SQUASH, SUMMER (*Cucurbita pepo*)
Powdery mildew; *Podosphaera xanthii*

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Powdery mildew resistant zucchini squash cultivar evaluation, 2010.

The objective of this experiment was to evaluate cultivars with powdery mildew resistance that are being marketed in the USA. Cultivars currently available have heterozygous resistance to powdery mildew (i.e. a copy of the major powdery mildew resistance gene from one parent; PMR). The abilities of the cultivars evaluated in 2010 to resist powdery mildew as well as their yielding ability were determined relative to Spineless Beauty, a standard cultivar lacking powdery mildew resistance. This field experiment was conducted at the Long Island Horticultural Research and Extension Center in Riverhead on Haven loam soil. The field was plowed on 30 Apr and conventionally tilled on 14 May and 1 Jun. Fertilizer (N-P-K 10-10-10) at 1000 lb/A was broadcast and incorporated on 10 May. Black plastic mulch and drip tape were laid on 11-13 May. Seeds were sown on 11 Jun in the greenhouse. Seedlings were transplanted by hand into beds covered with black plastic mulch on 22 Jun, one day after a waterwheel transplanter was used to open the holes and apply starter fertilizer plus insecticide. During the season, water was provided as needed via drip irrigation lines located beneath the mulch. Additional fertilizer (N-P-K 46-0-0) at 30 lb/A was injected through the drip irrigation system twice. Weeds were controlled between the rows of mulch by seeding white clover for a living mulch on 26 May after roto-tilling to prepare a seed bed and manage weeds that had already germinated. During the season, weeds were managed by mowing, hand weeding, and applying Select 2EC (8 oz/A) with 1% COC on 20 Jul to control weedy grasses. Select was applied when air temperature was 85 ^{o}F and resulted in damaged foliage. Cucumber beetles were managed with AdmirePro (7.5–10 fl oz/treated A) applied with the transplanter and Asana XL (9.6 oz/A) applied to foliage on 23 Jul. No fungicides were applied to control powdery mildew. The following fungicides were applied to preventively control downy mildew (*Pseudoperonospora cubensis*) and Phytophthora blight (*Phytophthora capsici*): ProPhyt (3 qt/A) on 21 Jul; Ranman 400 SC (2.75 fl oz/A) on 7 Aug; Forum (6 fl oz/A) on 14 and 21 Aug; and Tanos (8 oz/A) on 28 Aug. Plots were four adjacent rows each with three plants spaced 24 in. apart. Rows were spaced 68 in. apart. A single plant of Black Beauty, a susceptible zucchini cultivar, 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 leaf surfaces were assessed for powdery mildew on 27 and 30 Jul, and on 5 and 13 Aug. Initially 30 older leaves were examined in each plot, with the quantity adjusted based on the incidence of symptomatic leaves. Mid-aged leaves were also assessed on 13 Aug when powdery mildew had progressed to this leaf age group. Powdery mildew colonies (spots) 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. Area under the disease progress curve (AUDPC) from 27 Jul through 13 Aug was approximated using the trapezoidal integration method. Powdery mildew severity was also assessed on stems and leaf petioles. Squash fruit were harvested and weighed on 19, 23, 27 and 29 Jul; and on 3, 6 and 9 Aug. Fruit were separated into marketable and unmarketable grades based on length, then weighed. There were no unmarketable fruit with blemishes due to disease or insect feeding. Fruit characteristics were also evaluated and overall appearance was rated on a scale of 1 to 9 with 1= poor and 9 = best. Average monthly high and low temperatures (^{o}F) were 81/64 in Jun, 87/70 in Jul, and 83/67 in Aug. Rainfall (in.) was 1.63, 3.46, and 2.02 for these months, respectively.

Symptoms of powdery mildew were first observed on the third harvest date, 27 Jul, in the four plots with the susceptible cultivar and in 3 of the 28 plots planted to resistant cultivars. Based on severity on 13 Aug, only Amatista and Reward suppressed powdery mildew on both upper and lower leaf surfaces in comparison with Spineless Beauty. They provided 52-67% control on upper surfaces and 59-61% control on lower surfaces. Soleil was the only cultivar that did not differ significantly in powdery mildew severity from Spineless Beauty at any assessment. The remaining four powdery mildew resistant cultivars exhibited 54-63% control of powdery mildew on lower leaf surfaces. There were few significant differences among the resistant cultivars in disease severity. Races 1, 2, and 3 of *Podosphaera xanthii* were present with race 1 the dominant race based on severity of powdery mildew on the differentials (Hale's Best Jumbo, PMR 45, PMR 5, and MR 1) in a near-by planting. Total number of fruit produced was greatest for Golden Glory and least for Dunja.

	Powdery mildew severity (%)[z]								
	Upper leaf surface			Lower leaf surface			Marketable Fruit		Total
Cultivar (resistance)[y]	5-Aug	13-Aug	AUDPC	5-Aug	13-Aug	AUDPC	No./ plant	lb/plant	No./ plant
Amatista (PMR) ……..	0.14 b[x]	10.7 c	104.9 ab	0.06	19.8 b	79.7 b	2.2 bc	1.6 bc	4.3 bc
Reward (PMR) ……	0.19 b	15.5 bc	100.8 ab	0.17	18.8 b	76.3 b	3.7 ab	2.2 abc	6.0 ab
Payroll (PMR) …….	0.26 ab	24.8 ab	111.0 ab	0.20	17.7 b	72.0 b	3.2 abc	1.9 bc	5.8 abc
Dunja (PMR) ……..	0.08 b	21.9 abc	88.3 abc	0.06	21.7 b	87.3 b	1.9 c	1.3 c	3.9 c
Envy (PMR) ……	0.50 ab	26.8 ab	129.6 a	0.15	17.5 b	71.0 b	2.7 bc	1.8 bc	4.5 abc
Golden Glory (PMR) ..	0.20 ab	25.8 ab	63.3 bc	0.28	22.3 b	91.1 b	4.4 a	2.9 ab	6.3 a
Soleil (PMR) ……...	0.31 ab	31.9 a	43.9 bc	0.11	33.4 ab	134.5 ab	4.5 a	3.2 a	5.7 abc
Spineless Beauty (S) ...	0.98 a	31.5 a	133.1 a	0.66	47.9 a	196.3 a	2.6 bc	1.5 c	4.8 abc
P-value (treatment)	0.0212	0.0005	0.0003	0.3377	0.0002	0.0002	0.0001	0.0006	0.0026

[z] Exact colony counts were made when possible and severity was estimated using the conversion factor of 30 colonies/leaf = 1% severity.
[y] PMR = heterozygous resistance; S=susceptible.
[x] Numbers in each column with a letter in common are not significantly different from each other (Tukey's HSD, *P*=0.05).