

Title: Improved Management of Bunch Rot Diseases on Vignoles

Viticulture Consortium East 2006 Progress Report

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Objectives: The overall objective is to improve the management of bunch rot diseases of Vignoles. The specific objectives are:

- 1) to evaluate various fungicide programs in small plots and demonstration blocks and
- 2) to survey vineyards of Vignoles at harvest throughout Missouri to determine the major bunch rot diseases present.

Summary of Major Accomplishments and Results:

Objective 1) To evaluate various fungicide programs in small plots and demonstration blocks.

Plots were established in Vignoles vineyards at Windymont Vineyards, Purdy MO and Stone Hill Winery, Hermann, MO in May, 2006 to evaluate 10 spray programs for the control of summer bunch rot diseases. Treatments were arranged in a completely random design with four single vine replicates. Treatments were applied with a Solo motorized backpack mist sprayer (Model 444) and were sprayed to the point of drip. Treatments began at bloom. Prior to this the plots were sprayed by the individual growers. The check received the early season grower applied sprays and two subsequent sprays of Stylet oil to control powdery mildew. No additional sprays were applied.

Treatments were evaluated just prior to harvest on August 14 (Stone Hill) and August 15 (Windymont). All clusters on each vine were visually examined for the presence of rots. Each cluster was scored for the presence of black rot, ripe rot, bitter rot, phomopsis, macrophoma, botrytis, sour rot and other rots and the percent of each cluster affected with each rot was estimated. Some fruit with undetermined rots were collected in each plot and sent to Dr. Sutton's laboratory at North Carolina State University to examine under a stereo microscope and culture, if necessary.

The results of the trials are found in Tables 1 and 2. Very little black rot, phomopsis, macrophoma or botrytis were found in any of the plots and these were included in the "other rot category". Also included in the other rot category were rots associated with bird or insect injury, sun scald, and minor bunch rot fungi including *Aspergillus* spp. and *Alternaria* spp. Little ripe rot was found at Windymont and little bitter rot at Stone Hill and they are included in the "other" category at these locations. The incidence and severity of rotten fruit was higher in the plot at Stone Hill than Windymont. The overall percent infected fruit in the treatments (product of % clusters affected x percent fruit affected/cluster) was 4-5% at Windymont and up to 13% at Stone Hill. The incidence of sour rot was high at each location ranging from 19 to 42% of the clusters affected at Windymont and 22 to 58% at Stone Hill. A significantly greater amount of rot did not develop in the check which may be a result of the hot dry weather during the summer.

There was considerable vine to vine variation which masked many of the treatment differences at each location. However numerically the treatments which included the 10-day spray application interval beginning at veraison were better than those that used a 14-day interval. At both locations captan-based treatments tended to give the best overall control. There did not tend to be any advantage to the use of the QoI fungicides Abound and Pristine compared to captan.

Vines at Windymont were scored for canopy density using several measures to try to account for some of the vine to vine variation in disease incidence and severity. Ratings included presence or absence of Esca, percent shoots oriented up, percent clusters above the cordon, percent visible clusters, percent fruit exposed, and average shoot length. These will be used in a covariant analysis to try to detect significant treatment differences.

Objective 2) To survey vineyards of Vignoles at harvest throughout Missouri to determine the major bunch rot diseases present.

Vignoles vineyards in several different areas of Missouri were surveyed between August 14-16. The vineyards surveyed included Site 1 –Augusta, MO, Site 2 –Hermann, MO, Site 3 – Columbia, MO, and Site 4 –St. James, MO. Ten vines were randomly selected from throughout the vineyard and all clusters on each vine were visually examined for the presence of rots. Each cluster was scored for the presence of black rot, ripe rot, bitter rot, phomopsis, macrophoma, botrytis, sour rot and other rots and the percent of each cluster affected with each rot was estimated. The incidence of clusters with rot ranged from 3.4% at Site 3 to 40.3% at Site 2 (Table 3). Overall the severity of the rot (% diseased clusters x % fruit affected/cluster) ranged from almost 6% at Site 2 to 0.2% at Site 3.

Changes to incorporate in the trial for 2007.

The considerable vine-to-vine variation masked the differences between treatments at the small plot spray trial locations. To overcome the problems presented by this variation, the number of single vine reps will be increased from four to six. Additionally, the short time period between the start of the 10- and 14-day interval spray timings and the commercial harvest of the vines at the two locations did not allow for the adequate evaluation of the effect of spray timing on rot development. In 2007 the different spray timings will be started beginning at bunch closing rather than at veraison.

List of Significant Outreach Activities

Preliminary results of the bunch rot disease survey were presented to growers in December 2006 at season wrap-up meetings of the Vineyard Best Management Practices Project at:

- Keels Creek Winery, Eureka Springs, AR – Dec. 4
- Tiger Ridge Restaurant, Ste. Genevieve, MO – Dec. 5
- Robller Vineyards and Winery, New Haven, MO – Dec. 6
- Les Bourgeois Winery, Rocheport, MO – Dec. 7

Detailed data may be obtained by contacting:

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APPENDIX

Impact Statement:

The occurrences of bunch rot disease organisms of grapes were determined in several areas of Missouri. Some of these were disease organisms that had not previously been reported in this area. *Botrytis* rot of grapes, caused by *Botrytis cinerea*, was not identified in any of the vineyards surveyed in 2006. This has important implications for bunch rot disease control programs in this region, which are often based on the use of expensive materials aimed at controlling *Botrytis* and which have limited or no effect on the organisms identified in this survey.

Publications and Presentations:

Allen, Andy. Results from 2006 Vignoles Bunch Rot Survey. Presentation at season wrap-up meetings of the Vineyard Best Management Practices Project. Dec. 4-7, 2006.

Keels Creek Winery, Eureka Springs, AR – Dec. 4
Tiger Ridge Restaurant, Ste. Genevieve, MO – Dec. 5
Robbler Vineyards and Winery, New Haven, MO – Dec. 6
Les Bourgeois Winery, Rocheport, MO – Dec. 7

Tables and Graphs:

Table 1. Results of different spray treatments and timings on bunch rots of Vignoles at Stone Hill Winery, Hermann, MO.

Stone Hill Vineyards Treatment		Rate/Acre	Application time ^{z,y}	Spray interval (days)	Ripe rot		Sour rot		Other rots		All rots	
					Clusters affected (%)	Fruit affected (%)	Clusters affected (%)	Fruit affected (%)	Clusters affected (%)	Fruit affected (%)	Clusters affected (%)	Fruit affected (%)
1	Mancozeb 3 lb + Sulfur 4 lb		1									
	Mancozeb 3 lb + Nova 4 oz		2									
	Mancozeb 3 lb + Elevate 1 lb		3,4									
	Captan 3 lb + Nova 4 oz		5,7									
	Captan 3 lb + Elevate 1 lb.....		6									
	Captan 4 lb + Endura 8 oz		8									
	Captan 4 lb.....		10									
	Captan 4 lb + Vanguard 10 oz		12	10	0.0	0.0	37.8ab ^w	17.3ab	9.4	3.5	47.2b	16.5
2	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt		8									
	Captan 4 lb + ProPhyt 1 qt.....		10									
	Captan 4 lb + Vanguard 10 oz + ProPhyt 1 qt		12	10	4.3	4.0	41.4ab	14.3ab	13.6	8.0	57.8ab	13.3
3	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt		8									
	Captan 4 lb + Topsin M 1 lb.....		10									
	Captan 4 lb + Vanguard 10 oz + Topsin M 1 lb		12	10	1.1	0.8	39.1ab	12.5ab	10.8	9.0	49.2ab	12.5
4	Abound 11 fl oz.....		5,12									
	Captan 4 lb + Endura 8 oz		8									
	Captan 4 lb.....		10	10	0.0	0.0	25.0a	9.3b	12.8	6.8	37.8b	10.0
5	Pristine 8 oz.....		5,12									
	Captan 4 lb + Endura 8 oz		8									
	Captan 4 lb.....		10	10	0.0	0.0	24.6a	10.0b	12.6	6.0	37.3b	10.3
6	Captan 4 lb + Endura 8 oz		9									
	Captan 4 lb		11	14	4.9	0.8	57.8a	22.0a	12.4	4.3	72.9a	18.8
7	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt		9									
	Captan 4 lb + ProPhyt 1 qt.....		11	14	0.0	0.0	34.2b	15.8ab	6.7	6.0	40.9b	15.8
8	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt		9									
	Captan 4 lb + Topsin M 1 lb.....		11	14	1.4	2.0	22.2b	13.5ab	13.5	6.0	35.7b	12.5
9	Abound 11 fl oz.....		5,11									
	Captan 4 lb + Endura 8 oz		9	14	1.0	5.0	25.2b	18.3ab	11.8	4.8	38.1b	14.8
10	Pristine 8 oz.....		5,11									
	Captan 4 lb + Endura 8 oz		9	14	0.7	1.0	29.0b	11.3ab	20.2	3.8	50.6ab	12.0
Check	Stylet Oil 1.5 to 2%		3,4,5 ^x	--	3.5	0.8	31.9b	17.0ab	14.8	4.8	48.7b	13.8
					NS ^v	NS			NS	NS		NS

^z Timing: spray 1 = 24 Apr, spray 2 = 4 May, spray 3 = 15 May, spray 4 = 30 May, spray 5 = 15 Jun, spray 6 = 29 Jun, spray 7 = 14 Jul, spray 8 = 24 Jul, spray 9 = 28 Jul, spray 10 = 3 Aug, spray 11 = 11 Aug, spray 12 = 13 Aug.

^y Time for application of sprays 1 to 7 same for all treatments except where listed.

^x Spray 5 was last spray for check.

^w Means within the same column followed by the same letter are not significantly different at P = 0.05 as determined by Waller-Duncan K-ratio t-test, with k-ratio = 100.

^v NS = no significant difference.

Table 2. Results of different spray treatments and timings on bunch rots of Vignoles at Windymont Vineyards, Purdy, MO.

Windymont Vineyards Treatment ^z	Rate/Acre	Application time ^{y,x}	Spray interval (days)	Bitter rot		Sour rot		Other rots		All rots	
				Clusters affected (%)	Fruit affected (%)	Clusters affected (%)	Fruit affected (%)	Clusters affected (%)	Fruit affected (%)	Clusters affected (%)	Fruit affected (%)
1	Mancozeb 3 lb + Sulfur 4 lb	1									
	Mancozeb 3 lb + Nova 4 oz	2									
	Mancozeb 3 lb + Elevate 1 lb	3,4									
	Captan 3 lb + Nova 4 oz	5,7									
	Captan 3 lb + Elevate 1 lb.....	6									
	Captan 4 lb + Endura 8 oz	8									
	Captan 4 lb.....	10									
	Captan 4 lb + Vanguard 10 oz.....	12	10	2.4	5.0	21.2	6.6	21.7	9.2	41.3	10.2
2	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt	8									
	Captan 4 lb + ProPhyt 1 qt.....	10									
	Captan 4 lb + Vanguard 10 oz + ProPhyt 1 qt.....	12	10	2.4	1.8	27.1	7.5	28.4	8.5	56.1	8.9
3	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt	8									
	Captan 4 lb + Topsin M 1 lb.....	10									
	Captan 4 lb + Vanguard 10 oz + Topsin M 1 lb	12	10	0.0	0.0	29.8	5.4	28.1	5.9	52.9	6.1
4	Abound 11 fl oz.....	5,12									
	Captan 4 lb + Endura 8 oz	8									
	Captan 4 lb.....	10	10	2.7	3.2	26.1	8.4	34.8	5.2	57.4	7.5
5	Pristine 8 oz	5,12									
	Captan 4 lb + Endura 8 oz	8									
	Captan 4 lb.....	10	10	4.1	1.0	31.3	8.2	34.1	9.8	61.1	9.9
6	Captan 4 lb + Endura 8 oz	9									
	Captan 4 lb	11	14	0.7	1.1	19.1	7.6	34.2	4.5	52.1	5.8
7	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt	9									
	Captan 4 lb + ProPhyt 1 qt.....	11	14	5.7	4.0	28.7	10.8	38.3	5.9	63.2	8.7
8	Captan 4 lb + Endura 8 oz + ProPhyt 1 qt	9									
	Captan 4 lb + Topsin M 1 lb.....	11	14	3.5	1.3	30.3	8.7	27.8	4.9	58.3	7.0
9	Abound 11 fl oz.....	5,11									
	Captan 4 lb + Endura 8 oz	9	14	6.5	4.7	37.1	6.4	30.1	6.8	65.7	8.3
10	Pristine 8 oz	5,11									
	Captan 4 lb + Endura 8 oz	9	14	10.0	4.2	33.1	10.6	22.0	7.2	55.4	10.7
Check	Stylet Oil 1.5 to 2%	3,4,5 ^w	--	5.0	6.2	42.1	8.5	19.5	6.9	57.7	9.7
				NS ^v	NS	NS	NS	NS	NS	NS	NS

^z Danitol 10.67 fl oz/A sprayed on 11 Jul.

^y Timing: spray 1 = 24 Apr, spray 2 = 4 May, spray 3 = 15 May, spray 4 = 30 May, spray 5 = 13 Jun, spray 6 = 27 Jun, spray 7 = 11 Jul, spray 8 = 21 Jul, spray 9 = 25 Jul, spray 10 = 31 Jul, spray 11 = 8 Aug, spray 12 = 10 Aug.

^x Time for application of sprays 1 to 7 same for all treatments except where listed.

^w Spray 5 was last spray for check.

^v NS = no significant difference.

Table 3. Results of survey of the incidence and severity of bunch rot diseases in Vignoles winegrapes at four locations in Missouri.

Missouri	Site 1		Site 2		Site 3		Site 4		All Vineyards	
DISEASE	Ave. % Dis. Clust.	Ave. % Disease	Ave. % Dis. Clust.	Ave. % Disease	Ave. % Dis. Clust.	Ave. % Disease	Ave. % Dis. Clust.	Ave. % Disease	Total Ave. % Dis Clusters	Total Ave. % Disease
black	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ripe	0.0	0.0	3.7	22.9	0.0	0.0	0.0	0.0	0.9	5.7
bitter	0.0	0.0	1.6	2.7	0.0	0.0	3.1	54.2	1.2	14.2
sour	1.0	0.4	19.9	11.3	2.9	5.7	3.7	10.0	6.9	6.9
phomop	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
macro	0.0	0.0	0.7	0.2	0.0	0.0	0.0	0.0	0.2	0.1
botrytis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other	34.9	9.2	17.4	14.8	0.5	0.5	0.1	0.1	13.2	6.2
all	35.9	9.2	40.3	14.8	3.4	5.8	6.7	62.7	21.6	23.1