

Annual Report, June 30, 2006

Mid-Atlantic survey of grape powdery mildew sensitivity to commonly used fungicides, 2005-06

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Objectives

1. Evaluate grape powdery mildew isolates from Virginia and nearby viticultural areas for resistance to commonly used groups of fungicides, with emphasis on the ergosterol biosynthesis inhibitors and the QoI fungicides (strobilurins).
2. If indications or opportunities arise, limited tests will also be conducted with grape downy mildew (QoI fungicides and mefenoxam).

Outcomes

General

Since matching funds that had been requested from Viticulture Consortium East were not granted in 2005-2006, the original plan to have a student starting on this project in the summer of 2005 could not be realized. That gave this project a late start when notification of Virginia Wine Board funding was received at the end of June of 2005. However, the results obtained on fungicide resistance in grape downy and powdery mildew in Virginia have been interesting, useful, and ... worrisome.

For 2006-2007, partial funding has been obtained from Viticulture Consortium East and the Virginia Agriculture Council to supplement Wine Board funding, and a student has been accepted by the PWS department to work on this project. She is expected to arrive in early August. Collection efforts (just starting at the end of June) and continued testing will be carried out with the help of part-time, hourly-wage assistance until then.

Summary of findings:

Downy mildew isolates were obtained in 2005 from five commercial vineyards (two of which are just across the state line in North Carolina).

Four of the five locations appeared to have populations predominantly resistant to QoI fungicides (strobilurins: Abound and Pristine) (Table 1). There are no previous reports of this type of resistance in grape downy mildew in North America, although it has been common in Europe.

Table 1. Reaction of grape powdery and downy mildew isolates from several locations in Virginia and North Carolina to QoI fungicides.

Code	Source of isolates	Number QoI resistant in bioassay / Number tested	
		Powdery mildew	Downy mildew
A	Eastern Shore, Va.		4 / 4
B	Montgomery Co. (greenhouse)	0 / 2	0 / 1
C	Central Va.	8 / 8	3 / 3
D	Northern Va.	5 / 5	0 / 3
E	Central Va.	4 / 4	
F	South-Central Va.	3 / 3	
G	Western NC		2 / 2
H	Western NC		7 / 8

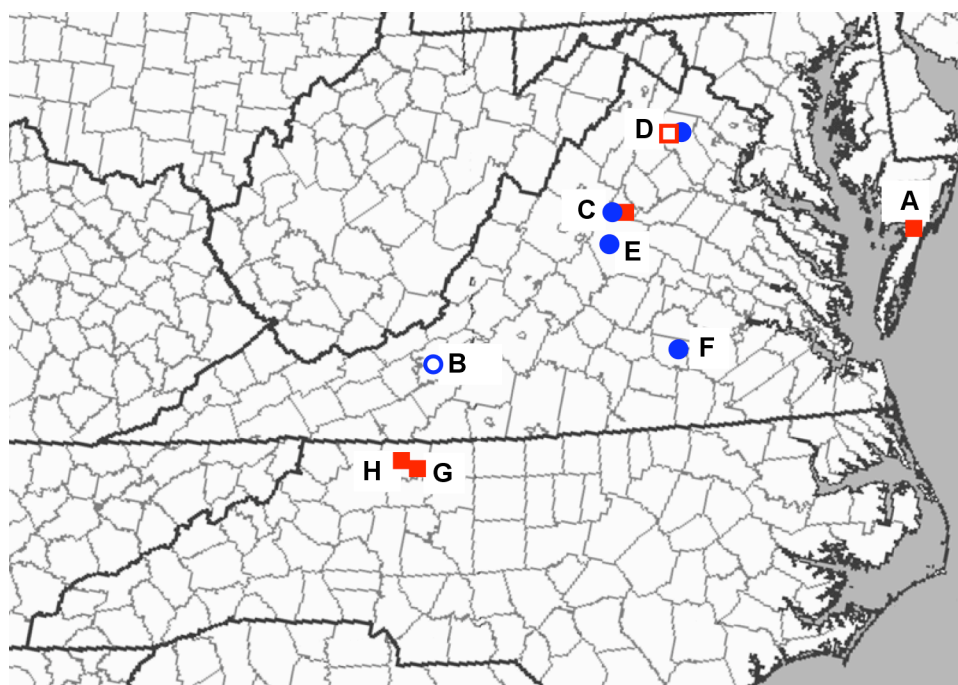


Figure 1. Geographic origins of powdery (circles) and downy mildew (squares) isolates. Labels correspond to isolate designations in text and tables.

Selected isolates were tested by inoculation onto potted grape plants that had been treated with the highest label rate (based on 100 gal/A) of azoxystrobin or pyraclostrobin. Disease control was poor to nil. In a follow-up test, plants were treated to run-off with a 5x, 1x, and 0.1x label rate (with the label rate again being based on 100 gallons per acre) of Abound and Pristine, allowed to dry, and then treated leaves were collected and inoculated with several downy mildew isolates (Table 2). The sensitive isolate was completely controlled at 0.1x label rate, as expected.

There was no control of the resistant isolate by the 1x label rate of both Pristine and Abound. However, at the 5x rate, Pristine provided substantial inhibition of the disease, whereas Abound did not (Table 2).

None of the isolates were resistant to Ridomil.

Table 2. Poor control of QoI-resistant DM isolates C-D5 and D-D1 with field rates of Abound and Pristine, and with a 5x field rate of Abound. (Exp. 2006-22)

DM Isolate	QoI reaction	Spray	Mean Disease Severity (0-5 scale) ¹
D-D1	sensitive	Pristine 1x label rate	0
D-D1	sensitive	Pristine 0.1x label rate	0
D-D1	sensitive	Abound 1x label rate	0
D-D1	sensitive	Abound 0.1x label rate	0
D-D1	sensitive	Water	2.8
C-D5	resistant	Pristine 5x label rate	0.5
C-D5	resistant	Pristine 1x label rate	4.6
C-D5	resistant	Pristine 0.1x label rate	4.4
C-D5	resistant	Abound 5x label rate	4.4
C-D5	resistant	Abound 1x label rate	4.7
C-D5	resistant	Abound 0.1x label rate	4.0
C-D5	resistant	Water	3.8
H-22	resistant	Pristine 5x label rate	0.5
H-22	resistant	Pristine 1x label rate	3.6
H-22	resistant	Abound 5x label rate	4.4
H-22	resistant	Abound 1x label rate	3.7
H-22	resistant	Water	3.1

¹0 = no disease development nor pathogen sporulation, 5 = severe disease development and pathogen sporulation

Powdery mildew isolates were obtained from three commercial vineyards and one experimental vineyard as well as from minimally sprayed grapes in Blacksburg.

All isolates from the four vineyards had QoI (strobilurin) resistance (Table 1). Resistance levels were high enough that they are expected to seriously compromise the efficacy of QoI fungicides against these isolates.

Reduced sensitivity (not necessarily catastrophic resistance) to Nova and Elite also was common in these isolates.

As expected, no sensitivity problems were found for Quintec.

Tests with boscalid (Endura, Pristine) remain to be completed.

Results were reported to Virginia growers through Viticulture Notes and a presentation at the winter meeting of the Virginia Vineyards Association. Also, owners or managers of vineyards where the isolates originated were notified of the results by email.

General

We have experimented with techniques that should allow us to store both powdery and downy mildew isolates in a frozen state. This does appear to work, and should be a great time saver compared to having to maintain many isolates on leaf disk, which has been our routine procedure until now.

We are working to implement a capability for PCR testing of QoI resistant isolates, which would allow us to get answers much more quickly than with bioassays. We hope to be able to start this type of testing for QoI fungicides during the 2006 growing season.