

Powdery Mildew Resistant Yellow Summer Squash Cultivar Evaluation New York 2006

Margaret T. McGrath, Ph.D. Cornell University, Riverhead, NY 11901

Jane F. Davey, Cornell University, Riverhead, NY 11901

Sandra Menasha, Cornell Cooperative Extension-Suffolk County, NY

Powdery mildew is an annual production problem for all cucurbit crops throughout the US reducing yield potential and fruit quality when not controlled. Effective control with fungicides alone has been challenged by development of fungicide resistance to key chemistries. There are now several yellow summer squash cultivars with resistance to this disease. The objective of this study was to evaluate seven cultivars of straightneck yellow summer squash and one crookneck cultivar (Sunglo) with resistance by comparing them to a susceptible cultivar that is an industry standard (Multipik).

Materials and Methods:

A field experiment was conducted at the Long Island Horticultural Research and Extension Center in Riverhead on Haven loam soil. All squash seed was planted on 7 Jun in the greenhouse and were transplanted into black plastic mulch on 19 Jun. During the season weeds were controlled with one application of Select 2EC 8 fl oz on 31 Jul, hand weeding, and mowing between the rows of black plastic mulch. Water was provided as needed through drip irrigation lines placed beneath the mulch. No fungicides were applied specifically for powdery mildew; however, copper fungicides applied for control of bacterial leaf spot (*Xanthomonas campestris* p.v. *cucurbitae*) would have also provided some suppression of powdery mildew on upper leaf surfaces. Champ (2 lb/A) was applied on 29 Jul; Cuprofix Disperss (2.5 lb/A) was applied on 12 Jul, and 5, 13, and 23 Aug; and Kocide 2000 (1.5 lb/A) was applied on 31 Aug. The following fungicides were applied preventively for downy mildew (*Pseudoperonospora cubensis*) and Phytophthora blight (*Phytophthora capsici*): Acrobat 50 WP (6.4 oz/A) on 12 Jul, Previcur Flex 66F (1.2 pt/A) on 29 Jul, Ranman (2.75 fl oz/A) on 23 Aug, and Tanos (8 oz/A) on 31 Aug. Neither disease developed before the end of this experiment.

Plots were one 20-ft row each with a plant spacing of 24-in. One zucchini plant of a susceptible cultivar (Zucchini Elite) was planted between each plot. A randomized complete block design with four replications was used.

Upper and lower surfaces of leaves were assessed for powdery mildew beginning on 26 Jul, one day before fruit were harvested for the second time. Ten old and 10 mid-aged leaves were selected on 26 Jul and on 9 Aug in each plot based on leaf appearance and position in the canopy. On 17 Aug 10 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. A square root transformation was used when needed prior to analysis to achieve homogeneity of variance.

Squash fruit were harvested and weighed a total of eight times on 24 and 27 Jul; and on 4, 7, 11, 14, 18, and 24 Aug. Fruit were separated into marketable and unmarketable grades based on length and blemishes from disease (bacterial leaf spot) and insect feeding. Weight and length of marketable fruit were measured. Fruit characteristics were evaluated and overall appearance was rated on a scale of 1 to 9; 1 = poor, 5 = marginal, 7 = acceptable, and 9 = good.

Results and Discussion:

All cultivars tested exhibited control of powdery mildew on lower leaf surfaces, where symptoms were most severe, relative to Multipik based on AUDPC values. Conquerer III had the least resistance. It is generally not marketed as having resistance however. XPT 1832 III was not significantly different from Conquerer III. Both were significantly more severely affected by powdery mildew on both leaf surfaces than the other six resistant cultivars. Conquerer III and Patriot II have transgenic resistance to two viruses: WMV and ZYMV. Conquerer III also is resistant to CMV and PRSV. General Patton and Sunray have the precocious yellow gene, as does the susceptible standard cultivar Multipik, which masks fruit symptoms of virus infection by WMV-II and CMV.

General Patton produced the greatest number and weight of marketable fruit. Success PM had the lowest yield. Fruit production was affected by poor weed control; therefore, yield data in table 1 should not be considered an indication of yielding ability but rather should be considered relative yield values.

Fruit of Multipik, Conquerer III, and Patriot II were rated 8 on a scale of 1 to 9 for overall appearance, which was the best rating for the cultivars in this experiment. Success PM and HMX 5712 were rated 6 which was the lowest. Multipik fruit were light yellow to golden in color, with semi-glossy skin, and a light yellow stem. Fruit were short and with a bulbous blossom end. Conquerer III fruit were yellow, glossy, and had a green stem. Fruit were long, slender and uniform with a slightly bulbous base. Patriot II fruit have light yellow skin and a green stem. Fruit were large and uniform with a long neck and bulbous base. The blossom end was smooth and round. Success PM fruit had a golden yellow color and a green stem. The long fruit have a short neck and a bulbous end. There were a lot of misshapen and irregular fruit. HMX 5712 produced light yellow, semi-glossy fruit with a green stem. Fruit were long and slender with a slightly bulbous base and tended to be misshapen. General Patton produced fruit yellow in color with a yellow stem. Fruit were uniform in shape, matte, and had a bulbous, smooth blossom end. Some wartiness to the skin, rated 7 on overall appearance. Sunray fruit were yellow in color with a yellow stem. Fruit were short and wide with a short neck and a bulbous blossom end. Mostly uniform with an appearance rating of 7. Sunglo fruit were a golden yellow color with a green stem. Fruit was a crookneck type with a very bulbous end that was rated 7 for appearance. XPT 1832 III fruit were light to golden yellow in coloring and have a yellow stem. Fruit have a semi-gloss appearance, short neck, and a bulbous base. Overall appearance was rated 7.

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Table 1. Yield and control of powdery mildew for yellow summer squash cultivars compared on Long Island, NY, 2006. Cultivars are listed in order of disease control.

Yellow Squash Cultivar	Seed Source	Marketable Fruit				Total No. Fruit/Plant	Powdery Mildew Control (%)	
		Number/Plant	Weight/Plant (lb)	Fruit Weight (lb)	Fruit Length (in)		Upper Leaf Surface	Lower Leaf Surface
Sunray	SI	3.6 ab ^z	1.8 a	0.49	6.8	4.0 abc	100 c	99 c
General Patton	SM	4.1 a	2.0 a	0.50	6.8	4.9 a	100 c	99 c
HMX 5712	HM	2.1 cd	0.9 cd	0.47	7.0	2.8 cd	100 c	98 c
Sunglo	SY	3.9 ab	1.7 ab	0.43	7.0	4.7 ab	98 c	96 c
Patriot II	SM	2.9 abc	1.5 abc	0.54	7.5	3.4 abcd	88 c	85 c
Success PM	TR	1.4 d	0.8 d	0.74	6.9	2.1 d	88 c	84 c
XPT 1832 III	SM	3.3 abc	1.4 abc	0.40	6.7	3.8 abcd	36 b	17 b
Conquerer III	SI	2.1 cd	0.7 d	0.38	6.9	3.0 bcd	16 ab	26 b
Multipik	HM	2.6 bcd	1.1 bcd	0.47	6.9	3.2 abcd	0 a	0 a
<i>P</i> -value		0.0078	0.0035	0.2786	0.3608	0.0616	0.0001	0.0001

^zNumbers in each column followed by the same letter are not significantly different from each other according to Fisher's protected LSD ($P=0.05$). Mean separation letters are included for total number of fruit which were significant at $P=0.10$.