BASIL, SWEET (*Ocimum basilicum*)
Downy mildew; *Peronospora belbahrii*

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Evaluation of commercial cultivars of sweet basil resistant to downy mildew, 2019.

An experiment with field-grown basil was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead, NY, in a field with Haven loam soil. The objective was to evaluate recently released cultivars of sweet basil bred to be resistant to downy mildew. The field was plowed on 3 Jun. Controlled-release fertilizer (N-P-K, 15-5-15) was broadcast at 675 lb/A (101 lb/A N) over the bed area and incorporated on 5 Jun. Beds were formed with drip tape and covered with black plastic mulch on 5 Jun. Weeds between mulched beds were managed by applying Devrinol DF-XT (2 lb/A) before transplanting, cultivating, covering the soil with landscape cloth, and by hand weeding. A waterwheel transplanter was used to make planting holes in the beds and apply starter fertilizer. A late planting date was used for the experiment to increase the likelihood of downy mildew developing during the experiment. The primary source of initial inoculum in this area is considered to be sporangia dispersed by wind from infected plants potentially a long distance away. Basil for the experiment was seeded in trays in a greenhouse on 13 Jun for most cultivars and on 9 Jul for Genesis N. Amazel is sterile, thus it was propagated through plant cuttings taken from established plants on 13 Jun. All plants were placed outdoors to harden for a few days and then transplanted in the field by hand on 9 Jul, except plants of Genesis N which were transplanted on 29 Jul. No fungicides were applied. A randomized complete block design with four replications was used. Each plot had 8 plants in 6-ft rows with 9-in. in-row plant spacing. The plots were 4 ft apart in the row. Downy mildew was assessed in each plot weekly from 21 Aug through 8 Oct. Incidence of plants with symptoms (sporulation of the pathogen visible on the underside of leaves) was recorded and percentage of leaves per plant with symptoms was estimated for each plant in each plot. Area Under Disease Progress Curve (AUDPC) values were calculated from 21 Aug to 8 Oct using the formula: $\sum n_{i=1}[(R_{i+1} + R_i)/2]\ [t_{i+1} - t_i]$, where R = disease incidence rating (% leaves with symptoms on affected plants) at the ith observation, t_i = time (days) since the previous rating at the ith observation, and n = total number of observations. Data were analyzed with one-way ANOVA and Tukey's HSD to separate means using JMP statistical software. Average monthly high and low temperatures (°F) were 86.3/71.3 in Jul, 82/68.8 in Aug, 76/66.1 in Sep, and 66.9/54.5 in Oct. Rainfall (in.) was 3.00, 1.52, 1.83 and 6.94 for these months, respectively. Extra plants of each cultivar from the field experiment were grown in pots in a greenhouse for an evaluation by cooperative extension employees on 6 Sep. Appearance, taste, aroma, and marketability were rated on a 1 (poor) to 10 (excellent) scale as interpreted by the rater.

Downy mildew was first observed in this experiment on 16 Aug. By 21 Aug symptoms were seen on approximately 50% of the leaves in the susceptible DiGenova plants and less than 10% of the leaves in the partially resistant Eleonora plants, while no symptoms were found in any of the resistant cultivars until 3 Sep when found in all but Amazel, Rutgers Devotion DMR, and Genesis N. Eventually symptoms were observed on all resistant cultivars but incidence of affected leaves remained low. Degree of control of downy mildew provided by the four resistant cultivars from VanDrunen Specialty Seeds compared with DiGenova was 82% for Rutgers Passion DMR, 94% for Rutgers Thunderstruck DMR, 91% for Rutgers Devotion DMR, and 94% for Rutgers Obsession DMR based on 8 Oct leaf incidence values. Amazel (Proven Winners) provided 90% control. Genesis N and Prospera (Genesis Seeds) provided 96% and 100% control, respectively. Data in table is organized based on AUDPC values. Cultivar ranking based on average rating from 24 raters (data not analyzed) was DiGenova (8.5 for appearance, 6.9 for taste, 7.6 for aroma, and 74% would buy), Eleonora (7.1, 5.7, 6.7, 52%), Rutgers Devotion DMR (7.3, 5, 6.4, 32%), Rutgers Obsession DMR (7.4, 5.4, 6.6, 35%), Rutgers Passion DMR (6.4, 4.2, 6.1, 17%), Rutgers Thunderstruck DMR (7.3, 5.5, 6.7, 44%), Prospera (7.9, 5.2, 6.7, 37%), and Amazel (7.3, 5.2, 6.7, 35%).

	Downy mildew incidence *							
	Affected plants (%)			Affected leaves on affected plants (%)				
Cultivar (reaction to downy mildew)	25 Sep	4 Oct	8 Oct	19 Sep	25 Sep **	4 Oct **	8 Oct **	AUDPC **
DiGenova (susceptible)	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	4087 a
Eleonora (intermediately resistant)	100.0 a	100.0 a	100.0 a	78.3 b	81.2 a	98.6 a	100.0 a	2953 b
Rutgers Passion DMR (resistant)	100.0 a	100.0 a	100.0 a	4.8 c	5.8 b	14.5 b	17.3 b	330 c
Rutgers Thunderstruck DMR (resistant)	68.8 ab	90.6 a	100.0 a	1.1 de	1.3 bc	4.4 cd	4.9 cd	81 d
Amazel (resistant)	18.8 bc	90.6 a	100.0 a	0.0 ef	0.2 c	9.3 bc	8.4 bc	73 d
Rutgers Devotion DMR (resistant)	68.8 ab	90.6 a	100.0 a	1.2 d	1.4 bc	1.9 de	9.0 bc	54 de
Rutgers Obsession DMR (resistant)	25.0 bc	81.3 ab	100.0 a	0.1 def	0.5 c	3.4 cd	5.8 bcd	46 de
Genesis N (resistant)	0.0 c	40.6 bc	84.4 a	0.0 f	0.0 c	0.6 de	3.5 cd	11 de
Prospera (resistant)	0.0 c	9.4 c	25.0 b	0.0 f	0.0 c	0.1 e	0.6 d	6 e
P-value (cultivar)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<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 back-transformed means.