

Fungicide performance trials for powdery mildew and downy mildew, Winchester, VA 2009

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Outline

- Fungicide Updates (2009)
 - List of new materials and some considerations
- Fungicide Trial Results
 - Downy and Powdery Mildew trials at Winchester, VA 2009
- Fungicide Updates (2010)

Materials of interest: Downy Mildew Trial

- **Revus (mandipropamid)**. It is a new downy-mildew specific fungicide from Syngenta that recently received the EPA registration (protectant).
 - There is not much information on this formulation for grape downy mildew.
 - **Revus and Revus Top (Revus + difenoconazole)** was tested at Winchester in 2009.

Materials of interest: Downy Mildew Trial

- **Tanos (famoxadone + cymoxanil)**. It is a relatively new downy mildew fungicide (curative and protectant).
 - The mode of action is very similar to that of strobilurins, thus, the same precautions regards chemical resistance will apply. Need to tank mix with another broad spectrum fungicide such as mancozeb.
 - It has been tested at Winchester this season *by itself* in 2009.

Materials of interest: Powdery Mildew Trial

- **Mettle 125 ME.** It is a newly registered tetraconazole fungicide (late 2008) against powdery mildew and botrytis from Isagro.
- **Torino** is Cyflufenamid from Gowan. It is not systematic, but shows a translaminar movement (vapor action) to improve coverage. The application rate will be 3.4 oz/A.

Materials and Methods

- Targeted diseases were downy mildew and powdery mildew.
- The experimental design was a completely randomized design with four replications, and experimental unit was a vine.
- Treatments were applied using 3 gallon sprayer tank which was pressurized using compressed air.
- The output pressure was regulated to 21 psi by CFValve system (GATE LLC). Treatment was applied using a single boom with a flat fan nozzle (TeeJet 8003VS).
- Every other vine was treated...

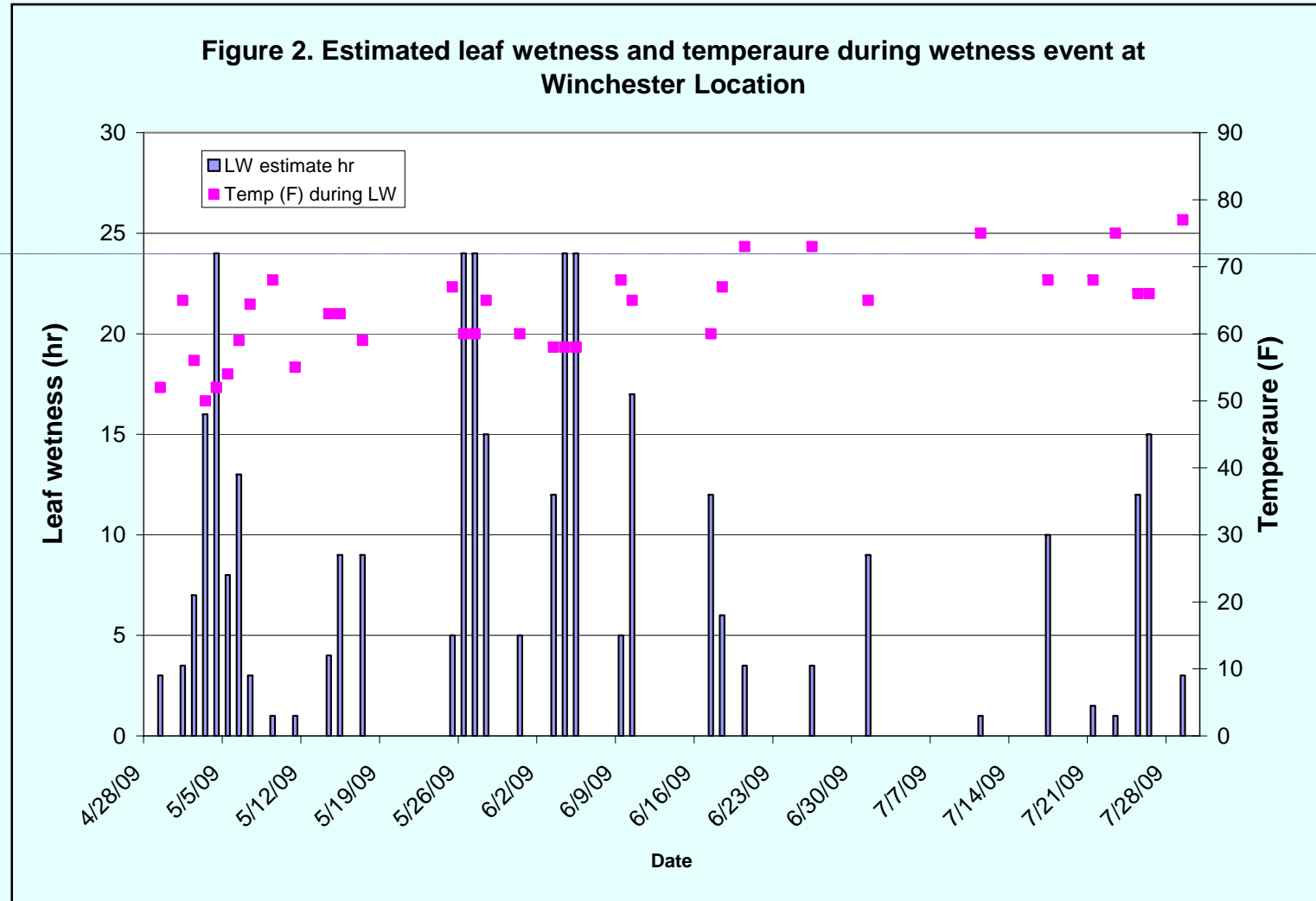


Materials and Methods

- Visual assessment of diseases was made four times in the season. Sixty leaves and ten clusters per vine were randomly selected and assessed for diseases
 - a total of 240 leaves and 40 clusters per treatment
- percentage of diseased area (disease severity) and disease incidence were recorded.
- Linear mixed model was used to conduct the analysis of variance (JMP 7.0.1, SAS institute, Cary NC).
 - Treatment was considered as fixed effect, and replication was considered as random effect.

Weather conditions

Figure 2. Estimated leaf wetness and temperature during wetness event at Winchester Location



Environmental conditions are key for grape disease development!

- Grape fungal pathogens requires a certain conditions (often time it is a combination of temperature and leaf wetness duration), to cause disease
- Black rot disease risk

Temperature in °F	Temperature in °C	Minimum Leaf Wetness Duration (hr) for Light Infection
50	10	24
55	13	12
60	16	9
65	18	8
70	21	7
75	24	7
80	27	6
85	29	9
90	32	12

Infection conditions

Dates	Potential disease risks	Comments
5/2-5/6/09	Ph, BR, PM (ascospore), DM	It was probably too cold for PM and DM
5/7/09	PM (ascospore), DM	
5/7-5/9/09	DM sporulation	Three consecutive nights with high RH and Temp > 55F
5/10/09		First observation of Ph
5/15/09	Ph, BR, PM (ascospore), DM	
5/15-5/17/09	DM sporulation	Three consecutive nights with high RH and Temp > 55F
5/18-5/20/09		Frost advisory
5/24/09		First observation of BR
5/25-5/27	Ph, BR, PM (ascospore), DM	63 h of wetness
5/25-5/29/09	DM sporulation	Five consecutive nights with high RH and Temp > 55F
5/28/09		First observation of DM
6/3-6/5/09	Ph, BR, PM (ascospore), DM	68 h or wetness
6/6/09		Bloom (50% on Chardonnay)
6/9/09	Ph, PM (ascospore), DM	
6/10/09	Ph, BR, PM (ascospore), DM	
6/4-6/13/09	DM sporulation	Ten consecutive nights with high RH and Temp > 55F
6/12/09		First observation of PM on leaves, DM on bunches (untreated)
6/17/09	Ph, BR, PM (ascospore), DM	12 h of wetness at low 60F
6/18-6/21/09	DM sporulation	Four consecutive nights with high RH and Temp > 55F
6/20/09	PM (ascospore), DM	~3.5 hr of wetness at mid 70F
6/26/09	PM (ascospore), DM	~3.5 hr of wetness at mid 70F
7/1/09	Ph, BR, PM, DM, Bot	9 h of wetness at 65F
7/10/09		First observation of Botrytis on bunches
7/17/09	PM, DM, Bot	4 hr (71F) + 6hr (66F)
7/21/09	Ph, BR, PM, DM, Bot	15 hr (68F)
7/25/09	Ph, BR, PM, DM, Bot	12 hr (66F)
7/26/09	Ph, BR, PM, DM, Bot	15 hr (66F)
7/18-7/30	DM sporulation	Ten consecutive nights with high RH and Temp > 55F
7/29/09	DM	Several rains (~ 2hr) observed
8/12-8/16	DM sporulation	Four consecutive nights with high RH and Temp > 55F

As the season progresses...



Black rot on leaves and berries



Phomopsis cane and leaf spot

As the season progresses...



Downy mildew on leaves and flowers

As the season progresses...



Powdery mildew on leaves and berries

How about treated vines?



Downy Mildew Treatments

Treatment name (rate/A)

Revus 250SC (7 fl oz/A) then
Ridmil Gold/Copper 65 (2lb/A)

Revus Top 4.17 SC (6 fl oz/A)
then Ridomil Gold/Copper 65

Mancozeb + Zoxamide

Ridomil Gold/Copper 65
(2lb/A)

GAVEL 75 DF (3 lb/A)

GAVEL 75 DF (3 lb/A)

Dithane DF (3lb/A) then Ridomil
Gold/Copper 65 (2lb/A)

Dithane DF (3lb/A) then Ridomil
Gold/Copper 65 (2lb/A) then
Prophyt (2 qt/A)

Untreated

Tanos^v (8 oz/A) then Ridomil
Gold/Copper 65 (2lb/A)

Application timing

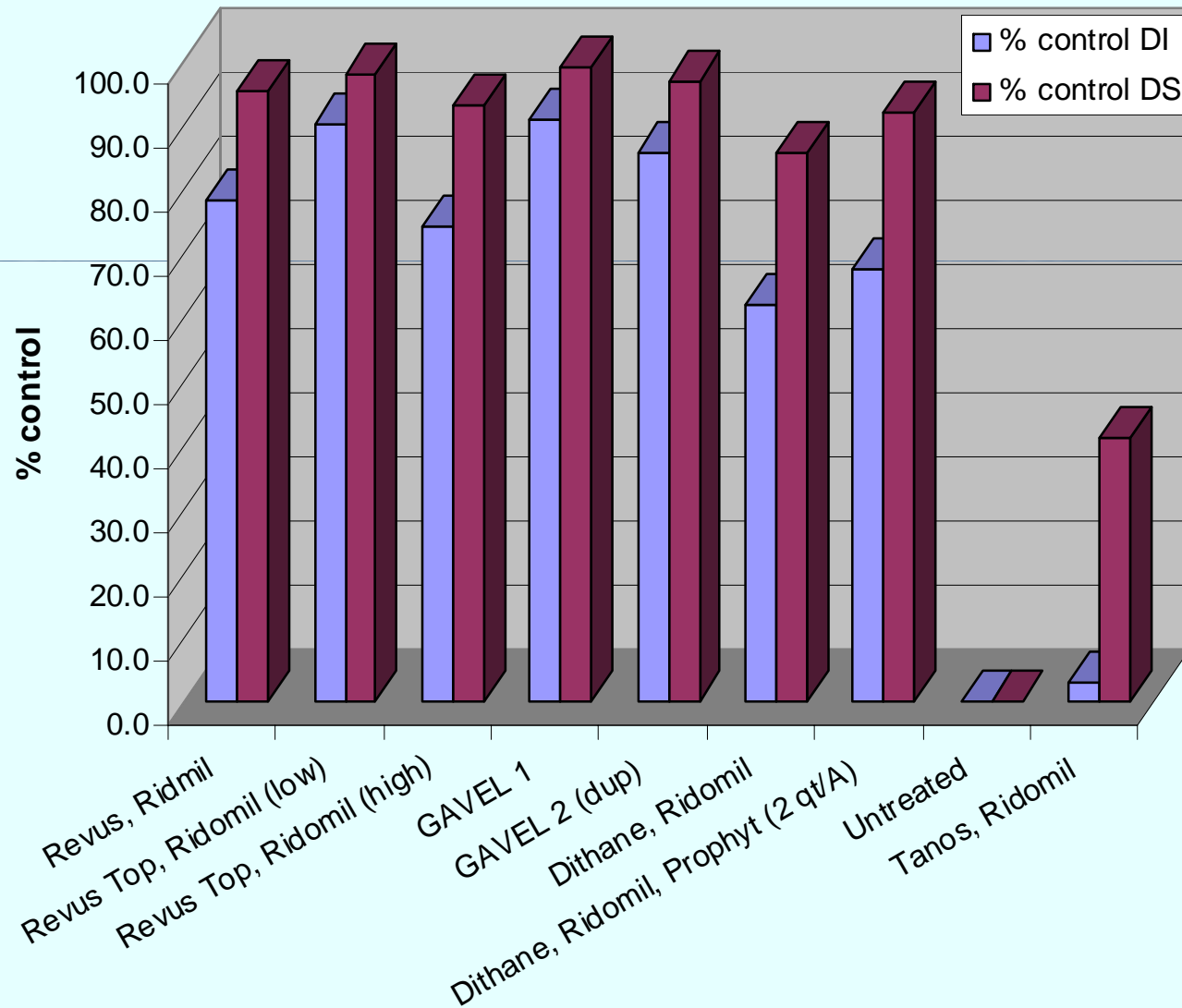
Treatment started at pre-bloom,
Applied 2 times, rotated once with
Ridomil gold/copper (2nd cover),
then applied two more times.

All treatments were applied
approximately 14-day schedule.

Results: Downy mildew materials

Treatment name (rate/A)	Days after first application	Disease incidence ^z		Disease severity ^y	
		LS mean ^w		LS mean ^w	
Revus 250SC (7 fl oz/A) then Ridmil Gold/Copper 65 (2lb/A)	38, 53(Revus), 67 (Ridomil), 79, 92 (Revus)	20.42	cde	0.63	cd
Revus Top 4.17 SC (6 fl oz/A) then Ridomil Gold/Copper 65 (2lb/A)	38, 53(Revus), 67 (Ridomil), 79, 92 (Revus)	9.17	ef	0.28	d
Revus Top 4.17 SC (7 fl oz/A) then Ridomil Gold/Copper 65 (2lb/A)	38, 53(Revus), 67 (Ridomil), 79, 92 (Revus)	24.17	bcd	0.91	cd
GAVEL 75 DF (3 lb/A)	38, 53, 67, 79, 92	8.33	f	0.12	d
GAVEL 75 DF (3 lb/A)	38, 53, 67, 79, 92	13.33	def	0.41	d
Dithane DF (3lb/A) then Ridomil Gold/Copper 65 (2lb/A)	38, 53(Dithane), 67 (Ridomil), 79, 92 (Revus)	35.42	b	1.89	c
Dithane DF (3lb/A) then Ridomil Gold/Copper 65 (2lb/A) then Prophyt (2 qt/A)	38, 53(Dithane), 67 (Ridomil), 79, 92 (Prophyt)	30.42	bc	1.04	cd
Untreated		93.75	a	13.30	a
Tanos ^v (8 oz/A) then Ridomil Gold/Copper 65 (2lb/A)	38, 53(Tanos), 67 (Ridomil), 79, 92 (Tanos)	90.83	a	7.82	b

Results: Downy Mildew: Percent control



Powdery Mildew Treatments

Torino

Treatment name (rate/A)

GWN-4617 (3.4 fl oz/A)

(experimental)

Vintage SC (4 fl oz/A)

then GWN-4671 (3.4 fl
oz/A) (experimental)

Quintec (4 fl oz/A)

Rally 40WPS (3 lb/A)

then Microthiol D (4 lb/A)

Rally 40WPS (3 lb/A)

Untreated

Mettle 125ME (5 fl oz/A)

LEM-17 (16 fl oz/A)

(experimental)

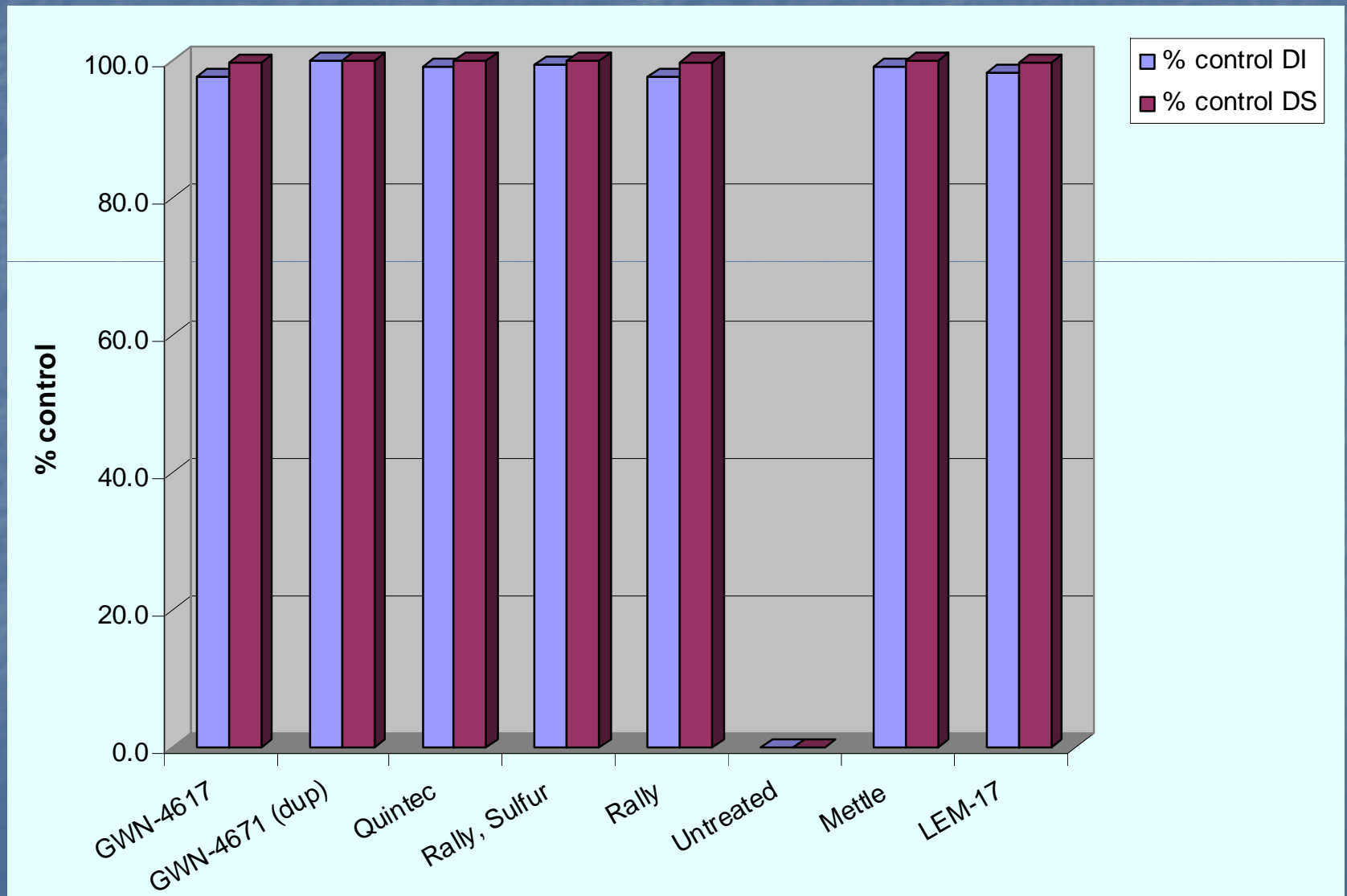
Application timing

Treatment started at
1st application after bloom
and applied three consecutive times
All treatments were applied
approximately 14-day schedule.

Results: Powdery mildew materials

Treatment name (rate/A)	Days after first application	Disease incidence ^z	Disease severity ^y	Disease severity (bunch) ^y
		LS mean ^w	LS mean ^w	LS mean ^w
GWN-4617 (3.4 fl oz/A) (experimental)	0, 7, 22, 33, 39, 54, 68	2.08 b	0.08 b	2.74 b
Vintage SC (4 fl oz/A) then GWN-4671 (3.4 fl oz/A) (experimental)	0, 7, 22 (Vintage), 33, 39, 54, 68, (GWN-4671)	0.00 b	0.00 b	12.75 b
Quintec (4 fl oz/A)	39, 54, 68	0.83 b	0.01 b	1.89 b
Rally 40WPS (3 lb/A) then Microthiol D (4 lb/A)	39, 54(Rally), 68 (Microthiol)	0.42 b	0.02 b	6.96 b
Rally 40WPS (3 lb/A)	39, 54, 68	2.08 b	0.04 b	6.08 b
Untreated		92.08 a	32.92 a	94.36 a
Mettle 125ME (5 fl oz/A)	39, 54, 68	0.83 b	0.01 b	4.30 b
LEM-17 (16 fl oz/A) (experimental)	39, 54, 68	1.67 b	0.05 b	0.68 b

Results: Powdery Mildew: Percent control



Overall conclusions

■ Downy mildew

- Considering how weather conditions favored downy mildew development early in the season, all treatment performed very well.
- Tanos was applied by itself, regardless of the label recommendation. Significant reduction in disease severity was observed

■ Powdery mildew

- Disease incidence was near 100% on check, yet that of other treatments were less than 2%
- Some infection on berries were observed, but it may due to spray equipment x canopy effect

Fungicide Update (2010)

Page 1-2 in the handout

BASF

■ Vivando

- The a.i. is Benzophenone which has an efficacy against **Powdery Mildew** (PM). It showed to disrupt hyphae and spore formation of PM fungus. The product is due in June 2010 in CA. The rate is 10.3 fl oz/A, it has a protective activity of 14-21 days. The PHI is 14 days. It may be locally systematic.

Fungicide Update (2010)

Bayer

■ LUNA

- The a.i. is Fluopyram (group 7 Pyrimidins), which has an efficacy against **PM and Botrytis**. It has a protective activity and it moves systematically (probably locally systematic). Since the same a.i. has been used for post harvest application, PHI may be very short.
- **Luna Experience (Fluopyram + Tebuconazole)** is registered for grape

Fungicide Update (2010)

Syngenta

■ Inspire super 2.82SC

- It is Difenoconazole + Cyprodinil mixed material for **Powdery Mildew (PM)** control. It is aiming to be on the shelf by March 2010. It has preventative and curative characteristics; and rainfast after 2 hrs of application. Rate is 14-20 oz/A.

■ Quadris Top

- A Difenoconazole + Azoxystrobin combination material for **PM and Black Rot**. It is due sometimes in 2010. The rate is 8-15 oz/A.

■ Switch 62.5WG

- A Cyprodinil + Fludioxonil combination material for **Botrytis and sour rot**. It has been used for other crops such as strawberry, and it obtained supplemental label for grape Sept 2009. The rate is 11-14 oz/A.

Fungicide Update (2010)

Valent

■ Quash

- It is a Metconazole product for **PM**. It has been used in stone fruit production against variety of diseases.

Gowan

■ Torino

- The a.i. is Cyflufenamid (FRAC group U6 Amidoximes, no resistance risk information) , which is active against **PM**. It is not systematic, but shows a translaminar movement (vapor action) to improve coverage. The application rate will be 3.4 oz/A.
- There are some new mode of action; however, many are mixed product which as existing mode of actions.
- Please rotate the mode of action (not to be confused with product name – take a look at FRAC code on the label.)

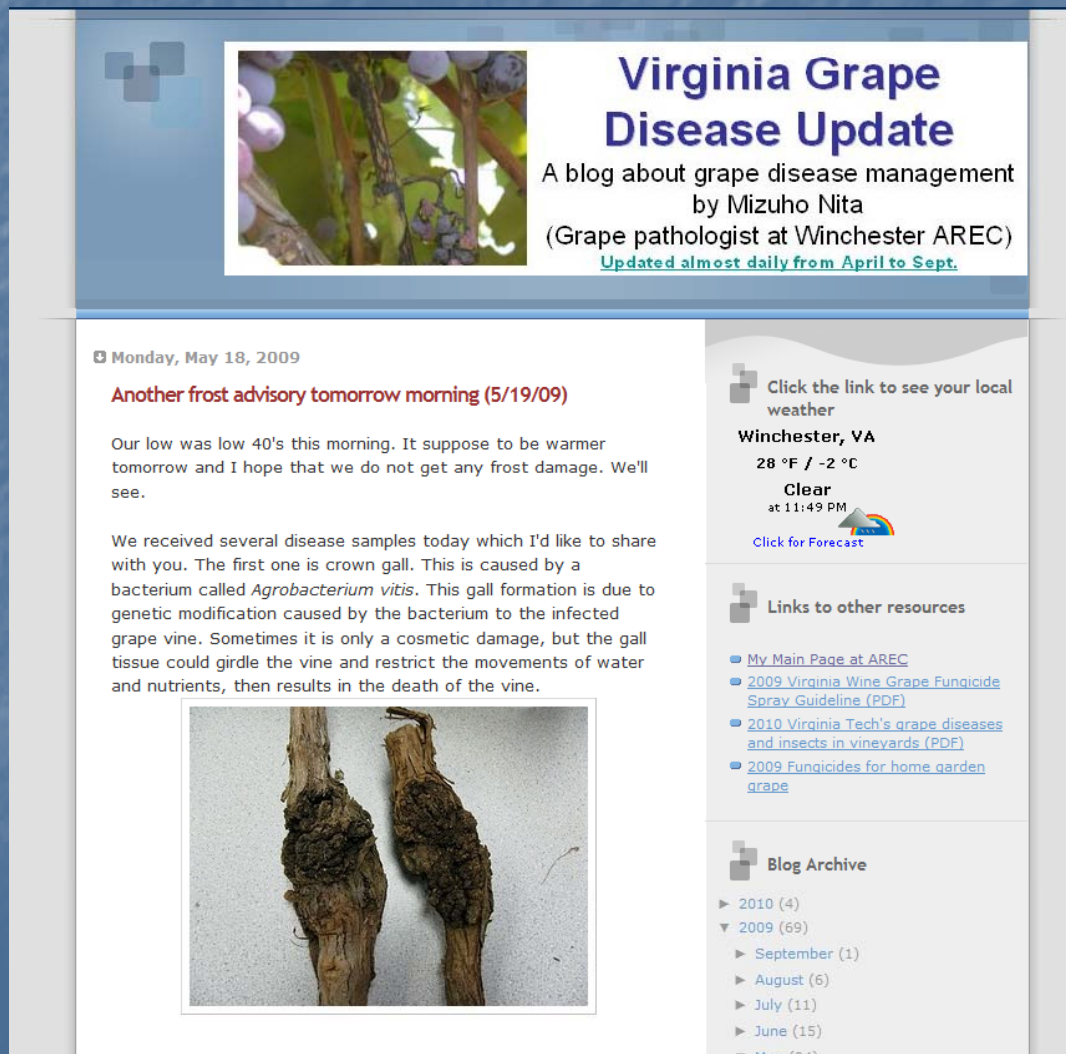
FRAC code



<http://www.frac.info/frac/index.htm>

Resources on Grape Disease Management

- My blog
 - Updated almost daily during the season
 - Please refer to my handout for URLs




Virginia Grape Disease Update
A blog about grape disease management by Mizuho Nita (Grape pathologist at Winchester AREC)
[Updated almost daily from April to Sept.](#)

Monday, May 18, 2009

Another frost advisory tomorrow morning (5/19/09)

Our low was low 40's this morning. It suppose to be warmer tomorrow and I hope that we do not get any frost damage. We'll see.

We received several disease samples today which I'd like to share with you. The first one is crown gall. This is caused by a bacterium called *Agrobacterium vitis*. This gall formation is due to genetic modification caused by the bacterium to the infected grape vine. Sometimes it is only a cosmetic damage, but the gall tissue could girdle the vine and restrict the movements of water and nutrients, then results in the death of the vine.



Click the link to see your local weather
Winchester, VA
28 °F / -2 °C
Clear
at 11:49 PM
[Click for Forecast](#)

Links to other resources



- [My Main Page at AREC](#)
- [2009 Virginia Wine Grape Fungicide Spray Guideline \(PDF\)](#)
- [2010 Virginia Tech's grape diseases and insects in vineyards \(PDF\)](#)
- [2009 Fungicides for home garden grape](#)

Blog Archive

- ▶ 2010 (4)
- ▼ 2009 (69)
 - ▶ September (1)
 - ▶ August (6)
 - ▶ July (11)
 - ▶ June (15)
 - ▶ May (21)

Resources on Grape Disease Management

- Fungicide application guideline
 - With pictorial keys for the target host stage

Growth stage or timing	Material and rate/acre	Comments
3- to 5-inch shoot or 7-10 days after the last spray 	Same as ½- to 1-inch shoot spray <p style="text-align: center;">----- Note -----</p> When you wonder about which fungicide to use, think about what was the primary problem in your vineyard, and also what is going on in this season. For example, if you had BR problems last year, and a weather forecast shows a warm rain event, you want to incorporate a fungicide against BR (such as Elite or Rally) and apply it before the rain.	Some of you start your program at this stage. Just remember that from 1-inch to 5-inch takes only a few days! Most of fungicides act only as protectants. Thus, in order to protect new growth from fungal infection, these materials need to be applied before the rain. 7-day interval application needs to be considered if: <ul style="list-style-type: none"> ▪ you are applying sulfur for PM (which does not require rain to infect tissue), ▪ PM has been a concern in your vineyard ▪ there has been a lot of rain since the last spray, or ▪ it is unusually warm, and shoots are growing rapidly. If rain is predicted between 7 and 10 days after your last spray, make another application before the rain.
6- to 10-inch shoot or 7-10 days after the last spray 	Same as ½- to 1-inch shoot spray	Please see above. To lower risk of fungicide resistance development, rotate the mode of action. In general, 2-3 sprays of a resistance-prone fungicide (3 for SI and 2 for strobilurin) per season are the maximum recommended. Please plan ahead. Refer to Table 2 for the mode of action, and read and follow the label.

Resources on Grape Disease Management

- Virginia Tech's Pest Management Guide
 - It covers not only diseases, but also insect and weeds

Diseases and Insects in Vineyards

Douglas G. Pfeiffer, Extension Entomologist, Virginia Tech

Anton B. Baudoïn, Plant Pathologist, Virginia Tech

J. Christopher Bergh, Extension Entomologist, Alson H. Smith Jr. AREC

Mizuho Nita, Extension Plant Pathologist, Alson H. Smith Jr. AREC

Additional information on pest and beneficial species identification is available online at <http://www.virginiafruit.ento.vt.edu/>.

Application rates: The rate per acre column gives rates for low-volume or concentrate applications. Sprays may be applied as semi-concentrate (40-100 gal/A) or concentrate (10-40 gal/A) sprays. Use caution with more concentrated sprays; the smaller droplet sizes associated with low-volume application are more prone to drift. Amount of pesticide to be applied for dilute applications (usually 100 gal/A early in early season, 200 gal/A in mid season, and 300 gal/acre in late season) is usually given on the label.

Table 3.1 - Disease and Insect Control

Pest	Chemical and Formulation	Rate/Acre	Spray Timing and Remarks
<i>Dormant</i>			
Anthracnose (Bird's eye rot), Powdery Mildew, Phomopsis	lime sulfur solution	10.0 gal	Only necessary where anthracnose, Phomopsis, or powdery mildew have been a serious problem. Lime sulfur can reduce overwintering inoculum of these diseases.
Mealybugs	Applaud 70DF	9.0-12.0 oz	If a problem at harvest in the previous year. If a delayed dormant spray does not provide a adequate control, a summer application may be made. Baythroid targets only crawlers. Movento prebloom only in table grapes.
	Venom 20SG	0.44-0.66 lb (foliar) 1.13-1.32 lb (soil)	
	Assail 30SG	2.5 oz	
	Provado Solupak	0.8-1.0 oz	
	Baythroid 2EC	2.4-3.2 fl oz	
	Movento 2SC	6.0-8.0 fl oz	
<i>Bud Swell</i>			
Grape flea beetle	Danitol 2.4EC or	8.0 fl oz	If adult beetles are present in damaging numbers. See Table 3.4 for Restricted Entry

Acknowledgement

- M. Kay Miller, Laboratory and Research Practitioner – III
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Questions?

