2013 Fungicide Resistance Management Guidelines for Cucurbit Downy Mildew and Powdery Mildew Control in the Mid-Atlantic & Northeast regions of the United States

Fungicide	Active Ingredient(s)	FRAC Code*	Risk Rating**	Management Required***	Powdery Mildew	Downy Mildew	General Fungicide Resistance Management Guidelines****
Kocide 3000 or OLF	fixed copper(s)	M1	L	N	+		
Microthiol or OLF	sulfur	M2	L	N	++		FRAC code M fungicides are low risk, protectant fungicides.
Manzate, Dithane or OLF	EBDC	М3	L	N		++	Use alone, or tank mix with
Gavel	zoxamide + mancozeb	M3 + 22	L-M	N		++	high-risk fungicides to improve control
Bravo, Echo or OLF	chlorothalonil	M5	L	N	++	++	
Topsin M	thiophanate methyl	1	H ^R	Υ	+		Select fungicides with at
Rally	myclobutanil	3	M ^R	Υ	++		least ++ rating. Rotate
Procure	triflumizole	3	M ^R	Υ	++		among fungicides with different FRAC codes. Tank
Folicur	tebuconazole	3	M	Υ	++		mix high risk fungicides with
Inspire Super	difenconazole + cyprodinil	3 + 9	Н	Υ	++		FRAC code M product if the product is not formulated
Ridomil Gold Copper	mefenoxam + copper	4 + M1	$H^R + L$	Υ		+	with a FRAC code M
Ridomil Gold Bravo	mefenoxam + chlorothalonil	4 + M5	$H^R + L$	Υ		+	fungicide.
Fontelis	penthiopyrad	7	M - H	Υ	++		When resistance is
Luna Experience ^a	fluopyram + tebuconazole	7 + 3	M	Υ	+++		qualitative (FRAC code 1
Luna Sensation ^a	fluopyram + trifloxystrobin	7 + 11	M	Υ	+++		and 11 fungicides), resistant pathogen strains are
Pristine	boscalid + pyraclostrobin	7 + 11	H ^R	Υ	++	+	completely insensitive and
Quadris	azoxystrobin	11	H ^R	Υ	+	+	cannot be controlled with the fungicide.
Cabrio	pyraclostrobin	11	H ^R	Υ	+	+	rungiolae.
Flint	trifloxystrobin	11	H^R	Υ	+		
Reason	fenamidone	11	Н	Υ		+	With quantitative resistance (FRAC Code 3 fungicides),
Tanos	famoxadone + cymoxanil	11 + 27	L-M	Υ		+	pathogen strains exhibit
Quintec	quinoxyfen	13	Н	Υ	+++++		range in fungicide sensitive and efficacy depends on
Ranman	cyazofamid	21	M - H	Υ		+++	level of insensitivity. Better
Gavel	zoxamide + mancozeb	22 + M3	M + L	Υ		++	control can be obtained with high label rates and tight
Curzate	cymoxanil	27	L-M	Υ		++	spray intervals.
Previcur Flex	propamocarb HCL	28	L-M	Υ		+++	
Alliete	aluminum tris	33	L	Υ		+	a. ,
Phosphonates	phosphorous acid salts	33	L	Υ		+	^a Luna fungicides are labeled for watermelon only.
Forum	dimethomorph	40	L - M	Y		+++	, , , ,
Revus ^b	mandipropamid	40	L - M	Υ		+/+++	control when the pathogen originated from the
Presidio ^b	fluopicolide	43	Н	Υ		+/++++	
Zampro	ametoctradin + dimethomorph	45 + 40	M	Υ		++++	
Torino	cyflufenamid	U6	M	Υ	+++++		southeast.

Efficacy Ratings: + = poor (not recommended), ++ = poor to good, +++ = good, ++++ = very good, +++++ = excellent

^{*} FRAC code: M = multi-site mode of action (MOA), numbered groups = fungicides with similar MOA

^{**} Risk Ratings: L = low risk, M = moderate risk or H = high risk for fungicide resistance to develop

^{***} Risk management required according to fungicide label

^{****} See fungicide label for specific crops, rates and instructions on use

R = resistance known; (+) control failures detected in the mid-Atlantic and Northeast regions Fungicides with the same color belong to the same FRAC code