

Powdery Mildew Resistant Winter Squash Cultivar Evaluation, New York 2007

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Cultivars with resistance are a valuable tool for managing powdery mildew, a very common disease that can reduce yield (fruit quantity and/or size) and market quality (flavor, color, storability, etc). Several winter squash cultivars recently became available on the commercial market advertised as having resistance to powdery mildew. These cultivars include hybrid and open-pollinated lines of butternut, acorn, and specialty squashes. 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.

Materials and Methods

A field experiment was conducted at the Long Island Horticultural Research and Extension Center in Riverhead on Haven loam soil. Seeds were sown on May 30 in the greenhouse. Seedlings were transplanted into black plastic mulch on June 19. Fertilizer (N-P-K 10-10-10) at 1,000 lbs./A was broadcast and incorporated on May 11. Water was provided as needed through drip irrigation lines placed beneath the mulch.

During the season, weeds were controlled with a clover living mulch broadcast seeded between plastic mulch on May 25, hand weeding, and mowing. Cucumber beetles were managed with Admire 2F applied after transplanting as a soil drench around transplants (0.02 ml/plant) on June 21 and with Asana XL 9.6 oz./A applied to foliage on July 16. 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 July 16, Ranman 400 SC (2.75 fl. oz./A) on August 12, Acrobat 50 WP (6.4 oz./A) on August 19, and Previcur Flex 6F (1.2 pt/A) on August 29. Neither disease developed before the end of this experiment.

Plots were three adjacent rows each with four plants spaced 24 inches apart. Rows were spaced 68 inches 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 August 2. Fifteen old leaves were selected on August 2 in each plot based on leaf appearance and position in the canopy. On August 17 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 (AUDPC) to obtain a measure of severity over the entire assessment period. 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 September 10. 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 thawed first. Fruit characteristics were also evaluated and overall appearance was rated on a scale of 1 to 5, with 1 = poor and 5 = best.

Results and Discussion

Only Autumn Delight exhibited control of powdery mildew on upper and lower leaf surfaces relative to Table Ace based on AUDPC values, with control on upper surfaces only significant at $P=0.09$. In sharp contrast, these cultivars all effectively suppressed powdery mildew in a similar experiment conducted in 2006, providing 63-93% control on upper leaf surfaces and 51-92% control 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 had a white ring around the stem resembling a star.

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Table 1. Yield and control of powdery mildew for winter squash cultivars compared on Long Island, New York, 2007. The first two entries are green acorn-type cultivars with resistance to powdery mildew listed in order of disease control. They are followed by two striped acorns, then the conventional green acorn cultivar included for comparison.

Winter Squash Cultivar	Seed Source	Marketable Fruit					Powdery Mildew Control (%)	
		Number/Plant	Weight/Plant (lbs.)	Fruit Length (in)	Cavity Width (in)	Sucrose (%)	Upper Leaf Surface	Lower Leaf Surface
Autumn Delight	SW	1.7 c ^z	2.9 c	12.6 b	6.7 c	7.6 cd	71.1 b	73.7 c
Table Star	SW	1.9 c	2.9 c	9.3 c	8.0 a	9.8 ab	23.7 ab	36.1 b
Harlequin	SW	3.6 b	4.2 b	8.7 c	7.3 b	10.7 a	33.7 ab	30.4 ab
Celebration	SW	4.2 a	5.0 a	9.5 c	7.3 b	8.6 bc	9.5 a	13.1 ab
Table Ace (Std)	SW	1.6 c	2.8 c	14.0 a	7.3 b	7.0 d	0 a	0 a
<i>P</i> -value		< .0001	< .0001	<.0001	0.0013	0.0023	0.0933	0.0064

^zNumbers in each column followed by the same letter are not significantly different from each other according to Fisher's protected LSD ($P=0.05$), except for powdery mildew control on upper leaf surfaces.