

Evaluation of resistant cultivars for management of downy mildew in fall cucumbers, 2021.

The experiment was conducted at the University of Massachusetts Research and Education Farm in Deerfield, MA in a field with soil classified as a Hadley silt loam. Cucumber seeds were sown 15 Jun in the greenhouse in 50-cell flats and moved outside to harden off on 29 Jun. Soil was amended with 10, 8, and 16 lb/A N, P, and K, respectively, in the form of 5-4-8 and raised beds were formed and covered with 1-mil white-on-black plastic mulch with one drip irrigation line. Seedlings were planted by hand into the beds on 6 Jul, with plots consisting of 10 ft of bed with 6 plants in a single row at 18-in. spacing and 10-ft unplanted buffers between plots within a bed. Plots were arranged in a randomized complete block design, with beds on 15-ft centers. There was enough natural rainfall during the growing season that drip irrigation was never used. Weeds were controlled between mulched beds by hand or by mechanical cultivation. Downy mildew (DM) severity was assessed by estimating percentage of symptomatic leaf area in each plot, as well as on ten randomly selected leaves per plot. Ratings were made on 23 Jul, 3, 10, 17, 24, and 31 Aug, and 7 Sep. Disease severity data were used to calculate area under the disease progress curve (AUDPC). Marketable-sized fruit (>6 in. for slicing-type cultivars and >4 in. for pickling-type cultivars) were harvested from the plants twice weekly from 3 Aug through 10 Sep and total and marketable yields were recorded. Fruit was considered unmarketable if it was misshapen or had excessive bird or insect damage. Average monthly temperatures (°F) were 69.5 in Jul, 73.1 in Aug, and 64.7 from 1 Sep through the end of the trial on 10 Sep. Rainfall (in.) was 10.81 in July, 4.06 in Aug, and 2.78 from 1 to 10 Sep. All data were analyzed using a general linear model and means were compared using Tukey's honestly significant difference test ($P = 0.05$) in SAS (SAS v.9.4, SAS Institute, Cary, NC).

Natural inoculum of DM was the only source of inoculum for this trial. DM was first observed on 3 Aug on all cultivars except 'Chaperon', 'SVCS 0951', and '20-4313xsib_03'; symptoms were first observed on those three remaining cultivars on 10 Aug. 'Cool Customer' and 'Marketmore 76' had significantly higher DM AUDPC values than all other cultivars in this trial except for 'Journey', which had a numerically but not significantly lower DM AUDPC than 'Cool Customer' and 'Marketmore 76'. 'Chaperon' had the lowest DM AUDPC value numerically, but was not significantly different from 'Brickyard', 'SVCS 0951', 'SV4142CL', 'Raceway', '20-4213xsib_03', and '20-4203-03.2'. The seeds of some but not all cultivars in this trial were treated with insecticide and no insecticides were applied after planting, so there was a significant amount of feeding damage from striped cucumber beetle on the fruit in this trial, which rendered the majority of fruit from all varieties unmarketable. Several varieties had a high proportion of stubby or bowling-pin shaped fruit, which also contributed to low marketable yield. The cultivars with the highest total yield were 'SV4142CL' and '20-4213xsib_03', both of which were also among the cultivars with the lowest DM AUDPC values. 'Chaperon' also performed well with low DM AUDPC, moderate total yield, and the highest marketable yield.

Cultivar	Producer ^z	AUDPCx ^y	Total Yield (lb) ^w	Marketable Yield (lb) ^w
Marketmore 76	Hollar Seeds	2454.88 c	23.10 a	6.57 a
Cool Customer	Johnny's Seeds	2313.13 c	28.90 abc	16.91 ab
Journey	Seminis	1855.38 bc	26.26 a	13.28 ab
SVCS 0951	Seminis	1196.13 ab	49.99 abc	4.73 a
SV4142CL	Seminis	1052.50 a	68.57 c	7.17 ab
Brickyard	Harris Moran	1065.63 a	51.46 abc	5.29 a
Raceway	Seminis	993.00 a	52.41 abc	9.51 ab
20-4213xsib_03	Cornell ^{OP}	660.63 a	71.72 c	15.06 ab
20-4203-03.2	Cornell ^{OP}	659.17 a	48.49 abc	17.86 ab
Chaperon	Seminis	440.13 a	62.76 bc	21.89 b
P-value		<0.0001	0.0002	0.0036

^zCultivars bred by Dr. Michael Mazourek of Cornell University are publicly bred and open pollinated.

^yArea under the disease progress curve was calculated from 23 Jul to 7 Sep according to 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 affected) at the *i*th observation, *t_i* = time (days) since the previous rating at the *i*th observation, and *n* = total number of observations. Values were calculated based on the average percent disease severity across the plot.

^xData were analyzed using PROC GLM and means were separated using Tukey's HSD. Numbers within each column followed by the same letter are not significantly different from each other.

^wTotal yields from each plot were recorded twice weekly. Marketable yields were recorded on 3, 6, 10, 13, 17 Aug and 3 and 10 Sep. Both total and marketable yields are here summed across the whole season.



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