

Powdery mildew resistant yellow summer squash cultivar evaluation, 2009.

The objective of this study was to evaluate cultivars possessing different powdery mildew resistance genes. The main goal was to determine whether cultivars with homozygous resistance, e.g. two copies of the powdery mildew resistance gene (PMRR), provide better suppression of powdery mildew than cultivars with heterozygous resistance (PMR). This was the case in cultivar evaluations conducted in 2007 and 2008 but not in 2006. Most commercial resistant squash cultivars have PMR. The abilities of the cultivars evaluated in 2009 to resist powdery mildew as well as their yields were determined relative to Gentry, 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. A blend of 19-10-12 controlled release fertilizer (containing 65% of N as ESN, a controlled release formulation) plus Muriate Potash (0-0-60) at 100 lb/A was spread on 10 Jun and then incorporated by disking. Black plastic mulch and drip tape were laid on 16 Jun. Seeds were sown on 26 May in the greenhouse. Seedlings were transplanted into the plastic-covered beds on 16 Jun. Water was provided as needed through drip irrigation lines located beneath the mulch. Weeds were controlled between plastic mulch strips by applying Strategy (3 pt/A) and Sandea (0.5 oz/A) on 17 Jun with a shielded herbicide sprayer and by hand weeding. Cucumber beetles were managed with Admire 2F (0.0007 fl oz/plant) applied after transplanting as a soil drench around transplants on 25 Jun and with Asana XL (9.6 oz/A) applied to foliage on 24 Jun and 1 Jul. No fungicides were applied to control powdery mildew. Ridomil Gold EC 1 pt/A + SprayHandler 8 fl oz/A were applied to soil on 8 Jun and incorporated by disking for Phytophthora blight (*Phytophthora capsici*). The following foliar fungicides were applied preventively for downy mildew (*Pseudoperonospora cubensis*) and Phytophthora blight: ProPhyt (4 pts/A) on 24 Jun; Forum 4.16SC (6 oz/A) on 27 Jul, 8 Aug, 27 Aug, 13 Sep, and 24 Sep; and Ranman 400 SC (2.75 fl oz/A) on 17 Jul, 1 Aug, 16 Aug, 4 Sep, 18 Sep, 1 Oct. Plots were three adjacent rows each with three plants spaced 24 in. apart. Rows were spaced 68 in. apart. Within each of the three rows between each plot a plant of Spineless Beauty zucchini squash, a susceptible cultivar, was planted to separate plots and provide a source of inoculum. A randomized complete block design with four replications was used. Upper and lower leaf surfaces of 10 to 30 leaves in each plot were assessed for powdery mildew on 13, 20, and 31 Jul; and 4 and 11 Aug. Initially the examined leaves were selected from the oldest third of the foliage based on leaf appearance and position in the canopy. As disease progressed mid-aged and young leaves also were examined. 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%. Powdery mildew severity was also assessed on stems and leaf petioles. Squash fruit were harvested and weighed on 28 and 31 Jul; and on 3, 6, 10, 14, 18 and 25 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 (°F) were 73/58 in Jun, 80/64 in Jul, and 83/68 in Aug. Rainfall (in.) was 6.43, 4.82, and 2.01 for these months, respectively.

Powdery mildew was found on 13 Jul at a very low level (1.3% of old leaves examined). First fruit just starting to develop were observed around that time (9 Jul). The cultivar evaluated with resistance from one parent (PMR), Yellow Scallopini, did not suppress powdery mildew: severity values were not significantly less than those of Gentry at any assessment date. The two cultivars with resistance genes from both parents were exhibiting 88% and 96% control on upper leaf surfaces and 77% and 97% control on lower surfaces on 11 Aug, the last assessment date. Yellow Scallopini yielded fewer fruit than the others; however, it produces saucer-shaped fruits with scalloped edges which is a different fruit type from the other cultivars and may have impacted yield. Sunray and Gentry produce straightneck fruit while Sunglo has a crookneck type fruit. All cultivars had marketable fruit at the first harvest.

Cultivar (resistance) ^y	Powdery mildew severity (%) ^z						Marketable fruit		Total fruit	
	Upper leaf surface			Lower leaf surface			Number/ plant	lb/ plant	Number/ plant	lb/ plant
	31-Jul	4-Aug	11-Aug	31-Jul	4-Aug	11-Aug				
Sunray (PMRR)	0.03 a ^x	0.3 b	0.6 b	0.07 b	0.4 c	0.9 c	9.4 a	4.4 a	10.9 a	6.0 a
Sunglo (PMRR)	0.18 a	4.3 ab	1.5 b	0.60 b	4.7 bc	7.7 c	7.5 b	3.7 a	10.4 a	7.3 a
Yellow Scallopini (PMR) ...	1.36 a	9.0 a	14.9 a	3.52 ab	18.7 a	52.7 a	4.4 c	1.6 b	7.0 b	4.5 b
Gentry (Susceptible)	2.12 a	10.2 a	12.4 a	5.35 a	14.5 ab	33.9 b	8.0 ab	4.0 a	10.3 a	6.3 a
P-value	0.0413	0.009	0.0003	0.0193	0.0023	0.0002	< .0001	< .0001	0.0001	0.0008

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

^y PMRR = homozygous resistance; PMR = heterozygous resistance.

^x Numbers in each column with a letter in common are not significantly different according to Fisher's Protected LSD (*P* = 0.05).