

Evaluation of basil cultivars for resistance to downy mildew, 2022

Twelve basil cultivars were seeded into 72-cell plug flats containing a soilless medium (Suremix MI Grower Products, Inc., Galesburg MI) in a greenhouse on the campus of Michigan State University, East Lansing, MI on 27 May. Plants were fertilized daily with 200 ppm of soluble fertilizer (Peter's fertilizer ICL Specialty Fertilizers, Dublin, OH). This study was planted at Michigan State University's Southwest Michigan Research and Extension Center, Benton Harbor, MI in a field previously planted to summer squash. Preplant fertilizer (nitrogen 100 lb./A, potassium 180 lb./A, sulfur 25 lb./A, and boron 2.0 lb./A) was applied on 31 May. On 5 Jul, five-week-old basil seedlings were transplanted 18 in. apart in raised beds covered with black polyethylene plastic mulch and spaced 8 ft apart. A single drip tape (0.65 gpm/100 ft) was installed under the plastic mulch for plot irrigation. Fertilizer (nitrogen 28%) was applied weekly at a rate of 1 gal/A through the drip irrigation. Twelve basil cultivars were planted in a completely randomized block design with four replications; single plots were 20 ft long with 13 plants per plot ('UF19-72' had 4 plants per plot due to bad germination) and a 5 ft buffer between plots in a row. The trial was inoculated by planting eight actively sporulating basil plants (two per replicate) in each of the two buffer rows, which contained susceptible basil cultivar 'Genova', on 26 Jul. The downy mildew infected plants were prepared by placing basil leaf tissue with actively sporulating lesions into water and agitating to release the sporangia. The sporangial suspension (1.0×10^4 sporangia/fl oz) was sprayed onto the plants using a plastic spray bottle (0.1 fl oz/plant) and incubated in a growth chamber (65°F, 16-hr light period) for 21 days. Immediately after inoculation, the plants were enclosed in translucent bags containing 6 fl oz of water for increased relative humidity. After planting the infected plants in the field, overhead irrigation was used early each morning and late each evening to create conducive conditions for disease development. Foliar infection (%) was visually assessed on 16, 23 and 30 Aug; and 6 and 13 Sep. The area under the disease progress curve (AUDPC) was calculated using the foliar infection data. Defoliation (%) was also assessed for each cultivar on 6 and 13 Sep. Data were analyzed with SAS statistical software using the PROC GLIMMIX procedure for one-way (ANOVA), with mean separation performed using Fisher's protected least significant difference (LSD) at $P=0.05$.

The cultivar 'Genovese Compact Improved', had significantly more disease than all other cultivars on the final rating date (13 Sep) based on both foliar infection (96.8%) and defoliation (51.3%). The cultivars 'Eleonora' and 'Enza Zadem' (Emma) had less disease than 'Genovese Compact Improved' but more than all other cultivars. 'Rutgers Obsession DMR', 'Potted Large Leaf', 'Rutgers Passion', 'Italian Large', and 'Potted Small Leaf' showed very limited symptoms while 'SMGSCI-21', 'UF19-72', 'Pesto Besto', and 'Prospera Red' showed no foliar symptoms. 'Genovese Compact Improved' had the most severe defoliation (51.3%) followed by 'Eleonora' (20.8 %) which was consistent with the amount of foliar infection observed throughout the trial. In contrast, 'Enza Zadem' (Emma) expressed reduced defoliation (4.3%) considering the amount of foliar infection observed (50%) at the last rating date, suggesting some degree of tolerance. Additionally, 'Prospera Red', 'Rutgers Obsession DMR', 'Rutgers passion', 'Pesto Besto', and 'Potted Small Leaf' had small amounts of defoliation (<7.0%) despite the lack of foliar symptoms. 'Potted Large Leaf', 'SMGSCI-21', and 'UF19-72' had no defoliation during the evaluation period.

Cultivar	Foliar infection (%) [*]						Defoliation (%)	
	16 Aug	23 Aug	30			AUDPC	6 Sep	13 Sep
			Aug	6 Sep	13 Sep			
Genovese Compact Improved	17.5 c ^{**}	38.3 a	77.5 a	91.5 a	96.8 a	1850.6 a	18.0 ab	51.3 a
Eleonora	2.6 c	9.5 b	19.5 b	46.3 b	60.0 b	745.9 b	10.3 ab	20.8 b
Enza Zaden (Emma)	9.3 b	14.3 b	32.5 b	40.0 c	50.0 c	814.6 b	2.3 bc	4.3 b
Rutgers Obsession DMR	0.0 c	0.0 c	0.0 c	2.5 d	5.0 d	35.0 c	1.8 bc	2.0 c
Potted Large leaf	0.0 c	0.0 c	1.3 c	1.3 d	3.8 d	30.6 c	0.0 c	0.0 c
Rutgers Passion	0.0 c	0.0 c	0.5 c	0.8 d	2.3 d	16.6 c	1.0 c	1.0 c
Italian Large	0.0 c	0.0 c	0 c	0.3 d	0.5 d	3.5 c	0.3 c	0.3 c
Potted Small leaf	0.0 c	0.0 c	0.0 c	0.0 d	0.3 d	0.9 c	0.3 c	0.3 c
SMGSCI-21	0.0 c	0.0 c	0.0 c	0.0 d	0.0 d	0.0 c	0.0 c	0.0 c
UF19-72	0.0 c	0.0 c	0.0 c	0.0 d	0.0 d	0.0 c	0.0 c	0.0 c
Pesto Besto	0.0 c	0.0 c	0.0 c	0.0 d	0.0 d	0.0 c	0.8 c	0.8 c
Prospera Red	0.0 c	0.0 c	0.0 c	0.0 d	0.0 d	0.0 c	7.5 bc	7.5 c
P-value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0032	<.0001

^{*}Based on a visual estimation of foliar infection (%).

^{**}Means with the same letter in each column are not statistically different using Fisher's protected LSD at $P=0.05$