

Powdery mildew-resistant acorn-type winter squash cultivar evaluation, 2007.

The goal of this study was to evaluate two solid green acorn-type winter squash cultivars and two striped acorn-types with powdery mildew resistance for their ability to resist this disease as well as their yielding ability relative to Table Ace, a standard cultivar lacking powdery mildew resistance that is commonly grown. A field experiment was conducted at the Long Island Horticultural Research and Extension Center in Riverhead on Haven loam soil. Seeds were sown on 30 May in the greenhouse. Seedlings were transplanted into beds covered with black plastic mulch on 19 Jun. Fertilizer (N-P-K 10-10-10) at 1000 lb/A was broadcast and incorporated on 11 May. Water was provided as needed through drip irrigation lines. During the season weeds were controlled with a clover living mulch broadcast seeded between plastic mulch on 25 May, hand weeding, and mowing. Cucumber beetles were managed with Admire 2F applied after transplanting as a soil drench around transplants (0.0007 fl oz/plant) on 26 Jun and with Asana XL (9.6 oz/A) applied to foliage on 16 Jul. No fungicides were applied specifically for powdery mildew. The following fungicides were applied preventively for downy mildew (*Pseudoperonospora cubensis*) and Phytophthora blight (*Phytophthora capsici*): Forum 4.16SC (6 oz/A) on 16 Jul, Ranman 400 SC (2.75 fl oz/A) on 12 Aug, Acrobat 50 WP (6.4 oz/A) on 19 Aug, and Previcur Flex 6 F (1.2 pt/A) on 29 Aug. Neither disease developed before the end of this experiment. Plots were three adjacent rows each with four plants spaced 24-in. apart. Rows were spaced 68-in apart. A plant of Multipik summer squash, a susceptible variety, was planted between each plot in each row to separate plots and provide a source of inoculum. A randomized complete block design with four replications was used. Upper and lower surfaces of leaves were assessed for powdery mildew beginning on 2 Aug. Fifteen old leaves were selected on 2 Aug in each plot based on leaf appearance and position in the canopy. On 17 Aug old and mid-aged leaves were assessed. Powdery mildew colonies (spots) were counted; severity was assessed 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 30 colonies/leaf = 1%. Average severity for the entire canopy was calculated from the individual leaf assessments. These canopy severity values were used to calculate area under disease progress curves (AUDPC) to obtain a measure of severity over the entire assessment period (2 – 17 Aug). Powdery mildew control was calculated for upper and lower leaf surfaces using AUDPC values relative to the average AUDPC value for Table Ace. Winter squash fruit were harvested, weighed, and measured on 10 Sep. Three representative fruit per plot were selected for measuring fruit width, fruit length, and cavity width and for assessing sugar content, which was done with a hand-held refractometer using fruit samples that were frozen and then thawed. Fruit characteristics were also evaluated and overall appearance was rated on a scale of 1 to 5 with 1= poor and 5 = best. Average monthly high and low temperatures (°F) were 79/61 in Jun, 82/66 in Jul, 82/65 in Aug, and 77/60 in Sep. Rainfall (in.) was 3.37, 3.63, 2.60, and 1.51 for these months, respectively.

Only Autumn Delight exhibited less severe powdery mildew on upper and lower leaf surfaces relative to Table Ace based on AUDPC values, with lower severity on upper surfaces only significant at $P=0.09$. In sharp contrast, all four cultivars evaluated effectively suppressed powdery mildew in a similar experiment conducted in 2006, providing 63-93% suppression on upper leaf surfaces and 51-92% suppression on lower surfaces. Celebration produced the greatest number and weight of marketable fruit. Fruit of Harlequin had the highest sugar content. Fruit of Table Star and Celebration also had significantly higher sugar content than fruit of Table Ace; Autumn Delight was the only cultivar with fruit that did not have significantly higher sugar content than Table Ace. External appearance was rated 4 for all. Autumn Delight was the only one rated 5 for cavity size, internal appearance, and also flesh color while most of the rest were rated 4. Fruit of Celebration were orange, yellow, green, and white speckled. Harlequin fruit were green and white. The other three cultivars produced dark green fruit. Table Star fruit had a white ring around the stem end resembling a star.

Cultivar	Powdery mildew severity (AUDPC) *				Marketable fruit		
	Upper leaf surface	Lower leaf surface	Number/plant	Weight/plant (lb)	Fruit length (in)	Cavity width (in)	Sucrose (%)
Autumn Delight	49.2 b **	68.0 c	1.7 c	2.9 c	12.6 b	6.7 c	7.6 cd
Table Star	129.9 ab	164.9 b	1.9 c	2.9 c	9.3 c	8.0 a	9.8 ab
Harlequin	112.7 ab	179.7 ab	3.6 b	4.2 b	8.7 c	7.3 b	10.7 a
Celebration	153.9 a	224.3 ab	4.2 a	5.0 a	9.5 c	7.3 b	8.6 bc
Table Ace (Std)	170.2 a	258.1 a	1.6 c	2.8 c	14.0 a	7.3 b	7.0 d
P-value	0.0933	0.0064	<.0001	<.0001	<.0001	0.0013	0.0023

* Exact colony counts were made when possible and severity was estimated using the conversion factor of 30 colonies/leaf = 1%.

** Numbers in each column with a letter in common are not significantly different according to Fisher's Protected LSD ($P = 0.05$), with the exception of the first column.