

Evaluating fungicides to manage epidemics of basil downy mildew in North Carolina, 2020

This fungicide efficacy experiment was conducted on basil grown at the Central Crops Research Station in Clayton, NC. Basil 'Italian Large Leaf' was seeded into trays in a greenhouse on 17 Jul and seedlings were acclimated to outdoor 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 had 7 plants spaced 2 ft apart. Non-treated rows of plots, also planted to 'Italian Large Leaf', were maintained as buffer rows between blocks of treatments. Irrigation and fertilization (N-P-K, 4-0-8) were applied via drip tape once per week. Fungicide treatments were applied in water equivalent to 50 gal/acre at 45 psi using a CO₂-pressurized boom sprayer with Teejet TXVS-26 ConeJet nozzles on 7-d intervals beginning on 26 Aug and ending on 14 Oct. Disease was assessed on 7-d intervals; downy mildew incidence resulting from natural inoculum 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 and severity was estimated as the percent symptomatic leaf area within the plot. Data did not meet the assumptions of normality and were subjected to a Kruskal-Wallis test with ranked means 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 1 Sep and eventually progressed throughout the trial. No significant treatment effects were observed on disease incidence on 15 Sep and 22 Sep. The Orondis Opti treatment significantly reduced disease incidence compared with all other treatments on 29 Sep, 6 Oct, 13 Oct, and 20 Oct. The area under the disease incidence progress curve (AUDIPC) was calculated based on weekly incidence ratings recorded from 25 Aug through 20 Oct and was significantly reduced in plots treated with Orondis Opti when compared with all other treatments. Similarly, significant treatment effects on disease severity were not observed for any treatments on 15 Sep and 22 Sep. The Orondis Opti treatment significantly reduced disease severity when compared with the non-treated control on 29 Sep and all other treatments on 6 Oct and 13 Oct. On 20 Oct, the Ranman, Presidio, and Quadris treatments significantly reduced disease severity compared with the nontreated control; Orondis Opti significantly reduced disease severity compared with all other treatments. The area under the disease severity progress curve (AUDSPC) was calculated based on weekly severity ratings recorded from 25 Aug through 20 Oct and was significantly reduced in plots treated with fungicides; however, Orondis Opti significantly reduced AUDSPC compared with the non-treated, Ranman, Presidio, and Quadris. Trace amounts of phytotoxicity were observed in plots treated with Orondis Opti.

Treatment and rate of product per acre ^y	Basil downy mildew incidence (%) ^z						AUDIPC ^x
	15 Sep	22 Sep	29 Sep	6 Oct	13 Oct	20 Oct	
Non-treated	14.3 a	50.0 a	85.7 a	89.3 a	100.0 a	100.0 a	2750.0 a
Ranman 400 SC 2.75 fl oz	0.0 a	0.0 a	60.7 a	92.9 a	100.0 a	100.0 a	2150.0 a
Presidio 4SC 4 fl oz	0.0 a	3.6 a	67.9 a	96.4 a	96.4 a	96.4 a	2187.5 a
Orondis Opti 0.83OD 32 fl oz	0.0 a	0.0 a	10.7 b	10.7 b	21.4 b	39.3 b	500.0 b
Quadris 15.5 fl. oz	3.6 a	7.1 a	67.9 a	85.7 a	100.0 a	100.0 a	2100.0 a
$P > \chi^{2w}$	0.5296	0.0669	0.0394	0.0216	0.0025	0.0091	0.0298

^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 ($P = 0.05$).

^ySingle active ingredient commercial products except for Orondis Opti, which is a premix of oxathiapiprolin and chlorothalonil.

^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).

Treatment and rate of product per acre ^y	Basil downy mildew severity (%) ^z						AUDSPC ^x
	15 Sep	22 Sep	29 Sep	6 Oct	13 Oct	20 Oct	
Non-treated	1.3 a	11.5 a	16.3 a	31.3 a	28.8 a	31.3 a	734.1 a
Ranman 400 SC 2.75 fl oz	0.0 a	0.0 a	3.3 ab	7.5 a	12.5 a	13.8 b	228.4 b
Presidio 4SC 4 fl oz	0.0 a	0.3 a	5.5 ab	12.5 a	11.3 a	13.8 b	254.6 b
Orondis Opti 0.83OD 32 fl oz	0.0 a	0.0 a	0.5 b	0.5 b	2.0 b	2.8 c	30.6 c
Quadris 15.5 fl. oz	0.3 a	0.3 a	4.3 ab	10.0 a	13.8 a	15.0 b	252.0 b
$P > \chi^{2w}$	0.5296	0.0747	0.0319	0.0169	0.0199	0.0058	0.0060

^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 ($P = 0.05$).

^ySingle active ingredient commercial products except for Orondis Opti, which is a premix of oxathiapiprolin and chlorothalonil.

^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).