



Interpreting FRAC 11 Fungicide Resistance Test Results

This resource is designed to help you navigate grape powdery mildew management decisions when faced with control failures, or with a diagnosis of FRAC 11 resistant mildew populations in your vineyard.

Step 1: Follow the directions below (“**How should I sample?**”) to collect and submit samples.

Step 2: Have your sample results handy.

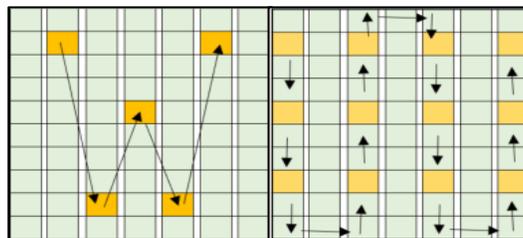
Step 3: Consider whether you had a powdery mildew management failure the preceding season. This helps determine the level of “risk” you might have in your vineyard this growing season.

Step 4: Navigate the flow chart to determine whether your control failure last year was likely due to poor spray practices (the most common form of control failure), and / or fungicide resistance. The suggested management options are designed to help minimize risk while maintaining maximum flexibility in your spray program.

Note: These recommendations are best practices based on our current level of knowledge. As we learn more about fungicide resistance risk and management, these recommendations will likely be adjusted.

How should I sample my vineyard for powdery mildew fungicide resistance testing?

The accuracy of test results is reflective of how many and where samples are collected. We currently recommend a minimum of five (5) samples from each 1 to 5 acre-vineyard increment that represent different areas within the vineyard. Samples can be collected using a stratified sampling approach or a “W” shaped sampling approach. For more information on sampling contact your state Extension Specialist.

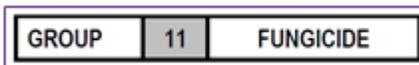


These samples can be collected via the glove method described at: <https://framenetworks.wsu.edu/grower-information/>.

If you want results to be reflective of the entire block, make sure to collect samples from multiple points. The classic “W” sampling strategy (left), and the stratified sampling approach (right) are good approaches.

What is a FRAC group and where do I find it?

Most fungicides have a specific FRAC group code number (“FRAC group”) that is printed on the front page of the label, for example:



In some cases, a fungicide brand will be a mixture of two or more unique active ingredients. In these cases, the label will display the FRAC group for both active ingredients. In the two examples below, the first fungicide (left) contains active ingredients in FRAC group 7 and FRAC group 11; the second fungicide (right) contains active ingredients in FRAC group 11 and FRAC group 3.



FRAME network

Interpreting FRAC 11 Fungicide Resistance Tests and Mildew Management for 2021

To optimize all pest management programs: Calibrate your sprayer at least annually. Monitor spray droplet size, application volume, and canopy coverage. During periods of high disease or pest pressure, consider using shortest labeled product intervals and highest labeled rates.

Disclaimer: These guidelines are intended to provide information to assist you in making management decisions for grape powdery mildew when faced with challenges associated with FRAC 11 fungicide resistance. Research on best practices is ongoing. The FRAME network is not responsible for the outcomes of selected farming decisions.

Time of Vineyard Sampling	FRAC 11 Resistance Test Results	Interpretation
Budbreak to immediate pre-bloom (BBCH 08 - BBCH 55)	Sensitive	FRAC 11 fungicides are OK provided two applications of multi-site products were used prior to the first FRAC 11 application. Tank mix FRAC 11 fungicides with fungicides of other FRAC groups or multi-site modes of activity.
	Any sample from a block comes back as "Resistant" or "Mixed"	Do not use FRAC 11 fungicides for the rest of the season for powdery mildew, unless future test results come back sensitive.
Immediate pre-bloom to pea-sized berries (BBCH 55 - BBCH 75)	Sensitive	FRAC 11 fungicides OK if tank-mixed with fungicides of other FRAC groups or multi-site modes of activity.
	Less than 50% of samples from a block are designated "Resistant" or "Mixed"	Do not use FRAC 11 fungicides for powdery mildew until after two applications of multi-site fungicides have occurred.
	More than 50% of samples from a block are designated "Resistant" or "Mixed"	Do not use FRAC 11 fungicides for the rest of the season for powdery mildew, unless future test results come back sensitive.
Pea-size berries to harvest (BBCH 75 - BBCH 99)	Sensitive	FRAC 11 fungicides OK if tank-mixed with fungicides of other FRAC groups or multi-site modes of activity.
	Less than 50% of samples from a block are designated "Resistant" or "Mixed"	Do not use FRAC 11 fungicides for powdery mildew until after two applications of multi-site fungicides have occurred.
	More than 50% of samples from a block are designated "Resistant" or "Mixed"	Do not use FRAC 11 fungicides for the rest of the season for powdery mildew. Next Season Spray Program Start: Do not use FRAC 11 fungicides in your early-season spray program for powdery mildew until after two applications of multi-site fungicides have occurred. Then follow recommendations based on testing as described above.

Extension Team:

Michelle Moyer (WSU), Walt Mahaffee (USDA), Phil Brannen (UGA), Monica Cooper (UCCE), Melanie Ivey (OSU), and Timothy Miles (MSU)

USDA-NIFA Specialty Crop Research Initiative
Award No. 2018-03375