

Powdery mildew resistant melon cultivar evaluation, 2012.

The objectives of this study, which is part of a multi-year cultivar evaluation project, were 1) to continue to monitor adaptation in the pathogen that has been reducing the effectiveness of powdery mildew resistance and 2) to determine whether cultivars with resistance to pathogen races 1 and 2 are better protected against powdery mildew than cultivars with resistance to only race 1. A field experiment was conducted at the Long Island Horticultural Research and Extension Center in Riverhead on Haven loam soil. Controlled release fertilizer (N-P-K, 19-10-9) at 525 lb/A (100 lb/A of N) was broadcast over the bed area and incorporated on 8 Jun. Beds were formed with drip tape and covered with black plastic mulch on 11 Jun. A waterwheel transplanter was used to make planting holes and apply starter fertilizer plus insecticide on 11 Jun. Seeds were sown on 23 May in the greenhouse. Seedlings were transplanted by hand into the planting holes on 15 Jun. During the season, water was provided as needed via drip irrigation lines. Weeds were managed by mowing and hand weeding. Cucumber beetles were managed with Admire Pro (2.8 fl oz/1000 ft) applied in the transplant water on 11 Jun. No fungicides were applied to manage powdery mildew. The following fungicides were applied preventively for downy mildew (*Pseudoperonospora cubensis*) and/or Phytophthora blight (*Phytophthora capsici*): ProPhyt (2 qts/A) on 18 Jul; Presidio (4 fl oz/A) on 31 Jul; Curzate 60 DF (5 oz/A) on 31 Jul; and Ranman 400 SC (2.75 fl oz/A) on 31 Jul and 24 Aug. Plots were three adjacent rows each with four plants spaced 24 in. apart. Rows were spaced 68 in. apart. To separate plots and provide a source of inoculum, two plants of a powdery mildew-susceptible squash cultivar were planted between each plot in each row. A combination of three squash (*Cucurbita pepo*) were used: Daisy and Fortune (summer squash) and Spineless Beauty (zucchini). A randomized complete block design with four replications was used. Upper and lower leaf surfaces were assessed for powdery mildew on 25 Jul and on 1, 6 and 16 Aug. Powdery mildew colonies were counted; severity was estimated when colonies had coalesced or were too numerous to count. Colony counts were converted to severity values using the conversion factor of 30 colonies/leaf = 1% severity. Average severity for the entire canopy was calculated from the individual leaf assessments. Area Under Disease Progress Curve (AUDPC) values were calculated from 25 Jul through 16 Aug. Ripe fruit were harvested on 6, 10, and 17 Aug. Average monthly high and low temperatures (°F) were 78/61 in Jun, 85/68 in Jul, and 83/67 in Aug. Rainfall (inches) was 5.44, 4.35, and 3.24 for these months, respectively.

Powdery mildew developed naturally. Symptoms were first seen on 23 Jul. Early in disease development, while severity was low (25 Jul assessment), no significant differences were detected among any of the cultivars. Powdery mildew on Superstar, the susceptible standard cantaloupe cultivar with no known genes for resistance included for comparison in this experiment, had become significantly more severe than all resistant cultivars by the next assessment on 1 Aug. The resistant cultivars provided a high level of suppression, indicating only race 2 and/or race 1 were present of *Podosphaera xanthii*. Degree of control relative to Superstar based on AUDPC values on upper and lower leaf surfaces was 99% and 100%, respectively, for Samoa, a Harper-type melon, 98% and 100% for Visa Premium, a galia-type melon, and 99% and 99% for Cleopatra, a standard cantaloupe. Control for the other resistant cultivars ranged from 86% to 98% on upper leaf surfaces and 83% and 96% on lower surfaces. Eclipse, which has major-gene resistance only to race 1 of *Podosphaera xanthii*, was not significantly more severely affected by powdery mildew than all the cultivars with resistance to races 1 and 2, suggesting that race 1 was the dominant race present. The two powdery mildew-resistant honeydew-type melons, Dream Dew and Summer Dew, were numerically but not significantly less severely diseased than Honeydew Green Flesh, a comparable susceptible cultivar. Dream Dew, with resistance only to race 1, was numerically more severely affected than Summer Dew, which is resistant to races 1 and 2. All honeydew melon cultivars matured later than the others, which could at least partly account for lower powdery mildew severity, especially on the susceptible honeydew cultivar compared to the susceptible cantaloupe. Powdery mildew was more severe on resistant cultivars in a similar experiment in 2010. The other melons evaluated in 2012 produce Tuscan type fruit (Orange Sherbert and Napoli) or standard or personal-sized cantaloupe-type fruit. Highest yielding varieties were Visa Premium, Cleopatra, Lilliput and Sugar Cube (last two produce personal-sized cantaloupe fruit)(data not shown). Fruit of Lilliput and Sugar Cube received the best taste ratings in evaluations conducted by project staff and by public groups. These two, Pixie and Visa Premium had high sucrose content, which often is related to taste.

Cultivar (resistance) ^x	Powdery mildew severity (%) ^z									
	Upper leaf surface ^y					Lower leaf surface ^y				
	25 Jul	1 Aug	6 Aug	16 Aug	AUDPC ^w	25 Jul	1 Aug	6 Aug	16 Aug	AUDPC ^w
Superstar (S).....	4.8	11.9 a	14.0 a	62.1	488.4 a	0.0	8.5 a	8.5 a	60.4 a	378.3 a
Eclipse (R1).....	0.0	0.0 b	0.1 b	10.4	40.3 bc	0.0	0.0 b	0.0 b	30.1 ab	59.3 bc
Avatar (R).....	0.6	0.3 b	1.0 b	7.8	23.0 c	0.0	0.5 b	0.5 b	17.6 b	19.6 bc
Cleopatra (R).....	0.2	0.0 b	0.0 b	2.3	5.4 c	0.0	0.0 b	0.0 b	13.3 b	4.5 bc
Lilliput (R).....	0.3	0.0 b	0.0 b	1.3	7.4 c	0.0	0.0 b	0.0 b	10.4 b	11.4 bc
Pixie (R).....	0.2	3.4 b	0.2 b	12.6	58.5 bc	0.0	0.0 b	0.0 b	10.2 b	40.3 bc
Sugar Cube (R).....	0.0	0.0 b	0.0 b	36.4	20.3 c	0.0	0.0 b	0.0 b	9.6 b	17.4 bc
Orange Sherbert (R).....	0.0	0.8 b	0.7 b	53.5	69.3 bc	0.0	0.6 b	0.6 b	6.0 b	27.3 bc
Napoli (R).....	0.0	0.0 b	0.0 b	6.9	14.1 c	0.0	0.0 b	0.0 b	5.5 b	20.5 bc
Samoa (R).....	0.2	0.0 b	0.0 b	1.6	4.6 c	0.0	0.0 b	0.0 b	5.1 b	0.3 c
Visa Premium (R).....	1.5	0.0 b	0.0 b	0.9	7.8 c	0.1	0.0 b	0.0 b	3.3 b	1.3 c
Honeydew Green										
Flesh (S).....	1.5	2.4 b	1.4 b	90.0	171.0 b	0.0	0.0 b	0.0 b	2.7 b	139.2 ab
Dream Dew (R1).....	0.8	0.1 b	0.2 b	11.9	59.3 bc	0.0	0.1 b	0.1 b	0.3 b	62.8 bc
Summer Dew F1 (R).....	0.0	0.0 b	0.0 b	6.7	25.8 bc	0.0	0.0 b	0.0 b	0.1 b	16.2 bc
<i>P-value (treatment)</i>	0.1121	<0.0001	<0.0001	0.2202	<0.0001	0.4697	0.0003	0.0003	<0.0001	<0.0001

^z Exact colony counts were made when possible and severity was estimated using the conversion factor of 30 colonies/leaf = 1% severity. Area Under Disease Progress Curve (AUDPC) was calculated from 25 Jul through 16 Aug.

^y Numbers in each column followed by the same or no letter are not significantly different from each other according to Tukey's HSD ($P=0.05$).

^x S indicates susceptible to powdery mildew, R1 indicates resistance to race 1, R indicates resistance to race 1 and 2 of *P. xanthii*.

^w AUDPC values were square root transformed before analysis. Table contains de-transformed values.