MUSKMELON (Cucumis melo 'Superstar')
Powdery mildew; Sphaerotheca fuliginea

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EVALUATION OF A BIOCONTROL AGENT AND BIOCOMPATIBLE FUNGICIDES FOR MANAGING POWDERY MILDEW OF MELON, 1995: A hyperparasitic fungus, Ampelomyces quisqualis (AQ-10), 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. AQ-10 and Kaligreen were applied alone or in combination with Nova to determine whether including a systemic fungicide would improve control, especially on the lower leaf surface. Nova was selected because resistance to benomyl and to triadimefon had been detected in 1991-1994. Fertilizer (1000 lb/A of 10-10-10) was broadcast on 30 May and incorporated on 1 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 1 Jun then incorporated. In addition, soil drainage was improved by subsoiling between rows on 20 Jul and rototilling driveways. Three-week-old seedlings were transplanted into black plastic mulch on 21-23 Jun at 36-in plant spacing and 68-in row spacing. Plots consisted of three rows of 10 plants each. Plants were sidedressed with ammonium nitrate (34-0-0) at a rate of 30 lb N/A on 27-31 Jul. Weeds were controlled by applying Dual 8E at 1 pt/treated A to the bare soil between the strips of mulch on 26 Jun, mechanically cultivating and hand-weeding. Cucumber beetles and aphids were managed by applying the following insecticides: Lannate LV (2 pt/A) on 28 Jun, Lannate LV (3 pt/A) on 28 Jul, Metasystox R (1 qt/A) on 12 Jul, and Asana (9.6 oz/A) on 21 Jul. Average monthly high and low temperatures (F) were 80/57 in Jun, 86/65 in Jul, and 86/62 in Aug. Rainfall (in.) was 2.52, 1.52, and 0.7 for these months, respectively. The field was irrigated (approx. 1.0 in.) 8 times on 29 Jun+1 Jul; 5, 13-14, and 24-25 Jul; 11+13, 19, 25 Aug, and 2 Sep (several days usually were required to move pipe across the field). A randomized complete block design with four replications was used. Treatments were started after symptoms were found on older leaves. AQ-10 was applied with 0.75% AddQ Spray Adjuvant. AQ-10 was stored in a refrigerator. Treatments were made during late afternoon or early evening, to provide favorable conditions for the hyperparasitic fungus, using a tractor-mounted boom sprayer equipped with ALBUZ lilac ceramic hollow cone nozzles spaced 9 in. apart that delivered 74 gal/A at about 250 psi. High gallonage and high pressure were used to obtain good coverage. Upper and lower surfaces of 15 leaves in each plot were examined for powdery mildew on 24 Jul, and 1, 8, 17, and 28 Aug. 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 24 Jul through 17 Aug. Severity data did not need to be transformed to obtain constant variance before subjection to analysis of variance. Number and weight of ripe fruit and number of rotten fruit were determined for the center 15 ft of each plot on 23 Aug, 30 Aug, and 7 Sep. Percentage of sucrose was determined using a hand refractometer for two fruit per plot on 23 and 30 Aug. Sensitivity to myclobutanil, the active ingredient in Nova, was determined using fungicide-treated cotyledon disks for isolates collected on 12 Sep from Bravo + Nova-treated plots.

The first fruit had started to enlarge on 24 Jul when powdery mildew was found on 44% of the older leaves examined. These leaves had an average of 2.4 colonies each. Powdery mildew quickly became severe in the control plots. All treatments suppressed powdery mildew on both upper and lower leaf surfaces. Treatments with Nova were more effective than those without Nova. Leaves died prematurely in the treatments without Nova; consequently there were not enough leaves to assess in these plots on 28 Aug. Severity on upper leaf surfaces on 28 Aug was significantly lower for the conventional fungicide program with Bravo (1%) than for the programs with biocompatible materials (28-47%) and for the program with Nova alone (51%). Severities on lower leaf surfaces on 28 Aug were 26-73% for these treatments. Nova was not as effective in late Aug as expected based on previous results (F&N Tests 49:142). This was more likely due to high disease pressure and use of a 14-day spray interval than due to fungicide resistance because none of the 38 isolates tested were able to tolerate a higher myclobutanil concentration than isolates tested previously from a field where Nova was very effective (F&N Tests 49:142). Yield (lb/A) was significantly higher with all treatments compared with the control. This was primarily due to significantly higher fruit weight (means of 10.0-15.1 lb/fruit for the nine treatments vs 6.3 lb/fruit for the control) and also to greater quantity of fruit. Sucrose content, a measure of fruit quality, was significantly higher than the control for all treatments with 2-3 applications of Nova. The biocompatible fungicides tested might have been more effective if applied more frequently, at a higher rate, and/or under lower disease pressure.

	Powdery mildew severity (% leaf coverage)							
	upper leaf surface [1]			lower leaf surface [1]			Sucrose	Yield
Treatment and rate/A (application dates) [2]	8 Aug	17 Aug	AUDPC	8 Aug	17 Aug	AUDPC	(%)	(lb/A)
Control (No Fungicide)	25.8 a [3]	66.5 a	565 a	30.0 a	79.6 a	625 a	3.5 ab	20347 a
Bravo Ultrex 2.7 lb (1-5) + Nova (1,3,5) [4]	7.3 bc	3.0 f	76 d	7.2 cd	13.0 c	124 cd	6.6 def	39422 bc
Nova 40WP 4 oz (1,3,5)	9.8 bc	8.5 ef	119 d	5.0 d	7.5 c	84 d	6.7 ef	41820 bc
AQ-10 WDG 1 oz (1-5)	14.6 ab	37.8 bcd	307 bc	14.9 bc	65.1 a	437 b	3.2 a	36244 b
AQ-10 WDG 1 oz (1-5) + Nova (1,3,5)	0.6 c	10.5 ef	57 d	1.2 d	7.6 c	49 d	6.9 ef	49046 c
AQ-10 WDG 1 oz (2,3,5) + Nova (1,4)	0.3 c	41.8 bc	193 cd	0.6 d	23.5 c	120 cd	5.9 cde	34408 b
AQ-10 WDG 1 oz (2-5) + Nova (1)	0.0 c	26.1 cde	127 d	0.7 d	20.0 c	110 d	5.0 bcd	37961 bc
JMS Stylet-Oil 0.75% (1-5)	9.8 bc	43.0 bc	281 bc	5.2 d	43.8 b	248 c	4.6 abc	32510 b
Kaligreen 2.2 lb (1-5)	16.3 ab	53.1 ab	388 b	17.8 b	64.8 a	462 b	4.0 ab	34355 b
Kaligreen 2.2 lb (1-5) + Nova (1,3,5)	0.3 c	20.3 def	97 d	1.2 d	20.2 c	112 d	7.6 f	42725 c
P-value	0.0054	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

[1] Exact colony counts were made when possible and severity was estimated using the conversion factor of 10 colonies/leaf = 1%.
[2] Application dates: 1=27 and 28 Jul, 2=3 Aug, 3=10 Aug, 4=17 Aug, and 5=27 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] Nova 40WP was applied at 4 oz/A for all Nova applications.