

### **Evaluation of pepper breeding lines and cultivars for Phytophthora-tolerance and skin separation, 2006.**

These experiments, arranged as a randomized complete block design with 4 replications, were conducted in a field naturally- and artificially-infested with *Phytophthora capsici* at the Rutgers Agricultural Research and Extension Center (RAREC), Bridgeton, New Jersey and in a field naturally- infested with Phytophthora at the Martino farm in Vineland, New Jersey. Bell pepper seeds were obtained from cooperating agencies, treated on 4 April with a solution of 4 parts water to 1 part Clorox and seeded on 6 April. On 19 May at the on-farm site, twenty bell pepper breeding lines or cultivars were transplanted by hand with into single rows (18" apart in row) on one-foot high, bare-soil beds (9 plants per plot) on 3 ft centers. On 26 May at RAREC, nine bell pepper breeding lines or cultivars were hand transplanted into double rows (18" in row) on black plastic mulch on 5 ft centers (18 plants per plot) with drip irrigation. At both sites, all treatment plots were 15 ft long, with guard rows of Phytophthora-susceptible bell pepper cv. 'Camelot' planted on the outside of plots at RAREC. 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. On 2 Aug, ten randomly selected fruit from all breeding lines or cultivars were rated for shoulder recess, fruit color, fruit shape, fruit smoothness, fruit gloss, uniformity, number of lobes, fruit length and width, and fruit wall thickness. All mature pepper fruit from 15 ft of each treatment row were harvested on 24 July, 11 Aug, 1 Sept, 20 Sept, and 5 Oct at the Martino farm and on 2 Aug, 15 Aug, 6 Sept, 28 Sept, and 12 Oct at RAREC. All fruit were graded, separated and weighed for statistical analysis. Rainfall for the months of June, July, August and September were 7.39, 5.70, 2.46, and 3.88" at RAREC and 5.25, 5.55, 2.23 and 4.16" at the on-farm site.

At RAREC, percent of Phytophthora-infected plants at last harvest ranged from 17 to 89% depending on breeding line or cultivar. Final percent silvering for combined harvest data ranged from 1 to 24% depending on breeding line or cultivar. Seminis 993-1126B, EZ E41-2009 and Seminis 994-3084 performed similarly to Phytophthora-tolerant cultivars Paladin and Revolution in both Phytophthora-tolerance based on the number of remaining healthy plants and yield (boxes/A). Of all breeding lines evaluated at RAREC, Seminis 992-8002A performed the least in phytophthora-tolerance (74% infected) and boxes/A (43 total). Percent silvering or skin separation ranged from 1 to 24% depending on breeding line or cultivar. Total percent silvering was lowest in Phytophthora-susceptible cv. Camelot at 1% compared to 24% in phytophthora-tolerant Paladin. Percent silvering in breeding lines was highest at 17% in Seminis 992-8002A, followed by 16% in Seminis 993-1126B, and 8% in Seminis 994-3084 and Enza Zaden E41-2009. Marketable yield (total boxes/A) varied significantly depending on breeding line and cultivar. Yield was highest in Seminis 994-3084 at 113 boxes/A, followed by Enza Zaden E41-2009 at 108, Seminis 993-1126B at 101 and Paladin at 84. Yield was significantly lower in breeding line Seminis 992-8002A at 43 boxes/A.

At the on-farm site, percent of Phytophthora-infected plants at last harvest ranged from 3 to 97% depending on breeding line or cultivar. Percent silvering for combined harvest data ranged from 0 to 26% depending on breeding line or cultivar. The lowest percentage of phytophthora-infected plants included Syngenta breeding lines 20397, 20398 and 20395 at 3, 3 and 8% which were not significantly different than Phytophthora-tolerant Paladin at 19% and Aristotle at 11%, respectively. Percent phytophthora-infected plants were highest in Enza Zaden 457 at 72%, Revolution at 75%, Enza Zaden 450 and Alliance at 78% and Camelot at 97%. Total percent silvering was lowest in Phytophthora-susceptible cv. Camelot at 2% compared to 19% in phytophthora-tolerant cultivar Paladin. Marketable yield (total boxes/A) varied significantly depending on breeding line and cultivar. Highest yielding breeding lines included Syngenta 20397, 20398, 20395, Seminis 994-1819 and 994-3089, and Enza Zaden E41-2009 and 452. Lowest yielding and highest phytophthora-infected breeding lines included Enza Zaden 450 and 457.

As noted from previous research trials and in this study, the more tolerance a bell pepper cultivar or breeding line has to the crown rot phase of phytophthora blight, the more likely skin separation, or 'silvering', is to develop in its fruit.

Cultivar <sup>z</sup>	Silvering			Marketable		Total fruit		Marketable boxes/A
	Percentage	Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
EZ E41-2009	2	0.50	0.10	28.50	7.40	53.30	9.70	154
Sem 994-3084	10	4.80	1.50	24.80	7.40	57.80	10.70	153
Sem 993-1126B	20	6.50	1.90	23.30	6.80	52.30	11.10	141
Alliance	0	0.00	0.20	19.80	6.00	47.30	8.50	125
Aristotle	20	9.30	3.20	18.80	5.70	73.80	12.80	119
Paladin	10	2.80	0.90	18.50	4.80	36.50	6.70	100
Revolution	3	0.50	0.10	16.30	4.90	58.50	8.70	102
Camelot	7	2.00	0.60	12.00	3.30	28.50	5.30	68
Sem 992-8002A	30	8.50	2.90	11.00	3.30	60.50	9.70	69
<i>LSD</i>	0.2	6.6	2.2	NS	NS	21.4	NS	NS

Table 1. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 1 at RAREC in 2006.

<sup>z</sup>Nine breeding lines or cultivars were planted at the Rutgers research station.

Cultivar <sup>z</sup>	Silvering			Marketable		Total fruit		Marketable boxes/A
	Percentage	Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
EZ E41-2009	5	2.50	0.60	39.30	7.70	66.30	11.70	160
Paladin	20	7.80	1.90	31.00	6.90	51.50	10.50	144
Sem 993-1126B	20	5.80	1.50	23.00	5.70	42.50	9.70	118
Sem 994-3084	10	3.80	1.10	20.30	5.10	34.50	8.10	105
Revolution	1	0.30	0.06	17.50	4.40	38.80	8.30	91
Alliance	2	0.50	0.10	14.80	3.80	26.80	6.00	78
Aristotle	10	2.50	0.80	11.80	3.00	19.50	4.60	63
Sem 992-8002A	20	4.50	1.30	9.30	2.40	20.00	4.90	50
Camelot	0	0.00	0.00	9.00	2.50	10.30	2.70	51
<i>LSD</i>	0.1	4.8	1.2	12.7	3.4	19.3	4.9	69.5

Table 2. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 2 at RAREC in 2006.

<sup>z</sup>Nine breeding lines or cultivars were planted at the Rutgers research station.

Cultivar <sup>z</sup>	Percentage	Silvering		Marketable		Total fruit		Marketable boxes/A
		Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Sem 994-3084	5	1.80	0.80	33.50	9.30	42.50	11.60	193
EZ E41-2009	0	0.00	0.00	26.00	6.10	32.50	7.10	126
Sem 993-1126B	10	1.80	0.70	16.80	4.40	24.50	6.00	91
Camelot	0	0.00	0.00	16.30	3.90	22.80	4.90	81
Paladin	18	4.00	1.20	15.50	3.60	27.30	6.10	75.0
Aristotle	7	0.80	0.30	13.80	3.70	19.00	4.70	76
Alliance	0	0.00	0.00	11.50	3.70	23.30	5.70	77
Sem 992-8002A	4	0.80	0.30	10.50	2.50	13.80	3.10	51
Revolution	5	0.50	0.20	10.30	2.60	15.00	3.50	54
<i>LSD</i>	0.1	NS	0.8	NS	NS	NS	NS	NS

Table 3. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 3 at RAREC in 2006.

<sup>z</sup>Nine breeding lines or cultivars were planted at the Rutgers research station.

Cultivar <sup>z</sup>	Percentage	Silvering		Marketable		Total fruit		Marketable boxes/A
		Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Sem 993-1126B	23	5.50	1.90	15.80	4.70	28.00	6.70	98
Paladin	29	5.80	1.70	14.00	3.70	31.00	6.10	76.0
EZ E41-2009	7	2.30	0.60	12.50	3.30	36.00	4.30	68
Sem 994-3084	9	1.80	1.00	10.50	3.30	28.00	4.40	69
Revolution	8	1.50	0.60	9.80	2.80	24.00	4.50	58
Alliance	6	1.00	0.40	9.80	3.10	22.00	3.80	64
Sem 992-8002A	8	1.00	0.60	6.00	1.90	17.00	2.50	39
Aristotle	8	1.50	0.50	4.50	1.50	11.00	2.30	30
Camelot	0	0.00	0.00	3.30	0.80	9.30	0.90	17
<i>LSD</i>	0.1	3.5	1.1	NS	NS	NS	NS	NS

Table 4. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 4 at RAREC in 2006.

<sup>z</sup>Nine breeding lines or cultivars were planted at the Rutgers research station.

Cultivar <sup>z</sup>	Percentage	Silvering		Marketable		Total fruit		Marketable boxes/A
		Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Sem 993-1126B	11	1.30	0.40	12.50	2.70	31.00	6.60	57
Revolution	2	1.00	0.40	10.00	2.30	27.00	4.00	47
Sem 994-3084	4	1.30	0.50	9.00	2.20	20.00	4.50	46
EZ E41-2009	27	0.80	0.30	7.80	1.50	33.00	6.30	31
Paladin	39	7.00	1.50	6.00	1.20	25.00	5.20	26
Aristotle	2	0.30	0.04	4.00	0.90	15.00	2.10	18
Camelot	0	0.00	0.00	1.50	0.30	3.80	0.60	6.5
Sem 992-8002A	25	0.30	0.10	1.30	0.30	5.30	0.90	5.7
Alliance	0	0.00	0.00	0.50	0.10	9.00	1.10	1.9
<i>LSD</i>	0.4	4.0	0.9	NS	NS	NS	21.8	NS

Table 5. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 5 at RAREC in 2006.

<sup>z</sup>Nine breeding lines or cultivars were planted at the Rutgers research station.

Cultivar <sup>z</sup>	Silvering			Marketable		Total fruit		Marketable Boxes/A
	Percentage	Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Syn 20395	0.03	0.50	0.23	15.00	6.80	23.00	8.30	260
Sem 992-8002A	0.00	0.00	0.00	13.50	6.40	20.50	7.46	247
EZ E41-2009	0.00	0.00	0.00	16.00	6.20	23.00	7.03	237
Aristotle	0.00	0.00	0.00	11.75	5.40	18.25	6.40	206
Revolution	0.00	0.00	0.00	8.50	4.50	30.00	7.26	174
Sem 994-3084	0.00	0.00	0.00	8.75	4.20	10.75	4.48	161
Sem 993-1126B	0.03	0.25	0.21	8.75	4.00	12.75	4.72	154
Syn 20397	0.00	0.00	0.00	8.00	4.00	15.75	5.44	153
Sem 994-1819	0.03	0.25	0.16	9.75	3.90	16.50	4.87	149
EZ 452	0.00	0.00	0.00	9.50	3.70	15.00	4.40	142
Camelot	0.00	0.00	0.00	7.00	3.40	7.00	3.40	132
Sem 994-3089	0.00	0.00	0.00	7.25	3.40	19.50	5.44	132
Syn 20398	0.00	0.00	0.00	7.75	3.40	9.25	3.66	131
EZ 457	0.00	0.00	0.00	7.75	3.20	18.75	4.80	124
EZ 450	0.00	0.00	0.00	5.50	2.60	7.50	3.08	98
Paladin	0.00	0.00	0.00	6.00	2.00	13.50	2.85	76
Sem 992-8002A recip	0.00	0.00	0.00	5.00	1.80	8.25	2.32	70
Syn 20396	0.03	0.25	0.12	4.50	1.70	13.75	3.17	67
EZ 464	0.00	0.00	0.00	3.50	1.40	4.50	1.56	53
Alliance	0.00	0.00	0.00	2.25	1.10	6.75	1.60	40
<i>LSD</i>	NS	NS	NS	NS	NS	NS	NS	NS

Table 6. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 1 at Martino Farm in 2006.

<sup>z</sup>Twenty breeding lines or cultivars were planted at Martino Farm in Vineland, NJ.

Cultivar <sup>z</sup>	Silvering			Marketable		Total fruit		Marketable Boxes/A
	Percentage	Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Sem 994-1819	0.19	3.50	1.35	15.00	5.57	26.25	8.44	214
Sem 994-3084	0.07	1.50	0.59	12.50	5.33	19.75	6.90	205
Syn 20398	0.21	4.25	1.75	10.75	4.61	21.75	7.06	177
Syn 20395	0.29	3.25	1.53	8.00	4.54	14.00	6.58	174
Sem 993-1126B	0.00	0.00	0.00	10.25	4.40	11.75	4.69	169
EZ E41-2009	0.00	0.00	0.00	10.75	4.28	15.50	5.20	164
Sem 994-3089	0.15	2.00	0.77	10.25	3.80	17.75	5.42	146
EZ 452	0.00	0.00	0.00	10.25	3.59	19.75	4.42	138
Sem 992-8002A	0.04	0.25	0.16	6.25	3.23	12.00	4.45	124
Aristotle	0.02	0.25	0.16	7.75	2.99	15.25	4.10	115
Paladin	0.17	1.25	0.50	7.75	2.74	13.25	4.02	105
Alliance	0.00	0.00	0.00	7.00	2.39	12.50	2.92	92
Syn 20396	0.15	1.50	0.46	6.50	1.96	11.25	3.26	75
Syn 20397	0.13	0.75	0.27	4.25	1.70	9.50	2.76	65
Sem 992-8002A recip	0.17	1.25	0.44	4.50	1.60	9.25	2.30	61
EZ 464	0.00	0.00	0.00	4.50	1.45	8.25	1.68	56
EZ 450	0.03	0.25	0.09	4.00	1.38	11.50	2.15	53
EZ 457	0.00	0.00	0.00	3.00	1.14	5.50	1.50	44
Camelot	0.00	0.00	0.00	2.25	0.98	8.75	1.33	38
Revolution	0.00	0.00	0.00	3.00	0.79	10.25	1.72	30
<i>LSD</i>	0.14	2.2	0.9	NS	NS	NS	NS	NS

Table 7. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 2 at Martino Farm in 2006.

<sup>z</sup>Twenty breeding lines or cultivars were planted at Martino Farm in Vineland, NJ.

Cultivar <sup>z</sup>	Percentage	Silvering		Marketable		Total fruit		Marketable Boxes/A
		Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Sem 994-1819	0.26	4.25	1.23	12.00	3.57	27.00	6.60	137
Sem 993-1126B	0.02	0.25	0.09	13.00	3.49	20.00	4.53	134
Syn 20398	0.26	3.25	0.90	7.75	2.59	22.75	5.41	99
EZ 452	0.10	0.50	0.17	9.00	2.55	30.25	5.14	98
EZ 450	0.20	2.00	0.83	7.50	2.33	19.50	4.56	89
Sem 992-8002A recip	0.19	3.00	0.95	8.00	2.32	21.00	4.49	89
Sem 994-3084	0.08	0.75	0.26	5.50	1.84	23.75	4.63	71
Alliance	0.00	0.00	0.00	6.00	1.84	7.75	2.22	71
Revolution	0.09	1.00	0.33	6.75	1.69	15.25	2.96	65
Syn 20395	0.54	6.50	1.62	7.50	1.64	26.75	4.85	63
EZ E41-2009	0.14	0.75	0.20	5.50	1.55	22.25	3.33	59
Camelot	0.02	0.25	0.11	5.75	1.45	14.25	2.47	56
Syn 20397	0.36	4.00	1.07	4.25	1.37	27.75	4.78	53
Paladin	0.39	3.25	0.78	4.75	1.36	18.25	3.87	52
Syn 20396	0.34	2.50	0.64	5.25	1.27	26.25	4.21	49
Sem 994-3089	0.26	2.25	0.66	4.50	1.24	24.25	4.13	48
EZ 457	0.13	0.75	0.20	4.00	1.17	9.25	2.18	45
Sem 992-8002A	0.39	2.75	0.71	3.75	1.15	22.50	3.92	44
Aristotle	0.29	4.00	0.98	3.25	0.97	24.75	4.16	37
EZ 464	0.00	0.00	0.00	3.00	0.87	9.00	1.72	33
<i>LSD</i>	0.3	3.2	0.9	NS	NS	NS	NS	NS

Table 8. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 3 at MartinoFarm in 2006.

<sup>z</sup>Twenty breeding lines or cultivars were planted at Martino Farm in Vineland, NJ.

Cultivar <sup>z</sup>	Silvering			Marketable		Total fruit		Marketable Boxes/A
	Percentage	Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Sem 994-3089	0.18	8.00	2.20	29.50	7.09	57.75	11.79	273
Aristotle	0.23	5.50	1.88	18.50	6.53	36.75	11.04	251
Sem 992-8002A recip	0.12	1.00	0.35	16.25	6.07	28.25	9.09	233
Syn 20395	0.07	2.00	0.64	23.25	5.92	43.75	9.24	227
Syn 20396	0.02	0.25	0.07	22.00	5.25	39.25	7.57	202
EZ E41-2009	0.00	0.00	0.00	18.50	5.08	36.75	7.95	195
Sem 994-1819	0.20	5.25	1.65	18.25	5.04	31.75	7.93	194
EZ 452	0.02	0.50	0.17	18.25	4.86	29.50	6.70	187
Syn 20397	0.24	4.00	1.68	9.50	4.51	26.75	9.17	173
Sem 992-8002A	0.16	3.25	1.51	11.75	4.49	34.50	9.47	173
Sem 993-1126B	0.00	0.00	0.00	11.25	3.61	18.75	5.83	139
Syn 20398	0.19	4.00	1.18	9.75	3.17	22.00	5.73	122
Sem 994-3084	0.07	1.00	0.31	9.00	2.87	29.25	6.43	110
Paladin	0.21	6.00	1.72	10.75	2.84	21.00	5.41	109
EZ 457	0.01	0.25	0.14	8.50	2.54	21.25	4.22	98
Alliance	0.00	0.00	0.00	7.25	2.14	13.75	3.27	82
Revolution	0.04	0.75	0.24	7.25	2.13	20.75	4.24	82
EZ 450	0.33	1.50	0.46	5.75	1.98	15.25	3.56	76
EZ 464	0.00	0.00	0.00	7.50	1.81	17.75	3.19	69
Camelot	0.00	0.00	0.00	1.50	0.40	20.75	2.07	15
<i>LSD</i>	0.2	4.9	1.5	NS	NS	NS	NS	NS

Table 9. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 4 at Martino Farm in 2006.

<sup>z</sup>Twenty breeding lines or cultivars were planted at Martino Farm in Vineland, NJ.

Cultivar <sup>z</sup>	Silvering			Marketable		Total fruit		Marketable Boxes/A
	Percentage	Number	Weight (lb)	Number	Weight(lb)	Number	Weight(lb)	
Sem 994-1819	0.22	5.50	1.65	16.75	4.10	38.25	7.37	157
Sem 994-3089	0.22	4.75	1.29	15.75	3.61	28.00	5.74	139
EZ 452	0.00	0.00	0.00	13.75	3.52	23.00	4.23	135
Syn 20398	0.11	3.75	0.97	13.75	3.01	32.75	5.31	116
Aristotle	0.37	6.00	1.98	10.25	2.99	21.00	5.43	115
EZ E41-2009	0.00	0.00	0.00	11.25	2.63	20.50	3.48	101
Sem 993-1126B	0.01	0.25	0.11	9.25	2.47	13.00	2.90	95
Syn 20395	0.38	6.50	1.71	10.75	2.43	23.75	4.84	93
Syn 20396	0.21	2.75	0.87	9.00	2.20	18.75	3.65	85
Paladin	0.40	5.50	1.43	7.50	1.82	17.75	3.87	70
Sem 992-8002A recip	0.11	1.00	0.28	6.75	1.66	13.00	2.36	64
Sem 992-8002A	0.26	3.50	1.29	6.50	1.60	14.50	3.24	61
EZ 457	0.00	0.00	0.00	5.50	1.49	12.00	2.18	57
Sem 994-3084	0.16	1.00	0.31	4.00	1.10	7.75	1.71	42
Syn 20397	0.48	2.25	0.80	4.50	1.09	9.25	2.06	42
Revolution	0.00	0.00	0.00	3.75	1.04	6.25	1.28	40
EZ 450	0.27	2.75	0.96	2.50	0.73	7.25	1.98	28
Alliance	0.00	0.00	0.00	2.00	0.66	4.50	0.97	25
EZ 464	0.02	0.25	0.02	3.25	0.60	6.00	0.86	23
Camelot	0.06	0.25	0.13	0.75	0.16	4.50	0.89	6
<i>LSD</i>	0.2	4.1	1.3	NS	NS	17.90	3.70	NS

Table 10. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering at harvest 5 at Martino Farm in 2006.

<sup>z</sup>Twenty breeding lines or cultivars were planted at Martino Farm in Vineland, NJ.

Cultivar <sup>z</sup>	Phyto-Infected Plants (%)	Silvering			Marketable		Total fruit		Marketable boxes/A
		Percentage	Number	Weight(lb)	Number	Weight(lb)	Number	Weight (lb)	
Camelot	89	1	0.4	0.1	8.4	2.2	14.9	2.9	45
Sem 992-8002A	74	17	3	1	7.6	2.1	23.3	4.2	43
Alliance	63	2	0.3	0.1	11.3	3.3	25.7	5	69
Aristotle	58	10	2.9	1	10.6	3	27.6	5.3	61
Revolution	45	4	0.8	0.3	12.8	3.4	32.6	5.8	70
Sem 994-3084	27	8	2.7	1	19.6	5.5	36.5	7.9	113
EZ E41-2009	25	8	1.2	0.3	22.8	5.2	44.1	7.8	108
Paladin	18	24	5.5	1.4	17	4.1	34.2	6.9	84
Sem 993-1126B	17	16	4.2	1.3	18.3	4.9	35.5	8	101
<i>LSD</i>	0.4	0.1	2.1	0.6	6.1	1.6	11.0	2.2	33.5

Table 11. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering for combined harvests at RAREC in 2006.

<sup>z</sup>Nine breeding lines or cultivars were planted at the Rutgers research station.

Cultivar <sup>z</sup>	Phyto-Infected Plants (%)	Silvering			Marketable		Total fruit		Marketable Boxes/A
		Percentage	Number	Weight(lb)	Number	Weight(lb)	Number	Weight(lb)	
Camelot	97	2	0.1	0	3.5	1.3	11.1	2	49.32
Alliance	78	0	0	0	4.9	1.6	9.1	2.2	62.02
EZ 450	78	16	1.3	0.5	5.1	1.8	12.2	3.1	68.94
Revolution	75	3	0.4	0.1	5.9	2	16.5	3.5	78.3
EZ 457	72	3	0.2	0.1	5.8	1.9	13.4	3	73.55
Syn 20397	56	24	2.2	0.76	6.1	2.5	17.8	4.8	97.34
Sem 994-3084	50	7.6	0.9	0.3	8	3.1	18.3	4.8	117.76
EZ 464	48	0	0.1	0	4.4	1.2	9.1	1.8	46.92
Sem 992-8002A	47	17	2	0.7	8.35	3.4	20.8	5.7	129.79
Sem 993-1126B	42	1.2	0.15	0.08	10.5	3.6	15.3	4.5	138.11
EZ 452	39	2	0.2	0.1	12.2	3.6	23.5	5	139.92
Syn 20398	39	15	3.1	1	9.95	3.4	21.7	5.4	128.97
EZ E41-2009	36	3	0.2	0	12.4	3.9	23.6	5.4	151.31
Sem 992-8002A recip	28	12	1.25	0.4	8.1	2.7	16	4.1	103.51
Paladin	19	23	3.2	0.9	7.4	2.1	16.8	4	82.51
Syn 20396	19	15	1.5	0.4	9.5	2.5	21.9	4.4	95.44
Aristotle	11	18	3.2	1	10.3	3.8	23.2	6.2	144.74
Syn 20395	8	26	3.8	1.1	12.9	4.3	26.3	6.8	163.52
Sem 994-1819	3	18	3.8	1.2	14.4	4.4	28	7	170.2
Sem 994-3089	3	16	3.4	0.98	13.5	3.8	29.5	6.5	147.28
<i>LSD</i>	0.4	0.1	1.5	0.5	4.6	1.5	8.0	2.0	58.7

Table 12. Number and weight of total fruit, marketable fruit, marketable boxes per acre and fruit with silvering for combined harvests at Martino farm in 2006.

<sup>z</sup> Twenty breeding lines or cultivars were planted at Martino Farm in Vineland, NJ.

Cultivar	Recess shoulder <sup>a</sup>	Fruit color <sup>b</sup>	Fruit shape <sup>c</sup>	Fruit smoothness <sup>d</sup>	Fruit gloss <sup>e</sup>	Uniformity <sup>f</sup>	Number of lobes <sup>g</sup>	Length (cm) <sup>h</sup>	Width (cm) <sup>i</sup>	Wall Thickness (mm) <sup>j</sup>
Alliance	7.0	7.0	7.0	5.0	1.0	5.0	3.3	8.3	8.6	6.0
Aristotle	5.0	5.0	7.0	2.0	1.0	3.0	3.2	8.0	8.1	6.5
Camelot	6.0	7.0	7.0	1.0	1.0	1.0	3.3	10.2	8.3	6.5
Revolution	7.0	5.0	7.0	6.0	1.0	1.0	3.1	8.3	8.8	6.1
Paladin	6.0	6.0	6.0	4.0	1.0	3.0	3.2	7.9	8.1	5.9
EZ E41-2009	1.0	7.0	8.0	6.0	2.0	3.0	3.5	9.8	8.1	5.6
EZ 450	5.0	5.0	7.0	9.0	1.0	5.0	3.1	8.6	8.5	7.2
EZ 452	1.0	5.0	8.0	8.0	1.0	3.0	4.1	9.1	8.5	6.3
EZ 457	4.0	9.0	6.0	9.0	2.0	3.0	3.6	7.6	7.7	5.5
EZ 464	1.0	9.0	5.0	5.0	2.0	1.0	3.4	7.1	7.0	5.7
Syn 20395	6.0	3.0	6.0	8.0	1.0	3.0	3.1	7.6	8.8	5.9
Syn 20396	5.0	3.0	5.0	6.0	1.0	3.0	3.0	7.3	8.4	5.3
Syn 20397	5.0	5.0	7.0	2.0	1.0	3.0	3.8	7.9	8.4	5.6
Syn 20398	3.0	5.0	7.0	3.0	1.0	3.0	3.5	7.7	8.6	5.5
Sem 994-1819	5.0	1.0	9.0	9.0	1.0	3.0	3.3	9.5	7.5	6.3
Sem 994-3089	9.0	3.0	7.0	9.0	1.0	3.0	3.3	9.0	8.8	7.5
Sem 992-8002A recip	4.0	3.0	8.0	5.0	1.0	3.0	3.8	9.2	8.9	8.0
Sem 993-1126B	5.0	3.0	9.0	5.0	2.0	3.0	3.1	9.9	8.7	7.1
Sem 992-8002A	5.0	3.0	9.0	2.0	1.0	3.0	3.5	10.5	8.2	7.3
Sem 994-3084	6.0	1.0	6.0	4.0	2.0	3.0	3.9	8.2	9.0	7.2
<b>Optimal range for NJ*</b>	<b>3-5</b>	<b>1-3</b>	<b>6-8</b>	<b>6-9</b>	<b>1</b>	<b>5-9</b>	<b>4</b>	<b>10-11</b>	<b>10-11</b>	<b>6-7</b>

Table 13. Fruit Quality ratings for 20 breeding lines and cultivars grown at Martino farm in 2006.

<sup>a</sup>. recess shoulder rated on a scale of 1 to 9 where 1=none, 5=medium and 9=deep

<sup>b</sup>. fruit color rated on a scale of 1 to 9 where 1=dark green, 5=medium green and 9=light green

<sup>c</sup>. fruit shape rated on a scale of 1 to 9 where 1=elongated and 9=conical blocky

<sup>d</sup>. fruit smoothness rated on a scale of 1 to 9 where 1=rough and 9=smooth

<sup>e</sup>. fruit gloss rated on a scale of 1 to 2 where 1=glossy and 2=dull

<sup>f</sup>. fruit uniformity rated on a scale of 1 to 9 where 1=not uniform and 9=uniform

<sup>g</sup>. average number of lobes per fruit

<sup>h</sup>. average length of 10 fruit (cm)

<sup>i</sup>. average width of 10 fruit (cm)

<sup>j</sup>. average thickness of fruit wall thickness (out of 10 fruit)

\* Optimal fruit quality value range for bell pepper cultivars grown in New Jersey

