

Evaluation of sweet basil cultivars for downy mildew tolerance in North Carolina, 2020

This cultivar evaluation was conducted on basil grown at the Central Crops Research Station in Clayton, NC. Basil was seeded into trays in a greenhouse on 17 Jul and seedlings were placed outdoors to acclimate to weather conditions 5 d before being transplanted into field plots on 20 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 and 5 ft between plots. Each plot consisted of 7 plants with 2 ft between plants. Additional rows, planted with cv. Italian Large Leaf 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. Incidence of downy mildew was evaluated as the number of plants with active sporulation on at least one leaf divided by the total number of plants in the plot. Severity was estimated as the percent symptomatic leaf area within the plot. Both assessments were made on 7-d intervals. Data did not meet the assumptions of normality and were subjected to a Kruskal-Wallis test (rank-based nonparametric analysis of variance), with ranked means separated according to pairwise t-tests of least squares means ($P = 0.05$).

Trace amounts of downy mildew, resulting from natural inoculum, were observed in an adjacent field on 1 Sep and in the trial area on 8 Sep. Disease was not observed on cv. Cardinal or Tulsi at any evaluation point throughout the study; however, significant differences in disease incidence and severity were observed between the other tested cultivars. On 15 Sep, downy mildew incidence was significantly lower for Lemon than for all other cultivars, with the exception of Cinnamon, Italian Large Leaf, Lime, and Sweet Thai, but by 20 Oct, no significant differences were observed in disease incidence among the symptomatic cultivars. The area under the disease incidence progress curve (AUDIPC) was calculated based on weekly incidence ratings recorded from 25 Aug and 20 Oct and was significantly reduced in plots of cvs. Cinnamon, Italian Large Leaf, Lemon, Mammoth, and Sweet Thai when compared with Italian Genovese and Pesto. On 15 Sep, disease severity was relatively low across the trial area, but cvs. Cinnamon, Italian Large Leaf, Mammoth, Lemon, Lime, and Sweet Thai had significantly lower severity than Italian Genovese and Pesto. Defoliation was observed from 29 Sep through 20 Oct and the recorded disease severity values reflect the change in leaf area within each plot. On 20 Oct, cv. Lime had significantly lower severity when compared with all other cultivars except for Lemon, Mammoth, and Sweet Thai; Italian Genovese and Pesto had significantly greater disease severity than all other cultivars. The area under the disease severity progress curve (AUDSPC) was calculated based on weekly severity ratings recorded from 25 Aug and 20 Oct and was significantly lower for cvs. Cinnamon, Lemon, and Lime compared with plots of Italian Genovese, Italian Large Leaf, and Pesto. Additionally, AUDSPC was significantly reduced for cvs. Italian Large Leaf when compared with Italian Genovese and Pesto.

Cultivar ^y	Basil downy mildew incidence (%) ^z							AUDIPC ^x
	15 Sep	22 Sep	29 Sep	6 Oct	13 Oct	20 Oct		
Pesto	78.6 a	92.9 a	100.0 a	100.0 a	100.0 a	100.0 a	3725.0 a	
Italian Genovese	46.4 ab	92.9 a	100.0 a	100.0 a	100.0 a	100.0 a	3450.0 ab	
Lime	14.3 cd	46.4 ab	92.9 ab	100.0 a	100.0 a	100.0 a	2825.0 bc	
Italian Large Leaf	7.1 cd ^z	42.9 bc	92.9 ab	100.0 a	100.0 a	100.0 a	2750.0 cd	
Sweet Thai	7.1 cd	39.3 bc	92.9 ab	100.0 a	100.0 a	100.0 a	2725.0 cd	
Mammoth	25.0 bc	42.9 bc	71.4 ab	89.3 bc	89.3 b	100.0 a	2612.5 cd	
Cinnamon	10.7 cd	46.4 b	75.0 ab	89.3 b	89.3 b	100.0 a	2562.5 cd	
Lemon	0.0 d	14.3 cd	78.6 ab	89.3 bc	89.3 b	100.0 a	2287.5 d	
Cardinal	0.0 d	0.0 d	0.0 c	0.0 c	0.0 c	0.0 b	0.0 e	
Tulsi	0.0 d	0.0 d	0.0 c	0.0 c	0.0 c	0.0 b	0.0 e	
$P > \chi^{2w}$	0.0042	0.0011	0.0011	0.0002	0.0002	<0.0001	0.0004	

^zValues 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 ($P = 0.05$).

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

^xArea under the disease incidence progress curve (AUDIPC) values based on ratings from 25 Aug through 20 Oct.

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

Cultivar ^y	Basil downy mildew severity (%) ^z							AUDSPC ^x
	15 Sep	22 Sep	29 Sep	6 Oct	13 Oct	20 Oct		
Pesto	11.3 a	18.8 a	82.5 a	95.0 a	95.0 a	95.0 a	2455.3 a	
Italian Genovese	5.3 a	20.0 ab	71.3 a	90.0 a	77.5 abc	90.0 a	2164.8 a	
Italian Large Leaf	1.3 bc	5.5 bc	20.0 b	51.3 b	52.5 b	58.8 bc	1119.1 b	
Sweet Thai	0.3 bc	1.8 cd	20.0 b	20.0 bc	52.5 bc	20.0 de	731.5 bc	
Mammoth	2.8 b	8.0 bc	23.8 b	13.8 c	48.8 cd	13.8 de	727.1 bcd	
Cinnamon	0.3 bc	5.3 bc	18.8 bc	27.5 bc	28.8 e	30.0 cd	668.5 cd	
Lime	0.5 bc	2.0 cd	13.8 bc	10.0 c	32.5 de	10.0 e	446.3 d	
Lemon	0.0 c	0.5 de	7.8 c	21.3 c	22.5 e	21.3 de	438.4 d	
Cardinal	0.0 c	0.0 e	0.0 d	0.0 d	0.0 f	0.0 f	0.0 e	
Tulsi	0.0 c	0.0 e	0.0 d	0.0 d	0.0 f	0.0 f	0.0 e	
$P > \chi^2$ ^w	0.0028	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	

^zValues 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 ($P = 0.05$).

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

^xArea under the disease severity progress curve (AUDSPC) values based on ratings from 25 Aug through 20 Oct.

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