Pennsylvania Potato Research Report, 2020

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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 blight, late blight and common 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 2020 field 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 89 round whites with a few yellow flesh, 25 red-skinned (a few purple skinned) and 29 russet or long white types. An early season variety trial of 28 varieties was conducted at Rock Springs. The Northampton Co. location and Erie Co. location had 31 and 29 varieties, respectively. Snack Food Association trial of 11 chipping varieties was conducted in Chambersburg. Breeding lines were contributed by the USDA-ARS, New York, Maine, North Carolina, Michigan, Idaho, Colorado, Wisconsin and a few other sources. See **Pennsylvania Regional Potato Germplasm Evaluation Program, 2020 on pages 1-2, and tables from different locations on pages 3-30, management information sites on page 31; descriptions of promising varieties for Pennsylvania on pages 32-36; supplemental progress report on pages 42-43 and tables from different locations on pages 44-49; and notes on fresh colors of potato varieties/lines on pages 50-51.**

2. Breeding for Disease Resistance

In three separate field trials, 27 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 considered as resistant or moderately resistant as the tolerant check: Reveille Russet, AF5414-1, TX08352-5Ru and NY165. Only a few small superficial lesions were observed on some tubers of these cultivars/lines. See **Field evaluation of potato cultivars and breeding lines for resistance to common scab in Pennsylvania, 2020 on page 37.**

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. The cultivar Kennebec was the moderately resistant check. Based on AUDPC values, AF5414-1, AF5412-3, AF5677-4, NY165, AF5406-7, and Russet Burbank were observed with

significantly less disease than Kennebec; NY152 (Lady Liberty) and NY151 were not significantly more or less resistant than cv. Kennebec. See **Evaluation of potato cultivars and breeding lines for resistance to late blight in Pennsylvania, 2020 on page 38.**

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. Four other cultivars/lines were characterized as moderately resistant because their AUDPC values were not significantly different from the moderately resistant checks: AF5406-7, Katahdin, Snowden and WAF10664-3. See **Evaluation of potato cultivars and breeding lines for resistance to early blight in Pennsylvania, 2020 on page 39.**

3. Chemical Control of Potato Late Blight and Early Blight

In late blight fungicide trial, 8 treatments were compared to an untreated control. All treatments significantly reduced foliar late blight severity compared to the unsprayed control. All foliar treatments significantly increased total yield of tubers compared to the unsprayed control. All treatments except treatments Zoxium 240SC 12.8 fl oz + Reason 500SC 5.5 fl oz and Reason 500SC 5.5 fl oz + Previcur Flex 6F 1.2 pt significantly increased marketable yield of tubers compared to the unsprayed control. See **Field evaluation of foliar fungicides for control of potato late blight in Pennsylvania, 2020 on page 40.**

In early blight fungicide trial, 6 treatments were compared to an untreated control. All foliar fungicide treatments significantly reduced foliar early blight compared to the unsprayed control. All foliar treatments significantly increased total and marketable yield of tubers compared to the unsprayed control. Extending the spray interval and reducing the total number of applications from four to three did not reduce fungicide efficacy. There were no significant differences in AUDPC, total yield and marketable yield among foliar treatments. See **Evaluation of fungicides for control of potato early blight in Pennsylvania, 2020 on page 41.**

Progress Report---December 2020

Pennsylvania Regional Potato Germplasm Evaluation Program, 2020

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The objective of this project is to find new potato varieties and advanced 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: Northampton Co. (Tables 1- 2), Erie Co. (Tables 3-4) and Rock Springs, Centre Co. (Tables 5-12). The Northampton location and Erie location had 31 and 29 varieties/lines in non-replicated trial, respectively. At the Rock Springs location the trials included 48 round whites with a few yellow flesh, 16 red-skinned (a few purple skinned) and 13 russet or long white types in replicated plots, and an additional 41 whites, 9 red-skinned and 16 russet or long white types planted in non-replicated observational plots. At Northampton 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 28 varieties was conducted at Rock Springs, Centre Co. (Tables 13-14). Snack Food Association trial of 11 chipping varieties was conducted by PA co-op at Bryan Bender's Farm in Chambersburg (Tables 15-16). The summer was hot and dry. Management information for each site is provided in Table 17. 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 will be conducted over the next few months.

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:

Northampton county trial:
In the Northampton location the following lines had marketable yield higher than Atlantic: Katahdin, Snowden, Superior, Chieftain, AAC Hamer, AF5225-1, AF5280-5, AF5563-5, B3292-5, Constance, NDAF113484B-1, BNC716-1, Red Prairie, MSZ416-8R/Y, NY165, B2869-29, and Eva.

Erie county trial:

In the Erie location, AF4831-2 had marketable yield higher than Atlantic.

Round white planted 8-inch apart in Rock Springs:
Based on data of replicated trials at Rock Springs, there were 8 round white clones with marketable yields significantly higher than Atlantic: Snowden, AF5225-1, AF5819-2, NY161, NY166, Melody, Connect, and Constance; there were another 25 round white clones with marketable yields higher than Atlantic. In non-replicated trial, there were 20 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, Certa KWS had marketable yields significantly higher than Chieftain; there were another 4 red-skinned or purple-skinned clones with marketable yields higher than Chieftain: AF5412-3, Red Prairie, MSZ416-8RY, and A08122-9RY. In non-replicated trial, COAF15129-3 and B3372-1 had marketable yields higher than Chieftain.

Russet-skinned or white planted 10-inch apart in Rock Springs:
Based on data of replicated trials at Rock Springs, WAF13027-2 had marketable yield higher than Russet Norkotah. In non-replicated trial, WAF14006-6, WAF14010-3, AF6370-1, AF6503-2, AAF12139-1, AAF12147-6 and AF6438-2 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, Yukon Gold, AF4831-2, NY160, Belmonda, AF5412-3, BNC716-1, BNC718-1, Envo, B2869-29 and Atlantic had marketable yields higher than Superior. In non-replicated trial, BNC833-2, B3355-6, B3372-1, NDAF14113Y-3 and NDAF14114YCB-3 had marketable yields higher than Superior.

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, University of Wisconsin potato breeding programs and Solanum International, Parkland Seed, Sterman Masser Inc. provided seed. Special thanks to Bob Leiby who made sure this project was completed.

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 Garry Hunsicker's Farm, Northampton County, 2020

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific Gravity
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		
Atlantic	172	155	90	100	38	52	0	0	5	1.069
Katahdin	184	167	90	108	34	43	13	0	3	1.045
Snowden	257	221	86	143	51	33	2	0	7	1.066
Superior	200	181	91	117	57	27	6	0	5	1.060
Yukon Gold [y]	172	129	75	84	40	35	0	0	0	1.050
Chieftain	278	184	66	119	29	37	0	0	29	1.052
AAC Hamer	206	165	80	107	54	26	0	0	5	1.070
AF5225-1	233	222	96	144	72	24	0	0	4	1.051
AF5280-5	274	235	86	152	46	40	0	0	8	1.052
AF5563-5	192	162	84	104	37	47	0	0	7	1.061
AF5677-4	128	104	81	67	64	17	0	0	3	1.072
B3292-5	289	240	83	155	54	30	0	0	5	1.054
NY161 [y]	221	138	63	89	52	10	0	0	11	1.048
MSV093-1Y [y]	101	47	47	30	39	8	0	0	48	1.046
NC606-23 [y]	163	117	72	75	40	32	0	0	12	1.049
Queen Anne [y]	178	76	43	49	43	0	0	0	0	1.045
Melody [y]	202	118	58	76	53	5	0	0	2	1.035
Krone y	133	30	23	19	23	0	0	0	20	1.052
Constance [y]	181	167	92	108	53	39	0	0	3	1.056
Isle Royale	171	140	82	90	52	29	0	0	2	1.043
NDAF113484B-1	192	172	90	111	53	37	0	0	1	1.044
BNC716-1 [y]	254	246	97	159	22	64	10	0	1	1.035
W8893-1R	180	148	82	96	56	26	0	0	4	1.056
Red Prairie	284	192	67	124	56	11	0	0	5	1.040
CO97232-2R/Y [y]	203	144	71	93	63	8	0	0	1	1.048
MSZ416-8R/Y [y]	241	218	90	141	40	42	8	0	2	1.035
NC509-16 [p]	130	59	46	38	46	0	0	0	8	1.061

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific Gravity
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		
NY165	225	192	86	124	63	23	0	0	1	1.062
B2869-29	280	248	89	161	41	42	5	0	1	1.063
Eva	185	168	91	109	25	66	0	0	5	1.051
Belmonda [y]	181	146	81	94	53	23	4	0	7	1.058

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

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

[3]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.

[4]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 [y] for yellow, [p] for purple.

Table 2. Tuber characteristics, internal defects for potato evaluation trial in Garry Hunsicker's Farm, Northampton County, 2020

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Atlantic	6	6	6	2	7	7	0	40	PO=Soft Rot, green
Katahdin	5	6	7	3	7	6	0	90	PO=Second tubers
Snowden	5	6	6	2	7	7	0	80	PO=Green, growth cracks
Superior	6	5	6	3	7	5	0	100	PO= Growth cracks, green
Yukon Gold	5	6	7	2	7	7	0	20	PO= Growth cracks
Chieftain	5	2	7	2	6	7	0	20	PO= Second tubers
AAC Hamer	6	7	8	2	7	7	0	40	PO=Green
AF5225-1	5	6	6	2	7	6	0	60	PO=Misshape, green
AF5280-5	5	6	6	2	7	7	0	50	PO= Second growth, green
AF5563-5	5	6	7	2	7	7	0	80	PO=Growth cracks, second tubers
AF5677-4	5	7	7	2	7	7	0	100	PO=Green
B3292-5	5	6	7	2	7	7	0	70	PO= Growth cracks, green
NY161	5	5	6	2	7	6	0	30	PO=Second tubers, growth cracks
MSV093-1Y	3	7	6	2	7	6	0	20	PO=Second tubers, misshape
NC606-23	5	7	6	3	7	6	0	20	PO=Green, misshape
Queen Anne	6	9	8	4	7	5	0	0	
Melody	5	7	8	2	7	6	0	10	PO= Second tubers
Krone	5	7	8	3	7	5	0	40	PO=Knobs
Constance	6	9	7	3	7	6	0	10	PO=Green, knobs
Isle Royale	4	2	7	2	6	7	0	10	PO=Green
NDAF113484B-1	5	2	7	3	6	7	0	10	PO=Green
BNC716-1	5	2	7	2	5	7	0	20	PO=Green
W8893-1R	5	2	8	2	7	7	0	0	PO= Growth cracks, green
Red Prairie	5	2	7	2	7	7	0	0	PO= Second tubers, green
CO97232-2R/Y	6	2	6	2	7	7	0	10	PO=Green
MSZ416-8R/Y	4	2	7	2	7	7	0	80	PO=Green
NC509-16	5	1	7	3	7	5	0	50	PO=Knobs, misshape

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
NY165	6	6	6	2	7	7	0	20	PO=Green
B2869-29	5	6	7	2	7	7	0	50	PO=Green, sprouts
Eva	5	6	6	2	7	7	0	60	PO=Green
Belmonda	6	9	7	3	7	6	0	20	Po=Green, misshape

[1]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.

[2]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, 2020

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		Gravity
Atlantic	345	288	83	100	33	44	6	0	11	1.088
Katahdin	188	115	61	40	14	38	9	0	36	1.071
Snowden	185	153	83	53	32	51	0	0	10	1.081
Superior	107	67	62	23	33	29	0	0	31	1.064
Chieftain	303	219	72	76	11	41	20	0	26	1.063
Yukon Gold [y]	171	141	83	49	16	42	19	5	16	1.075
Corsica [y]	250	183	73	63	39	27	7	0	21	1.076
NDAF102629C-4	153	75	49	26	21	28	0	0	42	1.066
NY161 [y]	291	207	71	72	44	26	2	0	19	1.069
AAC Hamer [y]	365	246	67	85	41	22	5	0	23	1.071
AF4831-2	385	301	78	105	55	24	0	0	5	1.062
NDAF113484R-1	187	149	80	52	30	49	0	0	14	1.063
B2152-17 [y]	270	206	76	71	49	27	0	0	2	1.066
Isle Royale	135	105	78	37	50	22	6	0	5	1.067
NY163	267	231	87	80	51	33	2	0	8	1.086
NY165	107	82	76	28	22	42	11	0	20	1.075
NY166	272	203	75	70	37	34	4	0	21	1.075
B2862-29	189	135	71	47	26	37	9	0	23	1.085
NCB3259-2	252	192	76	67	35	38	3	0	9	1.088
MSZ120-4	215	160	74	56	21	54	0	0	22	1.080
MSZ242-09	250	179	72	62	24	46	2	0	22	1.093
W14NYQZ9-5	190	134	70	46	12	31	26	0	28	1.083
Russet Norkotah *	174	129	74	45	39	14	21	0	12	1.051
A09022-4 *	172	123	71	43	45	26	0	0	13	1.077
A07908-6CR *	243	195	80	68	40	31	5	4	5	1.074
W14002-2rus *	221	175	79	61	53	16	10	0	7	1.060
W14904-13rus *	182	105	57	36	23	21	14	0	35	1.071

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific Gravity
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		
NCB3260-1	166	123	74	43	52	22	0	0	9	1.089
MSV179-1	123	104	85	36	25	60	0	0	8	1.068

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

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

[3]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.

[4]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 [y] for yellow.

Table 4. Tuber characteristics, internal defects for potato evaluation trial in in Mark Troyer Farm, Erie County, 2020

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Atlantic	5	6	6	3	6	6	50	0	PO=Green, growth cracks
Katahdin	4	6	7	3	6	5	30	0	PO=Green, misshape
Snowden	5	6	6	2	7	7	70	0	PO=Green, growth cracks
Superior	6	6	6	4	5	5	0	0	PO=Green, growth cracks
Chieftain	5	2	7	3	5	5	0	0	PO=Misshape, growth cracks, green
Yukon Gold	5	7	7	3	7	5	40	0	PO=Green, growth cracks
Corsica	5	9	6	3	7	5	20	0	PO= Green, knobs
NDAF102629C-4	5	8	7	2	7	6	0	0	PO=Green, growth cracks
NY161	5	9	8	2	5	6	0	0	PO=Green, growth crack
AAC Hamer	5	6	6	3	7	5	0	0	PO= Green, knobs, misshape
AF4831-2	4	2	7	3	6	6	0	0	PO= Growth cracks, green
NDAF113484R-1	5	2	7	2	7	7	0	0	PO=Green
B2152-17	6	2	8	2	6	6	0	0	PO= Green, misshape
Isle Royale	5	2	7	3	6	5	0	30	PO= Green, knobs
NY163	5	7	7	3	5	5	0	0	PO= Growth cracks, green
NY165	4	7	7	3	5	6	0	0	PO= Green, misshape
NY166	5	7	7	3	6	5	20	0	PO= Green, growth cracks, misshape
B2862-29	3	7	6	3	5	5	40	0	PO= Green, misshape
NCB3259-2	4	7	6	3	5	6	30	0	PO=Green
MSZ120-4	4	7	7	2	4	5	30	0	PO= Green, knobs, misshape
MSZ242-09	4	6	5	3	4	5	0	10	PO= Green, misshape
W14NYQZ9-5	4	6	6	2	6	6	60	0	PO=Green
Russet Norkotah	5	4	3	5	7	4	30	0	PO= Green, misshape
A09022-4	4	6	6	5	6	5	10	0	PO=Misshape, green
A07908-6CR	5	5	3	5	7	5	10	0	PO= Growth cracks, green
W14002-2rus	5	5	5	5	7	5	0	0	PO= Green, growth cracks
W14904-13rus	4	5	3	4	7	5	0	10	PO= Green, knobs

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
NCB3260-1	6	7	6	2	7	6	20	0	PO=Green
MSV179-1	6	7	7	2	7	7	0	0	PO= Green, misshape

[1]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.

[2]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, 2020

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]					Specific
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5	%PO[4]	Gravity
Replicate										
Atlantic	302	248	82	100	9	48	24	0	17	1.088
Katahdin	298	242	81	98	29	43	8	0	15	1.073
Reba	302	275	91	111	31	53	7	0	7	1.074
Snowden	387	364	94	147	34	55	6	0	3	1.084
Superior	198	170	87	68	31	52	4	0	7	1.074
Yukon Gold [y]	302	262	88	106	8	38	37	5	11	1.083
AF5280-5	307	238	78	96	26	52	1	0	15	1.063
AF5563-5	331	282	85	114	24	46	15	0	11	1.078
AF5677-4	377	324	86	131	30	51	4	0	10	1.089
B3012-1	357	328	92	132	50	38	4	0	2	1.083
NDAF102629C-4	246	216	88	87	29	55	4	0	10	1.071
NY149 [y]	328	274	83	111	49	34	0	0	5	1.070
NY151	440	269	61	109	17	37	7	0	35	1.071
NY152	382	332	86	134	47	39	0	0	9	1.077
NY165	342	318	93	128	31	54	7	0	4	1.084
WAF10664-3	360	292	81	118	24	49	7	0	16	1.078
AF5225-1	553	448	81	181	30	49	3	0	10	1.075
AF5819-2	400	350	87	141	19	52	16	0	10	1.073
MSAFB605-4 [y]	335	278	83	112	30	46	7	0	14	1.081
MSAFB609-12	390	318	82	128	29	48	5	0	13	1.064
MSAFB635-3	387	318	82	128	21	47	14	0	16	1.078
MSAFB635-15	302	259	86	105	41	40	4	0	10	1.085
B3292-5	362	268	73	108	30	41	2	0	19	1.074
NY161 [y]	440	376	85	152	33	50	2	0	8	1.074
NY163	378	336	89	136	33	54	2	0	7	1.087
NY166	430	365	86	148	37	44	5	0	9	1.077
NC587-10 [y]	386	149	38	60	33	5	0	0	24	1.097
NC606-23 [y]	194	171	88	69	31	52	5	0	2	1.067
W14187-2	244	206	85	83	38	44	3	0	10	1.082

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]					Specific
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5	%PO[4]	Gravity
W14NYQ29-5	315	241	76	97	16	53	8	0	22	1.088
W14NYQ4-1	360	268	74	108	13	35	25	0	22	1.086
W15NYR5-2	284	255	90	103	62	28	0	0	0	1.080
MSV179-1	280	243	87	98	15	53	18	0	12	1.070
MSX156-1Y [y]	406	286	71	115	11	25	25	9	26	1.069
MSZ120-4	370	287	77	116	21	48	9	0	18	1.078
MSZ242-13	426	309	72	125	15	36	21	0	25	1.075
MSZ615-2 [y]	365	314	86	127	28	52	7	0	9	1.075
MSZ242-09	418	308	74	125	12	40	21	0	20	1.091
MSZ063-2	329	287	87	116	29	54	5	0	6	1.084
CO09128-3W/Y [y]	175	35	19	14	16	3	0	0	11	1.063
Lady Amarilla [y]	351	222	64	90	37	27	0	0	24	1.075
Melody [y]	441	353	80	143	30	49	0	0	10	1.071
Krone [y]	462	302	65	122	54	11	0	0	18	1.073
Connect [y]	558	422	74	170	25	37	13	0	19	1.081
AAC hamer	238	206	86	83	56	31	0	0	3	1.083
Constance [y]	508	393	76	159	18	42	16	0	19	1.069
Corsica [y]	391	246	62	99	31	23	8	0	32	1.077
Non-replicate										
Atlantic	385	313	81	100	31	50	0	0	13	1.071
AF5931-1	391	318	81	102	14	55	12	0	17	1.093
AF6530-4 [y]	442	280	63	89	23	31	9	0	33	1.087
AF6541-15	440	401	91	128	28	61	3	0	6	1.082
AF6542-19	344	266	77	85	24	53	0	0	17	1.084
AF6551-4	366	361	99	115	22	71	6	0	0	1.073
AF6572-3 [y]	507	351	69	112	37	32	0	0	19	1.083
AF6579-3 [y]	335	238	71	76	34	37	0	0	17	1.074
AF6594-4 [y]	359	347	97	111	45	52	0	0	0	1.081
AF6602-10 [y]	476	437	92	140	38	49	5	0	0	1.088
AF6606-2 [y]	532	442	83	141	19	55	10	0	16	1.076
CO11023-2W	253	239	95	76	27	54	4	9	0	1.070
CO11250-1W/Y [y]	301	203	67	65	61	6	0	0	15	1.083

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]					Specific
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5	%PO[4]	Gravity
CO05128-5W/Y [y]	338	308	91	98	36	55	0	0	0	1.077
MSV093-1Y [y]	354	299	84	96	30	44	11	0	12	1.075
WAF16220-2	412	368	89	118	14	75	0	0	8	1.081
WAF16220-4 [y]	380	305	80	97	20	46	14	0	18	1.084
NDAF1489-4	399	327	82	105	55	27	0	0	6	1.075
BNC811-15	463	407	88	130	19	61	8	0	11	1.090
BNC811-22	415	304	73	97	31	43	0	0	21	1.096
BNC811-33	535	420	78	134	12	37	29	0	19	1.090
BNC811-35	444	265	60	85	7	44	9	0	39	1.082
BNC815-6	399	318	80	102	45	35	0	0	8	1.081
BNC815-7	305	208	68	67	20	39	10	0	25	1.081
BNC816-3	299	275	92	88	51	33	7	0	3	1.074
BNC818-9	432	402	93	128	12	68	13	0	6	1.086
BNC819-2	409	310	76	99	25	45	5	0	21	1.100
BNC821-9	322	230	72	74	24	34	14	0	22	1.090
B3379-1 [y]	348	317	91	101	67	24	0	0	0	1.085
B3379-2	298	272	91	87	63	25	3	0	0	1.096
B3381-4 [y]	328	275	84	88	49	35	0	0	10	1.085
B3382-8	436	393	90	126	41	49	0	0	5	1.082
B3385-2	414	267	64	85	12	33	20	0	34	1.086
B3390-6	439	327	74	104	22	44	8	0	23	1.087
B3397-1	517	438	85	140	18	52	15	0	11	1.090
B3403-6	426	402	94	129	32	62	0	0	3	1.085
B3410-12 [y]	491	276	56	88	12	30	15	0	43	1.076
B3423-9	485	267	55	85	8	31	16	0	43	1.086
BNC902-2	328	231	70	74	57	14	0	0	12	1.081
BNC902-3	414	348	84	111	23	49	12	0	9	1.085
BNC742-2	290	285	98	91	39	56	4	0	0	1.087
LSD	90	90	12		14	16	12	3	12	

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

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

[3]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.

[4]Percentage of total that are pickouts.

Planted 8-in. apart with 15 seed pieces per 10-ft plot. Yellow flesh varieties are indicated with [y].

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, 2020

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Replicate									
Atlantic	5	6	6	2	6	6	0	50	PO=Green, growth cracks
Katahdin	5	8	7	2	7	6	0	25	PO=Green
Reba	6	7	7	3	7	6	0	8	PO=Green
Snowden	5	6	5	2	5	6	8	33	PO=Green
Superior	4	7	6	3	5	5	17	17	PO=Green, growth cracks
Yukon Gold	4	7	7	2	4	5	0	8	PO=Green, misshape
AF5280-5	5	7	6	2	6	5	0	17	PO=Knobs, green
AF5563-5	6	8	7	2	5	6	0	83	PO=Green
AF5677-4	5	8	7	2	5	6	0	58	PO=Green, misshape
B3012-1	5	6	5	2	6	6	0	50	PO=Green, second tubers
NDAF102629C-4	5	8	7	2	6	6	0	33	PO=Green
NY149	5	9	6	2	6	6	0	25	PO=Green
NY151	5	7	6	2	6	6	0	8	PO=Green, growth cracks
NY152	6	6	5	2	6	6	0	42	PO=Green
NY165	5	6	6	3	6	5	0	8	PO=Green
WAF10664-3	4	7	6	2	5	5	0	8	PO=Green
AF5225-1	5	7	6	2	5	5	0	33	PO=Green
AF5819-2	5	8	6	2	5	6	0	33	PO=Green, misshape
MSAFB605-4	5	6	5	2	5	6	0	0	PO=Green
MSAFB609-12	4	7	6	2	5	5	0	8	PO=Green, misshape
MSAFB635-3	5	7	6	2	5	5	0	17	PO=Green, misshape
MSAFB635-15	4	7	6	2	5	5	0	0	PO=Green, misshape
B3292-5	5	7	6	2	5	5	0	8	PO=Green, growth cracks
NY161	5	9	6	2	4	5	0	37	PO=Green, growth cracks
NY163	5	7	6	2	6	5	0	0	PO=Green
NY166	5	7	7	2	5	5	0	0	PO=Green
NC587-10	3	6	5	3	5	5	0	50	PO=Second tubers, misshape, green
NC606-23	6	9	7	2	5	5	0	33	PO=Green
W14187-2	4	8	7	2	6	5	0	0	PO=Green, misshape

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
W14NYQ29-5	4	6	6	2	5	5	0	8	PO=Green, misshape
W14NYQ4-1	4	6	5	2	5	5	0	0	PO=Green, growth cracks
W15NYR5-2	6	6	6	2	6	6	0	0	
MSV179-1	4	7	6	2	5	5	0	17	PO=Green, misshape
MSX156-1Y	3	7	7	2	5	5	0	33	PO=Green
MSZ120-4	4	7	7	2	5	6	0	62	PO=Green, misshape
MSZ242-13	4	6	5	2	5	5	0	2	PO=Green, misshape
MSZ615-2	5	7	6	2	5	4	0	24	PO=Second tubers
MSZ242-09	4	6	5	2	6	5	0	0	PO=Green, growth cracks, misshape
MSZ063-2	5	7	6	2	5	4	0	18	PO=Green
CO09128-3W/Y	6	9	6	2	6	6	0	0	PO=Second growth
Lady Amarilla	5	9	6	4	6	5	0	0	PO=Misshape, second tubers
Melody	5	7	6	3	6	5	8	0	PO=Green, misshape
Krone	5	9	6	3	6	5	0	12	PO=Green, second tubers
Connect	5	7	6	3	6	4	0	0	PO=Misshape, green
AAC hamer	5	8	7	2	6	5	0	8	PO=Green
Constance	5	9	7	3	6	5	0	12	PO=Green
Corsica	3	6	5	3	6	4	0	0	PO=Misshape, green, second tubers
Non-replicate									
Atlantic	3	7	6	2	5	5	0	0	PO=Green, growth cracks
AF5931-1	3	5	6	2	5	5	0	0	PO=Green
AF6530-4	3	6	6	2	5	5	0	0	PO=Green, growth cracks
AF6541-15	4	7	6	2	5	5	0	0	PO=Green
AF6542-19	4	7	7	2	5	4	0	0	PO=Green
AF6551-4	3	6	5	2	5	5	0	0	
AF6572-3	4	7	6	2	5	5	0	0	PO=Green, second tubers
AF6579-3	4	7	6	3	6	4	0	0	PO=Growth cracks, green
AF6594-4	5	7	6	2	6	5	0	0	
AF6602-10	6	7	6	2	5	5	0	75	
AF6606-2	5	7	6	2	5	5	0	0	PO=Green
CO11023-2W	4	7	6	3	4	5	0	0	PO=Misshape
CO11250-1W/Y	4	9	6	3	4	5	0	0	PO=Misshape

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
CO05128-5W/Y	4	6	6	2	5	5	0	0	
MSV093-1Y	5	9	7	2	6	5	0	0	
WAF16220-2	5	7	7	2	5	5	0	0	PO=Green
WAF16220-4	4	7	6	2	5	4	0	0	PO=Green
NDAF1489-4	4	9	7	2	4	5	0	0	PO=Green
BNC811-15	3	6	6	2	5	5	0	0	PO=Green
BNC811-22	4	6	6	2	5	5	0	25	PO=Green
BNC811-33	4	6	6	2	5	5	25	0	PO=Green, growth cracks
BNC811-35	5	6	5	2	6	5	0	0	PO=Green
BNC815-6	4	6	5	2	5	5	0	0	PO=Green
BNC815-7	3	6	6	2	5	5	0	0	PO=Green
BNC816-3	4	6	5	2	5	5	0	0	PO=Green
BNC818-9	4	6	6	2	5	5	0	25	PO=Green
BNC819-2	4	6	6	2	5	5	25	0	PO=Green
BNC821-9	4	6	6	2	6	4	0	50	PO=Green, misshape
B3379-1	5	6	5	2	6	6	0	25	
B3379-2	5	6	5	2	5	5	0	0	PO=Green
B3381-4	4	6	5	2	6	5	0	0	PO=Second tubers
B3382-8	3	7	6	2	5	5	0	0	PO=Growth cracks
B3385-2	4	7	7	2	5	4	0	25	PO=Growth cracks
B3390-6	4	6	5	2	6	5	0	25	PO=Green
B3397-1	4	7	7	2	6	4	0	0	PO=Growth cracks, green
B3403-6	5	6	5	2	6	5	0	25	PO=Green
B3410-12	4	7	7	2	5	5	0	0	PO=Second growth, green
B3423-9	4	7	6	3	5	5	0	50	PO=Green
BNC902-2	4	7	6	2	5	5	0	0	PO=Green, second tubers
BNC902-3	5	7	6	2	5	5	0	0	PO=Green
BNC742-2	5	7	6	2	5	5	0	0	

[1]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.

[2]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, 2020

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		Gravity
Replicate										
Chieftain	429	342	80	100	19	46	15	0	17	1.072
Dark Red Norland	268	241	90	71	39	41	9	0	4	1.066
AF5412-3 [p]	421	357	85	104	24	49	13	0	11	1.066
AF5414-1 [r]	343	275	80	80	45	31	3	0	4	1.079
NDAF113484B-1	258	244	94	71	38	46	10	0	2	1.067
NY164	343	313	92	91	35	52	5	0	3	1.070
NDAF12143-1	281	251	89	73	34	47	8	0	5	1.079
NCB2607-3 [y]	113	100	89	29	44	46	0	0	0	1.079
W8893-1R	218	168	77	49	40	37	0	0	12	1.070
Red Prairie	440	363	82	106	41	39	3	0	3	1.071
MSBB238-1RY [y]	368	300	81	88	37	37	7	0	11	1.066
MSZ416-8RY [y]	379	352	92	103	18	42	23	9	3	1.070
A08122-9RY [y]	412	356	86	104	47	39	0	0	2	1.080
NDA8512C-1R	290	270	93	79	22	61	10	0	3	1.075
A08112-7R	241	156	65	46	60	4	0	0	0	1.067
Certa KWS	551	444	80	130	38	42	0	0	9	1.071
Non-replicate										
Chieftain	423	383	91	100	36	55	0	0	6	1.069
AAF11546-3	448	310	69	81	15	52	3	0	29	1.073
COAF15129-3 [y]	472	411	87	107	24	44	19	0	9	1.053
BNC839-5	389	349	90	91	32	43	14	0	4	1.071
NY160	300	254	85	66	52	33	0	0	0	1.078
BNC833-2	296	259	87	68	65	22	0	0	0	1.075
B3355-6 [p]	298	133	45	35	39	6	0	0	43	1.073
B3364-3 [p]	309	222	72	58	67	5	0	0	10	1.067
B3372-1 [p]	505	412	81	107	56	26	0	0	11	1.082
LSD	90	83	7		10	12	10	4	7	

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

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

[3]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.

[4]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 [y] for yellow, [p] for purple, [r] 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, 2020

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Replicate									
Chieftain	5	3	7	3	4	5	0	33	PO=Second tubers, growth cracks
Dark Red Norland	5	2	7	3	4	5	0	0	PO=Growth cracks, green, misshape
AF5412-3	4	1	7	3	5	5	0	0	PO=Misshape, knobs
AF5414-1	5	2	6	2	4	5	0	8	PO=Misshape
NDAF113484B-1	4	2	7	2	4	5	0	33	PO=Green, misshape
NY164	3	2	7	2	5	5	0	8	PO=Misshape
NDAF12143-1	5	2	7	2	4	6	0	17	PO=Misshape
NCB2607-3	4	2	7	2	4	5	0	0	
W8893-1R	4	2	7	3	4	4	0	50	PO=Second tubers, misshape
Red Prairie	5	2	6	2	4	5	0	42	PO=Second tubers
MSBB238-1RY	4	3	6	2	4	4	0	33	PO=Second tubers
MSZ416-8RY	4	2	6	2	4	5	0	29	PO=Green
A08122-9RY	4	2	6	2	3	5	0	8	PO=Second tubers, green
NDA8512C-1R	4	2	6	2	4	5	0	0	PO=Growth cracks, green
A08112-7R	5	2	7	3	5	5	0	0	
Certa KWS	4	2	6	2	5	5	0	25	PO=Misshape, green, growth crack
Non-replicate									
Chieftain	4	2	7	2	4	5	0	0	PO=Second tubers
AAF11546-3	4	2	6	3	4	5	0	0	PO=Growth cracks, second tubers
COAF15129-3	4	2	7	3	5	4	0	0	PO=Growth cracks
BNC839-5	4	2	6	2	4	5	0	0	PO=Misshape
NY160	5	3	7	2	4	5	0	0	
BNC833-2	4	1	6	3	5	4	0	0	
B3355-6	4	1	7	2	4	5	0	0	PO=Second tubers
B3364-3	4	1	7	3	4	4	0	0	PO=Growth cracks
B3372-1	4	1	6	3	4	5	0	0	PO=Growth cracks

[1]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.

[2]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, 2020

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		Gravity
Replicate										
Russet Norkotah	374	302	81	100	28	40	13	0	12	1.071
Reveille Russet	275	198	77	66	37	34	6	0	15	1.076
Russ. Burbank	334	161	48	53	19	14	15	0	42	1.079
AF5406-7	317	224	72	74	30	27	15	0	22	1.085
TX08352-5Ru	235	199	85	66	40	45	0	0	8	1.064
AF5735-8	323	283	87	94	45	34	9	0	10	1.091
WAF13027-2	377	310	82	103	33	40	9	0	13	1.076
W14002-2rus	313	215	70	71	30	35	4	0	23	1.065
W14904-13rus	337	196	60	65	22	37	1	0	29	1.079
A09022-4	240	185	77	61	52	25	0	0	11	1.084
COA11013-2	369	226	61	75	17	36	8	0	31	1.074
A07908-6CR	323	241	74	80	35	34	6	0	18	1.084
CO09076-3RU	232	130	54	43	21	25	5	3	37	1.074
Non-replicate										
Russet Norkotah	338	262	78	100	45	23	9	0	12	1.069
WAF14006-6	418	322	77	123	15	26	31	5	22	1.083
WAF14010-3	335	290	86	111	21	35	31	0	11	1.072
CO08155-2RU/Y	273	202	74	77	30	44	0	0	23	1.081
AF6340-6	197	191	97	73	22	46	29	0	0	1.070
AF6357-2	257	241	94	92	20	64	9	0	0	1.083
AF6370-1	298	264	89	101	26	35	28	0	8	1.078
AF6384-2	297	216	73	82	14	38	21	0	24	1.084
NDAF13242B-3	242	211	87	81	47	40	0	0	6	1.097
AF6495-16	380	193	51	74	19	32	0	0	41	1.085
AF6503-2	375	298	80	114	21	49	10	0	18	1.078
AF6506-4	428	237	55	91	22	27	6	0	39	1.076

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		Gravity
AF6512-6	335	230	69	88	24	18	19	7	28	1.103
AAF12139-1	559	439	78	168	20	34	16	8	19	1.086
AAF12147-6	337	320	95	122	28	43	23	0	0	1.077
AF6438-2	481	366	76	140	16	42	13	6	19	1.080
LSD	106	79	19		16	18	11	2	20	

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

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

[3]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.

[4]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, 2020

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Replicate									
Russet Norkotah	5	5	3	7	6	4	0	0	PO=Green, misshape
Reveille Russet	5	5	3	4	7	5	0	8	PO=Green, misshape
Russ. Burbank	3	5	3	5	7	5	8	0	PO=Misshape, knobs, green
AF5406-7	3	5	4	5	7	4	0	0	PO=Knobs, misshape, green
TX08352-5Ru	5	5	3	4	7	5	0	0	PO=Green, misshape, second tubers
AF5735-8	5	5	3	6	7	4	0	0	PO=Green
WAF13027-2	4	4	2	5	5	5	0	0	PO=Misshape, green
W14002-2rus	4	5	4	5	6	4	0	0	PO=Misshape, green
W14904-13rus	3	5	4	5	6	4	0	0	PO=Misshape, green
A09022-4	4	7	6	3	5	5	0	0	PO=Green
COA11013-2	4	5	3	5	7	4	0	42	PO=Misshape, second tubers, green
A07908-6CR	4	5	3	6	7	5	33	8	PO=Misshape, second tubers
CO09076-3RU	4	5	3	6	7	4	8	8	PO=Green, misshape, growth cracks
Non-replicate									
Russet Norkotah	5	5	3	7	6	4	0	0	PO=Green, misshape
WAF14006-6	4	4	2	7	7	4	0	0	PO=Green, misshape
WAF14010-3	3	4	2	7	7	4	0	100	PO=Misshape
CO08155-2RU/Y	4	5	4	6	6	4	0	0	PO=Green, misshape
AF6340-6	4	6	4	7	5	4	0	0	
AF6357-2	5	5	3	7	7	4	0	0	
AF6370-1	4	5	3	6	7	4	0	0	PO=Misshape
AF6384-2	4	5	4	6	7	4	0	100	PO=Green, misshape
NDAF13242B-3	4	5	3	6	7	4	0	25	PO=Misshape
AF6495-16	3	5	3	6	7	4	0	50	PO=Green, misshape
AF6503-2	3	7	5	4	6	5	0	0	PO=Green, misshape
AF6506-4	3	5	4	4	6	4	0	0	PO=Misshape, second tubers

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
AF6512-6	3	5	3	7	7	4	50	0	PO=Misshape, green
AAF12139-1	4	5	3	6	6	4	0	0	PO=Misshape, second tubers
AAF12147-6	4	5	3	6	7	4	0	0	PO=Green, misshape
AF6438-2	3	5	3	6	7	4	0	0	PO=Misshape

[1]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.

[2]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[1] potato evaluation trial in Plant Pathology Farm, Rock Springs, 2020

Variety/Line	Yield (cwt/A)[2]		%	% of	% by size class[4]				%PO[5]	Specific	Merit
	Total	>1 7/8"	US#1	Standard[3]	2	3	4	5		Gravity	Score[6]
Atlantic	312	261	83	100	12	45	26	0	16	1.088	2
Chieftain	443	354	80	136	18	49	12	0	17	1.072	2
Dark Red Norland	294	257	88	99	37	40	11	0	5	1.066	2
Katahdin	288	239	83	92	28	45	9	0	14	1.073	2
Reveille Russet	275	194	74	74	35	32	8	0	18	1.076	2
Russ. Burbank	337	164	49	63	21	15	13	0	42	1.079	4
Snowden	385	361	94	139	37	51	6	0	3	1.084	2
Superior	200	159	80	61	30	46	5	0	13	1.074	3
Yukon Gold[y]	301	267	90	102	9	39	38	4	9	1.083	3
AF5280-5	314	244	78	94	29	48	1	0	15	1.063	2
AF5406-7	344	229	68	88	28	25	14	0	26	1.085	3
AF5412-3[p]	420	365	87	140	23	51	14	0	9	1.066	2
AF5414-1[r]	350	281	80	108	44	33	3	0	4	1.079	2
AF5563-5	329	278	84	107	23	47	15	0	12	1.078	3
AF5677-4	377	324	86	124	29	53	3	0	11	1.089	2
B3012-1	372	344	92	132	48	42	3	0	2	1.083	2
NDAF102629C-4	255	220	86	84	28	55	3	0	11	1.071	2
NDAF113484B-1	259	244	94	94	40	42	12	0	2	1.067	2
NY149[y]	324	271	83	104	47	37	0	0	5	1.070	2
NY151	444	275	61	105	17	37	7	0	34	1.071	2
NY152	386	338	87	130	48	39	1	0	8	1.077	1
NY164	347	319	92	122	35	51	5	0	2	1.070	3
NY165	324	296	91	113	30	55	6	0	6	1.084	2
TX08352-5Ru	241	201	84	77	41	42	1	0	8	1.064	3
WAF10664-3	364	298	81	114	22	52	8	0	15	1.078	2
LSD	62	51	10	20	12	14	9	2	9		

[1]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.

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

[3]Percentage of the standard, Atlantic, for >1 7/8" yield. [4]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.

[5]Percentage of total that are pickouts. [6]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 [y] for yellow, [p] for purple and [r] for red.

Table 12. Tuber characteristics, internal and external defects for NE1731 potato evaluation trial in Plant Pathology Farm, Rock Springs, 2020

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Atlantic	5	6	6	2	6	6	0	44	PO=Green, growth cracks
Chieftain	5	3	7	3	4	5	0	44	PO=Second tubers, growth cracks
Dark Red Norland	5	2	7	3	4	5	0	0	PO=Growth cracks, green, misshape
Katahdin	5	8	7	2	7	6	0	25	PO=Green
Reveille Russet	5	5	3	4	7	5	0	6	PO=Green, misshape
Russ. Burbank	3	5	3	5	7	5	6	0	PO=Misshape, knobs, green
Snowden	5	6	5	2	5	6	13	25	PO=Green
Superior	4	7	6	3	5	5	13	19	PO=Green, growth cracks
Yukon Gold	4	7	7	2	4	5	0	6	PO=Green, misshape
AF5280-5	5	7	6	2	6	5	0	19	PO=Green, knobs
AF5406-7	3	5	4	5	7	4	0	0	PO=Knobs, misshape, green
AF5412-3	4	1	7	3	5	5	0	0	PO=Misshape, knobs
AF5414-1	5	2	6	2	4	5	0	6	PO=Misshape
AF5563-5	6	8	7	2	5	6	0	75	PO=Green
AF5677-4	5	8	7	2	5	6	0	56	PO=Green, misshape
B3012-1	5	6	5	2	6	6	0	44	PO=Green, second tubers
NDAF102629C-4	5	8	7	2	6	6	0	25	PO=Green, growth cracks
NDAF113484B-1	4	2	7	2	4	5	0	31	PO=Green, misshape
NY149	5	9	6	2	6	6	0	38	PO=Green
NY151	5	7	6	2	6	6	0	9	PO=Green, growth cracks
NY152	6	6	5	2	6	6	0	31	PO=Green
NY164	3	2	7	2	5	5	0	9	PO=Misshape
NY165	5	6	6	3	6	5	0	6	PO=Green
TX08352-5Ru	5	5	3	4	7	5	0	0	PO=Green, misshape, second tubers
WAF10664-3	4	7	6	2	5	5	0	13	PO=Misshape, green

[1]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.

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

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, 2020

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific Gravity
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		
Replicate										
Superior	177	154	87	100	44	41	2	0	5	1.079
Dark Red Norland	227	206	91	134	44	44	3	0	3	1.069
Yukon Gold [y]	212	188	89	122	34	42	13	0	5	1.077
AF4831-2	255	161	63	105	54	9	0	0	5	1.066
Noya	179	110	63	71	52	11	0	0	12	1.076
NCB2607-3 [y]	216	133	61	86	61	0	0	0	2	1.070
Isle Royale	106	74	67	48	57	10	0	0	19	1.059
CO05037-3W/Y [y]	178	83	44	54	43	1	0	0	3	1.085
B2157-17 [y]	228	141	62	92	56	6	0	0	3	1.082
NY160	247	196	79	127	55	22	2	0	1	1.074
Belmonda [y]	272	225	81	146	56	25	0	0	7	1.085
AF5412-3 [p]	229	204	89	132	49	35	5	0	6	1.065
AF5414-1 [pk]	193	154	80	100	59	21	0	0	2	1.082
BNC716-1 [y]	225	208	93	135	37	55	2	0	3	1.061
BNC718-1 [y]	258	226	87	147	41	40	6	0	9	1.074
NC509-16 [p]	124	74	55	48	46	9	0	0	2	1.069
Envol	212	183	86	118	49	36	2	0	5	1.071
AF5677-4	150	110	72	71	56	16	0	0	9	1.093
CO97232-2R/Y [y]	179	115	63	74	59	5	0	0	0	1.074
NC636-5	147	89	58	58	52	5	0	0	14	1.091
B2869-29	237	201	85	130	52	33	0	0	3	1.091
Atlantic	211	197	93	128	38	45	4	0	1	1.091
LSD	73	67	14		13	15	6		11	

Variety/Line	Yield (cwt/A)[1]		%	% of	% by size class[3]				%PO[4]	Specific Gravity
	Total	>1 7/8"	US#1	Standard[2]	2	3	4	5		
Non-replicate										
BNC833-2 [p]	230	172	75	112	57	18	0	0	2	1.075
B3355-6 [p]	220	180	82	116	66	15	0	0	0	1.073
B3364-3 [p]	181	123	68	80	59	10	0	0	0	1.071
B3372-1 [p]	330	255	77	166	65	13	0	0	8	1.085
NDAF14113Y-3	254	222	87	144	51	36	0	0	2	1.072
NDAF14114YCB-3	306	277	91	180	66	25	0	0	0	1.087

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

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

[3]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.

[4]Percentage of total that are pickouts. Varieties with colored flesh are indicated by [y] for yellow, [p] for purple, [pk] 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, 2020

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Replicate									
Superior	5	7	6	3	4	4	0	0	PO=Scab
Dark Red Norland	4	2	7	2	4	5	0	0	
Yukon Gold	5	7	7	2	5	5	0	0	PO=Scab, green
AF4831-2	5	2	7	3	6	5	0	0	PO=Scab
Noya	5	8	7	2	6	5	0	0	PO=Misshape, scab
NCB2607-3	6	2	8	3	6	5	0	0	PO=Green
Isle Royale	5	2	7	2	6	5	0	0	PO=Misshape, stem end rot
CO05037-3W/Y	5	9	6	2	6	5	0	0	PO=Misshape
B2157-17	5	2	7	3	6	5	0	0	PO=Misshape, green
NY160	5	3	7	3	6	6	0	0	PO=Green
Belmonda	5	9	7	3	7	5	0	0	PO=Misshape, green
AF5412-3	3	1	8	3	4	5	0	0	PO=Misshape
AF5414-1	4	2	7	3	4	4	0	0	
BNC716-1	5	2	6	2	5	6	0	0	PO=Growth cracks
BNC718-1	4	1	7	2	5	5	0	0	PO=Growth cracks, green
NC509-16	4	1	6	3	6	4	0	0	PO= Secondary tubers, misshape
Envol	5	9	6	3	6	5	0	0	PO=Scab, green, pink rot
AF5677-4	4	7	7	2	6	6	0	0	PO=Misshape, scab, soft rot
CO97232-2R/Y	5	2	6	2	7	7	0	0	
NC636-5	5	7	6	2	6	7	0	0	PO=Scab, green
B2869-29	5	7	6	2	5	7	0	0	PO=Green, scab
Atlantic	5	6	5	2	5	7	0	25	PO=Misshape, green

Variety/Line	Tuber Characteristics[1]						Internal Defects[2]		Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	
Non-replicate									
BNC833-2	5	1	8	3	7	5	0	0	PO=Misshape
B3355-6	6	1	8	3	5	5	0	0	
B3364-3	4	1	7	4	7	4	0	0	
B3372-1	4	1	7	3	7	5	0	0	PO=Growth cracks, misshape
NDAF14113Y-3	5	2	7	3	5	4	0	0	
NDAF14114YCB-3	5	2	7	4	6	4	0	0	

[1]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.

[2]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 for SNaC Chip Trial in Bender Potato Farm, Chambersburg, Pennsylvania, 2020

Variety/Line	Yield (cwt/A)[1]		% US#1	% of	% by size class[3]					% PO[4]
	Total	>1 7/8"		Standard[2]	1	2	3	4	5	
Lamoka	391	325	83	107	4	22	52	10	0	12
B2869-29	460	374	81	123	5	28	45	9	0	14
MSZ242-13	282	198	71	65	3	13	33	25	0	26
MSW474-1	433	381	88	126	6	35	43	10	0	6
CO11023-2W	355	249	70	82	13	37	31	3	0	17
ND7519-1	408	264	65	87	12	29	29	6	0	24
MSZ063-2	419	330	79	109	12	43	32	4	0	9
NY163	464	338	73	111	8	37	36	0	0	18
MSV030-4	334	289	87	95	5	24	47	16	0	8
CO11023-9W	283	181	64	60	16	37	25	2	0	21
Snowden	388	303	78	100	7	30	40	8	0	15
LSD[5]	74	62	9		3	8	10	7		9

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

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

[3]Percentage of total yield according to size class. 1=<1.875 in., 2=1.875-2.5 in., 3=2.5-3.25 in., 4=3.25-4.0 in., 5=>4.0 in.

[4]Percentage of total that are pickouts.

[5]LSD indicates least significant difference (*P= 0.05*). 4 replications.

Table 16. Tuber characteristics, internal and external defects for for SNaC Chip Trial in Bender Potato Farm, Chambersburg, Pennsylvania, 2020

Variety/Line	Tuber Characteristics[1]						nternal Defects		External Defects[3]								Reasons for Pickouts
	TA	C	TX	Sh	TED	TCS	% HH	% IB	R	H	Gr	K	G	Sc	Sp	T	
Lamoka	3	6	6	4	8	4	0	6	8	9	9	9	6	8	9	9	Green
B2869-29	4	6	6	4	7	5	13	0	7	9	8	8	5	7	9	9	Green, Second tuber, Growth crack, Scab
MSZ242-13	2	6	5	3	7	5	0	0	8	9	4	8	6	7	9	8	Green, Growth crack, Scab, Knob
MSW474-1	5	6	5	2	6	5	0	0	8	9	9	9	8	8	9	8	Green, Second tuber
CO11023-2W	5	7	6	2	8	6	0	0	8	9	9	8	7	8	9	7	Scab, Green, Knob, Second tuber
ND7519-1	2	6	5	3	8	5	0	0	8	9	8	7	7	8	8	4	Second tuber, Green, Growth crack, Knob
MSZ063-2	5	7	7	3	8	5	0	0	8	9	9	9	6	7	9	9	Green, Scab, Second tuber
NY163	7	6	7	2	8	7	0	0	9	9	9	7	8	8	8	6	Green, Second tuber, Misship
MSV030-4	5	6	5	3	8	5	6	6	6	9	9	7	8	8	9	9	Knob, Green
CO11023-9W	3	6	5	3	8	5	6	0	8	9	8	9	6	8	9	9	Green, Growth crack, Scab, Misship
Snowden	5	5	5	3	8	5	0	50	9	9	9	8	8	8	9	8	Green, Second tuber, Scab

[1]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.

[2]Internal Defects: HH = hollow heart, IB = internal browning. Percent of total number observed out of 16 tubers (4 tubers per rep, 4 reps).

[3]External Defects: R = Rhizoctonia, H = hairline cracks, Gr = growth cracks, K = knobs, G = sunburn, Sc = scab, Sp = sprouts, T = secondary tubers. 0 to 9 from very severe to none.

Table 17: Management of evaluation trials, 2020

Rock Springs

Trial	Germplasm trial
Planting Date:	1 June
Harvest Date:	8, 9 and 10 October
Previous Crop:	Wheat, cover crop in fall
Fertilizer Rate/A:	9 May: 0-0-60 (N-P-K) at 309 lb/A with 10 ft Gandy 19 May: 20-10-10 (N-P-K) at 590 lb/A with 10 ft Gandy 30 June: liquid N (39 lb/A) at Hilling
Herbicide:	Eptam 7E, Medal EC, Omnin750D, Matrix
Fungicide:	Elatus, AFrame, Manzate Pro-Stick, Luna Tranquility, Miravis Prime, Omni Chlorothalonil 720 SC, Quadris Top, Orondis Opti, Ridomil Gold, Zing!, Zampro
Insecticide:	Admire Pro, Lambda T2, Agri-Mek, Radiant SC, PBO
Vine Kill:	18 and 24 September
Rainfall (inches):	June (5.44), July (1.16), August (1.96), September (2.45)

Trial	Early variety trial
Planting Date:	20 May
Harvest Date:	9 September
Previous Crop:	Wheat, cover crop in fall
Fertilizer Rate/A:	9 May: 0-0-60 (N-P-K) at 309 lb/A with 10 ft Gandy 19 May: 20-10-10 (N-P-K) at 590 lb/A with 10 ft Gandy 25 June: liquid N (39 lb/A) at Hilling
Herbicide:	Eptam 7E, Medal EC, Omnin750D, Matrix
Fungicide:	Elatus, AFrame, Manzate Pro-Stick, Luna Tranquility, Miravis Prime, Omni Chlorothalonil 720 SC, Quadris Top, Orondis Opti, Ridomil Gold, Zing!, Zampro
Insecticide:	Admire Pro, Lambda T2, Agri-Mek, Radiant SC, PBO
Vine Kill:	21 and 27 August
Rainfall (inches):	June (5.44), July (1.16), August (1.96), September (2.45)

Table 18. Descriptions of promising varieties for Pennsylvania

FRESH MARKET

Connect from Solanum International

- A late season variety, with slightly netted skin and oval shape tubers. It is a yellow flesh variety; the yellow flesh is darker than Yukon Gold.
- At Rock Springs for 5 years, marketable yield average 143% of Atlantic, 137% of Katahdin and 160% of Yukon Gold.Tubers in the 2½" to 4" size average 42% compared to Katahdin 56% and Yukon Gold 62% in the same size class. Over 5 years pickouts average 24% compared to Katahdin at 14% and Yukon Gold at 24%, pickouts for Connect were mostly misshape.
- 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 Southeast 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. Has moderate resistance to common scab.
- At Rock Springs for 10 years, marketable yield average 125% of Atlantic and 134% of Katahdin. Specific Gravity average 1.063 compared to Atlantic 1.084 and Katahdin 1.069. Tubers in the 2½" to 4" average 57% compared to Katahdin 61% in the same size class.
- In Erie County over 4 years NY151 average 73% of Atlantic and 94% of Katahdin. Tubers in the 2½" to 4" average 38% compared to Katahdin 43% in the same size class.
- In the Southeast County trial over 5 years NY151 average 110% of Atlantic and 111% of Katahdin. Tubers in the 2½" to 4" average 46% compared to Katahdin 52% in the same size class.

AF5225-1 from University of Maine

- A medium late season variety with slightly netted skin and oval shape tubers.
- At Rock Springs for 6 years, marketable yield average 164% of Atlantic and 165%of Katahdin. Specific Gravity average 1.072 compared to Atlantic 1.084 and Katahdin 1.067. Tubers in the 2½" to 4" average 59% 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 the Southeast County trial over 6 years AF5225-1 average 118% of Atlantic and 130% of Katahdin. Specific Gravity average 1.063 compared to Katahdin 1.058.

Other candidate for further evaluation

NDAF102629C-4 from University of Maine

- A medium early season variety with moderately smooth skin and mostly round tubers. Has moderate scab resistance.
- At Rock Springs, marketable yield average 104% of Atlantic and 97% of Katahdin. Specific Gravity was 1.065 compared to Atlantic 1.062 and Katahdin 1.062. Tubers in the

2½" to 4" size were 61% compared to Katahdin 63% in the same size class. Pickouts were 10% compared to Katahdin at 14% both were mostly green.

AF5280-5 from University of Maine

- A medium season variety with slightly netted skin and mostly oval shape tubers. Has scab and golden nematode resistance.
- At Rock Springs, marketable yield average 114% of Atlantic and 115% of Katahdin. Specific Gravity was 1.059 compared to Atlantic 1.084 and Katahdin 1.067. Tubers in the 2½" to 4" were 57% compared to Katahdin 58% in the same size class. Pickouts were 10% for AF5280-5 mostly green compared to Katahdin at 13% green, growth cracks.

MSV179-1 from Michigan State University

- A medium late season variety with slightly netted skin and mostly round tubers.
- At Rock Springs, marketable yield average 105% of Atlantic and 107% of Katahdin. Specific Gravity was 1.068 compared to Atlantic 1.087 and Katahdin 1.070. Tubers in the 2½" to 4" were 75% compared to Katahdin 57% in the same size class. Pickouts were 7% compared to Katahdin at 14%.

Constance from ParkLand Seed

- A medium late season yellow flesh variety with moderately smooth skin and oval shape tubers. Has common scab resistance.
- At Rock Springs, marketable yield average 159% of Atlantic and 162% of Katahdin. Specific Gravity was 1.069 compared to Atlantic 1.088 and Katahdin 1.073. Tubers in the 2½" to 4" were 58% compared to Katahdin 51% in the same size class. Pickouts were 19% compared to Katahdin at 15%, mostly green for both varieties.

REDS AND SPECIALTY

Cerata from Solanum International

- A late season variety with moderately smooth skin and oval shape tubers.
- At Rock Springs over 3 years, marketable yield average 125% of Chieftain and 147% of Dark Red Norland. Tubers in the 1⅞" to 3¼" size average 73% compared to Chieftain 74% and Dark Red Norland 79% in the same size class. Specific Gravity average 1.057 compared to Chieftain 1.059 and Dark Red Norland 1.053.

Red Prairie from University of Wisconsin

- A medium season variety with moderately smooth skin and oval shape tubers.
- At Rock Springs over 4 years, marketable yield average 94% of Chieftain and 125% of Dark Red Norland. Tubers in the 1⅞" to 3¼" size average 75% compared to Chieftain 72% and Dark Red Norland 72% in the same size class. Specific Gravity average 1.059 compared to Chieftain 1.062 and Dark Red Norland 1.057.
- In Erie County over 2 years Red Prairie average 85% of Chieftain. Specific Gravity average 1.062 compared to Chieftain 1.065.
- In the Southeast County trial over 2 years Red Prairie average 84% of Chieftain. Specific Gravity average 1.058 compared to Katahdin 1.065.

NY161 from Cornell University

- A medium season variety with moderately smooth skin and oval shape tubers with a purple splash on the skin.
- At Rock Springs over 4 years, marketable yield average 160% of Atlantic and 150% of Katahdin. Tubers in the 2½" to 4"size average41% compared to Atlantic 64% and Katahdin 53% in the same size class. Specific Gravity average 1.066 compared to Atlantic 1.079 and Katahdin 1.062.
- In Erie County over 2 years NY161 average 101% of Atlantic and 178% of Katahdin. Specific Gravity average 1.067 compared to Atlantic 1.083 and Katahdin 1.066.
- In the Southeast County trial over 2 years NY161 average 121% of Atlantic and 156% of Katahdin. Specific Gravity average 1.060 compared to Atlantic 1.085 and Katahdin 1.059.

Other candidate further evaluation

MSZ416-8RY from Michigan State University

- A medium season yellow flesh variety, has slightly netted skin and mostly round tubers.
- At Rock Springs marketable yield was 103% of Chieftain and 146% of Dark Red Norland.

A08122-9RY from the USDA Idaho

- A medium season yellow flesh variety, has slightly netted skin and mostly round tubers.
- At Rock Springs marketable yield was 104% of Chieftain and 148% of Dark Red Norland.

B3372-1 from the USDA Beltsville

- A medium late purple flesh variety, has purple skin moderately smooth skin and oval shape tubers.
- At Rock Springs over 2 years, marketable yield average 99% of Chieftain. Tubers in the 1⅞" to 2½" size average 55% compared to Chieftain 31%. Specific Gravity average 1.075 compared to Chieftain 1.067.

CHIPPING

Lady Liberty (NY152) from Cornell University

- A medium late season variety with slightly netted skin. Chip color has been equal to Snowden. Moderate to good resistance to common scab.
- At Rock Springs over 5 years the marketable yield average 143% of Atlantic and 110% of Snowden. Tubers in the 1⅞" to 3¼" size average 77% compared to Atlantic 59% and Snowden 83% in the same size class. Specific gravity for Lady Liberty over 5 years average 1.075 compared to Atlantic 1.081 and Snowden 1.079.
- 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.

MSAFB605-4 from University of Maine

- A medium late season variety with netted skin and mostly round shape tubers.

- At Rock Springs the two-year marketable yield average was 116% of Atlantic and 84% of Snowden. Specific Gravity was 1.079 compared to Atlantic 1.086 and Snowden 1.083. Tubers in the 1⅞" to 3¼" were 79% compared to Atlantic 65% and Snowden 90% in the same size class. No Internal defects. Pickouts were 10% mostly green.

Other candidates for further evaluation

NY163 from Cornell University

- A medium early season variety with moderately smooth skin and mostly round shape tubers.
- At Rock Springs the 3-year average of marketable yield was 127% of Atlantic and 99% of Snowden. Specific Gravity was 1.087 compared to Atlantic 1.089 and Snowden 1.085. Tubers in the 1⅞" to 3¼" were 80% compared to Atlantic 56% and Snowden 84% in the same size class. Pickouts were 8% mostly green compared to Atlantic 17% and Snowden 8%.

MSZ120-4 from Michigan State University

- A late maturity variety with moderately smooth mostly round tubers.
- At Rock Springs the two-year average of marketable yield was 161% of Atlantic and 117% of Snowden. Tubers in the 1⅞" to 3¼" were 65% compared to Atlantic 65% and Snowden 90% in the same size class. Specific Gravity was 1.085 compared to Atlantic 1.086 and Snowden 1.083. Pickouts were 12% mostly green compared to Atlantic 12% and Snowden 2%.

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 3 years the marketable yield average 118% of Superior. Tubers in the 1⅞" to 3¼" size average 70% compared to 76% for Superior in the same size class. Specific gravity average 1.078 compared to 1.061 for Superior. Pickouts average 17% compared to 12% for Superior. Pickouts for Belmonda were mostly green with a few misshapes.

AF4831-2 from University of Maine

- Has red, moderately smooth skin, oval shape tubers.
- At Rock Springs the 2-year average of marketable yield was 112% of Superior and 99% of Dark Red Norland. Tubers in the 1⅞" to 3¼" size average 90% compared to 78% for Superior and 81% for Dark Red Norland in the same size class. Specific gravity average 1.064 compared to 1.076 for Superior and 1.066 for Dark Red Norland. Pickouts average 6% compared to 6% for Superior and 7% for Dark Red Norland.

Other candidates further evaluation

NY160 from Cornell University

- The tubers are oval shape with moderately smooth, pink skin.
- At Rock Springs the marketable yield is 127% of Superior and 95% of Dark Red Norland. Tubers in the 1⅞" to 3¼" size average 77% compared to 85% for Superior and

88% for Dark Red Norland in the same size class. Specific gravity average 1.074 compared to 1.079 for Superior and 1.069 for Dark Red Norland. No internal defects.

B3372-1 from the USDA at Beltsville

- The tubers are oval shape with moderately smooth, with purple skin. It has a dark purple flesh.
- At Rock Springs the 2-year average of marketable yield is 119% of Superior. Tubers in the 1⅞" to 3¼" size average 64% compared to 71% for Superior. Specific gravity average 1.091 compared to 1.077 for Superior. No internal defects.

BNC716-1 from the USDA at Beltsville

- The tubers are red mostly round with slightly net skin. It has a yellow flesh that is equal to Yukon Gold.
- At Rock Springs The marketable yield is 135% of Superior and 101% of Dark Red Norland. Tubers in the 1⅞" to 3¼" size average 92% compared to 85% for Superior and 88% for Dark Red Norland in the same size class. Specific gravity was 1.061 compared to 1.079 for Superior and 1.069 for Dark Red Norland. No internal defects.

POTATO (*Solanum tuberosum*)
Common scab; *Streptomyces* spp.

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Field evaluation of potato cultivars and breeding lines for resistance to common scab in Pennsylvania, 2020.

Twenty-seven 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 14 May. 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 five seed pieces planted in each plot and 4-ft breaks between plots within a row. Precipitation was 5.44, 1.16, 1.96, and 2.45 in. for Jun, Jul, Aug, and Sep, respectively. Standard crop management practices, and a recommended fungicide program for the management of early and late blights in Pennsylvania, were followed. Plants were vine killed on 9 Sep with Reglone (2.0 pt/A). Tubers were harvested on 16 Sep and were visually assessed for common scab on 2 Oct. 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: [Σ(Percent lesion coverage × predominant lesion type × number of tubers in each category) / (18 × total number of potato tubers evaluated)] × 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 considered as resistant or moderately resistant as the tolerant check: Reveille Russet, AF5414-1, TX08352-5Ru and NY165. Only a few small superficial lesions were observed on some tubers of these cultivars/lines.

Cultivar/Line	Common scab severity index	Common scab incidence (%)	Cultivar/Line	Common scab severity index	Common scab incidence (%)
Reveille Russet	0.74 g[z]	13.3 g	WAF10664-3	2.03 d-g	36.5 b-g
AF5414-1	0.83 g	14.9 g	NY149	2.19 d-g	39.4 b-g
TX08352-5Ru	0.92 g	16.6 fg	AF5412-3	2.30 d-g	29.8 d-g
NY165	1.05 g	18.8 fg	NY164	2.37 d-g	31.6 c-g
Russet Burbank	1.07 g	19.2 fg	AF5677-4	2.80 c-g	41.1 b-g
Superior	1.29 fg	18.0 fg	Katahdin	2.93 c-g	48.0 a-g
NDAF102629C-4	1.40 fg	25.1 efg	Snowden	3.55 b-g	41.6 b-g
NDAF113484B-1	1.42 fg	25.6 efg	AF5563-5	4.61 b-f	54.5 a-f
Dark Red Norland	1.44 fg	25.9 efg	Kennebec	5.15 b-e	69.8 abc
B3012-1	1.53 fg	27.5 efg	Chieftain	5.41 bcd	74.3 ab
AF5406-7	1.61 fg	27.1 efg	NY151	5.84 bc	67.2 a-d
NY152 (Lady Liberty)	1.68 fg	28.7 d-g	Yukon Gold	6.44 b	61.8 a-e
Atlantic	1.79 efg	23.2 efg	Shepody	10.51 a	81.9 a
AF5280-5	1.83 efg	30.9 c-g			

[z] Means followed by the same letter are not significantly different within column category at $P = 0.05$ as determined by Fisher's protected least significant difference test (LSD = 3.39 for severity and 39.6 for incidence).

POTATO (*Solanum tuberosum*)
Late blight; *Phytophthora infestans*

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Evaluation of potato cultivars and breeding lines for resistance to late blight in Pennsylvania, 2020.

Twenty-six 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 9 Jun. 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 5.44, 1.16, 1.96, and 2.45 in. for Jun, Jul, Aug, and Sep, respectively. The summer was hot and dry. Natural late blight infection was not observed. On 23 Aug, spreader rows were spray-inoculated with a mixture of four isolates of *Phytophthora infestans* clonal lineage US-23, at a concentration of 4.8×10^4 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 31 Aug and 4, 9, 14, 18 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. The cultivar Kennebec was the moderately resistant check. Based on AUDPC values, AF5414-1, AF5412-3, AF5677-4, NY165, AF5406-7, and Russet Burbank were observed with significantly less disease than Kennebec; NY152 (Lady Liberty) and NY151 were not significantly more or less resistant than cv. Kennebec.

Cultivar/Line	AUDPC[z]		Cultivar/Line	AUDPC	
AF5414-1	13	o[y]	WAF10664-3	665	gh
AF5412-3	30	no	Chieftain	669	g
AF5677-4	33	mno	Atlantic	676	g
NY165	95	lmn	NY164	731	fg
AF5406-7	105	lm	B3012-1	778	ef
Russet Burbank	152	l	AF5563-5	786	ef
Kennebec	279	k	NDAF102629C-4	817	de
NY152 (Lady Liberty)	290	k	Yukon Gold	818	de
NY151	303	k	AF5280-5	872	cd
Katahdin	428	j	TX08352-5Ru	899	bc
Snowden	539	i	Superior	963	b
Reveille Russet	562	i	Dark Red Norland	1094	a
NY149	593	hi	NDAF113484B-1	1105	a

[z] AUDPC = Area under the disease progress curve was calculated from 31Aug to 18 Sep according to the formula: $\sum^{n}_{i=1}[(R_{i+1} + R_i)/2]\,[t_{i+1} - t_i]$, where R = disease severity rating (% of leaf surface affected) at the ith observation, t_i = time (days) since the previous rating at the ith observation, and n = total number of observations.

[y] Means followed by the same letter are not significantly different at $P = 0.05$ as determined by ANOVA followed by Fisher's protected least significant difference test (LSD = 73).

POTATO (*Solanum tuberosum*)
Early blight; *Alternaria solani*

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Evaluation of potato cultivars and breeding lines for resistance to early blight in Pennsylvania, 2020.

Twenty-six 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 13 May 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 5.44, 1.16, 1.96, and 2.45 in. for Jun, Jul, Aug, and Sep, respectively. The summer was hot and dry. Natural early blight infection was observed in the field in the middle of Jul. For each plot, the percentage of symptomatic foliage was visually assessed on a 0 to 100% scale on 24, 30 Jul and 6, 13, 18, 25 Aug. 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. Four other cultivars/lines were characterized as moderately resistant because their AUDPC values were not significantly different from the moderately resistant checks: AF5406-7, Katahdin, Snowden and WAF10664-3.

Cultivar/Line	AUDPC[z]		Cultivar/Line	AUDPC	
Russet Burbank	71	l[y]	NY152 (Lady Liberty)	660	g-j
AF5406-7	113	l	AF5414-1	706	ghi
Katahdin	267	kl	Yukon Gold	869	fgh
Snowden	338	jkl	NY164	937	efg
Kennebec	347	i-l	Atlantic	1110	def
WAF10664-3	425	i-l	NDAF102629C-4	1234	cde
NY149	510	h-k	TX08352-5Ru	1284	cde
Reveille Russet	531	h-k	Superior	1432	cd
NY165	577	h-k	AF5280-5	1516	c
NY151	577	h-k	AF5677-4	1919	b
AF5563-5	618	g-k	B3012-1	2044	ab
Chieftain	636	g-j	NDAF113484B-1	2224	ab
AF5412-3	637	g-j	Dark Red Norland	2392	a

[z] AUDPC = area under the disease progress curve was calculated from 24 Jul to 25 Aug according to the formula: $\sum^{n}{}_{i=1}[(R_{i+1} + R_i)/2]\ [t_{i+1} - t_i]$, where R = disease severity rating (% of leaf surface affected) at the ith observation, t_i = time (days) since the previous rating at the ith observation, and n = total number of observations.

[y] Means followed by the same letter are not significantly different at $P = 0.05$ as determined by ANOVA followed by Fisher's protected least significant difference test (LSD = 359).

POTATO (*Solanum tuberosum* 'Atlantic')
Late blight; *Phytophthora infestans*

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Field evaluation of foliar fungicides for control of potato late blight in Pennsylvania, 2020.

Fungicides were evaluated on potato cv. Atlantic at the Penn State Russell E. Larson Agricultural Research Center in Pennsylvania Furnace, PA. The soil type was a Hagerstown silty clay loam. Potatoes were planted on 8 Jun. The experimental design was a randomized complete block with four replicates. Plots were three-rows wide (36 in. spacing between rows) and 10-ft long with 8 in. seed-piece spacing. Precipitation was 5.44, 1.16, 1.96, and 2.45 inches for Jun, Jul, Aug, and Sep, respectively. The summer was hot and dry. Natural late blight infection was not observed. On 23 Aug, spreader rows were spray-inoculated with a mixture of four isolates of *Phytophthora infestans* clonal lineage US-23, at a concentration of 4.8×10^4 sporangia/ml, to promote a 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. Fungicides were applied with a tractor-mounted, N_2-pressurized side boom sprayer at 30 psi and 44 gal/A. The spray boom was equipped with drop nozzles and boom nozzles so that both sides and the top of each plant were uniformly sprayed. Disease ratings were determined by visually assessing each plot for the percentage of late blight symptomatic foliage on a 0 to 100% scale. Ratings were taken on 31 Aug and 4, 9, 14, 18 Sep and the assessments were used to calculate the area under the disease progress curve (AUDPC). Plants were vine killed on 24 Sep with Reglone (2.0 pt/A). The middle row of each plot was harvested on 6 Oct. The tubers were visually assessed for late blight symptoms and tuber marketable yield data were collected on 15 Oct. Disease symptoms were not observed on any tubers. Disease and yield data were subjected to analysis of variance and Fisher's protected least significant difference test (SAS v. 9.4, SAS Institute, Cary, NC).

All treatments significantly reduced foliar late blight severity compared to the unsprayed control. All foliar treatments significantly increased total yield of tubers compared to the unsprayed control. All treatments except treatments Zoxium 240SC 12.8 fl oz + Reason 500SC 5.5 fl oz and Reason 500SC 5.5 fl oz + Previcur Flex 6F 1.2 pt significantly increased marketable yield of tubers compared to the unsprayed control.

Treatment and amount/A	Days after first application[z]	AUDPC[y]	Total Yield[x]	Marketable Yield[w]
Zing! 34 fl oz	0, 7, 14, 22, 28	2.9 c[v]	402 a	385 a
Zoxium 240SC 12.8 fl oz + Previcur Flex 6F 1.2 pt	0, 7, 14, 22, 28	4.9 bc	382 a	371 a
Zoxium 240SC 12.8 fl oz + Reason 500SC 5.5 fl oz	0, 7, 14, 22, 28	5.0 bc[v]	368 a	352 ab
Zoxium 240SC 12.8 fl oz + Badge SC 2.0 pt	0, 7, 14, 22, 28	6.1 bc	382 a	368 a
Zoxium 240SC 12.8 fl oz + Curzate 60DF 3.2 oz	0, 7, 14, 22, 28	10.3 bc	380 a	360 a
Reason 500SC 8.2 fl oz + Badge SC 2.0 pt	0, 7, 14, 22, 28	12.6 bc	366 a	355 a
Reason 500SC 5.5 fl oz + Previcur Flex 6F 1.2 pt	0, 7, 14, 22, 28	29.8 bc	371 a	352 ab
Reason 500SC 5.5 fl oz + Curzate 60DF 3.2 oz	0, 7, 14, 22, 28	46.6 b	388 a	376 a
Unsprayed control		445.8 a	318 b	305 b
LSD (0.05)		42.2	46	47

[z] First fungicide application was 20 Aug.

[y] AUDPC = Area under disease progress curve was calculated from 31 Aug to 18 Sep according to the formula: $\sum^{n}_{i=1}[(R_{i+1} + R_i)/2]\,[t_{i+1} - t_i]$, where R = disease severity rating (% of leaf surface affected) at the ith observation, t_i = time (days) since the previous rating at the ith observation, and n = total number of observations.

[x] Total Yield: cwt/A = hundred weight per acre of all tubers.

[w] Marketable Yield: cwt/A = hundred weight per acre of all tubers ≥1.875 inch.

[v] Means followed by the same letter within columns are not significantly different at $P = 0.05$ as determined by Fisher's protected least significant difference test.

POTATO (*Solanum tuberosum* 'Atlantic')
Early blight; *Alternaria solani*

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Evaluation of fungicides for control of potato early blight in Pennsylvania, 2020.

Fungicides were evaluated for managing early blight on potato cv. Atlantic at the Penn State Russell E. Larson Agricultural Research Center in Pennsylvania Furnace, PA. The soil type was a Hagerstown silty clay loam. Potatoes were planted on 14 May. The experimental design was a randomized complete block with four replicates. Plots were three rows wide (36-in. spacing between rows) and 10-ft long with 8 in. seed-piece spacing. Precipitation was 5.44, 1.16, 1.96, and 2.45 inches for Jun, Jul, Aug, and Sep, respectively. The summer was hot and dry. Natural early blight infection was observed in the middle of Jul. To promote a uniform spread of the pathogen to all treatment plots, spreader rows were spray-inoculated with a mixture of three isolates of *Alternaria solani*, with a concentration of 5.0×10^4 conidia/ml on 24 Jul. Fungicides were applied with a tractor-mounted, N_2-pressurized side boom sprayer at 30 psi and 45 gal/A. The spray boom was equipped with drop nozzles and boom nozzles so that both sides and the top of each plant were uniformly sprayed. On 24, 30 Jul and 6, 13, 18, 25, 29 Aug each plot was visually assessed for the percentage of foliage with early blight. The seven visual early blight assessments were used to calculate the area under disease progress curve (AUDPC). Plants were vine killed on 9 Sep with Reglone (2.0 pt/A). The middle row of each plot was harvested on 16 Sep. Tuber disease and marketable yield data were collected on 28 Sep. Disease symptoms were not observed on any tubers. The data were subjected to analysis of variance and Fisher's protected least significant difference test (SAS v. 9.4, SAS Institute, Cary, NC).

All foliar fungicide treatments significantly reduced foliar early blight compared to the unsprayed control. All foliar treatments significantly increased total and marketable yield of tubers compared to the unsprayed control. Extending the spray interval and reducing the total number of applications from four to three did not reduce fungicide efficacy. There were no significant differences in AUDPC, total yield and marketable yield among foliar treatments.

Treatment and amount/A	Days after first application[z]	AUDPC[y]	Total Yield[x]	Marketable Yield[w]
Miravis Prime 9.2 fl oz + Induce 0.25%	0, 14, 28, 42	273 b[v]	252 a	239 a
Luna Tranquility 11 fl oz + Induce 0.25%	0, 14, 28, 42	274 b	240 a	230 a
Miravis Prime 9.2 fl oz + Induce 0.25%	0, 21, 42	285 b	238 a	224 a
Provysol 3.5 fl oz + Induce 0.25%	0, 14, 28, 42	378 b	233 a	224 a
Luna Tranquility 11 fl oz + Induce 0.25%	0, 21, 42	461 b	232 a	218 a
Provysol 3.5 fl oz + Induce 0.25%	0, 21, 42	484 b	224 a	212 a
Unsprayed Control		1351 a	183 b	174 b
LSD (0.05)		228	38	37

[z] First fungicide application date was A = 22 Jul.

[y] AUDPC = Area under disease progress curve was calculated from 24 Jul to 29 Aug according to the formula: $\sum^{n}_{i=1}[(R_{i+1} + R_i)/2]\,[t_{i+1} - t_i]$, where R = disease severity rating (% of leaf surface affected) at the ith observation, t_i = time (days) since the previous rating at the ith observation, and n = total number of observations.

[x] Total Yield: cwt/A = hundred weight per acre of all tubers.

[w] Marketable Yield: cwt/A = hundred weight per acre of all tubers ≥1.875 inch.

[v] Means followed by the same letter within columns are not significantly different at $P = 0.05$ as determined by Fisher's protected least significant difference test.

Supplemental Progress Report, 2020----------March 22, 2021

Pennsylvania Regional Potato Germplasm Evaluation Program, 2020

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The objective of this project is to find new potato varieties and advanced 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: Northampton Co., Erie Co., and the Russell E. Larson Agricultural Research Center at Rock Springs, Centre Co. Please see the Progress Report from January 2021 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 1-3) and French fry results (Tables 4-5). 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 2021 progress report.

Chipping (Tables 1-3)

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 Northampton County, Atlantic, Snowden, AF5225-1, AF5280-5, AF5563-5, AF5677-4, and NY165 had acceptable color. At Erie County, Snowden, NDAF102629C-4, NY163, NY165, NY166,

NCB3259-2, MSZ242-09, W14NYQZ9-5, and NCB3260-1 had the best color; Atlantic, NY161, B2862-29, MSZ120-4, and MSV179-1 had acceptable color. At Rock Springs, Snowden, AF5280-5, NDAF102629C-4, NY152, NY165, MSAFB609-12, MSAFB635-15, NY166, W15NYR5-2, AF6594-4, WAF16220-4, BNC816-3, B3379-1, B3385-2, BNC902-2, and BNC742-2 had the best color; there were another 41 lines with color scores ≤ 5 and these lines had acceptable color.

From the results of the 3 week reconditioning the noteworthy lines are: At Northampton County, Snowden had the best color; Atlantic, AF5677-4, and NY165 had acceptable color. At Erie County, NDAF102629C-4, NY163, NY165, NY166, NCB3259-2, MSZ242-09, and NCB3260-1 had the best color; Atlantic, Snowden, MSZ120-4, W14NYQZ9-5, and MSV179-1 had acceptable color. At Rock Springs, Snowden, AF5280-5, NDAF102629C-4, NY152, NY165, MSAFB609-12, MSAFB635-3, NY163, NY166, W14187-2, W15NYR5-2, MSZ120-4, AF6551-4, WAF16220-4, BNC816-3, and B3379-1 had the best color; there were another 32 lines with color scores ≤ 5 and these lines had acceptable color.

From the results of the 6 week reconditioning the noteworthy lines are: At Northampton County, Snowden, AF5563-5, and AF5677-4 had the best color; NY165 had acceptable color. At Erie County, Snowden, NDAF102629C-4, NY163, NY165, NY166, NCB3259-2, MSZ242-09, and NCB3260-1 had the best color; Atlantic, MSZ120-4, W14NYQZ9-5, and MSV179-1 had acceptable color. At Rock Springs, Snowden, AF5563-5, AF5677-4, B3012-1, NDAF102629C-4, NY165, MSAFB609-12, NY163, W14187-2, MSZ120-4, AF6551-4, WAF16220-2, BNC816-3, B3379-1, and B3385-2 had the best color; there were another 31 lines with color scores ≤ 5 and these lines had acceptable color.

From the results of the chipping directly from 45°F the noteworthy lines are: At Northampton County, NY165 had the best color; Snowden had acceptable color. At Erie County, NY165, NY166, and NCB3259-2 had the best color; Snowden, NY163, MSZ120-4, MSZ242-09, and NCB3260-1 had acceptable color. At Rock Springs, NDAF102629C-4, NY165, NY166, W14NYQ29-5, W15NYR5-2, BNC819-2, and B3379-1 had the best color; there were another 20 lines with color scores ≤ 5 and these lines had acceptable color.

French fry Tests (Tables 4-5)
At Erie County, A09022-4 had the best color. At Rock Springs, AF5406-7, WAF13027-2, COA11013-2, WAF14006-6, WAF14010-3, AF6357-2, AF6370-1, AF6384-2, NDAF13242B-3, AF6495-16, AF6503-2, AF6512-6, AAF12139-1, and AAF12147-6 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, University of Wisconsin potato breeding programs and Solanum International, Parkland Seed, Sterman Masser Inc. provided seed. Special thanks to Bob Leiby who made sure this project was completed.

Table 1. Chip color results of potato evaluation in Garry Hunsicker's Farm, Northampton County, 2020.

Variety/ Line	Specific Gravity	Chip Color			
		Dec.[1]	Feb.[2]	Mar.[3]	Feb.[4]
Atlantic	1.069	4	5	6	7
Snowden	1.066	4	3	3	4
AF5225-1	1.051	4	8	6	-
AF5280-5	1.052	4	6	6	7
AF5563-5	1.061	5	7	3	-
AF5677-4	1.072	5	5	3	-
NY165	1.062	4	4	4	3
B2869-29	1.063	6	7	6	7

[1] Dec. = Stored at 55^0F from October 30, 2020 and chipped on December 8, 2020.
[2] Feb. = Stored at 45^0F from October 30, 2020 than transferred to 55^0F three weeks prior to chipping on February 10, 2021.
[3] Feb. = Stored at 45^0F from October 30, 2020 than transferred to 55^0F six weeks prior to chipping on March 3, 2021.
[4] Feb. = Stored at 45^0F from October 30 and chipped on February 25, 2021.

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

Table 2. Chip color results of potato evaluation in Mark Troyer Farm, Erie County, 2020.

Variety/ Line	Specific Gravity	Chip Color			
		Dec.[1]	Feb.[2]	Mar.[3]	Feb.[4]
Atlantic	1.088	5	4	5	6
Snowden	1.081	3	4	3	4
NDAF102629C-4	1.066	3	3	3	-
NY161 [y]	1.069	5	7	-	6
NY163	1.086	3	2	3	5
NY165	1.075	3	3	3	3
NY166	1.075	3	2	3	3
B2862-29	1.085	5	6	6	-
NCB3259-2	1.088	3	3	3	3
MSZ120-4	1.080	4	4	5	5
MSZ242-09	1.093	3	3	3	4
W14NYQZ9-5	1.083	3	4	4	6
NCB3260-1	1.089	3	3	2	4
MSV179-1	1.068	4	4	4	-

[1] Dec. = Stored at 55^{0}F from October 30, 2020 and chipped on December 8, 2020.
[2] Feb. = Stored at 45^{0}F from October 30, 2020 than transferred to 55^{0}F three weeks prior to chipping on February 10, 2021.
[3] Feb. = Stored at 45^{0}F from October 30, 2020 than transferred to 55^{0}F six weeks prior to chipping on March 3, 2021.
[4] Feb. = Stored at 45^{0}F from October 30 and chipped on February 25, 2021.

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 Plant Pathology & Environmental Microbiology Farm, 2020.

Variety/ Line	Specific Gravity	Chip Color			
		Dec.[1]	Feb.[2]	Mar.[3]	Feb.[4]
Atlantic	1.088	4	4	4	5
Snowden	1.084	3	3	3	4
AF5280-5	1.063	3	3	5	5
AF5563-5	1.078	4	4	3	5
AF5677-4	1.089	4	4	3	4
B3012-1	1.083	4	4	3	6
NDAF102629C-4	1.071	3	3	3	3
NY152	1.077	3	3	4	6
NY165	1.084	3	3	3	3
WAF10664-3	1.078	4	4	4	6
AF5819-2	1.073	4	4	4	5
MSAFB605-4	1.081	4	4	4	6
MSAFB609-12	1.064	3	3	3	4
MSAFB635-3	1.078	4	3	4	5
MSAFB635-15	1.085	3	4	6	5
NY163	1.087	4	3	3	4
NY166	1.077	3	3	4	3
W14187-2	1.082	4	3	3	5
W14NYQ29-5	1.088	4	4	4	3
W14NYQ4-1	1.086	4	4	4	6
W15NYR5-2	1.080	3	3	4	3
MSV179-1	1.070	4	4	6	6
MSZ120-4	1.078	4	3	3	4
MSZ242-09	1.091	4	4	5	5
MSZ063-2	1.084	4	4	4	4
AF5931-1	1.093	4	6	6	6
AF6530-4 [y]	1.087	4	4	6	7
AF6541-15	1.082	5	6	6	7
AF6542-19	1.084	4	4	5	7
AF6551-4	1.073	4	3	3	7
AF6594-4 [y]	1.081	3	4	5	6
AF6602-10 [y]	1.088	4	5	4	5
AF6606-2 [y]	1.076	4	5	5	7
CO11023-2W	1.070	4	5	7	6
CO11250-1W/Y [y]	1.083	5	4	4	6

Table 3. Continued.

Variety/ Line	Specific Gravity	Chip Color			
		Dec.[1]	Feb.[2]	Mar.[3]	Feb.[4]
MSV093-1Y [y]	1.075	4	5	5	5
WAF16220-2	1.081	4	4	3	4
WAF16220-4	1.084	3	3	4	6
BNC811-15	1.090	5	6	6	6
BNC811-22	1.096	5	5	5	7
BNC811-33	1.090	4	6	6	7
BNC811-35	1.082	5	6	6	8
BNC815-6	1.081	6	7	7	7
BNC815-7	1.081	5	7	6	6
BNC816-3	1.074	3	3	3	4
BNC818-9	1.086	4	5	4	7
BNC819-2	1.100	4	4	4	3
BNC821-9	1.090	4	5	4	6
B3379-1	1.085	3	3	3	3
B3382-8	1.082	4	6	4	6
B3385-2	1.086	3	4	3	4
B3390-6	1.087	4	6	5	7
B3397-1	1.090	4	6	6	6
B3403-6	1.085	5	5	5	6
B3423-9	1.086	5	4	4	6
BNC902-2	1.081	3	4	5	-
BNC902-3	1.085	4	4	4	6
BNC742-2	1.087	3	4	4	5

[1] Dec. = Stored at 55^0F from October 30, 2020 and chipped on December 7 & 8, 2020.
[2] Feb. = Stored at 45^0F from October 30, 2020 than transferred to 55^0F three weeks prior to chipping on February 9, 2021.
[3] Feb. = Stored at 45^0F from October 30, 2020 than transferred to 55^0F six weeks prior to chipping on March 2, 2021.
[4] Feb. = Stored at 45^0F from October 30 and chipped on February 24, 2021.

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

y = Yellow Flesh

Table 4. 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, 2020.

Variety/ Line	Yield (cwt/A) [1] Total	>1 7/8"	% of Standard[2]	Percent[3] Pickouts	Specific Gravity	French Fry Color[4] Nov.[5]	Feb.[6]	Mar.[7]
Atlantic	345	288	100	11	1.088	-	-	-
Russet Norkotah	174	129	45	12	1.051	1	1	1
A09022-4	172	123	43	13	1.077	00	00	00
A07908-6CR	243	195	68	5	1.074	1	1	2
W14002-2rus	221	175	61	7	1.060	2	3	3
W14904-13rus	182	105	36	35	1.071	0	2	2

[1] Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.
[2] Percentage of the standard, Atlantic for >1 7/8" yield.
[3] Percentage of total that are pickouts.
[4] French Fry Color: USDA Scale Color Standers for Frozen Fried Potatoes with 000 = lightest, 4 = darkest.
[5] Nov. = Stored at 55^0F from October 30, 2020 and fried on November 25, 2020.
[6] Jan. = Stored at 45^0F from October 30, 2020 than transferred to 55^0F three weeks prior to frying on February 8, 2021.
[7] Feb. = Stored at 45^0F from October 30, 2020 than transferred to 55^0F six weeks prior to frying on March 1, 2021.

Non – replicated trial.

Russets 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.

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, 2020.

Variety/ Line	Yield (cwt/A) [1] Total	>1 7/8"	% of Standard[2]	Percent[3] Pickouts	Specific Gravity	French Fry Color[4] Nov.[5]	Feb.[6]	Mar.[7]
Russet Norkotah	374	302	100	12	1.071	1	1	1
Reveille Russet	275	198	66	15	1.076	1	1	1
Russ. Burbank	334	161	53	42	1.079	0	1	0
AF5406-7	317	224	74	22	1.085	0	00	0
TX08352-5Ru	235	199	66	8	1.064	0	1	1
AF5735-8	323	283	94	10	1.091	1	1	1
WAF13027-2	377	310	103	13	1.076	00	0	0
W14002-2rus	313	215	71	23	1.065	1	2	2
W14904-13rus	337	196	65	29	1.079	0	0	1
A09022-4	240	185	61	11	1.084	00	-	-
COA11013-2	369	226	75	31	1.074	0	00	00
A07908-6CR	323	241	80	18	1.084	0	1	0
CO09076-3RU	232	130	43	37	1.074	1	1	1
Russet Norkotah	338	262	100	12	1.069	1	1	1
WAF14006-6	418	322	123	22	1.083	0	0	0
WAF14010-3	335	290	111	11	1.072	00	0	0
CO08155-2RU/Y [y]	273	202	77	23	1.081	0	1	1
AF6340-6	197	191	73	0	1.070	1	1	1
AF6357-2	257	241	92	0	1.083	00	0	0
AF6370-1	298	264	101	8	1.078	00	0	0
AF6384-2	297	216	82	24	1.084	00	00	0
NDAF13242B-3	242	211	81	6	1.097	00	0	0
AF6495-16	380	193	74	41	1.085	00	00	0
AF6503-2	375	298	114	18	1.078	00	00	00
AF6506-4	428	237	91	39	1.079	1	-	-
AF6512-6	335	230	88	28	1.103	0	0	0
AAF12139-1	559	439	168	19	1.086	0	0	00
AAF12147-6	337	320	122	0	1.077	0	0	0
AF6438-2	481	366	140	19	1.080	0	1	0

[1] Yield Total = all yield including pickouts. Yield >1 7/8" = categories 2, 3, 4 and 5 excluding pickouts.
[2] Percentage of the standard, Atlantic for >1 7/8" yield.
[3] Percentage of total that are pickouts.
[4] French Fry Color: USDA Scale Color Standers for Frozen Fried Potatoes with 000 = lightest, 4 = darkest.
[5] Nov. = Stored at 55^0F from October 30, 2020 and fried on November 25, 2020.
[6] Feb. = Stored at 45^0F from Octomber 30, 2020 than transferred to 55^0F three weeks prior to frying on February 8, 2021.
[7] Mar. = Stored at 45^0F from October 30, 2020 than transferred to 55^0F six weeks prior to frying on March 1, 2021

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

y = Yellow Flesh

Yellow Flesh Notes

We rated the flesh color on January 14, 2021.
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	YF 3
	AF6579-3	AF6530-4	NDAF1489-4
	AF6602-10	AF6572-3	NY161
	MSZ416-8R/Y (Red skin)	AF6594-4	NC606-23
	CO08155-2 (RU/Y (Russet)	AF6606-2	CO09128-3W/Y
	Corisca	B3381-4	CO05128-5W/Y
		B3410-12	Krone
		NY149	Connect
		NC587-10	Lady Amarilla
		NCB2607-3 (Red skin)	Constance
		MSV093-1Y	
		MSX156-1Y	
		MSZ615-2	
		MSBB238-1R/Y (Red skin)	
		CO11250-1W/Y	
		A08122-9R/Y (Red skin)	
		Melody	

Purple Flesh Variety
1 - B3372-1 (Purple skin), nice dark purple flesh.
2 – B3355-5 (Purple Skin), dark purple flesh
3 – B3364-3 (Purple skin), purple flesh with small white center
4 – AF5412-3 (Purple skin), purple flesh with white streaks in flesh

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

Yellow Flesh Notes

We rated the flesh color on January 14, 2021
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	YF 3
		NDAF14113Y-3 (Red skin)	CO05037-3W/Y
		B2152-17 (Red skin)	CO97232-2R/Y (Red skin)
		BNC716-1 (Red skin)	Belmonda
		BNC718-1 (Purple skin)	
		NCB2607-3 (Red skin)	

Purple Flesh Variety
1 - B3372-1 (Purple skin), nice dark purple flesh.
1 – NC509-16 (Purple skin), nice dark purple flesh.
3– BNC833-2 (Purple skin), purple flesh
4 – AF5412-3 (Purple skin), purple flesh with white streaks in flesh

Red Flesh Variety
AF5412-3 (Red skin) pink flesh with white center