

### Evaluation of downy mildew resistant cultivars of cucumber, 2021.

A field experiment was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead, NY, on Haven loam soil. The objective was to compare the new cultivar Brickyard and an experimental cultivar from Tokita to Bristol and DMR401, both of which exhibited good suppression in previous cultivar evaluation, as well as to the susceptible cultivar Speedway. The field was moldboard plowed on 6 Apr and urea fertilizer (46-0-0) was applied at 80 lb/A N on 7 Apr. For management of *Phytophthora* blight (caused by *Phytophthora capsici*), a mustard biofumigant cover crop (cv. Rojo Caliente) was seeded at 10 lb/A by drilling on 9 Apr. On 14 Jun the mustard was flail chopped, immediately incorporated by disking, and followed by a cultipacker to seal the soil surface; the field could not be irrigated to initiate biofumigation as usually done, but the soil was moist. Controlled-release fertilizer (N-P-K, 19-10-9) at 525 lb/A (101 lb/A N) was broadcast over the bed area and incorporated on 13 Jul. Beds were formed with drip tape and covered with black plastic mulch on 13 Jul. Seeds were sown on 28 Jun in the greenhouse. A waterwheel transplanter was used to make planting holes in the beds and apply starter fertilizer (9-18-9). Seedlings were placed outdoors to harden for a few days before transplanting on 19 Jul by hand into the holes in the beds. During the season, water was provided as needed via drip irrigation lines. Weeds were managed between the mulched beds by applying Strategy 3 pt/A, Sandea 0.5 oz/A, and Curbit EC 1 pt/A on 14 Jul with a tractor-sprayer and by hand weeding. The primary source of initial inoculum of *Pseudoperonospora cubensis* in this area is long-distance wind-dispersed spores from affected plants. Plots were three 8-ft rows spaced 68 in. apart with 9 plants per plot at 2-ft spacing. The plots were 4 ft apart within the row initially until plants began to vine, partly filling the area. Vines were moved as needed to maintain plot separation. A randomized complete block design with four replications was used. No fungicides were applied. Downy mildew occurrence was assessed weekly by estimating incidence of symptomatic leaves in each plot and rating severity on nine representative affected leaves. Canopy severity was calculated by multiplying incidence by average severity. Area under disease progress curve (AUDPC) values were calculated from 30 Jul through 31 Aug using the formula:  $\sum_{i=1}^n [(R_{i+1} + R_i)/2] [t_{i+1} - t_i]$ , where R = disease severity rating (% of leaf surface with symptoms) at the *i*th observation, *t*<sub>*i*</sub> = time (days) since the previous rating at the *i*th observation, and *n* = total number of observations. Defoliation, which was mainly due to downy mildew, was assessed on 31 Aug and 8, 14, and 22 Sep. Fruit were harvested, counted and weighed on 13, 16, 24 and 31 Aug; and 10, 13 and 21 Sep. Mis-shaped fruit but not over-sized fruit were considered unmarketable. Average monthly high and low temperatures (°F) were 82/67.4 in Jul, 83.4/68.4 in Aug, and 77.1/62.5 in Sep. Rainfall (in.) was 6.22, 9.0 and 4.89 for these months, respectively. Data was analyzed with one-way ANOVA and Tukey's HSD to separate means using JMP statistical software.

Downy mildew symptoms were first observed in one plot of the susceptible cultivar Speedway on 30 Jul, just 11 days after transplanting. All plots were found to be affected 4 days later at the next assessment. Downy mildew severity and incidence of affected leaves for the resistant cultivars at all ratings were numerically lower, and usually significantly lower, than for Speedway. The Tokita experimental and DMR401 exhibited the best suppression of downy mildew throughout the season and least defoliation on 8 Sep. For some variables they were significantly better than both Bristol and Brickyard. Brickyard was better than Bristol based on AUDPC values and 20 Aug ratings (data not shown). Control of downy mildew achieved based on AUDPC values for canopy severity was 57% for Bristol, 76% for Brickyard, 87% for the Tokita experimental, and 94% for DMR401. The Tokita experimental and DMR401 produced more fruit than the other resistant cultivars; all four produced more fruit than Speedway. This report includes work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, Hatch under NYC-153409.

Cultivar	Downy mildew occurrence *						
	Incidence of symptomatic leaves (%)			Canopy severity (%) **			
	4 Aug **	26 Aug	AUDPC **	4 Aug	12 Aug	26 Aug	AUDPC
Speedway (susceptible)	21.5 a	83 a	1611 a	2.16 a	18 a	58 a	867 a
Bristol	7.3 ab	39 b	1062 b	0.26 ab	13 ab	13 b	371 b
Brickyard	4.4 b	39 b	848 c	0.08 b	8 abc	9 bc	211 c
Tokita experimental	3.9 b	24 c	457 d	0.06 b	6 bc	7 c	109 d
DMR401	5.7 b	9 d	366 d	0.09 b	3 c	2 d	55 d
<i>P-value (treatment)</i>	0.005	<0.0001	<0.0001	0.0093	0.0005	<0.0001	<0.0001

\* Numbers in each column with a letter in common are not significantly different from each other (Tukey's HSD,  $P=0.05$ ).

\*\* Values were square root transformed before analysis because raw data were not distributed normally. Table contains de-transformed values.

Cultivar	Defoliation (%) <sup>z</sup>		Marketable fruit <sup>z</sup>			Fruit/plant <sup>z</sup>	
	31 Aug <sup>y</sup>	8 Sep	%	lb/plant <sup>x</sup>	oz/fruit	harvest 1 + 2	all harvests
Speedway (susceptible)	17.0 a	91 a	67 ab	2.3 c	7.6 b	2.0 ab	7.4 c
Bristol	4.3 b	71 a	70 ab	4.9 b	9.4 a	2.6 a	11.7 b
Brickyard	3.4 b	66 a	76 a	5.1 b	9.3 a	1.7 ab	11.6 b
Tokita experimental	0.5 b	40 b	62 b	6.8 a	9.6 a	1.4 ab	18.4 a
DMR401	1.2 b	31 b	63 b	7.1 a	8.8 ab	0.8 b	20.4 a
<i>P-value (treatment)</i>	0.0001	<0.0001	0.0141	<0.0001	0.017	0.0065	<0.0001

<sup>z</sup> Numbers in each column with a letter in common are not significantly different from each other (Tukey's HSD,  $P=0.05$ ).

<sup>y</sup> Values were square root transformed before analysis because raw data were not distributed normally. Table contains de-transformed values.

<sup>x</sup> Fruit that became over-sized because of extended time between harvests was not weighed. Yield per plant was estimated by multiplying average weight of marketable-sized fruit by number of fruit with marketable shape (straight and even).