Lodi Woodbridge Wine Commission
Yearly Report
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Project Title: Evaluation of fanleaf-resistant rootstock selections for use in the Lodi/ Woodbridge region

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Status of Proposal: First year

Objectives:

1. Determine the ability of *V. rupestris* x *M. rotundifolia* selections planted in a Lodi trial to induce tolerance to GFLV.

2. Evaluate the vegetative and fruiting characteristics of Viognier grafted to the above rootstock selections in a Lodi trial.

3. Evaluate the nematode populations at the Lodi trial site so that correlations between vine performance and pest pressure can be made.

OBJECTIVE 1

Experimental Procedures:

The Lodi plot was planted in cooperation with Stanton Lange in June 1998. It was set up with 5 single-vine replicates in a randomized complete block design. The standards were planted with 5 six-vine replicates. The test plants were planted in between St. George rootstock so that the nematode/virus inoculum would remain high and to give a better chance for even distribution of disease across the plot. These plots were designed to get the most information about the field performance and resistance of a large number of selections. However, viticultural performance information in the presence of GFLV will take some time with natural infection. Thus, GFLV infected buds were chip-budded into the vines in May 2001 and again in late March 2002. We expect to see evidence of fruit and vine symptoms by Fall 2002 and strong symptoms by Fall 2003. The rootstock selections are listed in Table 1.

ELISA and PCR will be used to monitor infections. Past experience suggest that symptoms on the fruit and vine will become evident in the following season and intensify from that time. Infection will be monitored by sampling new buds in the spring (the most reliable sampling tissue). For the first two years after budding, dormant wood samples will be taken to monitor GFLV infection in addition to the Spring sample.

Progress: As reported earlier all of the experimental vines have been chip-bud inoculated twice with GFLV. Bud and shoot tip samples were taken in May 2003 and are frozen in buffer awaiting ELISA assay.

OBJECTVE 2

Experimental Procedure: Measurements of rootstock selection effect on vegetative growth will include: pruning weights; number of buds retained; relative time of bud break; number of suckers removed (non-count shoots); shoot lengths; and estimates of leaf area. Measurements of rootstock selection on fruiting will include: relative time of flowering; relative time of veraison; relative time of maturity; crop weight; number of clusters; average berry weight; calculated number of berries; °B, pH and TA.

Progress: We harvested a second year of yield data (Table 1). Fanleaf will be most directly measured in the crop weights. Table 1 is sorted by the 2002 yield per vine data and shows a wide range of values. 3309C was low yielding as expected, but so was O39-16, which may reflect Ring nematode damage or weak plants. St. George was in the middle of the group and may not yet be displaying effects of nematode feeding. This year's data should begin showing the effects of GFLV infection. The cluster numbers mirrored the yield per vine data closely, as expected. There were a few selections that changed ranked dramatically, but these are most cases of vines that were maturing more slowly and are now balancing out.

During the last two years we have missed getting the pruning weights due to miscommunication between the vineyard owner and ourselves. We collected pruning weights this year, but these values were taken after pre-pruning. This should have resulted in a relatively constant effect, but the shoots near the stakes were not pre-pruned and we tried to simulate that effect by discarding the portion of the cane above the pre-pruning zone. These data are presented in Table 2. We also went through and recorded four spur caliper measurements per vine and correlated these values with the pruning weights in an effort to get a more complete estimate of vine growth for last year. However, these values varied widely and did not correlate with this year's pre-pruned pruning weights. There were no significant differences among selection pruning weights further indicating that the data were too variable.

We recorded bud-break data on April 12, 2003 (Table 2). These data were taken from the same spurs that were measured for the caliper data mentioned above. There was a high degree of variation in these values that prevented statistically significant differences. A few of the selections appeared to be either very early or late and it will be interesting to note whether these trends occur next year.

We took berry samples during the Fall 2002 harvest and determined °Brix, pH and titratable acidity per selection and compiled the data as average values in Table 3. These samples will be taken on an individual vine basis this year (Fall 2003). We recorded a wide range in °Brix and TA values that indicate variation in ripening. These trends lay the foundation for this year's data.

OBJECTIVE 3

Experimental Procedure: Each test vine in the plot will be sampled for the presence of *X. index* and root-knot nematodes, as well as other grape parasitic nematodes such as ring and pin. A soil sample will be taken from within the drip zone of the nematode susceptible St. George by scrapping away about 15 cm of soil and taking about 1 liter of soil with roots. Samples will be run in cooperation with Howard Ferris, Dept of Nematology. The Walker lab currently collaborates with them on a nematode resistance evaluation project.

Progress: We took nematode samples from 50 randomly selected sites in the plot. These were analyzied for the presnece of *Xiphinema index* (dagger nematode vector of GFLV), *X. americamum* (very common and related species but has little effect on grape) and *Mesocriconema xenoplax* (the ring nematode). 40 of 50 collection had X. index; 42/50 had X. americanum; and 40/50 had ring nematode. All three were scattered evenly across the plot and although extracted numbers were low (generally between 5 and 25 per 500ml of soil) root damage from feeding was evident in all the samples.

Table 1. Ranking of rootstock selections in the Lodi Viognier trial by mean crop weights from 2002. Xi represents *Xiphinema index* resistance (R=resistant, S=susceptible, MS=moderately susceptible, HS=highly susceptible).

				Cluster Numbers		Crop Weights (kg)	
Selection	Parentage	Xi	Rep	2001	2002	2001	2002
8921-01	solonis x rot	R	3	NC	21 a	NC	2.67 a
8911-02	rup x rot	R	5	24 ab	26 ab	6.72 ab	4.04 ab
c3309	rip x rup	S	30	18 a	32 ab	4.79 a	4.57 ab
O39-16	vin x rot	R	30	22 a	41 abc	7.60 ab	5.83 abc
8911-04	rup x rot	MS	5	36 ab	43 abcd	6.99 ab	5.89 abcd
8912-04	rup x rot	MS	5	13 a	51 abcdef	3.67 a	6.46 abcdef
L514-30	rufo x rip x champ	R	5	NC	46 abcde	NC	6.52 abcde
L513-4	rufo x rip	R	4	NC	41 abcd	NC	6.64 abcdef
8913-09	rup x rot	MS	5	37 abcd	52 abcdef	8.47 abc	7.39 abcdef
8917-03	rup x rot	R	5	25 ab	53 bcdef	8.44 abc	8.36 abcdefg
8913-08	rup x rot	MS	5	NC	56 cdef	NC	8.45 bcdef
8911-01	rup x rot	R	4	28 abc	61 def	7.07 ab	8.46 bcdefg
8916-19	rup x rot	R	5	36 abcd	59 cdef	11.41 abc	8.53 bcdefgh
8918-13	rup x rot	R	4	37 abcd	55 cdef	11.42 abc	9.15 bcdefgh
8913-21	rup x rot	R	5	31 abcd	54 cdef	8.74 abc	9.33 cdefgh
St. George	rup	HS	30	34 abcd	60 def	9.79 abc	9.41 defgh
8912-02	rup x rot	S	5	31 abcd	62 def	8.40 abc	9.58 defgh
8916-32	rup x rot	R	5	37 abcd	67 def	10.71 abc	9.59 defgh
8917-04	rup x rot	R	5	30 abcd	66 def	11.23 abc	10.43 defgh
8925-15	berl x rufo	MS	4	36 abcd	67 def	9.80 abc	10.56 defgh
8916-27	rup x rot	R	5	24 ab	60 def	6.82 ab	10.64 defgh
8916-04	rup x rot	R	5	31 abcd	63 def	13.90 abc	10.67 defgh
8909-04	rup x rot	R	5	24 ab	69 def	4.88 a	10.96 efgh
8918-11	rup x rot	R	5	26 ab	70 def	9.04 abc	11.01 efgh
8916-22	rup x rot	R	5	40 abcd	64 def	15.40 c	11.12 efgh
8925-31	berl x rufo	R	5	44 bcd	71 def	11.85 abc	11.30 efgh
8916-20	rup x rot	R	5	23 a	71 ef	5.11 a	11.54 efgh
8904-04	rup x rot	R	5	32 abcd	71 def	9.76 abc	11.68 efgh
8916-25	rup x rot	R	5	32 abc	67 def	10.84 abc	11.85 fgh
8916-31	rup x rot	R	5	47 cd	70 def	15.65 c	12.06 fgh
8916-16	rup x rot	R	5	48 cd	74 ef	15.02 bc	12.07 fgh
8920-01	solonis x rot	MS	5	40 abcd	74 ef	13.24 abc	12.16 fgh
8916-07	rup x rot	R	5	50 d	77 f	14.10 abc	12.17 fgh
8908-02	rup x rot	R	5	31 abcd	72 ef	10.12 abc	12.55 gh
8913-02	rup x rot	R	5	33 abcd	73 ef	10.83 abc	12.85 gh
8913-38	rup x rot	R	5	42 abcd	78 f	14.40 abc	13.59 h

Values followed by the same letter are not significantly different based on Duncan's Multiple Range mean separation ($p = 0.5$)

Table 2. Pruning weight and bud-break data from the Lodi Viognier fanleaf trial. Bud break data were recorded on April 12, 2003 from four spurs of each vine and rated in the following way based on the length of the pushed shoots: 1=0.1-0.3cm ; 2=0.4-0.6cm; 3=0.7-1.0cm; 4=1.1-1.3cm ; 5=1.4-1.6cm ; 6=1.7-2.0cm ; 7=2.1-2.3cm ; 8=2.4-2.6cm; 9=2.7-3.0cm.

Selection	Parentage	Xi	Rep	Pruning Wt (kg)	Bud break
8921-01	solonis x rot	R	3	0.08 a	3.00
8911-02	rup x rot	R	5	0.19 a	3.36
c3309	rip x rup	S	30	0.23 a	2.75
8912-04	rup x rot	MS	5	0.25 ab	2.10
L513-4	rufo x rip	R	4	0.29 ab	2.52
8913-08	rup x rot	MS	5	0.32 ab	3.64
8911-04	rup x rot	MS	5	0.33 ab	2.60
O39-16	vin x rot	R	30	0.33 ab	2.79
8911-01	rup x rot	R	4	0.37 abc	2.04
8920-01	solonis x rot	MS	5	0.39 abcd	2.36
8913-09	rup x rot	MS	5	0.46 abcde	2.76
8904-04	rup x rot	R	5	0.47 abcde	3.05
8925-15	berl x rufo	MS	4	0.51 abcdef	2.70
8918-13	rup x rot	R	4	0.51 abcdef	2.20
St. George	rup	HS	30	0.54 bcdef	2.72
8912-02	rup x rot	S	5	0.55 bcdef	2.12
8913-38	rup x rot	R	5	0.57 bcdef	2.44
8913-21	rup x rot	R	5	0.62 bcdef	2.80
8913-02	rup x rot	R	5	0.62 bcdef	2.12
8918-11	rup x rot	R	5	0.64 bcdef	2.12
8916-27	rup x rot	R	5	0.65 bcdef	2.96
8917-03	rup x rot	R	5	0.66 bcdef	2.84
8916-32	rup x rot	R	5	0.66 bcdef	2.67
8916-25	rup x rot	R	5	0.67 bcdef	2.44
8917-04	rup x rot	R	5	0.67 bcdef	2.28
8916-31	rup x rot	R	5	0.69 bcdef	2.20
8916-19	rup x rot	R	5	0.70 bcdef	2.90
8909-04	rup x rot	R	5	0.71 bcdef	2.88
L514-30	rufo x rip x champ	R	5	0.71 bcdef	2.30
8916-20	rup x rot	R	5	0.80 cdef	2.84
8916-16	rup x rot	R	5	0.84 defg	1.68
8916-22	rup x rot	R	5	0.88 efg	3.68
8925-31	berl x rufo	R	5	0.89 efg	3.24
8916-04	rup x rot	R	5	0.91 efg	1.85
8908-02	rup x rot	R	5	0.97 fg	2.80
8916-07	rup x rot	R	5	1.255 g	2.04

Values followed by the same letter are not significantly different based on Duncan's Multiple Range mean separation (p = 0.5)

Table 3. Juice data from the Lodi Viognier fanleaf plot sorted by °Brix readings.

Selection	Avg Brix	Avg pH	Avg TA (g/L)
8912-02	20.38	3.35	5.16
8920-01	20.78	3.47	4.84
8912-04	21.18	3.37	5.16
8909-04	21.38	3.35	5.16
St. George	22.04	3.56	4.68
O39-16	22.07	3.65	5.35
8913-38	22.38	3.32	5.65
8913-02	22.58	3.44	4.68
8916-31	22.58	3.48	5.00
8913-08	22.78	3.42	5.16
8916-19	22.81	3.93	5.00
8913-09	23.18	3.53	4.52
c3309	23.31	3.48	5.41
8916-32	23.31	3.53	4.36
8925-15	23.38	3.45	4.84
8911-02	23.45	3.49	4.68
8904-04	23.58	3.32	5.49
8916-16	23.58	3.36	5.49
8911-04	23.65	3.46	4.84
8918-13	23.78	3.49	5.00
8913-21	23.98	3.50	4.52
8908-02	24.38	3.54	4.68
8916-27	24.38	3.56	4.36
8917-04	24.38	3.46	5.16
8918-11	24.38	3.43	5.00
8921-01	24.38	3.4	5.16
8916-25	24.58	3.44	5.00
8925-31	24.58	3.5	5.00
8916-20	25.18	3.56	5.33
8917-03	25.18	3.51	5.00
8916-04	25.58	3.53	4.84
8916-07	25.78	3.70	4.84
L513-4	25.98	3.56	5.00
L514-30	26.38	3.53	5.33
8916-22	27.38	3.74	4.84
8917-08	na	na	na
8925-11	na	na	na

Table 4. Results of nematode testing done at the Lodi plot. We tested 50 soil samples from the St. George interplants to determine the abundance and diversity of nematode types at the Lodi plot. Very few root-knot nematodes were found, but we found *Xiphinema index* (XI), *X. americanum* (XA) and *Mesocriconema xenoplax* (ring nematode (RI)). Only three of the samples were negative for all three species.

R/V	1	2	3	4	5	6
1	XI/XA/ RI					
3		XI				
5			XA/RI			
7						XI/XA/ RI
9	O/O/O	XI/XA/RI		XI / RI		
13			XA// RI			
15		XI/XA/RI				
17						XI/XA/RI
19			XI/XA	XA/RI		
21	XI/XA					
23					XI/XA/ RI	
25		XI/XA/RI				
27						XI/XA/RI
29		XI/XA/RI				
31	XI/.XA/RI				XA/RI	
33						XI/XA/RI
41	XI/XA/RI	XI/XA/RI			XI/XA	
43						XI/XA/RI
45				XI/XA/RI		
49		XI/RI		XI/RI		XI/XA
51	XI/XA/RI				XI/XA/RI	
57				O/O/O		
59						XA
61	XI/XA/RI		XA/RI		XI	
63		XI/XA/RI		XI/XA/RI		
65						XI/XA/RI
67		XI/XA				
69				XA		
75			XI/XA/RI			
77	XI/XA/RI			XI/XA/RI		O/O/O
81		XI/XA/RI				
83			XI/XA/RI		XI/XA	
89		XI/XA	XI/XA/RI			XI/XA/RI