

Research Progress Report to Maine Potato Board

Screening Potato Varieties for Pink Rot and Bacterial Soft Rot Resistance

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1. Pink rot trial

To evaluate the clones from UMaine breeding program for the resistance to pink rot, a field trial was carried out on Aroostook Research Farm in Presque Isle in 2017. All 38 clones and 6 standard varieties were used. Potato seed pieces were planted on 24 May, with 10 seed tubers per clone or variety at one-foot planting spacing. Each row was inoculated with 1.5 L of artificially prepared inoculum of mefenoxam-sensitive *Phytophthora erythroseptica* isolates in the furrow. Three replications were applied. Fertilizer (N:P:K = 14:14:14) was applied at 1,100 lb/A. All plots were treated with Bravo Weather Stik (a.i. chlorothalonil) at 16 fl oz product/A and Blackhawk (a.i. spinosad) at 3.6 oz/A to control late blight and insects, respectively, during the season. Emergence was evaluated on 26 June. Potato vines were killed by the application of Reglone on August 21. Potato tubers were dug up by a harvester on September 5 and stored for 14 days before disease evaluation. Data were analyzed using R statistical package (R Foundation for Statistical Computing, Vienna, Austria) and ANOVA with Fisher's LSD were used to compare the effects of treatments at $\alpha = 0.05$. Some varieties and clones showed highly resistant to pink rot. Clones 'AF5677-6, AF5450-7 and AF4831-2 were more tolerant than 'Snowden'.

Table 1. Response of potato germplasm to pink rot 2018.

Variety	Emergence	Vigor (%)	Weight (lb)	Disease incidence (%)
AAF10615-1	24 abc	66.67 ab	5.37 b	42.16 ab
AF5071-2	16 abc	56.67 ab	5.90 b	23.04 abc
AAF-07521-1	9 c	23.33 ab	6.38 b	17.75 c
AF5468-5	21 abc	63.33 ab	9.12 ab	25.44 abc
Russet Norkotah	24 abc	63.33 ab	9.40 ab	17.74 abc
Red gold	18 abc	33.33 ab	9.70 ab	13.70 bc
WAF10664-3	22 abc	50 ab	11.14 ab	11.80 c
AF5492-6	21 abc	53.33 ab	11.44 ab	10.73 c
AF5040-8	29 ab	70 ab	11.59 ab	4.24 c
AF5412-3	27 abc	76.67 ab	11.64 ab	2.47 c
WAF10612-1	18 abc	43.33 ab	11.89 ab	44.14 a
AF5407-13	22 abc	43.33 ab	12.00 ab	8.48 c
WAF10073-3RUS	11 bc	26.67 ab	12.13 ab	7.88 c
AF3317-15	19 abc	63.33 ab	12.81 ab	9.61 c
Atlantic	17 abc	43.33 ab	13.38 ab	3.10 c
NDAF113470C-3	29 ab	80 ab	14.20 ab	1.86 c
AF5563-2	27 abc	60 ab	14.72 ab	2.00 c
Pike	24 abc	66.67 ab	14.82 ab	0.00 c

AF5682-5	27	abc	66.67	ab	14.86	ab	3.44	c
AF4872-2	25	abc	73.33	ab	15.43	ab	15.40	abc
AF5484-3	16	abc	18.33	b	15.46	ab	0.56	c
Dark Red Norland	27	abc	56.67	ab	15.47	ab	4.88	c
AF5682-3	22	abc	70	ab	15.70	ab	2.08	c
AF5179-4	21	abc	43.33	ab	15.78	ab	14.64	bc
AF4648-2	29	ab	40	ab	15.89	ab	0.00	c
NDAF113484B-1	30	a	70	ab	16.49	ab	8.49	c
AAF10237-4	20	abc	46.67	ab	17.13	ab	8.18	c
Snowden	21	abc	43.33	ab	17.25	ab	0.51	c
AF5312-1	26	abc	70	ab	17.82	ab	2.12	c
AF5225-1	15	abc	45	ab	17.94	ab	6.46	c
AF5280-5	26	abc	76.67	ab	18.32	ab	1.50	c
WAF10051-RUS	18	abc	30	ab	18.40	ab	1.60	c
AF5677-4	23	abc	73.33	ab	18.47	ab	6.36	c
AF5164-19	28	ab	73.33	ab	19.21	ab	7.67	c
AF5091-8	18	abc	45	ab	19.48	ab	7.65	c
AF4172-2	29	ab	63.33	ab	20.05	ab	8.22	c
NDAF092412-3	21	abc	60	ab	20.20	ab	4.78	c
AF5406-7	28	ab	66.67	ab	20.46	ab	9.07	c
AF5245-1	30	a	83.33	a	20.57	ab	3.29	c
AF5414-1	28	ab	53.33	ab	21.11	ab	6.03	c
AF5429-3	29	ab	83.33	a	21.67	ab	9.27	c
AF5450-7	19	abc	53.33	ab	23.60	a	4.23	c
AF5677-6	25	abc	70	ab	25.05	a	2.97	c
AF4831-2	26	abc	83	a	25.61	a	1.85	c

Means followed by different letters are significantly different ($P < 0.05$).

2. Soft rot trial

To evaluate the clones from UMaine breeding program for the resistance to soft rot, *Pectobacterium parmentieri* strain ME175 and *Dickeya dianthicola* strain ME30 were used to inoculate potato tubers. Inoculum was prepared by incubating each isolate in a 50 ml tube with sterile tryptic soy broth overnight on a shaker at 180 rpm at 28°C. Three replications were used for each variety. Using a sterile 1-ml pipette tip, 1-cm-deep hole was punched on two sites along the middle line of the tuber. Inoculum (20 µl) of each isolate was placed inside a hole, so that each tuber was inoculated with both isolates, and dielectric grease was used to cover the holes and avoid loss of moisture. The tubers were placed in a 28°C incubator for 3 days, after which they were cut transversally and the decayed tissue was measured in depth and width, and the two measurements multiplied. Varieties were compared within isolates using Tukey's HSD mean comparison, $\alpha = 0.05$. No test varieties showed complete resistance for soft rot pathogens, although there were different levels of susceptibility (Table 2). In the results of 2018 trial, to *Pectobacterium parmentieri* ME175, 'Katahdin', AF5412-3, and 'Russet Burbank' were tolerant.

To *Dickeya dianthicola* ME30, 'Katahdin', AF5412-3 and NADF102629C-4 were more tolerant (Table 2).

Table 2. Responses of potato varieties and clones to the inoculation of *Dickeya dianthicola* ME30 and *Pectobacterium parmentieri* PW163 measured by lesion area (length x wide) on tubers, 2018.

Clone/variety	Lesion area (mm ²), ME30		Lesion area (mm ²), PW163		Lesion Lesion area (mm ²), water
Kahtahdin	106.68	f	123.61	h	80.05
AF5412-3	121.4	ef	129.14	h	71.75
NADF102629C-4	124.51	ef	136.04	gh	71.7
Russet Burbank	147.71	def	128.44	h	83.19
AF5164-19	184.68	cdef	238.56	abcdefg	88.12
AF5225-1	187.23	cdef	150.67	efgh	70.08
WAF10073-3Rus	196.76	bcdef	212.26	abcdefg	76.79
AF1424-7	201.43	bcdef	188.22	cdefgh	65.09
AF4872-2	201.72	bcdef	220.17	abcdefg	75.19
AF4831-2	205.21	bcdef	179.08	defgh	86.32
AAF08434-1	205.9	bcdef	201.5	cdefgh	77.84
Yukon Gold	208.54	bcdef	189.25	cdefgh	103.02
AF4296-3	209.06	bcdef	143.18	fgh	59.65
AF5414-1	209.71	bcdef	180.66	defgh	87.1
Sebago	212.94	bcdef	182.2	defgh	108
AF4552-5	214.18	bcdef	181.57	defgh	88.85
AF4648-2	221.43	bcdef	212.99	abcdefg	83.13
AF5091-8	225.08	bcdef	280.88	abcd	154.73
AF5040-8	225.86	bcdef	248.38	abcdefg	116.61
Atlantic	230.66	bcdef	267.54	abcdef	62.65
AF5179-4	232.47	bcdef	159.64	defgh	76
AF5429-3	233.13	bcdef	203.7	bcdefgh	74.34
Shepody	233.35	bcdef	237.07	abcdefg	89.64
Dark Red Norland	238.42	bcdef	242.93	abcdefg	109.93
AF3362-1	242.1	bcde	188.01	cdefgh	100.07
Green Mountain	247.31	bcde	223.61	abcdefg	95.97
AF3001-6	247.75	bcde	185.64	cdefgh	98.14
Snowden	250.39	bcde	189.97	cdefgh	92.21
AF4157-6	252.67	bcde	199.4	cdefgh	51.4
AF5245-1	254.91	bcde	223.61	abcdefg	84.3
AF4138-8	269.64	bcd	281.31	abcd	89.66
AF5407-13	272.27	bcd	227.32	abcdefg	96.34
AF4172-2	276.21	bcd	275.38	abcde	107.69
AF5468-5	276.23	bcd	246.72	abcdefg	124.47

Clone/variety	Lesion area (mm²), ME30		Lesion area (mm²), PW163		Lesion Lesion area (mm²), water
AF5406-7	277.96	bcd	338.25	a	83.86
AAF0752-1	284.04	bc	230.22	abcdefgh	74.21
AF5280-5	288.5	bc	262.59	abcdef	45.86
AF5450-7	290.66	bc	220.91	abcdefgh	112.99
AF5406-10	304.88	bc	334.55	a	84.9
AF4659-12	306.14	bc	309.36	abc	90.88
AF5071-2	323.97	ab	247.91	abcdefgh	75.46
AF5312-1	325.41	ab	258.87	abcdefg	95.83
AF0338-17	443.23	a	328.51	ab	113.79

Means followed by different letters are significantly different ($P < 0.05$).