

Project Title: Management of Downy Mildew of Blackberry

Principle Investigator(s): Melanie Lewis Ivey

Phone Number: 330-465-0309

E-mail: ivey.14@osu.edu

Cooperating Institution: The Ohio State University (OARDC). Department of Plant Pathology

Mailing Address: 1680 Madison Avenue, Wooster, OH 44691

Other Key Personnel: Alejandra Jimenez Madrid, PhD candidate, The Ohio State University-Wooster Campus (OARDC)

Why was this project funded? Blackberry downy mildew was first observed in Ohio in 2017 at a commercial blackberry field in Wayne County. Little information is known about the epidemiology and management of the disease in Ohio. The objective of this study was to evaluate fungicide programs to identify the most effective program for controlling downy mildew of blackberry.

Project outline: Fungicide efficacy studies were conducted in a 2-yr-old commercial blackberry with a history of downy mildew. Two susceptible blackberry cultivars (Ouachita and Natchez) were used in this study. Five fungicide programs (Table 1) were evaluated and fungicides and application timings were based on published studies conducted on blackberry in Mexico.

Take-home messages: Downy mildew is systemic in blackberry and symptoms from secondary inoculum (sporangia) begin to appear when there are multiple days of cool and humid weather. In these initial studies we determined that the timing of the production of secondary inoculum in Northeastern Ohio does not warrant season long applications of fungicides as prescribed in Mexico. Preliminary data support the application of fungicides once sporangia are first observed in the region (similar to cucurbit downy mildew programs). This would require the use of sentinel plots to monitor for disease or intensive scouting programs. Organic programs are ineffective and a dormant application of mefenoxam does not appear to have an impact on disease in plants that are systemically infected with downy mildew.

Impacts:

1. Through this study we have begun to better understand the epidemiology of downy mildew in Ohio and how the biology and epidemiology of the pathogen affects disease management decisions.
2. Preliminary data from this study were used to leverage a graduate student OARDC SEEDs grant and ODA Specialty Crop Block Grant.

What was discovered?

Downy mildew symptoms were first observed on June 11, 2018. Weather conditions the week leading up to when the first symptoms were observed were cool (Average temp: air:63.9 F; canopy:64.0 F), humid (average RH:82.0%) with minimal rain (0.02 mm). On cv. Ouachita none of the programs reduced disease severity compared to the non-treated control, however overall disease severity was low. The organic program (program 5) for both varieties was ineffective at reducing incidence compared to the non-treated control. The program containing potassium phosphite only (program 4) reduced incidence on cv. Natchez but not on the more susceptible cv. Ouachita. All of the programs containing azoxystrobin, mancozeb and copper sulfite (programs 1-3) significantly lowered disease incidence.

Program 2 (cv. Ouachita only) was more effective than program 1 and similar to program 1 in controlling downy mildew. The dormant drench of mefenoxam did not appear to have any impact on disease. Additional research is necessary to determine the appropriate timing of fungicide spray programs.

Table 1. Fungicide and biocontrol spray programs to evaluate the efficacy in controlling downy mildew of blackberry

Spray Program	Dormant Drench	23 Apr	7 May	22 May	29 May	4 Jun	14 Jun	21 Jun	28 Jun	4 Jul	12 Jul	18 Jul	2 Aug
	13 Apr												
1	Mf	Mn	Mn	Cs	-	Cs	-	Az	-	Cs	-	Az	Cs
2	-	Cs	Cs	Az+Mn	-	Mn	-	Az+Mn	-	Az	-	Az	Az
3	-	Mn	Mn	Cs	-	Cs	-	Az	-	Cs	-	Az	Cs
4	Pf	Pf	Pf	Pf	-	Pf	-	Pf	-	Pf	-	Pf	Pf
5 (organic)	-	Cs	Cs	Bs	Bs	Bs	Bs	Bs	Bs	Bs	Bs	Bs	Bs
Non-treated	-	-	-	-	-	-	-	-	-	-	-	-	-

Az=azoxystrobin; Mf=mefenoxam; Mn=mancozeb; Cs=copper sulfate; Pf=potassium phosphite; Bs=*Bacillus subtilis*.

Table 2. Fungicide and biocontrol treatments and rates used in this study

Active Ingredient	Brand Name	Company	Rate/acre
Azoxystrobin (22.9%)	Abound	Syngenta	10 fl oz
Basic copper sulfate (27.1%)	Cuproxat	Nufarm	5 pints
Mefenoxam (45.3%)	Ridomil Gold SL	Syngenta	1.8 lb ai
Mono- and dipotassium salts of Phosphorous Acid (53.0%)	Fosphite Fungicide	JHBiotech, Inc	3 qt in 100 gal of water
Mancozeb (75%)	Protect DF	Nufarm	8 oz/1000 Sq. Ft

Table 3. Mean downy mildew incidence and severity on cv. Ouachita

Program No.	Incidence (%)	Severity Score
1	2.8 bc	2.3
2	1.75 d	1.6
3	2.45 cd	2.3
4	3.34 abc	2.3
5	3.50 ac	2.2
Non-treated	3.94 a	2.6

Table 4. Mean downy mildew incidence and severity on cv. Natchez

Program No.	Incidence (%)	Severity Score
1	1.94 b	1.5 b
4	2.83 b	2.2 ab
5	4.32 a	2.9 a
Non-treated	4.16 a	2.7 a