PUMPKIN (*Cucurbita pepo* 'Wizard')
Powdery mildew; *Sphaerotheca fuliginea*

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EVALUATION OF A BIOCONTROL AGENT AND BIOCOMPATIBLE FUNGICIDES FOR MANAGING POWDERY MILDEW OF PUMPKIN, 1996: A hyperparasitic fungus, *Ampelomyces quisqualis* (AQ10), and two biocompatible fungicides, a potassium bicarbonate (Kaligreen) and a mineral oil (JMS Stylet-Oil), were compared in an experiment conducted on Haven loam soil at the Long Island Horticultural Research Laboratory in Riverhead, NY. Fertilizer (1000 lb/A of 10-10-10) was broadcast and incorporated on 17 Jun. Phytophthora fruit and crown rot occurred to a limited extent in part of this field in 1994. Therefore, Ridomil 2E (2 qt/A) was broadcast over the entire field on 19 Jun then incorporated. In addition, soil drainage was improved by subsoiling between rows on 22 Jul. Pumpkin seed were planted on 26 Jun at 24-in. within row plant spacing and 68-in. between row spacing. Plots consisted of three 30-ft rows. Plants were sidedressed with ammonium nitrate at a rate of 30 lb N/A on 8 Aug. Weeds were controlled by applying herbicides, mechanically cultivating and hand-weeding. Command (5 oz/A) was applied and lightly incorporated on 26 Jun before planting. Curbit EC (1 qt /treated A) was applied in a 10-inch band over the planted rows on 27 Jun. Cucumber beetles and aphids were managed by applying the following insecticides: Admire 2F (10 oz/treated A) in a 10-inch band over the row on 3 Jul, Metasystox R (1 qt/A) on 23 Aug, and Lannate LV (3 pt/A) on 1 Sep. Downy mildew was managed by applying Ridomil 2E (1 pt/A) on 3 and 26 Sep and Aliette 80WDG (3 lb/A) on 6 and 26 Sep. Average monthly high and low temperatures (F) were 80/60 in Jun, 80/63 in Jul, 82/63 in Aug, and 75/58 in Sep. Rainfall (in.) was 2.94, 4.78, 2.8, and 4.74 for these months, respectively. The field was irrigated (approx. 1.0 in.) on 2 and 11 Jul; 9-10, 20, and 28-29 Aug. A randomized complete block design with four replications was used. AQ10 was applied with 0.3% AddQ Spray Adjuvant starting before disease detection (preventive schedule). The other treatments were started after symptoms were found on older leaves (IPM schedule). Kaligreen was applied with NuFilm P (6 oz/A). Spray coverage was optimized by using a tractor-mounted boom sprayer equipped with ALBUZ ATR lilac ceramic hollow cone nozzles (median droplet size of 60 microns) spaced 11 in. apart that delivered 71 gal/A at about 250 psi. Travel speed was 1.3 mph. Treatments were made on 21 and 29 Jul; 5, 12, 17, 23, and 30 Aug during late afternoon or early evening (except 17 Aug), to provide favorable conditions for the hyperparasitic fungus. Rain (1.32 in.) began within an hour of the second application, therefore the third application was made as soon as possible afterwards. Upper and lower surfaces of 10-50 leaves in each plot were examined for powdery mildew on 15 and 27 Aug, and 11 Sep. Colonies were counted or severity (percent leaf area covered by mildew) was estimated. Average severity for the entire canopy was calculated from the individual leaf assessments. Area under disease progress curve (AUDPC) was calculated for severity from 15 Aug through 11 Sep. Severity data did not need to be transformed to obtain constant variance before subjection to analysis of variance. Replication 1 was notably different from the other replications in plant growth and disease severity; therefore, analysis of variance was conducted both including and excluding Replication 1.

Powdery mildew was less severe in treated than in nontreated plots. However, differences among treatments were significant at P=0.05 only for severity on upper leaf surfaces on 27 Aug. AUDPC values differed significantly at P=0.06-0.07. Differences were significant at P=0.05 when Replication 1 was excluded from the analysis. JMS Stylet-Oil was the most effective treatment: AUDPC was significantly lower (P=0.06-0.07) than the control for both leaf surfaces. JMS Stylet-Oil and Kaligreen were more effective when applied to muskmelon in an adjacent experiment.

	Powdery mildew severity (% leaf coverage)							
	upper leaf surface [1]				lower leaf surface [1]			
Treatment and rate/A (application dates) [2]	27 Aug	11 Sep	AUDPC [4]		27 Aug	11 Sep	AUDPC [4]	
Control (No Fungicide)	6.2 a [3]	5.2	123	160 a	5.1	25	255	307 a
AQ10 WDG 2 oz + AddQ 0.3% (1-7)	0.6 b	4.2	40	51 b	2.8	21	198	243 ab
Kaligreen 2.2 lb (3-7)	2.9 ab	3.1	62	79 ab	4.1	16	178	208 b
JMS Stylet-Oil 1.5% (3-7)	0.1 b	1.8	14	15 b	0.8	17	140	152 b
P-value	0.03	0.44	0.06	0.05	0.26	0.14	0.07	0.03

1 Exact colony counts were made when possible and severity was estimated using the conversion factor of 30 colonies/leaf = 1%.
2 Application dates: 1=21 Jul, 2=29 Jul, 3=5 Aug, 4=12 Aug, 5=17 Aug, 6=23 Aug, and 7=30 Aug.
3 Means in a column with a letter in common are not significantly different according to Fisher's Protected LSD (P=0.05).
4 Means in the second column do not include Replication 1.