CANTALOUPE (*Cucumis melo*)
Powdery mildew; *Podosphaera xanthii*

M. T. McGrath and C. T. Downing
Plant Pathology & Plant-Microbe Biology Section
SIPS, Cornell University, LIHREC
3059 Sound Avenue, Riverhead, NY 11901

Evaluation of powdery mildew resistant cultivars of cantaloupe, 2020.

An experiment with cantaloupe was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead, NY, in a field with Haven loam soil. The main objective of this experiment was to evaluate three new powdery mildew resistant cantaloupe cultivars (Halona, Shockwave, and Sugar Rush) for powdery mildew resistance, yield, and fruit quality compared to three resistant cultivars commercialized previously (Ambrosia, Astound and Sugar Cube). The field was mold-board plowed on 6 Apr. For management of Phytophthora blight (caused by *Phytophthora capsici*), a mustard biofumigant cover crop (cv. Rojo Caliente) was seeded at 10 lb/A by drilling on 7 Apr after applying urea fertilizer (46-0-0) at 80 lb/A N on 6 Apr. On 12 Jun the mustard was flail chopped, immediately incorporated by disking, and followed by a cultipacker to seal the soil surface; the field could not be irrigated to initiate biofumigation as usually done. Controlled-release fertilizer (N-P-K, 19-10-9) at 525 lb/A (101 lb/A N) was broadcast over the bed area and incorporated on 22 Jun. Beds were formed with drip tape and covered with black plastic mulch also on 23 Jun. A waterwheel transplanter was used to make planting holes in the beds and apply starter fertilizer. Seed was sown in trays in a greenhouse on 1 Jun. Seedlings were transplanted by hand into the holes on 24 Jun. Plants that died were replaced on 29 Jun, 7 Jul and 13 Jul. Plots were three 10-ft rows spaced 68 in. apart with 12 plants per plot at 2-ft spacing. To separate plots and provide a source of inoculum, there were two powdery mildew-susceptible summer squash plants (cv. Slick Pik) between plots. Weeds were managed between the mulched beds by applying the herbicides Strategy 3 pt/A, Sandea 0.5 oz/A, and Curbit EC 1 pt/A prior to transplanting on 23 Jun using a tractor mounted sprayer. During the season, weeds were managed by cultivating and hand weeding as needed. The following fungicides were applied throughout the season to manage Phytophthora blight: Orondis Ultra 7 fl oz/A on 9 Jul, 19 and 31 Aug, Omega 1 pt/A on 15 Jul and 10 Sep, Presidio 4 fl oz/A on 22 Jul and 25 Aug, Revus 8 fl oz/A on 29 Jul, and Ranman 2.75 fl oz/A on 5 and 12 Aug. In this area, the primary source of initial inoculum of *Podosphaera xanthii* is considered to be long-distance wind-dispersed spores from affected plants. There were two adjacent experiments. Plants in one experiment were treated with the following fungicides using a tractor-drawn boom sprayer (50 GPA and 125 PSI) to evaluate the resistant cultivars as part of an integrated management program: Procure 8 fl oz/A on 5, 19 and 31 Aug, and Vivando 15 fl oz/A on 12 Aug, 25 Aug and 10 Sep. The other experiment was not sprayed with fungicides for powdery mildew. A randomized complete block design with four replications was used for both experiments. Plots in both experiments were inspected for powdery mildew symptoms on upper and lower leaf surfaces on 22 and 29 Jul; 3, 10-11, 17-18 and 24-25 Aug; and 1 and 8 Sep. For the first four assessments in both experiments, 27 to 30 older leaves were rated in each plot starting with plots of Ambrosia. Since no symptoms were found in these plots at the first three assessments, plots of the other resistant cultivars were not examined on those dates. For the remaining assessments, an equal number of young, mid-aged, and old leaves (selected based on leaf physiological appearance and position in the canopy) were rated for a total of 15 to 21 leaves in each plot. Powdery mildew colonies were counted or severity was assessed by visual estimation of percent leaf area affected when colonies could not be counted accurately because they had coalesced and/or were too numerous. Colony counts were converted to severity values using the conversion factor of 10 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 18 Aug through 1 Sep. Fruit from plots in the fungicide-treated experiment were harvested as they ripened on 11, 17-18, 21, and 25 Aug. On 18 and 26 Aug, juice was obtained from flesh samples taken from a representative fruit from each plot with ripe fruit and analyzed for sugar content using a refractometer to obtain a Brix reading. Ten staff members on these dates rated fruit appearance, taste, texture, and marketability on a 1 (poor) to 5 (excellent) scale as interpreted by the rater. Fruit remaining in plots were counted on 1 Sep. Data for each experiment were analyzed separately with one-way ANOVA and Tukey's HSD to separate means using JMP statistical software. Average monthly high and low temperatures (°F) were 86.3/69.6 in Jul, 84.3/68.2 in Aug and 75.7/60.9 in Sep. Rainfall (in.) was 3.80, 3.33, and 2.70 for these months, respectively.

Powdery mildew was first observed on 17-18 Aug in both experiments at low levels and only in 4 of the 48 plots. Severity remained very low through 1 Sep, even in non-fungicide-treated plots, in contrast with an adjacent experiment with powdery mildew resistant acorn cultivars (PDMR 15:V063). Average severity on upper and lower leaf surfaces of non-fungicide-treated Ambrosia, the cultivar with numerically the most symptoms, was 1.6% and 0.7%, respectively, on 1 Sep, which was the end of the harvest period, then increased to 13.1% and 19.5% on 8 Sep. Low severity is reflected in the exceptionally small AUDPC values. Data from 8 Sep was not analyzed because six plots were defoliated then due to powdery mildew and being at the end of the harvest period.

Sugar Cube produced the smallest fruit as expected for this cultivar. Fruit weight was greatest for Ambrosia. Sugar Rush and Halona produced significantly more fruit early in the harvest period (11 – 18 Aug). Shockwave produced fruit with highest sugar content; Ambrosia and Astound had significantly lower Brix values. Average quality ratings for the cultivars (data not analyzed) were: Ambrosia (3.4 for external appearance, 3.3 for internal appearance, 3.3 for taste, and 2.9 for texture), Astound (3.9, 3.8, 3.4, 4.3), Shockwave (3.5, 5, 3.7, 3.5), Sugar Rush (4, 4, 3.7, 4.2), Sugar Cube (4.2, 4.1, 4, 3.7), and Halona (4.1, 3.8, 3.5, 3.7). This report includes work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Hatch under NYC-153409.

Cultivar (reaction to powdery mildew)	Powdery mildew severity (AUDPC)[z,y]		Yield assessments [z,y]			
	Upper leaf surface	Lower leaf surface[x]	Fruit wt (lb)	Brix	No. fruit/plant 11 – 18 Aug	No. fruit/plant Total
Shockwave (resistant)	10.46	7 a	4.98 c	15.0 a	0.00 b	3.81
Ambrosia (resistant)	5.94	2 ab	7.60 a	10.2 c	0.04 b	3.19
Astound (resistant)	2.77	2 ab	4.66 c	11.4 bc	0.00 b	3.67
Sugar Rush (resistant)	3.87	1 b	4.73 c	13.2 abc	1.02 a	3.46
Sugar Cube (resistant)	0.01	0 b	2.64 d	13.6 ab	0.38 b	3.21
Halona (resistant)	0.00	0 b	6.15 b	12.0 abc	0.98 a	3.19
P-value (cultivar)	0.0893	0.0008	<0.0001	0.0032	<0.0001	0.5941

[z] Powdery mildew severity data are from non-fungicide-treated experiment. Yield data from are from fungicide-treated experiment.

[y] Numbers in each column with a letter in common or no letter are not significantly different from each other (Tukey's HSD, P=0.05).

[x] Values were square root transformed before analysis because raw data were not distributed normally. Table contains de-transformed values.