Annual Report 2004

Evaluation of Wine Grape Cultivars and Selections for a Cool Maritime Climate

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Summary

In 2004 the weather conditions in the beginning of the season were good, but became more challenging a month prior to harvest. Incomplete set on some varieties was a problem with two factors. First, early bud break and early warm spring weather created conditions for rapid shoot growth. This in turn caused a larger carbohydrate demand at the shoot tip, which we believe competed as a carbohydrate sink with the new blooms. The result was a reduced or incomplete set in some varieties. The second factor appeared to be an instance of early bunch-stem necrosis (EBSN). The causes of this physiological disorder are not fully understood, but it is characterized by sections of the bunch that shrivel up and dry shortly after bloom. Insufficient boron spray applications might have exacerbated the EBSN problem. In Pinot Noir (clone 2A) grown on rootstocks there was very little evidence of either problem in comparison with self rooted plants. Some varieties (e.g. St. Laurent, Siegerrebe) were more severely affected and lost part or all of the crop.

August and September are usually seen as the predictably dry months. However, in 2004 9.75 inches of precipitation were recorded in those 2 months, compared to the 40-year average of 3.47 inches for this period. This resulted in high potential for rot infection. Vines trained to the VSP and Scott-Henry systems had clusters exposed early, approximately 2 weeks after berry set, and suffered little or no rot at either the Mount Vernon or the Everson locations. Rot was not a problem on most cultivars and the Pinot Noir clones were able to remain hanging on the vines until mid October with very little rot. At the Mount Vernon site 1817 AHU were recorded and 2075 AHU at Everson (to October 31, 2004).

A full crop was produced from most of the trial plots at Mount Vernon and Everson. In the main replicated plots, cultivars vinified in 2004 included varietal wines from both red and white wine cultivars, as well as some blends. This includes the wine from the replicated Pinot Noir rootstock trial, which was reduced in 2004 to the 3 most promising rootstocks plus self rooted control, and used for cultural studies (See Wine List, below.)

After seeing results of the rootstock trials in 2002 and 2003, new planting in 2004 included additions to the pretest and an advanced (replicated) cultivar trial grafted to one of the 3 promising rootstocks. This trial includes standards like Madeleine Angevine, Siegerrebe and Pinot Noir along with promising cultivars from the pretest and main trial. Most of these were planted in spring 2004 and should begin fruiting in 2005-2006, if funding is maintained. Aim of this trial is to see whether the rootstock effects observed in Pinot Noir 2A will also carry over to other varieties.

Collecting and analyzing harvest data and producing wines for evaluation continued in 2004. Cooperation of area winemakers is engaged in the post-harvest evaluation of varieties suitable for wine production (see Discussion & Recommendations, below.) Individual wines are being made from grapes of Pinot Noir 2A. Evaluation of the 2003 wine crop is estimated for winter of 2004, and the 2004 wine crop is in process of vinification.

Methods

Data collection in this trial consists primarily of weekly sampling of fruit as harvest season approaches, and laboratory analysis of the juice to determine brix, pH and titratable acid. Berry sampling is done by taking 10 berries from each plant for a sample of 50 berries from each 5-plant replicated plot in the rootstock and cultivar trials. Each plot is replicated 3 times. (In the pretest plots with only 3 plants per cultivar, berry samples are collected from all 3 plants.) At harvest, yield of each plot is weighed and juice samples are collected for analysis as the grapes are being crushed.

Project categories

1. Cultivar Trials

The trial initiated in 2000 presently consists of about 35 cultivars, selections, and clones with predominant emphasis on red wine production (see Appendix, **Table 1**). Plot design is a randomized block of 3 replications, with 5 plants per replication. At the Mount Vernon site, row spacing is 10' rows with 6' between plants. At Everson the spacing is 9' rows with 5' between plants.

In 2004 an advancedcultivar trial on selected rootstocks was begun at Mount Vernon consisting of 3 replications, with 5 plants per replication, spaced in 8' rows with 5' between plants: Rootstocks are Millardet et de Grasset 101-14 and Couderc 3309. Cultivars are Agria, Dornfelder, Dunkelfelder, Garanoir, Leon Millot, Madeleine Angevine, Optima, Ortega, Pinot Gris [Ruhlander clone], Pinot Noir 777, Regent, Reichensteiner, Schonburger, Siegerrebe and Sylvaner, all of which have performed well at the trial sites. Additional plantings in the rootstock block include several more Pinot Noir clones and Pinot types on the rootstocks Couderc 3306 and Millardet et de Grasset 101-14.

2. Pretest

The pretest (see Appendix, **Table 2**) screens potential cultivars, to determine if they should be added to the main replicated trial, from which varietal wines can be produced for evaluation. The pretest consists of 3 plants per cultivar, replicated once. Promising grapes from the pretest will be multiplied, replicated and added to the main trial. Some promising cultivars or clones advanced to the main trial in 2004 are Optima, Ortega, Pinot Gris [Ruhlander] and Reichensteiner.

3. Rootstock Trial

The rootstock trial was downsized in 2004 from 7 rootstocks to the 3 best performing rootstocks (from data and observations 2001-2003). It now consists of Pinot

Noir 2A grafted on the 3 most promising rootstocks (C3309, 101-14 and 420A) plus a self rooted control. Each rootstock is evaluated for its effect in terms of maturity, yield, and quality compared with self rooted plants. Replications consist of five plants on each rootstock, replicated three times at the Everson plot and five times at the Mount Vernon plot (see Appendix, **Table 3**).

4. Cultural Studies

1. *Spacing* – In 2003, a vine spacing trial was initiated, consisting of replicated plots at 8' spacing between rows, with in-row spacing at 4', 6', 8' and 10' to evaluate the effect of various spacings on vine vigor, canopy management, production efficiency and overall vine balance. Cultivars included in the trial are Agria, Dornfelder, Dunkelfelder, Pinot Noir 777 and Zweigelt.
2. *Plastic row shield* – Once again in 2004 some cultural experiments were conducted in the Pinot Noir rootstock block planted in 2000. In the first trial, a 3' wide sheet of clear plastic was hung on the west side of the row in April and retained until harvest. The sheet extended 1 ½' above and 1 ½' below the lateral canes (fruiting area.) Fruit from this row was compared with the control (no plastic) to examine possible effect in advancing ripeness.
3. *Scott-Henry training system* – In 2004 a trial row was selected in the Pinot Noir rootstock block and trained in the Scott-Henry (S-H) system which trains two cane tiers, half the shoots trained upward and half downward. Fruit from this row was compared with the control row which was trained in the standard Vertical Shoot Positioning (VSP) system.
4. *Ethrel application* – To test the effect of Ethrel application in mid season as an aid in canopy management, a trial row was selected in the Pinot Noir rootstock block and material applied to the canopy area by backpack sprayer. On July 23, 2004 an application of 10 ml/gal (approx. 100gal/A) was made to the test row, applied only to the leafy canopy. On August 18 the same material was reapplied at the same concentration to both leaves and fruit clusters. Fruit from this row was compared with the control row which did not receive any Ethrel applications.
5. *Delayed fruit harvest* – On October 14, 2004 fruit samples were taken at harvest from plots in the control row of the Pinot Noir rootstock trial. In one row the fruit was left hanging and plants monitored for any disease (rot). This allowed harvest to be delayed until October 27. Comparison was made between juice samples taken at harvest in the control row with those taken in the late harvest row to see what changes occurred over time in brix, pH and titratable acid.

Results

1. Cultivar trials

Harvest data from 2004 are shown below.

Table 1. Cultivar trial, Mount Vernon (1817 AHU) – Harvest date, average pH, brix, titratable acid and fruit yield, in harvest order (W=white)

Cultivar	Harvest	avg brix	% t. acid	Yield (lbs/plant)
Burmunk (W)	9/10	18.6	0.98	4.83
Iskorka (W)	9/10	21.5	0.60	4.90
Agria	10/4	19.8	0.62	4.63
Garanoir	10/4	17.9	0.75	7.10
Regent	10/4	21.2	0.72	2.40
Sylvaner (W)	10/4	15.5	0.80	11.62
Schonburger (W)	10/4	16.2	0.75	1.81
Dunkelfelder	10/4	17.5	0.98	4.34
Zweigelt	10/4	19.5	0.95	10.98
Dornfelder	10/4	16.0	0.77	14.37
Nero	10/4	20.0	0.89	5.50
Golubok	10/14	21.8	1.05	3.06

Table 2. Cultivar trial, Everson (2075 AHU) – Harvest date, average pH, brix, titratable acid and fruit yield, in harvest order (W=white)

Cultivar	Harvest	avg brix	% t. acid	Yield (lbs/plant)
Agria	10/2	20.1	0.42	4.98
Dornfelder	10/2	17.6	0.62	6.29
Dunkelfelder	10/2	17.2	0.62	6.29
Zweigelt	10/2	17.1	0.65	6.38
Regent	10/5	21.9	0.66	2.71
Schonburger (W)	10/5	19.0	0.38	2.09
St. Laurent	10/5	18.6	0.65	3.33
Garanoir	10/5	18.1	0.42	4.17

2. Pretest

Harvest data from the pretest (3 plants/plot) 2004 are shown below.

Table 2. Pretest cultivars, Mount Vernon – Harvest date, brix, titratable acid and fruit yield (in harvest order, R = red wine cultivar)

Cultivar	Harvest	avg brix	% t. acid	Yield (lbs/plant)
Perle of Csaba	9/10	19.0	0.53	5.18
Pinot Precoce (R)	9/17	17.4	0.92	3.18
Madeleine Angevine	9/21	19.7	0.70	8.30
Ortega	9/21	20.1	0.70	5.52
Optima	9/24	17.8	0.77	6.04
Muscat [Norway] (R)	10/04	19.3	0.74	3.29
Reichensteiner	10/04	20.0	0.87	2.89
Auxerrois cl. 22 GM	10/04	18.1	0.69	5.24
Pinot Gris [Ruhlander]	10/04	18.8	0.86	4.03
Muller-Thurgau	10/04	18.1	0.71	9.10
Kerner	10/06	18.0	1.19	6.45
Regner	10/14	20.3	0.87	---
Liza	10/14	19.8	1.25	---
Rani Riesling	10/14	19.8	1.05	---
Gamay Chaudenay (R)	10/14	17.4	1.41	---
Toldi	10/14	14.0	0.88	---
I 31-67	10/14	19.6	0.67	---
Plai	10/14	18.0	1.07	---
Viorica	10/14	17.4	1.10	---
Laurot	10/14	18.1	0.97	---
Petra	10/14	20.0	1.08	---
Bianca	10/14	18.4	0.98	---
Pinot Noir 777	10/27	18.3	0.84	2.90

Mostof the cultivars and selections in the pretest produced enough fruit for evaluation in 2004, and several of them yielded enough for wine making in either single varietals or blends, when crops from Mount Vernon and Everson plots were combined. Some varieties lost most of their fruit due to the physiological disorder EBSN (see Discussion for detailed remarks.) Cultivars were evaluated for their performance, and those that did not do well were scheduled for discard.

3. Rootstock Trial

The Pinot Noir trial was harvested on October 14, 2004 and the juice analyzed with results shown below.
Table 3. Rootstock trial – Mount Vernon 10/14/04 – Average brix, pH, titratable acid, cluster size and fruit yield (in ascending order by titratable acid)

Rootstock	brix	pH	% t.a.	Cluster size (gms)	Yield (lbs/plant)
101-14	19.7 a	3.10 a	0.94 b	104	3.99
C3309	19.7 a	3.11 a	0.90 b	127	3.72
420A	20.1 a	3.13 a	0.92 b	104	4.34
self rooted	18.0 b	3.00 b	1.26 a	95	2.69*

*In 2004, empty or partial clusters may have resulted from two possible causes, 1.) competition for critical nutrients by rapidly growing shoot tips at bloom time and 2.) EBSN. Set was affected more in self rooted Pinot Noir than on rootstocks.

4. Cultural Studies

1. *Spacing* – Though some fruit was produced in these plots in 2004, it was insufficient to provide data of any significance.

2. *Plastic Row Shield* - Analysis of juice from vines with plastic shield vs. no plastic is shown below.

Table 5. Plastic shield trial 2004

Treatment	brix	pH	% t.a.	Cluster size (gms)	Yield (lbs/plant)
plastic	20.0	3.08 a	0.90	127	4.08
no plastic	19.4	3.05	0.98	118	4.88

3. *Scott-Henry Training System*
Table 6. Scott-Henry training system compared with Vertical Shoot Positioning (VSP)

Treatment	brix	pH	% t.a.	Cluster size (gms)	Yield (lbs/plant)
Scott-Henry	19.5	3.06	0.92 b	213	8.12
VSP	19.4	3.05	0.98 a	118	4.08

4. *Ethrel application*
Table 7. Ethrel application trial 2004

Treatment	brix	pH	% t.a.	Cluster size (gms)	Yield (lbs/plant)
Ethrel	20.6 a	3.18 a	0.86 b	118	4.18
untreated	19.4 b	3.05 b	0.98 a	114	4.08

5. Delayed fruit harvest – Analysis of juice from the Pinot Noir plot sampled on October 14, 2004 was compared with juice sampled on October 27, 2004. Data were averaged for all plots harvested on each date and results are shown below.
Table 8. Fruit samples 10/14/2004 and 10/27/2004

Harvest date	brix	pH	% t.a.
10/14/2004	19.4 b	3.05 a	0.98 b
10/27/2004	20.0 a	2.85 b	1.30 a

Discussion

Inthe rootstock trial, juice from Pinot Noir 2a grafted on Millardet et de Grasset 101-14, Millardet et de Grasset 420A and Couderc 2209 rootstocks had significantly lower TA levels and higher brix and pH readings than that from self rooted plants. Cluster weight varied and some differences were significant. Results from 2004 are consistent with data from previous years in showing that these 3 rootstocks are effective in advancing maturity of Pinot Noir compared to self rooted plants.

As noted above, yields of self rooted plants were most adversely affected by defective set which we believe is due to a combination of factors. Competition with shoot tip growth at bloom time for essential nutrients can result in uneven berry set. This was also seen in grafted plants but at a much lower level. The second possible factor, early bunch-stem necrosis (EBSN) is described in *The Production of Grapes & Wine in Cool Climates* (Jackson and Schuster, 1997, p. 118.) EBSN as illustrated there appears identical to the damage seen in the Mount Vernon trial plots, (**shown in photo at left**) particularly with certain varieties such as St Laurent and Dunkelfelder. Jackson writes that "EBSN causes sections of the bunch to shrivel and dry so the bunch ends up with fewer branches. EBSN is exacerbated by stress factors such as poor nutrition, drought prior to capfall, and severe shade around the bunches. Cool overcast and wet weather will also enhance the disorder." Causes of ESBN are not well understood, but in this case a deficiency of Boron at early bloom seems the most likely contributing factor.

A number of cultural experiments were carried out in the Pinot Noir trial plot in 2004. The effect of installing a plastic row shield in April was again compared to a control row of unshielded plants.The juice from plants shielded by plastic row cover showed significantly higher pH levels and also showed higher levels of brix and lower titratable acid. Due to overall warmer conditions and earlier harvest in 2004, the differences between plastic and no plastic treatment were not statistically significant (5% level) except for pH. As in previous years the plastic row shield advanced fruit maturity, but not as significantly as in 2003.

Another cultural trial involved converting one row from the standard Vertical Shoot Positioning (VSP) system to the Scott-Henry system described above. The Scott-Henry system produced nearly double the yield without any significant effect on the brix or pH. Titratable acid levels showed significant differences (0.90 for the VSP trained plants vs. 0.98 for Scott-Henry). It will be interesting to continue this comparison in a cooler year to see the effects of heavier production in the Scott-Henry on maturity and quality.

Use of Ethrel applications in July and August was tested for reduction of shoot growth. In the row given Ethrel application, juice brix and pH were significantly increased, and titratable acid reduced. A reduction in top growth of new shoots was observed in the canopy of the treated row. This suggests that use of Ethrel applications in canopy management has some potential for saving of labor and expense by reducing the amount of hedging etc. needed in the canopy.

In thetest of fruit hanging time, one row was left on the vine approximately two weeks after the standard harvest (October 14 vs October 27), and juice from those vines compared with the juice characteristics of the fruit picked earlier. Later harvest fruit had significantly higher brix and for unexplained reasons, significantly higher titratable acid and significantly lower pH levels.

Recommendations

Results of the trials to date have clearly shown that high quality wine grapes can be grown in western Washington, given careful choice of the appropriate varieties and rootstocks, and selection of a good site. After selecting a suitable area for establishing the vineyard, take soil tests and amend the soil as needed. Many soils

tend to be low in potash, magnesium and calcium. Monitor heat unit accumulation from April 1 – October 31, using an Avatel, Hobo or similar recording device.

Most of the plots in the trial produced sufficient fruit both for sample tests and for wine making. Evaluations over the past 3 years have produced new promising cultivars, along with some established standard varieties.

RED

Agria
Dornfelder
Dunkelfelder
Garanoir
Golubok
Leon Millot
Muscat of Norway
Pinot Noir (clones)
Regent
Zweigelt

WHITE

Burmunk
Iskorka
Madeleine Angevine
Optima
Ortega
Pinot Gris [Ruhlander]
Reichensteiner (blending)
Siegerrebe
Sylvaner

These recommended varieties with high potential should benefit from being grafted onto a rootstock (preferably Millardet et de Grasset 101-14, Couderc 3309 or Millardet et de Grasset 420A.) On a site with marginal heat units, it may be necessary to concentrate on the earlier varietals such as Siegerrebe and Pinot Precoce Noir. When plant material is made available, Golubok (red) and Burmunk and Iskorka (whites) should be included as well

Preliminary observations of varietals that are worth trying, particularly in warmer sites and grafted on rootstocks, include St. Laurent (red) and Auxerrois, Chardonnay 76 and Sauvignon Blanc (whites). Regent is particularly recommended for home growers who are interested in red wine making. It is very productive, with potential for making a high quality wine, and the plants show good resistance to disease. Adopting certain cultural practices can do much to enhance fruit maturity. Cluster thinning, plastic row shields, good canopy management and attention to nutrition and disease sprays, applied to an open canopy in a timely manner, all help to maximize fruit quality.

WINE LIST – The following varietal and blended wines were vinified in 2004 from fruit in the Mount Vernon and Everson trial plots:

RED

Agria
Dornfelder
Dunkelfelder
Garanoir
Golubok
Nero
Pinot Noir [clone 2A]
Pinot Precoce
Regent
Zweigelt

WHITE

Auxerrois (blend)
Burmunk
Chardonnay 76
Iskorka
Pinot Gris [Ruhlander]
Schonburger
Sylvaner

Acknowledgements

Support for this project in 2004 has been provided by the Washington State Wine Advisory Board and the Northwest center for Small Fruit Research. The help and participation of our cooperators from the Puget Sound Wine Growers and Coastal Cascadia Wine Growers in harvesting and winemaking is gratefully acknowledged.

Tom Bronkema, Wine Consultant
Tom Thornton, Cloud Mountain Farm
Lopez Island Winery – Brent Charnley
San Juan Vineyards – Kurt Niznik
Vashon Island Winery – Ron Irvine
Carpenter Creek Winery – Jeff Hammer
Pasek Cellars – Gene Pasek
Chuck Jackson, Boeing Wine Club
Steve Snyder, Woodinville Winery
Steve & Susan Oleson
Lou Hollers
Bob Tombs
Steven Mohns
Lynne Irelan
Jim Haack
Steve Wilbur
Bill Swartz
Megan Rutherford
Pete Bradley

Appendix – Cultivars/Selections and Rootstocks on trial

Table 1. Main variety evaluation 2004 (* = Everson only)

Agria	Golubok	Pinot Noir 23	Rubin Tairofsky
Auxerrois cl. 22 GM	I 55/8	Pinot Noir 115	Schonburger
Burmunk	Iskorka (54-36-33)	Pinot Noir 667	Siegerrebe
Chardonnay 76	Kerner	Pinot Noir 777	St. Laurent
Dornfelder	Leon Millot	Pinot Pommard	Sylvaner
Dunkelfelder	Madeleine Angevine	Pinot Precoce	Zweigelt
Gamaret*	Muscat of Norway	Regent	
Gamay Freaux	Nero	Reichensteiner	
Garanoir	Optima	Rondo	

Table 2. Pretest, 2004 (* = Everson only)

Aligote*	i 31-67	Muscat of Norway	Pinot Noir 115	Regner
Auxerrois cl. 22 Gm	Kerner	Optima	Pinot Noir 777	Reichensteiner
Baco 1	Lagrein*	Ortega	Pinot Pommard	Reisland
Bianca	Laurot	Perle of Csaba	Pitos	Saperavi
Chardonnay 76	Leon Millot	Petra [SK 77-5/3]	Plai	Siegerrebe
Dolcetto*	Liza [SK 77-12/6]	Phoenix	Rani Riesling	Toldi
Gamay Chaudenay	Madeleine Angevine	Pinot Gris [Ruhlander]	Red Traminer*	Viorica
Gruner Veltliner	Muller Thurgau			

Table 3. Rootstock Trial (Pinot Noir 2A)

Control–own root	Couderc 3309	Millardet et de Grasset 101-14	Millardet et de Grasset 420A