

New Fungicides for Grapevine Powdery Mildew Management, 2011

Gary G. Grove and Mark E. Nelson

Washington State University Irrigated Agriculture Research and Extension Center, 24106
N. Bunn Road, Prosser, WA 99350

As of spring 2011 grape growers in Eastern Washington have several new fungicides at their disposal for managing powdery mildew on wine grapes. Notice of these registrations was not received in time for inclusion in the WSU 2011 Pest Management Guide for Grapes in Eastern Washington. New products included in the powdery mildew toolbox include Adament (tebuconazole + trifloxystrobin), Inspire Super (difenoconazole + cyprodinil), Unicorn (tebuconazole + sulfur) and Vivando (metrafenone). Adament and Inspire Super, along with the existing products Flint (trifloxystrobin) and Pristine (pyraclostrobin + boscalid), provide the added benefit of (when applied at proper rates) also controlling Botrytis bunch rot. The full component of powdery mildew compounds is presented in Table 1. The table includes fungicide class information, and Fungicide Resistance Action Committee (FRAC) group number or code. The FRAC code represents the mode of action of the fungicide. This information is helpful when designing a fungicide program that conforms to FRAC resistance management guidelines. It is important to remember that if a pathogen population develops resistance to fungicides within a FRAC group, it is likely to be resistant to all members of that group. Resistance is more likely to develop if the pathogen is frequently treated with one or multiple fungicides within a given FRAC group. Included in the table are members of the fungicide classes (or FRAC Groups) known as benzophenones (metrafenone, Group U8), DMI (demethylation inhibitors, Group 3), QoI (quinone outside inhibitors; previously called strobilurins, Group 11), quinolines (quinoxifen, Group 13), sulfur (Group M2), various “biological” fungicides (Group 44), petroleum derived spray oils, and potassium bicarbonate. Petroleum spray oils and potassium bicarbonate are listed as “Not Classified” (NC) by FRAC. Several products are formulations or “premixes” of two different fungicide classes, modes of action, of FRAC groups. Consult product labels for appropriate rates and spray intervals. The resistance risk is product-dependent (Table 1). All of the aforementioned “new” products have performed well in efficacy trials at WSU-IAREC.

The availability of “premix” or combination fungicide formulations is a relatively recent trend in agriculture. The grape toolbox contains several of these product types: Adament (tebuconazole + trifloxystrobin), Inspire Super (difenoconazole + cyprodinil), Pristine (pyraclostrobin + boscalid), and Unicorn (tebuconazole + sulfur). Both active ingredients in these compounds, *with the exception of Inspire Super*, have activity against powdery mildew (only the tebuconazole component of Inspire Super is active against the disease). When both modes of action have activity against the target organism, some level of resistance management is built into the products provided that they are used rationally. The use of “premix” types of products can provide better disease control, provide disease control security if there is field resistance to one of the two active ingredients, and help prevent resistance if there is not.

A recent survey revealed that QoI (Group 11) or QoI-containing fungicide products (Abound, Flint, Pristine, and Sovran) were the industry’s first line of defense against powdery mildew. The resistance risk of these Group 11 fungicides (formerly known as strobilurins) is high while the risk of other important classes (DMI, quinolones, and benzophenones) is considered medium. The resistance risk of contact fungicides sulfur, narrow range petroleum oil, and potassium bicarbonate is low. We have no evidence of fungicide resistant mildew populations in Eastern

Washington but this could change rapidly given the nature of powdery mildew and the resistance history (in grapes) of Group 11 and Group 3 fungicides. Therefore it is imperative that resistance management guidelines be followed beginning with the introduction of the group.

General resistance management guidelines include the incorporation of cultural practices that lower disease pressure. Cultural practices such as vigor management, shoot removal and positioning, and leaf removal lower disease pressure and improve spray penetration. The incorporation of these practices serves to lower selection pressure on pathogen populations. Always use fungicides in a protective, rather than reactive, manner: It is far easier to prevent powdery mildew than to cure it. Additional guidelines include limiting the number of applications of individual modes of action per season and limiting sequential applications. Do not tank mix or alternate fungicides with the same FRAC number in a spray program. Medium risk compounds such as DMI (Group 3) and quinoline compounds (Group 13) should be applied no more than 3 times per season and no more than twice in sequence. High risk QoI (FRAC Group 11) compounds or premixed formulations containing them (Adament, Flint, Sovran, Pristine, and Abound) fungicides should be preferably alternated 1:1 with other modes of action or Groups. It is preferable to make only one application of any resistance-prone compound and then switch to a fungicide from a different class or FRAC group, but the cost of this approach can be expensive in Eastern Washington. *Never* exceed more than two QoI applications in sequence. If two sequential applications of a QoI fungicide are made, this “block” should be alternated with at least two applications of one or more fungicides of a different mode of action or FRAC group. When QoI compounds are used as a solo product (Abound, Flint, and Sovran), the number of applications should be no greater than 1/3 of the total number of fungicide applications per season. In programs utilizing tank mixes or pre-mixes of a Group 11 fungicide with a fungicide of another group (e.g. Adament or Pristine), the number of Group 11 fungicide (QoI)-containing applications should be no more than 1/2 of the total number of fungicide applications per season. It also helps to tank-mix fungicides from different groups that are both effective against powdery mildew. Sulfur is a relatively inexpensive and effective companion product for mixing with medium- or high-risk compounds. Try to include it in every spray tank aimed at powdery mildew if permitted according to usage instructions on product labels. Always follow label instructions pertaining to application rates and intervals and always use a properly calibrated sprayer and sufficient spray volume to provide good coverage.

The most critical period for powdery mildew control is from immediate prebloom to three weeks postbloom. Our most effective compounds should be utilized during this period. Bloom is also a critical period for the establishment of Botrytis bunch rot in the vineyard. As noted above, several of our highly effective powdery mildew fungicides/fungicide premixes (Adament, Flint, Inspire Super, and Pristine) provide (when used at appropriate rates) activity against *both* powdery mildew and bunch rot. These compounds are logical for deployment during bloom but remember to keep applications of QoI (Group 11) compounds or mixtures containing them to a minimum.

Trade Names ¹	Active Ingredients	Class	FRAC Group ¹	Mildew Efficacy	Resistance Risk
Abound	azoxystrobin	QoI	11	Good	High
Adament ⁴	tebuconazole	DMI	3	Excellent	Medium
	trifloxystrobin	QoI	11		High
Armicarb ²	potassium bicarbonate	Carbonate	NC	Fair ²	Low
Flint ⁴	trifloxystrobin	QoI	11	Excellent	High
Inspire Super ⁴	difenconazole	DMI	3	Excellent	Medium
	cyprodinil	AP	9		Medium
JMS Stylet Oil ⁴	narrow-ranged petroleum oil	PDSO	NC	Good ³	Low
Kaligreen ²	potassium bicarbonate	Carbonate	NC	Fair ²	Low
Pristine ⁴	pyraclostrobin	QoI	11	Excellent	High
	boscalid	Carboxamide	7		Medium
Rally	myclobutanil	DMI	3	Good	Medium
Serenade Max	<i>Bacillus subtilis</i>	Biological	44	Fair	Low
Sonata	<i>Bacillus pumilis</i>	Biological	44	Fair	Low
Quintec	quinoxifen	Quinoline	13	Excellent	Medium
Rubigan	fenarimol	DMI	3	Good	Medium
Sovran	kresoxim-methyl	QoI	11	Good	High
Sulfur	Sulfur	Sulfur	M2	Good	Low
Unicorn	tebuconazole	DMI	3	Good	Medium
	sulfur	Sulfur	M2		Low
Vivando	metrafenone	benzophenone	U8	Excellent	Medium

¹Fungicide Resistance Action Committee

²Eradicant activity good, protective activity poor

³ Eradicant activity good, protective activity good

⁴ Controls Botrytis bunch rot at maximum labeled rate

Use pesticides with care. Apply them only to plants, animals, or sites listed on the labels. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

YOU ARE REQUIRED BY LAW TO FOLLOW THE LABEL. It is a legal document. Always read the label before using any pesticide. You, the grower, are responsible for safe pesticide use. Trade (brand) names are provided for your reference only. No discrimination is intended, and other pesticides with the same active ingredient may be suitable. No endorsement is implied.