

EVALUATION OF POTATO CULTIVARS GROWN IN THE PACIFIC NORTHWEST FOR RESISTANCE TO LATE BLIGHT

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In the past few years damage caused to potatoes by new and aggressive strains of the late blight fungus has received increasing national and even international attention. Many people are concerned that new strains of *Phytophthora infestans* are 1) more aggressive, 2) have greater parasitic fitness, 3) are increasingly variable and 4) more adaptable to disease control technologies, 5) have expanded host range, and 6) may be able to overwinter in soil via oospores. Reports of the 1) severity of recent epidemics throughout the United States and Canada, 2) symptoms involving larger lesions and stem lesions, 3) new clonal populations not identified before, 4) insensitivity to the fungicide metalaxyl, 5) disease outbreaks on nightshade and tomato as well as on potato, and 6) the presence of A1 and A2 mating types in the same field provide evidence that such concerns are well-founded.

Consequently, there has been a renewed emphasis in research and extension programs on late blight control measures including sanitation and cultural practices, disease forecasting, appropriate fungicide spray programs, and the efficacy of new or experimental fungicides. However, in order to use control measures against the new strains of *P. infestans* most effectively, the relative susceptibility of important commercial potato cultivars grown in Washington needs to be known.

Therefore, Dennis Johnson and I established late blight cultivar trials at WSU-Mount Vernon during the 1993 and 1994 growing seasons. This location was chosen because of an aggressive, metalaxyl-insensitive *P. infestans* population in the area and the likelihood of weather favorable for late blight. Potato cultivars and clones selected for evaluation were planted late May in single rows; plots were arranged as randomized complete blocks, replicated four times and separated on all sides by 10 ft alleys to minimize interblock interference. All plots were 20 ft long and had a 42 in row spacing and 9 in seed spacing. Border rows of *White Rose* were included between every four record rows to facilitate spread of the fungus. Fertilizer and herbicide applications were typical for the area but no fungicides were used in these trials. In 1993 total rainfall April through August was 10 in (40 yr average = 8.8 in). An additional 3 in of water was applied during the growing season via an irrigation gun. In 1994 total rainfall April through August was 6.04 in; sprinkler irrigation delivered 0.14 inches of water, mornings and evenings three times a week for four weeks.

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Irrigation provided extended periods of leaf wetness favorable for late blight and artificial inoculation with *P. infestans* proved unnecessary.

Beginning in mid- July and continuing through late August, plots were rated weekly for percent blighted foliage. Relative potato cultivar susceptibilities were compared by ranking AUDPC (area under the disease progress curve) values (Table 1). Percent blighted tubers also was assessed at harvest after digging (Table 2). Results were subjected to statistical analysis and where *F* values showed significant differences, Fisher's protected LSD Test was applied at $P = 0.05$.

The tested cultivars and clones ranked similarly in susceptibility to late blight caused by new metalaxyl-insensitive strains of *P. infestans* when reactions were compared to those obtained with metalaxyl-sensitive *P. infestans* strains prior to 1990. *Norchip*, *Hilite*, *Russet Norkotah* and *Goldrush* ranked more susceptible than *Russet Burbank*; *Superior*, *Shepody*, *White Rose* and *Ranger* were similar in susceptibility to *Russet Burbank* ; and, *Rosa*, *CO08-3008-1*, *ND-2438-7R*, *Kennebec* and *Elba* ranked less susceptible than *Russet Burbank*. Comparison of the number of blighted tubers at harvest showed that foliage and tuber susceptibilities differed, and that *Shepody* and *Russet Norkotah* tubers were the most susceptible of those tested to tuber blight.

Late blight developed earlier and more quickly on *Superior*, *Hilite*, *Norkotah* and possibly *Shepody* than on *Russet Burbank*. This is in agreement with observations made in the Columbia Basin and western Washington. Susceptibilities based on maturity class in this study showed the earlier maturing cultivars generally being more susceptible than later maturing cultivars. Since the earlier crop canopy of these very susceptible cultivars also would create a micro-environment earlier in the season for disease development, they possibly can serve as sources of inoculum build-up in these regions. Fields of such cultivars should be monitored and managed, accordingly, for early development of late blight.

Table 1. Area under the disease progress curve (AUDPC) and mean ranks (least to most susceptible) of potato cultivars screened in western Washington in 1993 and 1994 against new strains of *Phytophthora infestans*.

Cultivar and Maturity Class		WA			
		AUDPC		Rank	
		1993	1994	1993	1994
<i>Elba</i>	Late	527	135	a	a
<i>Kennebec</i>	Medium-late	748	247	ab	ab
<i>Rosa</i>	Medium	866	...	b	...
<i>ND24387R</i>	Medium-late	...	407	...	c
<i>C00830081</i>	Medium late	...	362	...	bc
<i>Ranger</i>	Medium-late	1101	389	cd	bc
<i>Russet Burbank</i>	Late	1035	650	c	d
<i>White Rose</i>	Medium	1060	834	c	de
<i>Shepody</i>	Medium-late	1169	807	de	cd
<i>Superior</i>	Early	1516	1079	g	ef
<i>Goldrush</i>	Medium	...	1194	...	fg
<i>Russet Norkotah</i>	Medium-early	1214	1424	ef	g
<i>Hilite</i>	Medium-early	1388	1456	fg	g

Ranks determined by Proc Rank procedure in SAS. Common letters within years do not differ significantly according to analysis of variance of ranked AUDPCs and LSD (least significant difference) analysis ($P = 0.05$). Populations of *P. infestans* identified as US-6 and US-11 sensu Goodwin existed in the plots in 1993 and 1994, respectively.

Table 2. Percentage of tuber rot in selected potato cultivars infected with new populations of *Phytophthora infestans* at WSU-Mount Vernon in 1993 and 1994.

Cultivar/Clone	Percent Tuber Rot at Harvest	
	1994	1993
<i>Shepody</i>	18.7 a	7.1 ab
<i>Norkotah</i>	15.0 a	5.9 ab
<i>White Rose</i>	6.2 b	3.1 c
<i>Hilite</i>	2.89 b	1.6 c
<i>Goldrush</i>	4.7 b	---
<i>Kennebec</i>	4.7 b	2.3 c
<i>Alleghany</i>	4.2 b	---
<i>Russet Burbank</i>	2.7 b	3.7 bc
<i>Ranger Russet</i>	2.8 b	2.3 c
<i>Elba</i>	2.1 b	1.5 c
<i>Superior</i>	1.1 b	2.0 c
<i>Red LaSoda</i>	1.1 b	---
<i>Rosa</i>	---	2.2 c
<i>C008-3000-1</i>	0.48 b	---
<i>ND02438-7R</i>	0 b	---
LSD ($P = 0.05$) ²	0.0662	0.0259

Populations of *P. infestans* identified as US-6 and US-11 sensu Goodwin existed in plots in 1993 and 1994, respectively. Percent data transformed before statistical analysis using square root + 1. Common letters in the same column do not differ significantly by analysis of variance and LSD (least significant difference) analysis ($P = 0.05$).