MUSKMELON (*Cucumis melo*)
Powdery mildew; *Podosphaera xanthii* (formerly *Sphaerotheca fuliginea*)

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Alternative fungicides to Bravo evaluated on muskmelon cultivars differing in susceptibility to powdery mildew, 2001.

Genetic and chemical controls were evaluated alone and in combination using a factorial treatment arrangement. Eclipse, which has resistance to race 1 *Podosphaera xanthii*, and Apollo, which has resistance to race 1 and 2, were compared with susceptible Superstar. There were three fungicide programs plus a nontreated control. The standard fungicide program was Quadris F (15.4 fl. oz/A) applied in alternation with Nova 40W (5 oz/A) + Bravo Ultrex 82.5WG (2.7 lb/A). Potassium bicarbonate formulated as Kaligreen 82SP (4 lb/A) and copper hydroxide formulated as Kocide 2000 53.8DF (1.5 lb/A) were used in place of Bravo in the Bravo alternatives fungicide program. The biocompatible fungicide program was an alternation of Kaligreen and Kocide, which are approved for organic production. Fungicides were applied with a tractor-mounted boom sprayer equipped with D3-45 hollow cone nozzles spaced 11 in. apart that delivered 88 gpa at 200 psi. This experiment was conducted at the Long Island Horticultural Research and Extension Center in a field with Haven loam and Riverhead sandy loam soil. Fertilizer (666 lb/A of 15-15-15) was broadcast and incorporated on 7 Jun. Transplants were seeded in the greenhouse on 29 May. On 26 Jun, seedlings were transplanted with starter fertilizer (15-30-15) into black plastic mulch at 24-in. plant spacing and 68-in. row spacing. Plants were watered using drip irrigation as needed based on irrometer readings. Weeds between rows were controlled by applying Gramoxone Extra EC (2 pt/treated A) on 3 Jul and hand-weeding. Cucumber beetles were managed with a seedling drench of Admire 2F (0.02 ml/plant) on 20 Jun and a foliar application of Asana XL (9.6 oz/A) on 14 Jul. To manage Phytophthora fruit and crown rot, Ridomil Gold EC (1 pt/A) was broadcast over the entire field then incorporated on 8 Jun**,** and Acrobat 50WP (6.4 oz/A) was applied on 31 Aug and 7 Sep. Average monthly high and low temperatures (F) were 80/63 in Jun, 80/63 in Jul, 84/68 in Aug, and 75/59 in Sep. Rainfall (in.) was 6.08, 3.43, 4.86, and 2.98 for these months, respectively. A randomized complete block design with four replications was used. Plots contained 12 plants in three 4-plant rows. Upper and lower (under) surfaces of 5 to 50 leaves in each plot were examined on 9, 14, 22, and 29 Aug and 5, 13, and 24 Sep. Initially, 50 older leaves were examined in each plot. As disease progressed, leaves of other age classes and fewer total leaves were examined. The number of leaves examined was adjusted based on the incidence of affected leaves in a plot. Mid-aged leaves and young leaves were also examined beginning on 29 Aug. Powdery mildew colonies were counted. When colonies could not be counted accurately because they had coalesced and/or were too numerous, severity was estimated. Average severity for the entire canopy was calculated from the individual leaf assessments. Defoliation, predominantly due to powdery mildew, was assessed on 4, 11, and 17 Sep. Ripe fruit were counted and weighed on 4 and 11 Sep. Percentage of sucrose was determined using a hand refractometer for two fruit per plot. Ripe and green fruit were counted on 17 Sep. Differential melon genotypes (Topmark, PMR-45, and PMR-6) were grown near the plots to determine if race 1, 2 and/or race 3 of *P. xanthii* were present.

Based on powdery mildew development in the differential melon genotypes, race 1 and race 2 appeared together, in contrast with previous years when race 2 appeared later in the epidemic than race 1. Race 3 did not occur. Although both race 1 and 2 were present, powdery mildew was significantly less severe on nontreated Eclipse, which has resistance only to race 1, than on nontreated susceptible Superstar. Nontreated Apollo, which has resistance to both race 1 and 2, surprisingly was not less severely affected by powdery mildew than nontreated Eclipse. Apollo exhibited a higher level of resistance in 2000 (F&N Tests 2001:V75). The biocompatible fungicide program applied to Superstar was not as effective as either the standard fungicide program or the Bravo alternatives fungicide program. Defoliation was only observed in nontreated Superstar (81%) and Superstar receiving the biocompatible program (46%) on 4 Sep. There was significantly more defoliation with the biocompatible program compared to the other programs on all three assessment dates for Superstar. Sucrose content, a measure of fruit quality, was not significantly improved over nontreated with the biocompatible program, in contrast with the other programs. The Bravo alternatives program differed significantly from the standard program only based on powdery mildew severity on 5 Sep and AUDPC for lower leaf surfaces. All fungicide programs improved control of powdery mildew obtained with genetic control. There were only minor differences among the three fungicide programs applied to the two cultivars with resistance to powdery mildew. The only significant difference was a higher AUDPC value for powdery mildew on lower leaf surfaces with the biocompatible program compared to the other programs. Powdery mildew control in these resistant cultivars did not result in improved fruit quality. Quantity of fruit was not affected by fungicide treatment for any cultivar. Superstar receiving the standard fungicide program produced more fruit than both Apollo and Eclipse receiving the same treatment (average of 40, 32, and 30 fruit/plot, respectively).

	Powdery mildew severity (% leaf coverage)[a]						Defoliation (%)	Sucrose
	upper leaf surface			lower leaf surface				
Cultivar, Treatment[b]	29 Aug	5 Sep	AUDPC	29 Aug	5 Sep	AUDPC	11 Sep	(%)
Superstar, No Fungicide	47.348 a[c]	60.87 a	1391.0 a	47.596 a	83.43 a	1686.4 a	79 a	6.0 d
Superstar, Std Fungicide	0.284 c	0.14 c	27.7 de	1.929 b	3.05 cde	72.8 d	9 de	9.2 ab
Superstar, Bravo Alternatives	0.298 c	7.46 b	94.0 cd	0.687 bc	19.03 b	258.4 c	19 cd	9.4 ab
Superstar, Biocompatibles	7.857 b	8.93 b	244.2 b	35.641 a	67.14 a	1361.5 a	55 b	7.5 cd
Eclipse (R1), No Fungicide	0.645 c	7.88 b	188.5 bc	0.206 bc	10.41 bc	512.6 b	11 de	10.4 a
Eclipse (R1), Std Fungicide	0.004 c	0.00 c	0.1 e	0.024 c	0.00 e	0.2 e	4 e	10.2 a
Eclipse (R1), Bravo Alternatives	0.004 c	0.00 c	0.0 e	0.008 c	0.00 e	0.1 e	3 e	10.7 a
Eclipse (R1), Biocompatibles	0.000 c	0.04 c	4.6 e	0.475 bc	4.08 cde	273.9 c	8 de	9.3 ab
Apollo (R1+R2), No Fungicide	0.734 c	9.94 b	322.6 b	0.352 bc	7.57 bcd	376.1 bc	24 c	8.2 bc
Apollo (R1+R2), Std Fungicide	0.000 c	0.00 c	0.0 e	0.006 c	0.00 e	0.1 e	10 de	8.3 bc
Apollo (R1+R2), Bravo Alternatives	0.000 c	0.00 c	0.1 e	0.000 c	0.00 e	0.0 e	11 de	9.2 ab
Apollo (R1+R2), Biocompatibles	0.000 c	0.13 c	1.7 e	0.010 c	0.38 de	52.3 d	10 de	8.4 bc
P-value	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

[a] Exact colony counts were made when possible and severity was estimated using the conversion factor of 10 colonies/leaf = 1%. A square root transformation was used when needed to stabilize variance. The table contains de-transformed values.

[b] R1=resistant to race 1 of *Podosphaera xanthii*; R2=resistant to race 2. Application times were: 1=15 Aug, 2=22 Aug, 3=30 Aug, 4=6 Sep, and 5=13 Sep. Treatment was started after disease detection for each cultivar. Standard program (Superstar): Quadris (week 1,3,5), Bravo + Nova (week 2,4). Standard program (Eclipse and Apollo): Quadris (week 2,4), Bravo + Nova (week 3,5). Bravo alternatives (Superstar): Quadris (1), Kaligreen + Nova (2), Quadris (3), Kocide + Nova (4), Quadris (5). Bravo alternatives (Eclipse and Apollo): Quadris (2), Kaligreen + Nova (3), Quadris (4), Kocide + Nova (5). Biocompatible fungicides (Superstar): Kaligreen (1), Kocide (2), Kaligreen (3), Kocide (4), Kaligreen (5). Biocompatible fungicides (Eclipse and Apollo): Kocide (2), Kaligreen (3), Kocide (4), Kaligreen (5).

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