replicated</b>								
Norkotah Russet	227	140	100	28	1.066	1	1	0
Reveille Russet	311	195	139	29	1.063	1	1	2
Russet Burbank	460	191	136	54	1.081	1	1	1
AF5164-19	362	230	164	32	1.070	1	00	0
AF5406-7	336	203	145	35	1.070	1	0	1
AF5468-5	346	240	171	26	1.066	1	1	1
ND8068-5Russ	152	107	77	13	1.078	0	00	0
TX08352-5RU	235	169	121	24	1.057	0	1	1
A08510-1LB	359	207	147	24	1.083	1	0	0
A09022-4	274	143	102	36	1.076	00	00	00
COA11013-2	340	189	135	32	1.057	1	00	1
A09136-9LB	346	184	131	43	1.088	0	00	00
A12305-2adg	458	291	207	34	1.079	1	0	0
A08422-4sto	332	216	154	32	1.075	1	1	1
<b>Non-replicated</b>								
Norkotah Russet	293	211	100	20	1.059	1	1	0
AF6104-6	248	172	81	17	1.074	0	00	00
AF6118-5	371	194	92	37	1.082	0	0	00
WAF14006-6	444	329	156	23	1.067	1	0	0
WAF14010-3	271	122	58	49	1.068	0	0	00
AAF11263-1	328	268	127	15	1.086	0	0	-
AF6307-3	295	187	88	31	1.076	1	0	1
AF6318-3	288	180	85	26	1.073	0	0	00
AF6340-6	287	238	113	8	1.066	0	0	0
AF6347-3	307	237	112	11	1.073	00	00	00
AF6357-2	344	219	104	33	1.075	0	0	0
AF6370-1	251	188	89	14	1.069	0	0	1
AF6384-2	332	236	112	27	1.080	00	00	00
NDAF13242B-3	218	184	87	16	1.081	1	0	00
NDAF13242B-8	318	240	113	22	1.078	1	1	1

<sup>1</sup> Yield Total = all yield including pickouts. Yield >1 7/8” = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup> Percentage of the standard, Atlantic for >1 7/8” yield.

<sup>3</sup> Percentage of total that are pickouts.

<sup>4</sup> French Fry Color: USDA Scale Color Standers for Frozen Fried Potatoes with 000 = lightest, 4 = darkest.

<sup>5</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and fried on December 9, 2019.

<sup>6</sup> Jan. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to frying on January 27 & 28, 2020.

<sup>7</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to frying on February 18 & 19, 2020.

Replicated trials are the average of 3 replicates except for those lines which were non-replicated.



**Table 6.** Total yield, greater than 1 7/8” yield, specific gravity, and French fry color for russet skinned or long white potato evaluation trial in Lehigh County, Forrest Wessner Farm, 2019.

Variety/ Line	Yield (cwt/A) <sup>1</sup>		% of Standard <sup>2</sup>	Percent <sup>3</sup> Pickouts	Specific Gravity	French Fry Color <sup>4</sup>		
	Total	>1 7/8”				Dec. <sup>5</sup>	Jan. <sup>6</sup>	Feb. <sup>7</sup>
Atlantic	369	329	100	7	1.099	-	-	-
Belmonda <sup>y</sup>	398	347	106	5	1.093	1	1	2
Caribou	191	158	48	6	1.079	1	1	2
Norkotah Russet	135	98	30	17	1.080	1	1	2

<sup>1</sup> Yield Total = all yield including pickouts. Yield >1 7/8” = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup> Percentage of the standard, Atlantic for >1 7/8” yield.

<sup>3</sup> Percentage of total that are pickouts.

<sup>4</sup> French Fry Color: USDA Scale Color Standers for Frozen Fried Potatoes with 000 = lightest, 4 = darkest.

<sup>5</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and fried on December 5, 2019.

<sup>6</sup> Jan. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to frying on January 27, 2020.

<sup>7</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to frying on February 18, 2020.

Non – replicated trial.

Russets and long whites were planted 10-in. apart with 24 seed pieces per 20-ft plot, Atlantic were spaced 8-in. apart with 30 seed pieces per 20-ft plot.

y = Yellow Flesh

**Table 7.** Total yield, greater than 1 7/8” yield, specific gravity, and French fry color for russet skinned or long white potato evaluation trial in Erie County, Mark Troyer Farm, 2019.

Variety/ Line	Yield (cwt/A) <sup>1</sup>		% of Standard <sup>2</sup>	Percent <sup>3</sup> Pickouts	Specific Gravity	French Fry Color <sup>4</sup>		
	Total	>1 7/8”				Dec. <sup>5</sup>	Jan. <sup>6</sup>	Feb. <sup>7</sup>
Atlantic	388	252	100	31	1.077	-	-	-
Norkotah Russet	404	211	84	42	1.061	1	1	1
A08422-4sto	530	372	148	27	1.076	0	1	1
A09022-4	383	232	92	35	1.078	00	00	00
A12305-2adg	538	272	108	45	1.076	0	0	0
A08510-1LB	444	335	133	13	1.077	0	0	1
TX08352-5Ru	293	107	43	57	1.051	0	0	2
AF5164-19	467	238	95	46	-	00	00	00
AF5468-5	458	343	136	22	1.067	0	1	1
AF5406-7	343	194	77	38	1.066	1	1	1
Reveille Russet	353	188	75	43	1.061	1	1	2
Belmonda <sup>y</sup>	547	361	143	32	1.079	1	2	2

<sup>1</sup> Yield Total = all yield including pickouts. Yield >1 7/8” = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup> Percentage of the standard, Atlantic for >1 7/8” yield.

<sup>3</sup> Percentage of total that are pickouts.

<sup>4</sup> French Fry Color: USDA Scale Color Standards for Frozen Fried Potatoes with 000 = lightest, 4 = darkest.

<sup>5</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and fried on December 5, 2019.

<sup>6</sup> Jan. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to frying on January 27, 2020.

<sup>7</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to frying on February 18, 2020.

Non – replicated trial.

Russets and long whites were planted 10-in. apart with 24 seed pieces per 20-ft plot, Atlantic were spaced 8-in. apart with 30 seed pieces per 20-ft plot.

y = Yellow Flesh

**Table 8.** Total yield, greater than 1 7/8” yield, specific gravity, and French fry color for russet skinned or long white NE1731 potato evaluation trial in Plant Pathology & Environmental Microbiology Farm, 2019.

Variety/ Line	Yield (cwt/A) <sup>1</sup>		% of Standard <sup>2</sup>	Percent <sup>3</sup> Pickouts	Specific Gravity	French Fry Color <sup>4</sup>		
	Total	>1 7/8”				Dec. <sup>5</sup>	Jan. <sup>6</sup>	Feb. <sup>7</sup>
Atlantic	262	239	100	6	1.083	-	-	-
Reveille Russet	296	185	77	29	1.063	1	1	2
Russet Burbank	445	200	84	50	1.081	1	1	1
AF5164-19	367	231	97	34	1.070	1	00	0
AF5406-7	311	200	83	30	1.070	1	0	1
AF5468-5	346	236	99	27	1.066	1	1	1
ND8068-5Russ	137	97	41	15	1.078	0	00	0
TX08352-5RU	226	152	63	28	1.057	0	1	1

<sup>1</sup> Yield Total = all yield including pickouts. Yield >1 7/8” = categories 2, 3, 4 and 5 excluding pickouts.

<sup>2</sup> Percentage of the standard, Russet Norkotah for >1 7/8” yield.

<sup>3</sup> Percentage of total that are pickouts.

<sup>4</sup> French Fry Color: USDA Scale Color Standers for Frozen Fried Potatoes with 000 = lightest, 4 = darkest.

<sup>5</sup> Dec. = Stored at 55<sup>0</sup>F from November 26, 2019 and fried on December 19, 2019.

<sup>6</sup> Jan. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F three weeks prior to frying on January 27 - 28, 2020.

<sup>7</sup> Feb. = Stored at 45<sup>0</sup>F from December 3, 2019 than transferred to 55<sup>0</sup>F six weeks prior to frying on February 18 - 19, 2020.

Replicated trials are the average of 4 replicates

## Yellow Flesh Notes

We rated the yellow flesh in February.

We used Yukon Gold that was grown at Rock Springs

Scale:

YF1 - lighter than Yukon Gold

YF2 – equal to Yukon Gold

YF3 - darker than Yukon Gold

Rock Springs

**Germplasm Trial**

YF 1

YF 2

AF5040-8

WAF13058-1

NY149

NC606-23

NCB2607-3 (Red Skin)

B3152-17 (Red Skin)

B3381-4

B3410-12

BNC718-1 (Purple Skin)

MSV093-1Y

Connect

Melody

YF 3

WAF14096-5

NY161

B3148-12

BNC716-1 (Red Skin)

MSX156-1Y

## Purple Flesh Variety

1 - B3372-1 (Purple skin)

1 – NC509-16 (Purple Skin)

1 – BNC502-10 (Purple skin)

2 – B3355-6 (Purple Skin) nice dark flesh, small white center.

3 - B3364-3 (Purple Skin)

4 – BNC833-2 (Purple Skin) some light color in flesh

5 – AF5412-3 (Purple Skin)

## Red Flesh Variety

AF5414-1 (Red Skin). Pink flesh color, with small white center

AF6280-1 (Red Skin). Pink flesh color, with larger white center

## Yellow Flesh Notes

We rated the yellow flesh in February.

We used Yukon Gold that was grown at Rock Springs

Scale:

YF1 - lighter than Yukon Gold

YF2 – equal to Yukon Gold

YF3 - darker than Yukon Gold

Rock Springs

**Early Season Trial**

YF 1

YF 2

Peter Wilcox (Purple Skin)

B2152-17 (Red Skin)

B3224-4 (Purple Skin)

BNC716-1 (Red Skin)

NCB2607-3 (Red Skin)

Red Apple (Red Skin)

Bonnate

Prada

YF 3

WAF14096-5

CO05037-3W/Y

Belmonda

Sunshine

Erika

Queen Anne

## Purple Flesh Variety

1 - B3372-1 (Purple skin) dark purple flesh

2 – NC502-10 (Purple Skin) dark purple flesh

3 – B3372-6 (Purple skin) some light color in flesh

4 – BNC833-2 (Purple Skin) some light color in flesh

5 - B3364-3 (Purple Skin) some light color in flesh

## Red Flesh Variety

BNC831-8 (Red Skin) red flesh with small white center

AF6280-1 (Red Skin) pink flesh color, with white center