PUMPKIN (*Cucurbita pepo* 'Appalachian')
Phytophthora fruit rot; *Phytophthora capsici*
Powdery mildew; *Sphaerotheca fuliginea*

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EVALUATION OF PLANT GROWTH ENHANCERS PLUS A FUNGICIDE TO MANAGE PHYTOPHTHORA FRUIT ROT AND POWDERY MILDEW OF PUMPKIN, 1999: The objectives of this study were to examine the benefits of weekly applications of AuxiGro or Greenstim with Bravo Ultrex for disease control and yield enhancement. AuxiGro, marketed by Auxein Corp., is a 'plant metabolic primer' that has been shown to enhance growth and development of numerous plant species (from brochure). Active ingredients are gamma aminobutyric acid (GABA) and L-glutamic acid. Greenstim, a 'nutrient induced resistance system' that promotes vigorous plant growth, contains macro and micro nutrients, sea plant extracts, carbohydrates, and a multi-vitamin component. It is marketed by Miller Chemical & Fertilizer Corp. A field experiment was conducted at the Long Island Horticultural Research and Extension Center in Riverhead, NY, in a field (Riverhead sandy loam soil) where Phytophthora fruit rot of pumpkin had developed in 1994, 1996, and 1997. Fertilizer (1000 lb/A of 10-10-10) was broadcast and incorporated on 27 May. Pumpkin seeds were planted on 24 Jun at 24-in. within row spacing and 68-in. between row spacing. Weeds were controlled by applying Curbit EC (4 pt/treated A) + Command 4EC (1 pt/treated A) in a 10-inch band over the planted rows on 25 Jun; these were incorporated by irrigating. Cucumber beetles were managed by applying Sevin XLR (1 qt/A) on 3 Jul. Average monthly high and low temperatures (F) were 83/62 in Jun, 89/69 in Jul, 83/66 in Aug, and 77/61 in Sep. Rainfall (in.) was 0.8, 3.67, 8.18, and 5.31 for these months, respectively. The field was irrigated (approx. 1.0 in.) when soil was dry due to inadequate rainfall on 12 Jul, 19 Jul, 30 Jul, and 2 Aug. Plots were three 26-ft rows with 14 ft between plots. Treatments were applied with a tractor-mounted boom sprayer equipped with D3-45 hollow cone nozzles spaced 11 in. apart that delivered 100 gpa at 250 psi. An application was made before the end of the 7 day interval on 13 Sep because of heavy rain on 10 Sep and rain forecast for 15-17 Sep. A randomized complete block design with five replications was used. Fruit were examined weekly for symptoms of Phytophthora fruit rot and other diseases. A nondestructive procedure was used to estimate fruit weight so that fruit could be left undisturbed for disease development Weight was estimated from width X length using a linear regression equation derived using fruit from the non-plot areas of this field. Fruit width and length were measured on 21 Sep.

Disease pressure was high beginning in late Sep. Symptoms caused by *Phytophthora capsici* were first observed on 7 Sep on 2.4% of the fruit in one nontreated plot. Phytophthora fruit rot was observed in another experiment with the same pumpkin variety on 17 Aug, 6 days after 1.7 in. rain. Surprisingly, symptoms were not observed in either experiment following 3.1 in. of rain on 22 Jul. Also, following 3.55 in. on 26 Aug and 1.05 in. on 27 Aug, fruit rot was only observed in 1 of the 20 plots with an overall incidence of 0.8% on 7 Sep. Symptoms were observed on 13 Sep in three nontreated plots plus one AuxiGro-treated plot. Symptoms were not observed in the other two treatments until 20 Sep. Hurricane Floyd with 3.05 in. of rain on 16 Sep provided ideal conditions for disease development based on the quantity of affected fruit observed 11 days later. All treatments had significantly fewer fruit with Phytophthora fruit rot than the nontreated control beginning on 20 Sep. Incidence of fruit rot was lower for plants treated with Greenstim + Bravo than those treated with Auxigro + Bravo on most assessment dates; this difference was statistically significant on 5 and 19 Oct. Bravo provided excellent control of powdery mildew on upper leaf surfaces but only some control on lower leaf surfaces. Defoliation due primarily to powdery mildew was significantly greater in nontreated plots on 7 Sep. Applying AuxiGro or Greenstim with Bravo did not improve the level of control of either disease achieved with Bravo alone. There were no significant differences among treatments in total number of fruit (36 to 42), percent fruit ≥ 17 lb (28 to 35%), percent fruit ≥ 20 lb (13 to 18%), and average fruit weight (14.4 to 15.3 lb), which was estimated from length and width measurements made on 21 Sep. All treatments had significantly more fruit with solid handles than the nontreated control on 7 Sep (76.6 to 80.4% vs 52.6%).

	Fruit with Phytophthora fruit rot (%) [1]					Powdery mildew severity 7 Sep (%)		
Treatment and rate/A (application time) [2]	20 Sep	27 Sep	5 Oct	12 Oct	19 Oct	Upper [3]	Lower [3]	Defoliation 7 Sep (%)
Nontreated	47.7 a [4]	89.2 a	91.6 a	92.1 a	95.2 a	53.3 a	75 a	82 a
Bravo Ultrex 2.7 lb (2-9)	6.9 b	49.6 b	54.6 bc	63.9 b	71.5 bc	0.0 b	49 c	61 b
AuxiGro 4 oz (1); 2 oz + Bravo (2-9)	4.5 b	53.4 b	63.7 b	72.5 b	82.0 b	0.7 b	72 ab	50 b
Greenstim 1 qt (1); 1-2 qt + Bravo (2-9)	8.0 b	43.2 b	51.4 c	60.0 b	68.1 c	3.3 b	65 b	53 b
P-value	0.0001	0.0001	0.0001	0.0010	0.0009	0.0001	0.0001	0.0023

[1] Total observed with definite symptoms of Phytophthora fruit rot (sporangia visible) and unconfirmed symptoms (sporangia not visible). Almost all affected fruit had sporangia.

[2] Rate of formulated product/A. Application times were: 1=29 Jul, 2=5 Aug, 3=13 Aug (rain afterwards), 4=16 Aug, 5=23 Aug, 6=30 Aug, 7=9 Sep, 8=13 Sep, 9=20 Sep, and 10=28 Sep. All Bravo treatments were Bravo Ultrex applied at 2.7 lb/A. Greenstim was applied at 2 qt/A for the last two applications.

[3] Powdery mildew severity on upper and lower leaf surfaces.

[4] Numbers in a column with a letter in common are not significantly different according to Fisher's Protected LSD ($P = 0.05$).