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

M. T. McGrath and G. M. Fox
Dept of Plant Pathology & Plant-Microbe Biology
Cornell University, LIHREC
3059 Sound Avenue, Riverhead, NY 11901

Evaluation of Phytophthora-resistant bell pepper cultivars with and without a fungicide program, 2008.

Two adjacent field experiments were conducted in a field where Phytophthora blight has been observed since 1991 at the Long Island Horticultural Research and Extension Center. Soil type is Haven loam. Fertilizer (N-P-K 10-10-10) at 1000 lb/A was broadcast and incorporated on 25 May. The field was tilled on 4 Jun. Bell peppers were seeded on 6 May in the greenhouse and transplanted on 13 Jun. For weed control, soil between plants was sprayed with Prowl H_2O (1.5 pt/A) immediately after transplanting and before irrigating. During the season weeds were controlled by cultivating and hand weeding. Fruit were protected from worm pests by applying Orthene (1 lb/A) on 28 Jul and 13 Aug and Spintor (6 oz/A) on 22 and 29 Aug. Each plot consisted of two 10-ft rows of peppers spaced 34 in. apart with 8 plants in each row spaced 15 in. apart. There was an unplanted 5-ft buffer zone between plots within the row. A randomized complete block design with four replications was used for each experiment. The cultivars evaluated included Paladin, Aristotle, Revolution, and Declaration, which are marketed as having intermediate resistance to Phytophthora blight, and an experimental cultivar developed by Syngenta Seeds Rogers brand. Host resistance is to the crown rot phase only. One experiment was not treated with fungicides while the other was treated approximately weekly. This was done to improve control especially of the aerial phase of Phytophthora blight. A soil application of ProPhyt (5 pt/A) and Ridomil Gold EC (1 pt/A) was made in a band on both sides of each row of transplants on 20 Jun using a backpack CO_2-pressurized sprayer. Foliage was treated with Forum (6 fl oz/A) + Kocide 3000 (0.75 lb/A) applied on 1 Jul, 14 Jul, 29 Aug, and 24 Sep; ProPhyt (6 pt/A) + Kocide 3000 (0.75 lb/A) applied on 28 Jul; Fosphite (6 pt/A) + Kocide 3000 (1 lb/A) applied on 22 Aug; and Presidio (4 fl oz/A) + Kocide 3000 (0.75-1 lb/A) applied on 13 Aug, 11 Sep, and 3 Oct. The foliar applications were made using a tractor-mounted boom sprayer equipped with D5-25 hollow cone nozzles spaced 17 in. apart that delivered 96 gal/A at 100 psi. Disease incidence (percentage of infected plants per plot) was assessed on 22 Sep and 20 Oct. Marketable mature green fruit were harvested on 25 Aug; 4, 16, and 22 Sep; and 20 Oct. Fruit rotting due to Phytophthora were counted. A square root transformation was used when needed prior to analysis to achieve homogeneity of variance. Average monthly high and low temperatures (^{o}F) were 80/63 in Jun, 84/67 in Jul, 79/63 in Aug, 75/61 in Sep, and 63/47 in Oct. Rainfall (in.) was 3.88, 3.67, 3.76, 8.34, and 3.18 for these months, respectively.

Rain events in 2008 provided very favorable conditions for development of Phytophthora blight. Symptoms of crown rot were observed on a few plants of the susceptible cultivar Crusader on 26 Jun, 13 days after transplanting. Incidence of plants with foliar symptoms of Phytophthora blight for all of the resistant cultivars as well as the susceptible cultivars Karisma and Alliance was significantly lower than for Crusader on 22 Sep in both experiments and on 20 Oct for plants in the fungicide-treated experiment. An experimental cultivar, RPP 20809, had the lowest incidence of plants with foliar symptoms, which was significantly lower than all other cultivars in both experiments on 20 Oct except for Paladin and Aristotle in the fungicide-treated experiment. Aristotle had the numerically lowest total incidence of fruit affected by Phytophthora over all harvest dates (40% and 22% for the two experiments), but these means were not significantly different from the other cultivars. Significant differences in fruit rot incidence were only detected for combined data from Sep and Oct in the non-fungicide-treated experiment. Degree of control of the foliar and fruit rot phases of Phytophthora blight with resistant cultivars was substantially better where an integrated management program with fungicides was used.

	Non-fungicide-treated					Fungicide-treated [z]				
	Phytophthora blight incidence (%) [y]		Phytophthora fruit rot (%) [x]		Marketable fruit #/plot	Phytophthora blight incidence (%) [y]		Phytophthora fruit rot (%) [x]		Marketable fruit #/plot
Cultivar	22-Sep	20-Oct	25-Aug	Sep-Oct	Total	22-Sep	20-Oct	25-Aug	Sep-Oct	Total
RPP 20809	1.6 e [w]	31.3 c	25	71 abc	3.5 b	1.6 b	10.9 d	8	40	6.5 c
Paladin	15.6 de	60.9 b	48	81 ab	4.1 b	4.7 b	23.4 cd	18	40	9.5 bc
Aristotle	56.3 bc	98.4 a	40	29 d	28.3 a	14.1 b	26.6 cd	13	45	46.8 a
Revolution	31.3 cd	93.8 a	54	45 bcd	7.6 b	9.4 b	45.3 bc	30	69	16.3 b
Declaration	31.3 cd	100.0 a	59	43 cd	5.4 b	10.9 b	45.3 bc	29	84	9.0 bc
Karisma (Susceptible)	53.1 bc	100.0 a	47	72 abc	3.0 b	4.7 b	42.2 bc	23	75	9.0 bc
Alliance (Susceptible)	71.9 b	100.0 a	49	90 a	5.9 b	17.2 b	62.5 b	28	61	16.8 b
Crusader (Susceptible)	100.0 a	100.0 a	57	84 a	3.9 b	46.9 a	95.3 a	35	61	14.3 bc
P-value	< .0001	< .0001	0.6232	0.0239	<.0001	0.0629	<.0001	0.423	0.164	<.0001

[z] Fungicide applications were made on 20 Jun; 1, 14, and 28 Jul; 13, 22, and 29 Aug; 11 and 24 Sep, and 3 Oct.

[y] Proportion of plants wilting or dead due to Phytophthora blight.

[x] Proportion of fruit with symptoms of Phytophthora fruit rot.

[w] Means followed by the same letter are not statistically different from each other (Fisher's Protected LSD, *P*=0.05).