

Evaluating basil cultivars for tolerance to downy mildew in North Carolina, 2019.

This field evaluation was conducted on basil grown at the Central Crops Research Station in Clayton, NC. Basil was seeded into trays in a greenhouse on 2 Jul and acclimated to outdoor weather conditions for up to 5-d before being transplanted into field plots on 2 Aug. The study was arranged in a randomized complete block design with four replications. Plots were established on single 14-ft long raised beds covered with white plastic mulch, on 5-ft centers with 5-ft between plots; there were 7 plants per plot and 2-ft between plants. Additional rows, planted with alternating plots of Mammoth and Dulce Vida seedlings, were included to act as a buffer between rows of tested cultivars. Irrigation and fertilization (N-P-K, 4-0-8) were applied via drip tape once per week. Downy mildew incidence was evaluated as the number of plants with active sporulation on at least one leaf divided by total plants in the plot and severity was determined by visually estimating the percentage symptomatic leaf area within the plot. Both assessments were made on 7- to 10-day intervals. Data differed significantly from normality and were subjected to a rank-based nonparametric analysis of variance (Kruskal-Wallis test). Ranked means were separated according to pairwise t-tests of least squares means ($P = 0.05$).

Trace amounts of downy mildew were observed in the trial area on 27 Aug, which progressed throughout the trial. Disease was not observed on the holy basil cultivar, Tulsi, at any evaluation point throughout this study; however, significant differences in incidence and severity were observed between the other tested cultivars. On 3 Sep, the cultivar, Lemon, had significantly lower downy mildew incidence than all other cultivars, with the exception of ‘Sweet Thai’ and ‘Window Pane’, but by 30 Sep, no significant differences were observed in disease incidence among symptomatic cultivars. Area under the disease incidence progress curve (AUDIPC) values were calculated based on weekly incidence ratings recorded from 3 Sep to 30 Sep and were significantly lower for ‘Lemon’, ‘Sweet Thai’, and ‘Window Pane’ compared with ‘Italian Large Leaf’, ‘Italian Genovese’, and ‘Cinnamon.’ Disease severity was relatively low across the trial area on 3 Sep, and defoliation was observed on 30 Sep but the recorded disease severity values reflect the change in leaf area within each plot. ‘Sweet Thai’ had significantly lower severity when compared with the other cultivars except for ‘Lemon’ and ‘Window Pane’; ‘Italian Large Leaf’ and ‘Italian Genovese’ had significantly greater observed disease severity than all other cultivars. Area under the disease severity progress curve (AUDSPC) values were calculated based on weekly severity ratings recorded from 3 Sep to 30 Sep and were significantly lower for the cultivars, Lemon, Sweet Thai, and Window Pane, compared with all other cultivars. Additionally, AUDSPC was significantly reduced for cultivar Cinnamon when compared with ‘Italian Genovese’.

Cultivar ^x	Basil downy mildew incidence (%) ^w				AUDIPC ^y
	3 Sep	12 Sep	19 Sep	30 Sep	
Italian Large Leaf	46.4 a ^z	100.0 a	100.0 a	100.0 a	2621.4 ab
Italian Genovese	71.4 a	100.0 a	100.0 a	100.0 a	2821.4 a
Cinnamon	57.1 a	96.4 a	100.0 a	91.7 a	2632.7 a
Lemon	14.3 c	64.3 b	92.9 ab	100.0 a	2014.3 c
Sweet Thai	17.9 bc	60.7 b	92.9 ab	92.9 a	1975.0 c
Tulsi	0.0 c	0.0 c	0.0 c	0.0 b	0.0 d
Lime	39.3 ab	92.9 ab	82.1 b	89.3 a	2287.5 bc
Window Pane	17.9 bc	60.7 b	89.3 ab	100.0 a	1982.1 c
P > χ^{2z}	0.0033	0.0039	0.0050	0.0038	0.0009

^wValues represent the average basil downy mildew incidence (%) ratings before ranking and are based on the number of plants with symptoms per plot. Means within columns followed by the same letter are not significantly different according to pairwise t-tests of least squares means ($P = 0.05$).

^xAll cultivars are of *Ocimum basilicum* except for Tulsi, which is a cultivar of *Ocimum tenuiflorum*.

^yArea under the disease incidence progress curve (AUDIPC) values based on ratings from 27 Aug through 30 Sep.

^zP-values based upon a Kruskal-Wallis test (rank-based nonparametric analysis of variance).

Cultivar ^x	Basil downy mildew severity (%) ^w				AUDSPC ^y
	3 Sep	12 Sep	19 Sep	30 Sep	
Italian Large Leaf	1.0 abc ^z	40.0 a	52.5 ab	42.5 a	1034.3 ab
Italian Genovese	6.8 a	62.5 a	80.0 a	55.0 a	1576.5 a
Cinnamon	3.3 ab	31.3 a	45.0 bc	17.5 b	777.3 b
Lemon	0.8 bc	4.8 b	20.0 d	16.3 bc	313.4 c
Sweet Thai	0.5 cd	4.0 b	12.5 d	10.0 c	203.5 c
Tulsi	0.0 cd	0.0 c	0.0 e	0.0 d	0.0 d
Lime	1.0 abc	4.0 b	16.3 d	17.5 b	282.5 c
Window Pane	0.8 bc	9.3 b	30.0 cd	16.3 bc	439.4 c
P > χ^{2z}	0.0103	0.0012	0.0009	0.0009	0.0003

^wValues represent the average basil downy mildew severity ratings before ranking and are based on a visual estimation of the percent symptomatic leaf area within the plot. Means within columns followed by the same letter are not significantly different according to pairwise t-tests of least squares means ($P = 0.05$).

^xAll cultivars are of *Ocimum basilicum* except for Tulsi, which is a cultivar of *Ocimum tenuiflorum*.

^yArea under the disease severity progress curve (AUDSPC) values based on ratings from 27 Aug through 30 Sep.

^zP-values based upon a Kruskal-Wallis test (rank-based nonparametric analysis of variance).