BASIL, SWEET (*Ocimum basilicum* 'DiGenova')
Downy mildew; *Peronospora belbahrii*

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Evaluation of conventional fungicides for downy mildew in sweet basil, 2021.

An experiment with field-grown basil was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in Riverhead, NY, in a field with Haven loam soil. A susceptible sweet basil cultivar, DiGenova, was used. The field was moldboard plowed on 29 May. Controlled-release fertilizer (N-P-K, 19-10-9) was broadcast at 525 lb/A (101 lb/A N) over the bed area and incorporated on 30 Jun. Beds were formed with drip tape and covered with black plastic mulch on 30 Jun. Weeds between mulched beds were managed by cultivating, covering the soil with landscape cloth, and by hand weeding. A waterwheel transplanter was used to make planting holes in the beds and apply starter fertilizer. Basil for the experiment was seeded in trays in a greenhouse on 8 Jun. All plants were placed outdoors to harden for a few days and then transplanted in the field by hand on 7 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 sporangia dispersed by wind from infected plants potentially a long distance away. A randomized complete block design with four replications was used. Each plot had 8 plants in 6-ft rows with 9-in. in-row plant spacing. The plots were 3 ft apart in the row. Fungicides were applied weekly over a 6-week period, with a backpack CO_2-pressurized sprayer and hand-held boom with TJ60-8004EVS nozzle(s) operated at 55 psi and 2.3 mph. Applications 1-3 were made using a boom with a single nozzle delivering 32 gal/A. Starting with application 4, plants were large enough to use a boom with two drop nozzles directed to the side of plants as well as a nozzle delivering spray over the top of the plant that delivered 73 gal/A. Downy mildew was assessed in each plot weekly from 10 Aug through 30 Sep. Incidence of plants with symptoms (sporulation of the pathogen visible on the underside of leaves) was recorded and percentage of leaves per plant with symptoms was estimated for each plant in each plot. Area under the disease progress curve (AUDPC) values were calculated from 10 Aug to 8 Sep using the formula: $\sum_{i=1}^{n} [(R_{i+1} + R_i)/2]\,[t_{i+1} - t_i]$, where R = rating for incidence of disease (% leaves with symptoms on affected plants) at the *i*th observation, t_i = time (days) since the previous rating at the *i*th observation, and n = total number of observations. Data were analyzed with one-way ANOVA and Tukey's HSD to separate means using JMP statistical software. Average monthly high and low temperatures (^oF) were 82 and 67.4 in Jul, 83.4 and 68.4 in Aug, and 77.1 and 62.5 in Sep. Rainfall (in.) was 6.2, 9.0 and 4.9 for these months, respectively.

Fungicide treatments were started before symptoms were seen. Symptoms were first observed on 3 Aug in three control plots and one plot treated with Revus. On 10 Aug, 53-69% of plants in treated plots and100% of the plants in untreated control plots had symptoms (no significant differences; data not shown). All plants had symptoms starting with the rating on 17 Aug. For all ratings, treated plants had numerically but not always significantly lower incidence of affected leaves compared to control plants. Fluoxapiprolin had the lowest incidence starting with the 30 Aug rating. This treatment was significantly better than the others based on the 8 Sep rating. Based on AUDPC values, fluoxapiprolin provided 64% control versus 56% for the fungicide program and 43% for Revus. There was a plot of each treatment with substantially more downy mildew than other plots of these treatments in the north end of the experiment in two adjacent replications. Excluding these plots and also the control plot with high incidence in this area, control obtained with these treatments was 81, 66, and 51%, respectively (data not shown). Rating done on 16 Sep, 2 wks after the last application, documented no residual activity. Control of downy mildew achieved with fluoxapiprolin resulted in less defoliation. The fifth application scheduled for 25 Aug was delayed by 1 day because of extensive rainfall (2.6 in.) due to Hurricane Henri on 22-23 Aug. The last application was applied early due to rain forecast with remnants of Hurricane Ida starting late on 1 Sep (3.3 in. total). It is possible efficacy of treatments was affected by the impact of these storms on application timing, product residues, and/or disease development. No phytotoxicity was observed.

Treatment and amount/A (application dates) [y]	Incidence of downy mildew: affected leaves on affected plants (%) [z]					Defoliation (%) [z]	
	10 Aug [x]	25 Aug	8 Sep	AUDPC	16 Sep	8 Sep	16 Sep
Untreated control	21	99 a	97 a	2538 a	99 a	55 a	99 a
Ranman 3 fl oz + K-Phite 1 qt (1, 4) Presidio 4 fl oz + K-Phite 1 qt (2, 5) Orondis Ultra 8 fl oz (3, 6)	5	23 b	69 b	1110 b	85 ab	29 b	63 bc
Revus 8 fl oz (1-6) [w]	7	54 ab	50 b	1442 ab	97 a	20 b	84 ab
Fluoxapiprolin 13.7 fl oz (1-6) [w]	5	26 b	24 c	918 b	77 b	14 b	36 c
P-value (treatment)	0.3785	0.0309	<0.0001	0.0145	0.0033	0.0004	0.001

[z] Numbers in each column with a letter in common or no letters are not significantly different from each other (Tukey's HSD, *P*=0.05).
[y] Application dates were 1= 28 Jul, 2=4 Aug, 3=11 Aug, 4=18 Aug, 5=26 Aug, and 6=31 Aug.
[x] Values were square root transformed before analysis because raw data were not distributed normally. Table contains de-transformed values.
[w] Treatment applied with the nonionic surfactant Induce at 0.125% v/v.