

Assessment of downy mildew susceptibility in basil cultivars and experimental resistant cultivars, 2015.

The objective of this experiment was to assess the degree of resistance in experimental resistant cultivars grown under field conditions and exposed to naturally-occurring *Peronospora belbahrii* inoculum. The cultivars were obtained from Enza Zaden USA, Inc. and PanAmerican Seed. They were compared to a standard susceptible cultivar, DiGenova, and the first commercialized resistant cultivar, Eleonora. The experiment was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead, NY, in a field with Haven loam soil. Beds were formed, drip irrigation tape was laid, and beds were covered with black plastic mulch on 6 Jul. To provide a source of natural inoculum within the experimental area, basil (cultivar DiGenova) was transplanted by hand into a spreader row on 7 Jul. These plants were not inoculated. Basil for the experiment was transplanted by hand on 15 Jul. A late planting date was used to increase the likelihood of downy mildew developing during the experiment. The primary source of initial inoculum in this area is considered to be long-distance wind-dispersed spores from affected plants. A randomized complete block design with four replications was used. Each plot contained 13 plants in 10-ft rows with 9-in. in-row plant spacing. The plots were 3 ft apart in the row. Downy mildew was assessed in each plot on 12, 25, and 28 Aug, and 4, 14, and 24 Sep. Incidence of plants with symptoms (sporulation of the pathogen visible on the underside of leaves) and percentage of leaves per plant with symptoms was estimated for 10 plants in each plot. Incidence of downy mildew in the plots was calculated by multiplying these values. Area Under Disease Progress Curve (AUDPC) values were calculated from 25 Aug through 24 Sep. Percent of leaves that had dropped off of plants because of downy mildew were estimated on 14 and 24 Sep. At the last disease assessment on 24 Sep, plants were removed from plots and held upside down while in the field to be able to thoroughly examine the underside of leaves. Percentage of leaves with symptoms (incidence) was estimated. Average monthly high and low temperatures (°F) were 83/68 in Jul, 84/67 in Aug, and 81/63 in Sep. Rainfall (in.) was 1.24, 2.14, and 2.84 for these months, respectively.

Downy mildew developed naturally and became severe as is typical for the area. Symptoms of downy mildew were first observed on 10 Aug in the spreader row. No symptoms were found in plots on 12 Aug. Symptoms were found 15 of the 44 plots on 18 Aug, 39 plots on 25 Aug, and all plots on 28 Aug. Entries in the table are organized by AUDPC value, however the susceptible standard cultivar, DiGenova, is listed at the top. BA108 exhibited excellent resistance for one month, the duration period the disease was present and being assessed. It was significantly better than Eleonora, the first downy mildew resistant sweet basil cultivar available in the US, based on incidence of leaves with symptoms on 24 Sep, AUDPC, and defoliation. M3655Z, M4828Z, BA111, BA113, and Eleonora also exhibited resistance. The other four entries evaluated did not exhibit resistance.

Entry	Downy mildew incidence							
	% leaves w/ symptoms *				% symptomatic plants *		Defoliation (%) *	
	25 Aug **	14 Sep	24 Sep	AUDPC	25 Aug	28 Aug	14 Sep **	24 Sep
DiGenova (Control)	1.25 abc	62.8 a	69.8 a	1603 a	61.5 abc	82.8 abc	13.4 bcde	70.0 abc
BA102	2.61 abc	75.8 a	69.5 a	1817 a	82.8 a	94.3 a	41.0 ab	87.5 ab
Elidia (BA103)	4.31 ab	63.5 a	77.5 a	1788 a	82.8 a	96.0 a	58.4 a	91.8 a
Emily (BA508)	1.93 abc	71.0 a	66.0 a	1731 a	77.0 a	86.5 ab	18.6 bc	57.5 cd
BA112	1.22 abc	65.0 a	70.8 a	1647 a	70.0 ab	87.5 a	17.0 bc	60.0 bcd
BA113	0.87 abc	29.3 b	27.3 bcd	693 b	53.8 abc	84.5 abc	4.5 cde	12.5 efg
Eleonora (BA104)	0.06 c	25.0 b	36.5 b	672 b	19.3 bc	50.3 cd	15.4 bcd	40.0 de
BA111	0.12 bc	21.8 b	35.8 bc	659 b	37.3 abc	51.3 bcd	7.3 cde	32.5 def
M4828Z	4.54 a	14.3 b	14.8 de	572 b	82.8 a	88.5 a	1.4 de	6.3 fg
M3655Z	4.33 ab	11.3 b	15.8 cde	441 bc	86.8 a	82.5 abc	4.1 cde	6.3 fg
BA108	0.00 c	3.8 b	4.0 e	103 c	11.8 c	25.0 d	0.7 e	2.0 g
<i>P-value (treatment)</i>	0.0006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

* Numbers in each column followed by the same letter are not significantly different from each other (Tukey's HSD, $P=0.05$).

** Values were square root transformed before analysis. Table contains de-transformed values.