

PEPPER, BELL (*Capsicum annuum*)
Phytophthora blight, *Phytophthora capsici*

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Evaluation of pepper breeding lines and cultivars for tolerance to the crown rot phase of *Phytophthora* blight and development of skin separation or 'silvering' in fruit, 2010.

This experiment, arranged as a randomized complete block design with 4 replications, was conducted in a field with a history of *Phytophthora* blight (*P. capsici*) at the Rutgers Agricultural Research and Extension Center (RAREC), Bridgeton, New Jersey. All peppers were grown by a local transplant producer located in Vineland, NJ. On 7 June, bell pepper breeding lines or cultivars were hand transplanted into double rows (18 in. in row) on black plastic mulch on 5-ft-centers (18 plants per plot) with drip irrigation. All treatment plots were 15-ft-long with *Phytophthora*-susceptible bell pepper 'Tomcat' planted in 5-ft breaks between plots. Fertility schedule and management of insect and weeds were done according to local recommendation guidelines. Each week, the number of *Phytophthora*-infected plants (out of a total number of 18) were counted and recorded from each plot. All mature pepper fruit from 15 ft of each treatment row were harvested on 12 Aug, 2 and 24 Sep, and 8 Oct. All fruit were graded, separated and weighed for statistical analysis. Rainfall for the months of Jun, Jul, Aug, Sep and Oct were 2.35, 4.13, 2.96, 4.36 and 5.55 in., respectively.

The field season was excessively hot and dry, therefore pressure for *Phytophthora* blight development was low during much of the summer. There were no significant differences in the number and weight of marketable fruit, fruit with 'silvering', and total marketable fruit for harvest 1, 3, and 4 (Tables 1,3 & 4). There were significant differences in the number and weight of marketable fruit, fruit with 'silvering', and total marketable fruit for harvest 2 (Table 2). For combined harvests, there were significant differences in the number and weight of marketable fruit, fruit with 'silvering', and total marketable fruit (Table 5). The total number of 28 lb boxes/A varied significantly depending on cultivar or breeding line (Table 5). Overall, yield was highest in 'Alliance', 'Revolution', and 'Camelot' (Table 5). Fruit with 'silvering' varied significantly depending on cultivar or breeding line (Table 5). Fruit with 'silvering' was highest in *phytophthora*-resistant 'Paladin' at 16.9% followed by *phytophthora*-tolerant 'Aristotle' at 12.7% and 'Intruder' at 12.5%. 'Silvering' was lowest in *phytophthora*-susceptible 'Camelot' and 'Alliance', and *phytophthora*-tolerant 'Revolution' and 'Declaration' (Table 5). There were no significant differences in AUDPC values between cultivars or breeding lines (Table 5).

Table 1. Number and weight of marketable fruit, fruit with silvering, and total marketable fruit at harvest 1 at the Rutgers Agricultural Research and Extension Center in 2010.

Cultivar/Breeding Line	Marketable fruit ^z		Fruit with silvering ^y		Total marketable fruit ^x	
	No.	Wt.	No.	Wt.	No.	Wt.
Alliance	10.75	3.20	1.25	0.50	12.00	3.70
Declaration	15.75	4.40	3.00	1.01	18.75	5.41
Revolution	19.00	5.32	1.00	0.37	20.00	5.69
Vanguard	16.75	4.19	2.00	0.62	18.75	4.81
Aristotle X3R	19.50	5.31	4.75	1.66	24.25	6.97
Camelot	11.00	2.18	1.75	0.35	12.75	2.52
PS 09941819	10.25	2.62	4.75	1.54	15.00	4.16
PX 0996-7922A	15.50	4.30	1.25	0.57	16.75	4.87
Intruder	13.75	4.29	4.75	1.55	18.50	5.84
Paladin	12.75	2.80	4.25	1.14	17.00	3.94
	NS	NS	NS	NS	NS	NS

^z Number and weight (in lb/plot) of marketable fruit without 'silvering'.

^y Number and weight (lb/plot) of fruit with 'silvering'.

^x Total number and weight (lb/plot) of marketable fruit with and without 'silvering'.

NS = nonsignificant

Table 2. Number and weight of marketable fruit, fruit with silvering, and total marketable fruit at harvest 2 at the Rutgers Agricultural Research and Extension Center in 2010.

Cultivar/Breeding Line	Marketable fruit ^z		Fruit with silvering ^y		Total marketable fruit ^x	
	No.	Wt.	No.	Wt.	No.	Wt.
Alliance	104.75 a ^w	31.55 a	6.00 b	2.17	110.75 ab	33.72 a
Declaration	81.75 abc	24.35 ab	5.00 b	1.71	86.75 abc	26.057 ab
Revolution	85.25 abc	24.93 ab	8.75 b	2.92	94.00 abc	27.84 ab
Vanguard	71.50 abc	22.57 ab	9.75 b	3.45	81.25 abc	26.03 ab
Aristotle X3R	54.50 c	15.34 b	13.75 ab	4.58	68.25 c	19.92 b
Camelot	93.50 a	27.17 a	6.25 b	2.13	99.75 abc	29.31 ab
PS 09941819	86.00 abc	26.85 a	13.25 ab	4.95	99.25 abc	31.80 ab
PX 0996-7922A	78.50 abc	21.85 ab	15.75 ab	5.06	94.25 abc	26.91 ab
Intruder	57.00 bc	15.80 a	14.00 ab	4.36	71.00 bc	20.16 b
Paladin	92.50 ab	21.54 ab	22.25 a	5.37	114.75 a	26.91 ab

^z Number and weight (lb/plot) of marketable fruit without 'silvering'.

^y Number and weight (lb/plot) of fruit with 'silvering'.

^x Total number and weight (lb/plot) of marketable fruit with and without 'silvering'.

^w Means followed by the same letters are not significantly different according to Fisher's Least Significant Difference (LSD) test ($P=0.05$).

Table 3. Number and weight of marketable fruit, fruit with silvering, and total marketable fruit at harvest 3 at the Rutgers Agricultural Research and Extension Center in 2010.

Cultivar/Breeding Line	Marketable fruit ^z		Fruit with silvering ^y		Total marketable fruit ^x	
	No.	Wt.	No.	Wt.	No.	Wt.
Alliance	32.00	9.31	0.25	0.16	32.25	9.47
Declaration	25.00	7.37	1.25	0.59	26.25	7.96
Revolution	32.75	9.25	0.75	0.37	33.50	9.63
Vanguard	26.25	9.19	2.50	1.27	28.75	10.46
Aristotle X3R	19.00	5.75	3.50	1.37	22.50	7.12
Camelot	40.25	11.99	0.00	0.00	40.25	11.99
PS 09941819	15.25	4.49	0.75	0.30	16.00	4.79
PX 0996-7922A	30.00	8.45	1.75	0.65	31.75	9.10
Intruder	23.25	6.73	1.75	0.64	25.00	7.36
Paladin	22.25	6.18	1.75	0.66	24.00	6.84
	NS	NS	NS	NS	NS	NS

^z Number and weight (lb/plot) of marketable fruit without 'silvering'.

^y Number and weight (lb/plot) of fruit with 'silvering'.

^x Total number and weight (lb/plot) of marketable fruit with and without 'silvering'.

NS = nonsignificant

Table 4. Number and weight of marketable fruit, fruit with silvering, and total marketable fruit at harvest 4 at the Rutgers Agricultural Research and Extension Center in 2010.

Cultivar/Breeding Line	Marketable fruit ^z		Fruit with silvering ^y		Total marketable fruit ^x	
	No.	Wt.	No.	Wt.	No.	Wt.
Alliance	38.00	8.85	0.25	0.09	38.25	8.94
Declaration	35.50	7.87	0.50	0.20	36.00	8.06
Revolution	34.75	7.86	0.00	0.00	34.75	7.86
Vanguard	27.50	6.19	0.00	0.00	27.50	6.19
Aristotle X3R	22.25	4.95	0.75	0.25	23.00	5.20
Camelot	25.00	6.03	0.00	0.00	25.00	6.03
PS 09941819	24.50	5.38	0.25	0.06	24.75	5.44
PX 0996-7922A	22.00	4.81	0.25	0.10	22.25	4.91
Intruder	38.00	8.49	1.00	0.37	39.00	8.86
Paladin	28.50	6.42	4.75	1.37	33.25	7.78
	NS	NS	NS	NS	NS	NS

^z Number and weight (lb/plot) of marketable fruit without 'silvering'.

^y Number and weight (lb/plot) of fruit with 'silvering'.

^x Total number and weight (lb/plot) of marketable fruit with and without 'silvering'.

NS = nonsignificant

Table 5. Total number and weight of marketable fruit, fruit with silvering, total marketable fruit, and total percent 'silvering' for combined harvests at the Rutgers Agricultural Research and Extension Center in 2010.

Cultivar/Breeding Line	Marketable fruit ^z		Total fruit with silvering ^y		Total marketable fruit ^x		Total boxes/A ^w	% Fruit with silvering ^v	AUDPC Value ^u
	No.	Wt.	No.	Wt.	No.	Wt.			
Alliance	46.38 a ^t	13.27 a	1.94 d	0.73 c	48.31 a	13.96 a	289.1 a	4.4 cd	445.7 a
Declaration	39.50 ab	10.97 abc	2.44 bcd	0.88 bc	41.94 ab	11.87 ab	245.9 ab	5.6 cd	880.4 a
Revolution	42.94 ab	11.84 ab	2.62 bcd	0.92 bc	45.56 ab	12.76 ab	264.3 ab	4.7 cd	883.4 a
Vanguard	35.50 bc	10.54 a-d	3.56 bcd	1.34 abc	39.10 ab	11.87 ab	245.9 ab	10.5 abc	655.6 a
Aristotle X3R	28.81 c	7.84 d	5.69 ab	1.96 ab	34.50 b	9.80 b	203.0 b	12.7 ab	555.7 a
Camelot	42.44 ab	11.84 ab	2.00 cd	0.62 c	44.44 ab	12.46 ab	258.2 ab	2.9 d	1086.2 a
PS 09941819	34.00 bc	9.83bcd	4.75 bcd	1.71 abc	38.75 ab	11.54 ab	239.2 ab	9.2 bcd	1016.8 a
PX 0996-7922A	36.50 abc	8.95 bcd	4.75 bcd	1.59 abc	41.25 ab	11.45 ab	237.1 ab	8.0 bcd	1405.0 a
Intruder	33.00 bc	8.83 cd	5.38 abc	1.73 abc	38.38 ab	10.55 b	218.6 b	12.5 ab	348.7 a
Paladin	39.00 ab	9.23 bcd	8.25 a	2.13 a	47.25 a	11.37 ab	235.4 ab	16.9 a	480.3 a

^z Number and weight (lb/plot) of marketable fruit without 'silvering'.

^y Number and weight (lb/plot) of fruit with 'silvering'.

^x Total number and weight (lb/plot) of marketable fruit with and without 'silvering'.

^w Total number of 28 lb boxes/A for combined harvests.

^v Total percentage of harvested fruit with 'silvering'.

^u Arcsine-transformed Areas Under Disease Progress Curve (AUDPC) values for phytophthora development.

^t Means followed by the same letters are not significantly different according to Fisher's Least Significant Difference (LSD) test ($P=0.05$).

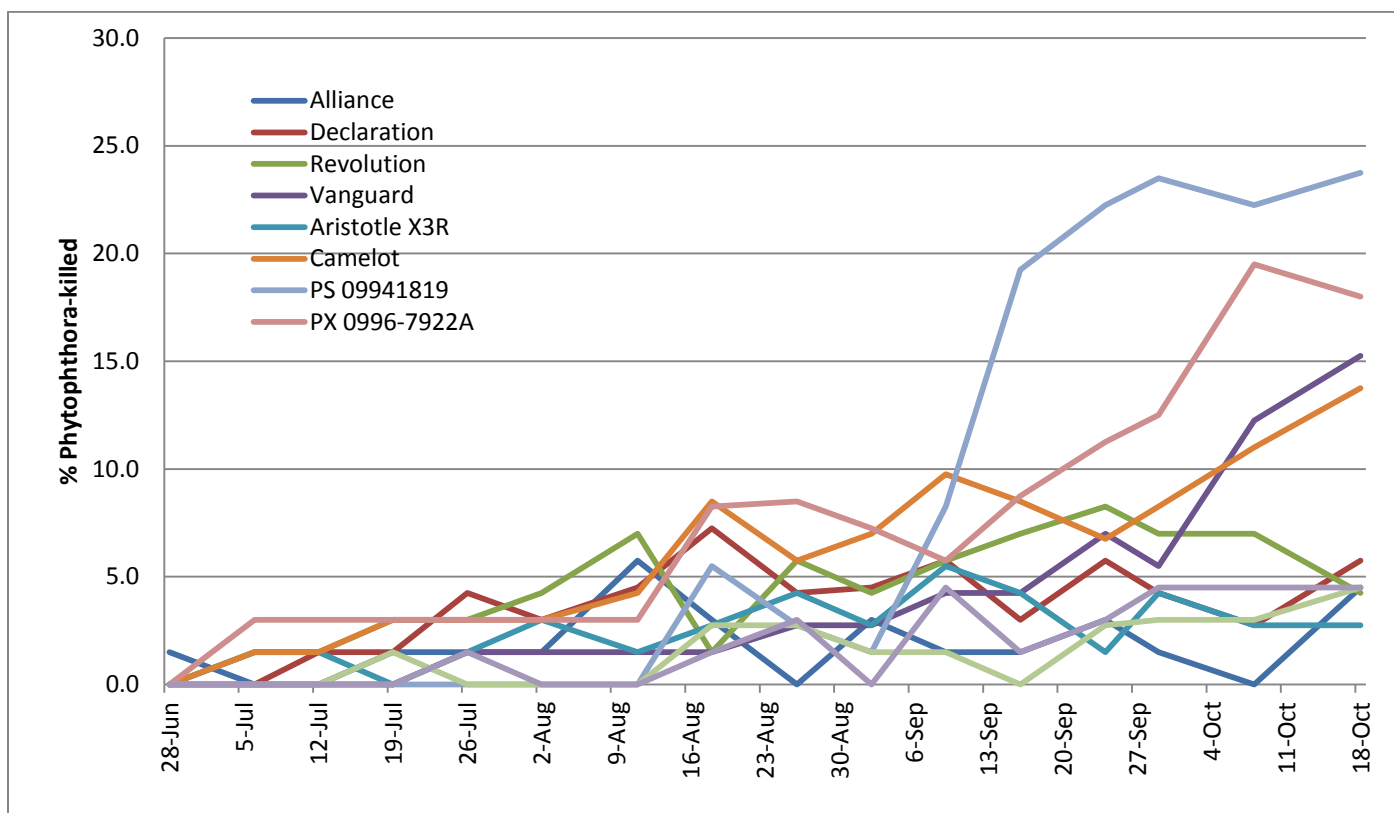


Figure 1. Disease progress curves for cultivars and breeding lines evaluated for resistance to the crown rot phase of Phytophthora blight at the Rutgers Agricultural Research and Extension Center in Bridgeton, NJ in 2010.