

Powdery mildew-resistant melon cultivar evaluation, 2013.

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 host 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 (LIHREC) in Riverhead on Haven loam soil. Controlled release fertilizer (N-P-K, 19-10-9) at 525 lb/A (101 lb/A of N) was broadcast over the bed area and incorporated on 5 Jun. Beds were formed with drip tape and covered with black plastic mulch on 10 Jun. A waterwheel transplanter was used to make planting holes and apply starter fertilizer plus insecticide on 12 Jun. Seeds were sown on 17 May in the greenhouse. Seedlings were transplanted by hand into the planting holes on 14 Jun. During the season, water was provided as needed via drip irrigation lines. Weeds were managed by applying herbicides after laying plastic (Strategy at 3 pt/A, Sandea at 0.5 oz/A, Scythe at 1%, and Roundup WeatherMAX at 22 oz/A) and hand weeding primarily in transplant holes. The following insecticides were applied for cucumber beetles: Admire Pro (2.8 fl oz/1000 ft) in the transplant water on 12 Jun, Hero (10 fl oz/A) on 5 Jul, and Asana (9.6 fl oz/A) on 10 Jul. Thrips were managed by applying Entrust (8 fl oz/A) on 18 Jul, and Radiant (6 fl oz/A) on 29 Jul. No fungicides were applied to manage powdery mildew. The following fungicides were applied preventively for Phytophthora blight (*Phytophthora capsici*): ProPhyt (3 qt/A) on 16 Jul, Ranman 400 SC (2.75 fl oz/A) on 18 Jul and 2 Aug, Presidio (4 fl oz/A) on 10 Aug, and Forum (6 oz/A) on 28 Jul and 18 Aug. Topsin M (8 oz/A) was applied preventively on 29 Jul for anthracnose (*Colletotrichum orbiculare*); this fungicide is no longer effective for powdery mildew due to resistance. A randomized complete block design with four replications was used. 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 zucchini squash cultivar (Spineless Beauty) were planted between each plot in each row. Upper and lower leaf surfaces were assessed for powdery mildew on 15, 22, and 29 Jul and on 5, 12, 20, and 27 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 5 Aug through 12 Aug. Ripe fruit were harvested on 13, 20, and 27 Aug. To determine which pathogen races were present, powdery mildew differentials were grown in a section of the field adjacent to the plots with the melon varieties. The same procedures were used to grow these plants and assess powdery mildew. Average monthly high and low temperatures (°F) were 78/61 in Jun, 86/71 in Jul, 80/64 in Aug. Rainfall (inches) was 9.92, 3.07, and 2.43 for these months, respectively.

Powdery mildew developed naturally. Symptoms were first observed on 15 Jul. All resistant cultivars provided a high level of suppression of powdery mildew as compared to Superstar, the susceptible standard cantaloupe cultivar with no known genes for resistance. Degree of control obtained ranged from 95% to 100% based on AUDPC values for severity on both leaf surfaces and from 83% to 100% based on severity on 12 Aug. 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. Similar conclusion was reached based on powdery mildew development on the differentials: severity was low on the differential with resistance to race 1 (PMR-45), 2% versus 24% on the susceptible differential variety (Hales Best Jumbo), while no symptoms were found on the differentials with resistance to race 1 and 2 (PMR-5 and MR-1, which also has resistance to race 3). Cultivars resistant to races 1 and 2 also provided excellent suppression in similar experiments conducted in 2011 and 2012, but not in 2010. Eclipse has not always been as effective. Most cultivars examined produce standard cantaloupe fruit. Sugar Cube produces small (personal-sized) fruit, SXM 7057 is a canary-type melon, Angelina is a honeydew-type, Inbar is a Galia-type, and Samoa is a Harper-type.

Cultivar ^y	Powdery mildew severity (%) ^z							
	Upper leaf surface				Lower leaf surface			
	5 Aug	12 Aug	AUDPC ^x	27 Aug	5 Aug	12 Aug	AUDPC ^x	27 Aug
Superstar (S).....	31.17 a	22.88 a	184.3 a	dead	29.55 a	27.45 a	193.9 a	dead
Eclipse (R1).....	0.02 b	0.81 b	1.4 b	13.41	0.05 b	0.31 b	1.0 b	11.45
Athena.....	0.02 b	0.78 b	2.2 b	13.84	0.01 b	0.18 b	0.6 b	8.92
Verona.....	0.13 b	4.58 b	9.3 b	28.81	0.07 b	2.83 b	4.0 b	19.93
Majus.....	0.00 b	0.05 b	0.1 b	dead	0.06 b	0.01 b	0.1 b	dead
Sugar Cube.....	0.00 b	0.75 b	1.2 b	23.14	0.01 b	0.48 b	0.6 b	15.69
SXM 7057.....	0.02 b	3.96 b	8.6 b	dead	0.02 b	3.83 b	4.8 b	dead
Angelina.....	0.10 b	1.55 b	4.3 b	dead	0.03 b	1.00 b	2.6 b	dead
Inbar.....	0.23 b	1.43 b	4.6 b	dead	0.02 b	0.26 b	0.9 b	dead
Samoa.....	0.03 b	0.04 b	0.2 b	8.25	0.02 b	0.23 b	0.5 b	3.43
<i>P-value</i> (<i>treatment</i>)	<0.0001	0.0020	<0.0001		<0.0001	0.0002	<0.0001	

^z Numbers in each column with a letter in common are not significantly different from each other (Tukey's HSD, P=0.05).

^y All varieties have resistance to pathogen races 1 and 2 except Superstar, the susceptible cultivar included for comparison, and Eclipse which has resistance only to race 1.

^x AUDPC values were calculated for severity from 5 Aug through 12 Aug. Values were square root transformed before analysis.