

Assessment of field resistance to pyraclostrobin- and mefenoxam-based fungicides for managing downy mildew in cucumber, 2007.

The main goal of this study was to determine efficacy of FRAC code 4 and 11 fungicides for downy mildew control because of concern that resistance had developed in the pathogen to these chemistries. Efficacy was determined by applying Ridomil Gold EC and Cabrio alone weekly, and comparing these two treatments with a nontreated control and a currently recommended fungicide program. Cucumber was direct-seeded on 11 Jul 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. Inoculum often has arrived late in the summer growing season in this area, especially before 2004 when the current dominant pathogen strain was not known. Weeds were controlled by applying Strategy (2 pt/A) over the seeded rows on 11 Jul, and by cultivating and hand weeding as needed. Cucumber beetles were managed with insecticides, applying Admire 2 F (20 fl oz/A) over the planted rows with Strategy on 11 Jul and Asana XL (9.6 fl oz/A) as a foliar treatment on 17 Aug. Plots consisted of three 15-ft rows spaced 68 in apart with plants at approximately 24-in spacing. The plots were 15 ft apart in the row. A randomized complete block design with four replications was used. Fungicides were applied weekly for 7 weeks beginning on 9 Aug, before symptoms were seen, using a tractor-mounted boom sprayer equipped with D5-25 hollow cone nozzles spaced 17 in. apart that delivered 86 gal/A at 100 psi. Downy mildew severity was assessed weekly beginning on 30 Aug by rating severity on 12 leaves. Leaves with downy mildew symptoms from plants in an adjacent planting that had not been treated with fungicides active against downy mildew were collected on 11 Sep and sent to North Carolina State University for the pathogen to be tested for fungicide resistance. Marketable fruit and culls were harvested weekly from 30 Aug to 27 Sep. Average monthly high and low temperatures (°F) were 82/66 in Jul, 82/65 in Aug, and 77/60 in Sep. Rainfall (in.) was 3.63, 2.60, and 1.51 for these months, respectively. Overhead irrigation was used as needed to supplement rainfall.

Downy mildew symptoms were first seen on 14 Aug. Ridomil and Cabrio did not control downy mildew, in sharp contrast with results reported several years ago (e.g, F&N 57:V016 and F&N 59:V141). Lack of control was unlikely due to poor application timing considering the fungicide program with Tanos and Previcur Flex was effective and that symptoms were not detected until 5 days after the first application. Resistance to mefenoxam and QoI fungicides (azoxystrobin) was detected in the isolate tested at NCSU (G. Holmes and S. Colucci, personal communication). Other researchers testing these fungicides in the eastern US in 2007 reported lack of control. This suggests resistance could be widespread. Cabrio was also ineffective when tested on squash in 2006 at LIHREC; however, Ridomil Gold EC was effective (PDMR 1:V146). Managing downy mildew had a substantial impact on yield. Total number of marketable fruit was 30-42% lower in the plots where downy mildew was not controlled. Total weight was 41-46% lower. Only plants treated with Tanos plus Previcur Flex had marketable fruit at the last harvest date. No phytotoxicity was observed with any of the tested compounds.

Fungicide and rate/A ^y	Downy mildew severity (%) ^z				Marketable yield	
	Old to mid-aged leaves		Mid-aged to young leaves		lb/plot	No. plot
	6-Sep	AUDPC	13-Sep	AUDPC		
Nontreated	46.0	a ^x 985 b	59.2	a 1509 b	54 b	98 b
Cabrio 20 EG 14 oz	50.4	a 1042 b	50.0	a 1481 b	49 b	82 b
Ridomil Gold EC 0.25 pt	51.7	a 1095 b	64.0	a 1558 b	50 b	83 b
Tanos 50DF 8 oz + Manzate Pro-Stick 3 lb alt Previcur Flex 6F 1.2 pt + Manzate	20.2	b 225 a	5.8	b 357 a	90 a	140 a
<i>P</i> -value	0.0084	< .0001	0.0395	< .0001	0.0119	0.0059

^z Percent leaf tissue with symptoms of downy mildew was estimated for leaves in two age classes.

^y Rate of formulated product/A. Treatments were started before disease detection in the area. Application dates were 9 Aug, 16 Aug, 25 Aug, 31 Aug, 7 Sep, 14 Sep, and 21 Sep.

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