PUMPKIN (*Cucurbita pepo* 'Appalachian')
Phytophthora blight; *Phytophthora capsici*

M. T. McGrath
Department of Plant Pathology
Cornell University, LIHREC
3059 Sound Avenue, Riverhead, NY 11901

Evaluation of yard-waste compost for managing Phytophthora blight of pumpkin, 2004.

The experiment was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in a field (Haven loam soil) where Phytophthora blight developed in 1991 to 1993, 1995 to 1999, and 2001. A long-term study was started in 2001 to examine the benefits of regularly adding compost to soil for improving soil health and managing diseases as well as the utility of compost as a source of nutrients to reduce chemical fertilizer inputs. Compost has been shown to be effective for suppressing several soilborne plant diseases. Plot location was determined using Phytophthora blight data from a previous experiment (F&N 48:172). Plots were arranged in a randomized complete block design with 8 replications. A low area that runs diagonally through the center of the field was not used because blight was very severe here in a previous experiment. Adjacent plots with similar previous severity values were selected to be a replication; consequently the plots in some replications were oriented side-by-side and in others they were end-to-end. Plots were 28.3 ft wide and 45 ft long with at least 20 ft between plots that were end-to-end. Each June since 2001 compost has been spread on the 8 amended plots at a rate of approximately 45 wet tons/A (20 dry tons/A) with a Millcreek compost spreader, then hand-raked as needed to obtain even distribution before disking to incorporate the compost up to about 6 in. depth. Phytophthora blight occurred on pumpkin in this field in 2001 despite the use of a brewery-waste compost of higher microbial activity than the yard-waste compost that was ineffective in previous experiments at LIHREC (B&C 10:143, 11:115, and 17:V20). Compost was applied about two weeks before seeding pumpkin in all 3 experiments. The goal of the 2004 experiment was to determine if compost applied over 4 successive years in a field planted to non-host crops for 2 years (sweet corn in 2002 and snap bean in 2003) would be beneficial for suppressing Phytophthora. When the 2003 experiment was initiated, snap bean was not recognized as a host of *P. capsici*. However, no symptoms of blight or above ground indications of root rot were observed. Composted yard waste was obtained in 2004 from Long Island Compost Corp in East Moriches, NY. Based on nutritional analysis performed by the University of MA Soil and Plant Tissue Testing Laboratory, the compost was 1.28% N (10.2 lb/yd^3) and thus was anticipated to provide 50 lb/A of N assuming 10% availability. Therefore on 16 Jun 04, 500 lb/A of 10-10-10 fertilizer (50 lb/A of N) was broadcast over compost plots and 1000 lb/A was applied to non-compost plots. Compost was spread on 17 Jun, followed by disking. Pumpkin was seeded in the plots on 23 and 24 Jun at approximately 24-in. within row plant spacing. Each plot contained three rows spaced 68 in. apart. Weeds and insects were controlled by applying Strategy (3 pt/treated A) and Admire 2F (16 fl oz/ treated A) in a 10-inch band over the planted rows on 25 Jun; these were incorporated lightly by irrigating (approx. 0.3 in.) on 28 Jun. Cultivation and hand weeding were also performed. Red clover was planted on 30 Jun in the driveways between plots to minimize the potential for movement of *Phytophthora* between plots in rain runoff. Downy mildew was managed by applying Phostrol (4 pt/A) on 2 Aug; Phostrol (5 pt/A) on 11 Aug, 26 Aug, 4 Sep, and 13 Sep; Flouronil (2 lb/A) on 11 and 26 Aug; and Curzate (3.2 oz/A) on 20 Aug, 4 Sep, and 13 Sep. While these fungicides were recognized as having activity against Phytophthora, the potential impact of uncontrolled downy mildew on this and also nearby experiments was considered unacceptable. Downy mildew developed in the area much earlier than usual. Additional fungicides applied specifically for powdery mildew were Bravo Weather Stik (2.5 pt/A) on 8 Aug and Quintec (4 oz/A) on 8 and 26 Aug. The field was irrigated (approx. 1.0 in.) when soil was dry due to inadequate rainfall. It also was irrigated (approx. 0.25 in.) on 15, 16, and 17 Sep to provide conditions favorable for Phytophthora blight. Average monthly high and low temperatures (F) were 77/59 in Jun, 82/65 in Jul, 82/66 in Aug, 78/60 in Sep, and 64/49 in Oct. Rainfall (in.) was 0.88, 3.33, 3.94, 6.97, and 2.04 for these months, respectively. Plots were examined routinely for symptoms of Phytophthora blight. Fruit rotting due to Phytophthora and other causes were counted on 13 Oct, 20 Oct, and 1 Nov. Yield was determined on 1 Oct by measuring length and width of all mature fruit. Weight was estimated for these fruit using a regression equation developed by measuring and weighing representative fruit.

Conditions were dry during most of the 2004 growing season and thus not conducive for Phytophthora blight. Daily rainfall exceeded 0.5 in. on only 5 days in Aug and Sep: 1.1, 0.62, 0.88, 2.15, and 3.84 in. on 15 Aug, 16 Aug, 21 Aug, 18 Sep, and 29 Sep, respectively. The first symptoms observed were fruit rot on 4 Oct. The earliest observation of Phytophthora blight in all research fields at LIHREC in 2004 was 2 Sep in another pumpkin experiment. There were no significant differences between treatments in proportion of fruit with Phytophthora fruit rot or rot of any type, which included black rot, bacterial soft rot, and Phytophthora-like symptoms lacking sporulation. Variation was high among plots for both treatments. Phytophthora fruit rot reached substantially higher incidence in this experiment compared to all other pumpkin experiments at LIHREC in 2004, and occurrence was more widespread in this field. There were no significant differences between treatments in yield despite the fact that compost-amended plots had more green leaves than nontreated plots late in the growing season. Therefore, while compost soil amendments have not proven useful for managing Phytophthora blight, compost has proven useful as a partial replacement for chemical fertilizer.

	Fruit with symptoms of fruit rot (%) *				Yield of marketable fruit			
	Phytophthora fruit rot		Fruit rot (all types)					
Treatment	13 Oct	1 Nov	13 Oct	1 Nov	No./plot	Average wt (lb)	> 19 lb (%)	> 13 lb (%)
Nontreated Control …….	8 (0-38)	23 (0-67)	24 (5-46)	55 (14-82)	42.0	13.1	9.1	50.6
Compost ……	4 (0-17)	20 (2-48)	21 (6-39)	56 (33-79)	42.6	13.7	9.6	57.2
P-value	0.43	0.67	0.59	0.86	0.78	0.30	0.73	0.23

* Average (range for all replications).