

Efficacy of fungicides for managing downy mildew in organically-produced cucumber, 2008.

The goal of this study was to evaluate fungicides approved for organic production using a cucumber cultivar that has exhibited relatively low susceptibility to downy mildew compared to other cultivars in cucumber evaluations conducted at North Carolina State University since 2005. This integrated approach was taken because downy mildew is considered a difficult disease to manage organically. Cucumber was seeded on 11 Aug and transplanted on 25 Aug into bare-ground in a field with Haven loam soil at the Long Island Horticultural Research and Extension Center in Riverhead. A late planting date was used to increase the likelihood of downy mildew developing during the experiment. Organic production practices were used. On 20 Aug Pro-Gro 5-3-4 organic fertilizer at 1000 lb/A was spread over the rows to be planted and then incorporated by disking. Neptune's Harvest hydrolyzed fish emulsion fertilizer (0.094 fl oz in 6 fl oz water) was poured into the transplant hole before planting. On 12 Sep plants were side-dressed with Bio-Diversity 8-2-8 organic fertilizer at 375 lb/A and then cultivated to incorporate. Weeds were controlled by cultivating and hand weeding as needed. Plots consisted of single 27-ft rows spaced 14 or 17 ft apart with 18 plants at 18-in spacing. The plots were 10 ft apart in the row. A randomized complete block design with four replications was used. Fungicides were applied weekly for 5 weeks beginning on 9-10 Sep, before symptoms were observed, using a backpack CO₂-pressurized sprayer equipped with an 8002E nozzle that delivered 74 gal/A at 50 psi. An unexpected heavy rain shower occurred shortly after the treatments were applied on 9 Sep and the same treatments were again on 10 Sep. Downy mildew severity was assessed on 2 and 9 Oct by estimating incidence of symptomatic leaves and then rating average severity on the affected leaves. These measurements were used to estimate canopy severity. Marketable fruit and culls were harvested on 5 and 13 Oct. Average monthly high and low temperatures (°F) were 79/63 in Aug, 75/61 in Sep, and 63/47 in Oct. Rainfall (in.) was 3.76, 8.34, and 3.18 for these months, respectively. Drip irrigation was used as needed to supplement rainfall.

Downy mildew symptoms were first seen on 22 Sep, 12 days after the first application and 8 days after 3 days of rain. Favorable conditions for downy mildew development were provided by rain and long, heavy dew periods which are common during late summer to fall where the experiment was conducted. Rain fell over 4 days starting with 3 in. on 27 Sep. Temperatures were unusually cool during fall 2008, thus few fruit developed and the experiment was terminated due to poor plant growth. All treatments provided some control based on incidence on 2 Oct. Degree of control was 21% to 46%. Sporatec was not effective based on severity on affected leaves. No significant differences were detected among treatments on 9 Oct, but values were highest for the non-treated control plants.

Treatment and rate/A ^y	Downy mildew assessments ^z						
	Incidence		Severity on affected leaves		Canopy severity		
	2-Oct	9-Oct	2-Oct	9-Oct	9-Oct		
Nu-Cop 50DF 2 lb	33.8	c ^x	51.3	25.6	b	13.8	8.4
Actinovate AG 12 oz + Biolink 4 pt/100 gal	32.5	c	52.5	30.0	b	13.5	7.1
Taegro 3.5 oz	33.8	c	50.0	29.4	b	11.0	5.8
Sporatec AG 2 pt	47.5	b	56.3	37.5	a	15.3	9.0
Non-treated	60.0	a	67.0	42.5	a	21.3	14.4
<i>P</i> -value	< 0.0001		0.3854	0.0001		0.3406	0.3288

^z Percent leaf tissue with symptoms of downy mildew was estimated and severity was assessed for the affected leaves. Canopy severity was calculated from these values.

^y Rate of formulated product/A. Sporatec was mixed in deionized water. Treatments were started before disease detection in the area. Application dates were 9 - 10 Sep, 18 Sep, 24 Sep, 30 Sep, and 6 Oct.

^x Means followed by the same letter are not statistically different from each other (Fisher's Protected LSD, *P*=0.05).