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Management of Phoma Using Bio-and Conventional Fungicides on Fresh Market Dill

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Dill (*Antheum graveolens*) is a popular herb frequently grown for the fresh market. Dill and its close relative fennel (*Foeniculum vulgare*) are susceptible to Phoma, a foliar disease caused by the fungal pathogen *Cercosporidium punctum* Earle. Initial symptoms are visible in the lower canopy and may worsen under wet conditions resulting in a severely blighted plant. Older leaves first turn from green to yellow, followed by browning leaf tips. Stems lesions are frequently peppered with small black specks which are the fungal stromata supporting numerous conidiophores which produce spores referred to as conidia that are easily dispersed by wind and water. Rainfall, overhead irrigation, and long dew periods favor disease development. Hence there is an urgent need to evaluate candidates for control of pathogens with such potential for disease severity and the general limitations of efficacy data on herbs available. Consequently, a field experiment was conducted on dill at the Everglades Research and Education Center in Belle Glade, FL. The variety Mammoth was direct-seeded in double rows atop of six-inch raised beds formed on three-foot centers with the resident organic soil. The experiment consisted of a randomized complete block design with four replications of 12 treatments (Table 1). *Cercosporidium* was established in the trial by distributing infected leaf material between the unsprayed dill rows serving as buffers between experimental units. Sprays were applied using a CO_2 backpack sprayer and a 36-inch hand-held boom equipped with three Tee-Jet 11003 flat fan nozzles angled inward for maximize coverage. Foliar sprays at a volume of 60 GPA commenced approximately five to six weeks after planting and were subsequently followed by weekly applications. Disease assessment was conducted by whole-plant visual ratings and expressed as the percentage of foliage exhibiting foliar leaf spot symptoms. The bio-rational fungicide products (biofungicides, phosphites, copper, and disinfectants) did not provide statistically significant disease control though significant reductions were achieved using the conventional fungicides. Merivon, a combination of a strobilurin and a new generation carboximide, the strobilurin Quadris, and the carboximide Fontelis performed significantly better than the other conventional fungicides. The resulting disease severities are depicted in Fig. 1. Though none of the treatments maintained disease severity below 10%, sprays were only conducted once per week and were initiated only after the onset of visual symptoms within the experiment. Of the prospects tested, both strobilurins and carboximides show promise, likely due in part to their translaminar and limited systemic activity. Growers may achieve greater efficacy with preventative sprays and, in the case of bio-rational pesticides, applications made on a much more frequent basis.

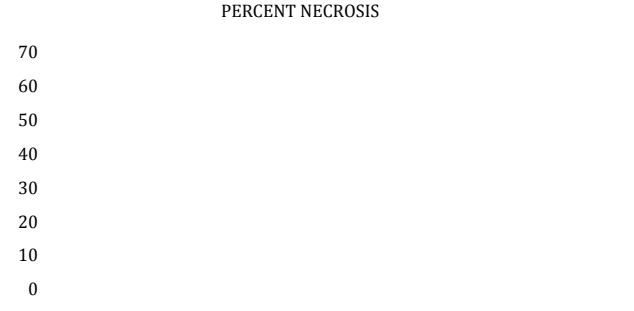

Fig. 1. Percentage of Foliar Necrosis from *Cercosporidium punctum* (Phoma) per Individual Treatment

Table 1. Selected Bio- and Conventional Fungicides Evaluated in 2013 for Phoma Management on Dill

Fungicide	Active Ingredient(s)	Rate/Acre	Manufacturer
ProPhyt SL	Potassium phosphite	3.0 pt	Helena
Serenade Max WP	*Bacillus subtilis* QST 713	4.0 lb	Bayer
Badge WP	Cu hydroxide + Cu oxychloride	2.0 lb	Isagro
Oxidate SL	Hydrogen dioxide	1% v/v	Biosafe
Actinovate SP	Streptomyces lydicus	1.5 lb	Natural Industries
Cabrio EG	Pyraclostrobin	12.0 oz	BASF
Pristine EG	Pyraclostrobin + Boscalid	10.5 oz	BASF
Evito T	Fluoxastrobin + Tebuconazole	4.0 fl oz	Arysta
Quadris SC	Azoxystrobin	15.2 fl oz	Syngenta
Merivon SC	Pyraclostrobin + Fluxapyroxad	5.5 fl oz	BASF
Fontelis SC	Penthiopyrad	24.0 fl oz	DuPont

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