CUCURBITS (*Cucurbita* spp.)
Phytophthora crown rot and fruit rot; *Phytophthora capsici*

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SENSITIVITY OF CUCURBITA BREEDING LINES AND VARIETIES TO PHYTOPHTHORA CROWN ROT AND FRUIT ROT, 1993: The objectives of this experiment were to identify potential sources of resistance and to evaluate material previously screened for sensitivity to *Phytophthora capsici* in FL. Sensitivity was determined in an infested field of Riverhead sandy loam soil at the Long Island Horticultural Research Laboratory in Riverhead, NY. Phytophthora fruit rot developed on pumpkin in this field in 1991. Disease pressure was severe in this field in 1992 when fungicide programs for pumpkin were evaluated. Environmental conditions were very favorable for *Phytophthora* in both 1991 and 1992 due to extensive periods of rain in mid-Aug. Fertilizer (10-10-10) was broadcast at a rate of 1000 lb/A on 25 Jun 93. Weeds were controlled with a preplant, incorporated application of Alanap L (4 qt/A) and Prefar 4E (5 qt/A) on 12 Jul and hand-weeding. Approximately 1-month-old seedlings were transplanted on 13 Jul. Plots size was two 7.5-ft rows spaced 68-in. apart with 8-12 plants. Single rows of No. 7 and 9 were placed together in a plot because there were few plants. Breeding lines and varieties are identified in the table. There were two replications in a randomized block design. The first was in a slightly lower area of the field where water collected in tire tracks after rain. A row of pumpkin (*Cucurbita pepo* 'Spirit') was planted next to each plot to serve as an indicator of disease pressure in each plot. Cucumber beetles and aphids were managed by applying the following insecticides: Metasystox-R 2SC (2 pt/A) on 6 Aug, Phosdrin 4EC (1 pt/A) on 26 Jul, Sevin 4F (1 qt/A) on 15 Jul, and Thiodan 3EC (2 pt/A) on 15 Jul and 20 Aug. The fungicides Bravo 720 (3 pt/A) and Bayleton 50DF (4 oz/A) were applied on 6 and 20 Aug to suppress powdery mildew. Average monthly high and low temperatures (F) and total rainfall (in.) were 87, 65, and 2.36 in Jul; 84, 63, and 1.24 in Aug; and 76, 57, and 7.61 in Sep, respectively. The field was irrigated (0.5-1.0 in.) on 13 Jul. It was irrigated excessively (1.5-2.0 in.) on 23-24 Aug and 3 Sep in an effort to stimulate disease development by saturating the soil. Plants and fruit were examined periodically for symptoms. Fruit were removed periodically from zucchini and summer squash plants (No. 10, 11, 14, and 15). Number of symptomatic and apparently healthy (nonsymptomatic) fruit were counted on 3, 8, 16, and 28 Sep and 15 Oct. Vines of No. 7 and 9 grew together and it was difficult to distinguish their fruit.

Disease development was limited during the first half of the growing season because of the unusually hot and dry conditions. Phytophthora fruit rot was observed first on 23 Aug, 6 days after 0.64 in. of rainfall, on No. 3, 10, and 12 in replication 1. The 13 days with rain plus 1 day of irrigation in Sep provided favorable conditions for disease development. There evidently was flooding in the low area of the field (mostly in replication 1) due to 2.66 in. of rain on 22 Sep (2.92 in. over 21-22 Sep) based on movement of plant tissue and lines of debris on fruit. Symptoms of fruit rot were observed on all breeding lines and varieties by 28 Sep. Disease pressure generally was more severe in replication 1 than 2. There also were differences in disease pressure within a few plots: there were more affected fruit in replication 1 than 2 for No. 5, 12, 13, 19, and 20 but not for 'Spirit' pumpkin in these plots. The zucchini and summer squash (No. 10, 11, 14, and 15) and one of the pumpkin varieties (No. 18) were affected more than the others. In addition to fruit symptoms, these plants died prematurely (except for No. 15 in replication 1), apparently because of Phytophthora crown rot. Production of squash fruit consequently had declined substantially by mid-Sep. The fruit on No. 15 in replication 1 were affected primarily by other diseases, especially Choanephora wet rot. In contrast, vines of No. 4, 5, 6, 7, and 9 were not affected: leaves remained green and up-right. No fruit of *C. maxima* (No. 22) were affected before 28 Sep. No. 13 also performed relatively well: only young fruit had symptoms before 28 Sep and most plants were in good condition at least until mid-Sep. *C. moschata* (No. 4) did not have fruit before mid-Sep. Sporulation was sparse on No. 13 and 17. Similar results were obtained in FL when No. 10-17 were evaluated for crown rot due to *P. capsici* following natural infection in spring, 1993. No. 10, 11 and 14 were susceptible; No. 15 was susceptible in 1 plot and was not infected in another; No. 12, 16, and 17 were not infected in 1-2 plots; and No. 13 was not infected in 2 plots and consistently performed better than the others.

		Symptoms first seen		Fruit with Phytophthora (%)					
				Replication 1		Replication 2		Pumpkin (9/28)	
No.	Species and breeding line or variety	Rep 1	Rep 2	9/16	9/28	9/16	9/28	Rep 1	Rep 2
2.	*C. moschata* 'Waltham butternut' X *C. martinezii* F_3	9/16	9/16	62	85	34	47	75	20
3.	*C. pepo* PI 174186	9/3	9/3	25	71	11	25	44	40
4.	*C. moschata* 'Portuguese Local'	-- [1]	9/28	-- [1]	-- [1]	0	78	50	25
5.	*C. martinezii* X *C. moschata* (complex pedigree)	9/16	9/28	100	91	0	76	20	40
6.	*C. Sororia* PI 196309	9/16	9/8	61	100	43	75	83	33
7.	*C. martinezii*	9/16	9/28	100	100	0	56	75	50
8.	*C. moschata* X *C. lundelliana* F_2	9/16	9/16	16	71	62	96	57	50
9.	*C. lundelliana* X *C. moschata* (complex pedigree)	9/16	9/16	83	100	10	56	75	50
10.	*C. pepo* 'Zucchini Elite' (zucchini)	9/3	9/16	100	NF	22	100	0	33
11.	*C. pepo* 'Multipik' (yellow straightneck)	9/8	9/16	NF	NF	33	NF	60	25
12.	*C. pepo* Inbred 4503 (middle eastern type)	9/3	9/16	75	75	24	52	0	40
13.	*C. pepo* Inbred 4504 (middle eastern type)	9/8	9/28	29	60	0	8	20	20
14.	*C. pepo* 'Supersett' (yellow crookneck)	9/3	9/8	100	NF	NF	NF	100	50
15.	*C. pepo* Inbred 4506 (zucchini)	--	9/16	0	NF	100	NF	100	50
16.	*C. moschata* Inbred 4507 (butternut squash)	9/3	9/28	50	82	0	80	57	50
17.	*C. moschata* Inbred 4508 (butternut squash)	9/16	9/16	64	100	4	74	50	0
18.	*C. pepo* 'HMX 2692' (pumpkin)	9/3	9/8	100	100	100	100	67	25
19.	*C. pepo* 'HMX 2690' (pumpkin)	9/3	9/28	100	100	0	50	0	50
20.	*C. pepo* 'HMX 2688' (pumpkin)	9/16	9/28	20	100	0	80	0	80
22.	*C. maxima* 'Blue Hubbard Special'	9/28	9/28	0	69	0	55	50	40

[1] Fruit were beginning to develop on 28 Sep.
NF No fruit.