Vintage 2006: Umpqua Valley Reference Vineyard Report

Summary:
The 2006 vintage started off slow with a cool, wet spring and was followed by a largely climatically favorable growing season. The summer saw little rainfall, but experienced three periods of heat spikes contributing to higher maximum temperatures than normally observed and a greater number of days above 95°F than in years past. Growing degree-day totals ranged from 1913 to 2840 across the reference vineyards driven mostly by variations in elevation and north-south location. Although bud break was nearly three weeks later than the last two vintages, the remaining phenological timing was similar to the past three years. Ripening samples and harvest composition for 2006 reveal that, in spite of the cool, wet and delayed spring growth period, fruit development and balance was similar over the last three vintages. The major difference in harvest for 2006 appears to be slightly higher ripeness levels and higher yields that were consistent across most varieties.

Project Overview:
The goals of the project were to set up a suite of reference vineyards that monitor temperature, phenology, and composition of important varieties grown in the Umpqua Valley AVA. The purpose of the research is to provide an in depth look at spatial variations in important weather, plant, and yield parameters in the region.

During 2003-04 nine reference vineyards were established across a north-south transect throughout the Umpqua Valley AVA at elevations ranging from 335 ft to 1154 ft (642 ft average). The spatial and elevation makeup of the reference vineyards is intended to capture a range of site variability typically found in the Umpqua Valley.

The initial varieties chosen for the trial plantings (in 2003-04) were Tempranillo clone 01, Tempranillo clone 02, Syrah clone 01, Grenache clone 04, Malbec clone 04, and Viognier clone 01. During 2004-05, Pinot Noir (Pommard clone), Pinot Gris (clone 2), and Riesling (Wente clone) where added to the trial. Over the last three years, wood was delivered to all vineyards for planting. These trial plantings are in various stages of development with four locations contributing observations from the third leaf of the plantings. However, due to the time needed for growth, the project participants decided to monitor phenology and composition of five existing varieties: Pinot Noir, Pinot Gris, Syrah, Tempranillo, and Merlot. While not all of the reference vineyards have every variety, those chosen provide a reasonable suite of variety/site combinations that can be monitored until the trial plants are established.

To measure temperature at each site, HOBO® H8 Pro-Temperature Loggers were installed at each of the reference vineyards. The sensors record at 15 minute intervals and the data is collected from each site just after the growing season is over (after Oct 31). The temperature data is then aggregated to hourly and daily average, maximum, and minimum values and

finally summarized by site for the dormant (Nov 1 – Mar 31) and growing season (Apr 1 – Oct 31).

Phenological observations for bud break, flowering, véraison, and harvest for the interim varieties are submitted by each reference vineyard. The phenological data is then examined for average dates and intervals between dates for the entire region and by variety.

For composition information, varietal samples are taken on September 13 each year from the interim varieties observed (starting in 2007 the trial varieties will be also sampled in the same manner). The date was chosen as it represents a "snapshot" of fruit maturity that is not dependent on the subjective determination of ripeness for a given wine style. This date also represents an estimated mid-point of the véraison to harvest period leaving roughly 2-4 weeks before picking. One hundred berry samples are collected and then analyzed for °Brix, titratable acidity, pH, and berry weights using standard industry methods. From the sampling, a report is sent out during the last week of September to all members of the Umpqua Valley Winegrowers Association. In addition, the reference vineyards submit harvest composition at the end of the season (°Brix, titratable acidity, pH, and yields). In most cases the data came from the wineries where the fruit was processed, while in other cases the values came from field observations. Therefore, the harvest composition data is not as consistent in terms of measuring techniques or devices. The composition data are then summarized by region and variety.

Results:

Climate

The weather and climate of 2006 saw conditions that were anything but normal (Figure 1). A warmer than average January was followed by cooler than average temperatures in February and March that slowed vine development (described below). A warm up through mid-May was culminated with a few days that were up to 17°F warmer than average. Bloom occurred during a near normal period in early June and was immediately followed by a very warm period in mid to late June. Leading up to véraison the warmest period of the year occurred in mid to late July with heat spikes of nearly 20°F above normal. The period from véraison to harvest was near normal with the exception of a very cool period in mid-September. After the 15th of October temperatures dropped off rapidly. During the growing season daily departures as much as +19°F and -15°F were observed at the Roseburg weather station.

Rainfall from January to April was higher than the long term average for the Umpqua region and was followed by a growing season (Apr-Oct) that was slightly less than average (Figure 1). As is commonly seen in Oregon, a wet and cool period during mid-September slowed things down. While the cool spring brought a slow start to heat accumulation for the growing season (April 1st through October 31st using a base of 50°F with no upper cut-off), the season quickly caught up with 2003 and 2004 (Figure 2). By the end of the growing season, the 2006 growing season ended up as the second warmest in the last six years, and was substantially warmer than the long term averages from the Roseburg weather station.

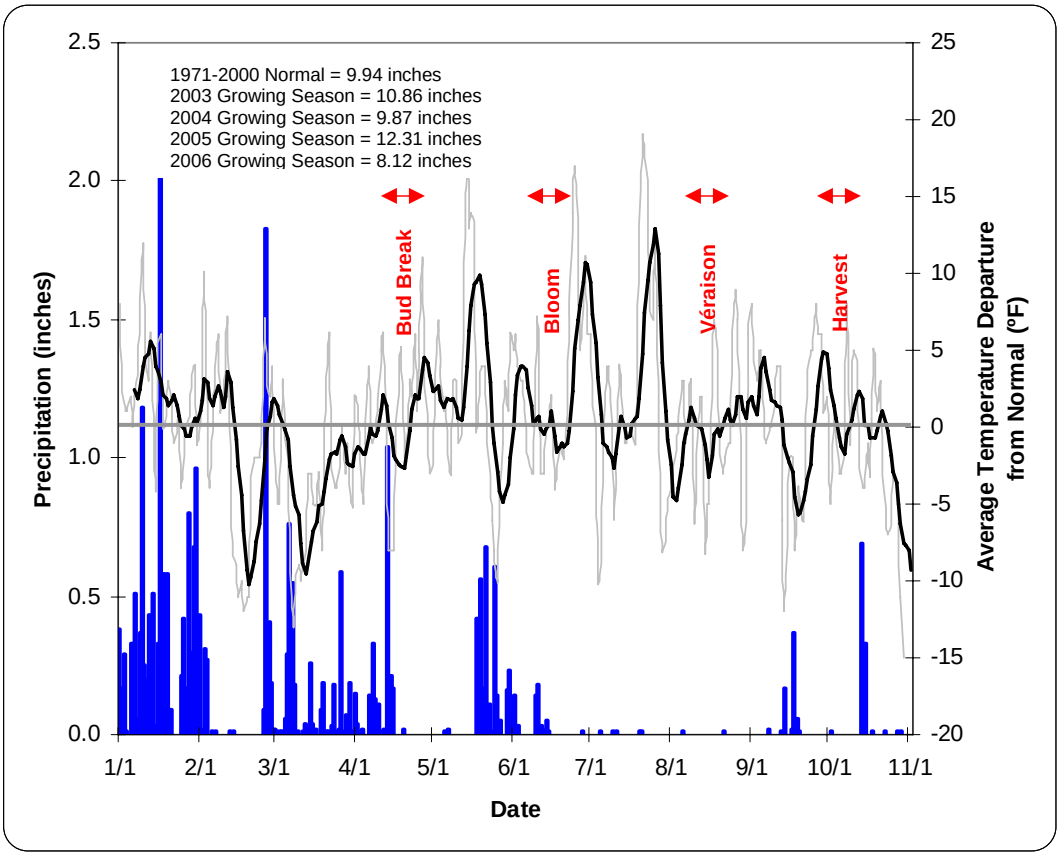

Figure 1 – Daily average temperature departures from normal and precipitation for January-October from the Roseburg weather station. The phenological indicators represent the region-wide average with the bar depicting the varietal variability (see text for more details). The long-term average is derived from the 1971-2000 climate normals.

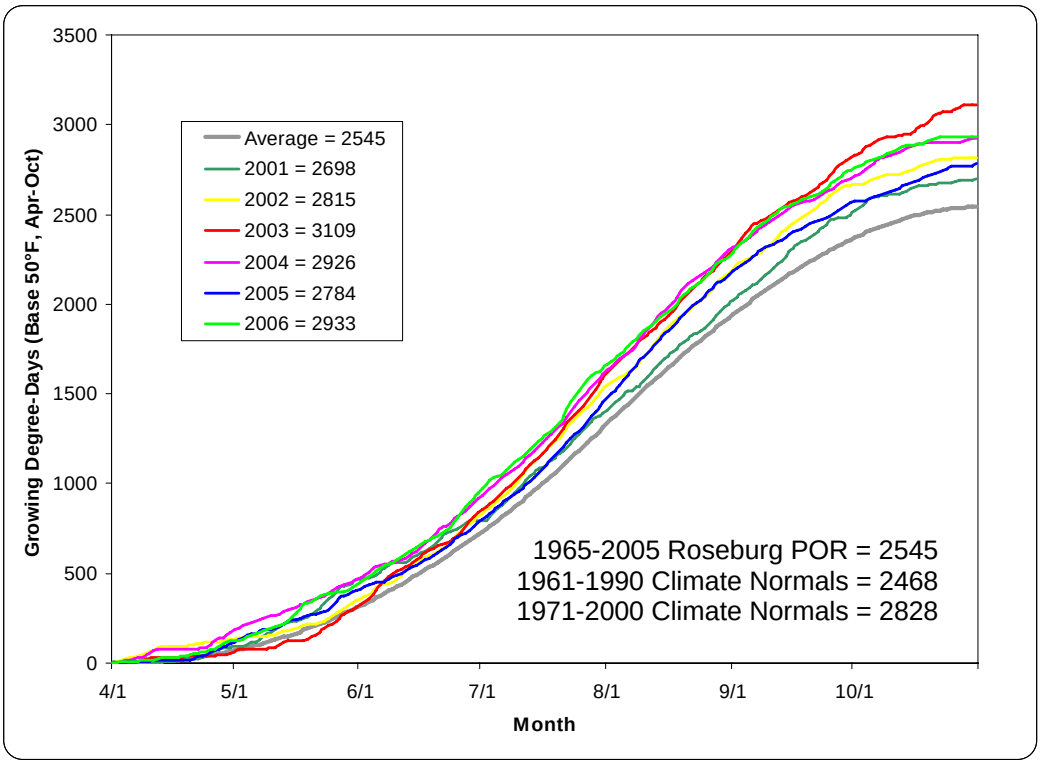

Figure 2 – Growing degree-day accumulation during April-October from the Roseburg weather station (base 50°F). The long-term averages are derived from the period of record values (POR).

Reference Vineyard Climate Observations:

Dormant Period

The winter of 20005-06 (Nov 1 through Mar 31), was characterized by relatively mild conditions, but was colder than the 2004 and 2005 winter throughout the region (Table 1). The absolute low temperatures for the reference vineyards during the winter reached into the upper teens during the third week of February with the lowest observation being 15.9°F. The number of days below 32°F, averaged across all reference vineyards was 32 with a range of 24 to 40 due to elevation.

Table 1 – Reference vineyard dormant period (November 1-March 31) climate characteristics for 2005-06.

Variable	*Mean*	*Standard Deviation*	*Maximum*	*Minimum*
Average Temperature (°F)	42.3	0.8	43.7	41.5
Average Maximum Temperature (°F)	50.7	1.0	51.7	49.4
Average Minimum Temperature (°F)	35.8	0.3	36.0	35.3
# of Days < 32°F	32	4.5	40	24

Growing Season

The 2006 growing season average degree-day accumulation was 2458 with a standard deviation of 283 units (Table 2). Maximum accumulation was 2840 degree-days while the minimum was 1913 degree-days. Average growing season temperatures range from 58.3-62.9°F, while average maximum temperatures range from 74.7-81.3°F and average minimum temperatures from 45.9-48.3°F. The variation in site maximum temperatures is three times greater than that for minimum temperatures (standard deviation of 0.7 vs. 2.2°F). Growing season temperature extremes summarized from the reference vineyards saw a five day heat spike starting in the third week of July with an absolute maximum temperature observed of 110.2°F on Jul-23. Site differences were clearly seen in absolute maximum temperatures with a range of nearly 10°F over the reference vineyards. The number of days over 95°F averaged

Table 2 – Reference vineyard growing season temperature characteristics (April-October 2006).

Variable	*Mean-Median*	*Standard Deviation*	*Maximum*	*Minimum*
Growing Degree Days (base 50°F with no upper cut-off)	2458	283	2840	1913
Average Temperature (°F)	61.0	1.4	62.9	58.3
Average Maximum Temperature (°F)	78.4	2.2	81.3	74.7
# of Days > 95°F	24	10	39	12
Average Minimum Temperature (°F)	46.7	0.7	48.3	45.9
# of Days < 32°F	4	2	7	2
Last Spring Frost	Mar-27	5 days	Apr-6	Mar-19
First Fall Frost	Oct-26	2 days	Oct-30	Oct-25

Frost dates are given as the median date.

24, but ranged from 12 to 39 occurring mostly in mid May, late June, and late July (note that in a normal year, the Roseburg weather station observes 27).

In terms of minimum temperatures and frost frequency, the 2006 growing season saw absolute minimum temperatures dip into the low 30s during three periods in April with the lowest temperatures occurring during the last 10 days of October (lowest observed was 23.3°F). During the periods of the coolest nighttime temperatures, the range between the reference vineyards was less than 2.0°F. The median last spring frost date was Mar-27 for the reference vineyards with the earliest occurring on Mar-19 and most other sites occurring in early April (Table 2). The first fall frosts did not occur until the cool period during the last 10 days of October, with an average of Oct-26.

Comparison to Previous Years

Comparing the two dormant periods for which data was available shows that 2005-06 was cooler than 2004-05 in average conditions, with a similar number of days below 32°F, but colder extreme low temperatures. For the growing season, 2006 proved to be intermediate to 2004 and 2005 in terms of growing degree days (Table 3), however, the range in values between reference vineyards was larger for 2006 that the previous two years (927 vs. 711 and 328, respectively) indicating greater spatial and elevational differences in climate. During 2006 the reference vineyards experienced warmer maximum temperatures as evidenced by the higher absolute maximum and the number of above 95°F. The 2006 vintage also saw greater frost potential with 2-7 occurrences of temperatures below 32°F; however most of these were confined to the last 10 days in October. The last spring frost in 2006 was recorded in late March, earlier than 2005 and similar to 2004. While 2004 and 2005 did not have a first fall frost until after, November 1st, the cool last week of October ushered in frosts by Oct-26 on average (Table 3).

Table 3 – Reference vineyard climate comparisons across the dormant and growing seasons (November 1-October 31) for each year of the project.

Season/Variable	*Year or Period*		
Dormant Season	***2003-04***	***2004-05***	***2005-06***
Average Temperature (°F)	NA	43.7	42.3
Minimum Temperature (°F)	NA	23.3	16.0
# of Days < 32°F	NA	34	32
Growing Season	***2004***	***2005***	***2006***
Growing Degree-Days	2636	2302	2458
Maximum Temperature (°F)	107.7	106.7	110.2
# of Days > 95°F	17	10	24
Minimum Temperature (°F)	33.9	30.1	23.3
# of Days < 32°F	0	2	4
Last Spring Frost	< Apr-1	Apr-14	< Apr-1
First Fall Frost	> Oct-31	> Oct-31	Oct-26

The maximum and minimum temperatures are the absolute values recorded for the entire region for that year. Frost dates are the absolute latest and earliest observed over the entire region for that year.

Phenology

Summarizing phenological observations across all varieties, including the trial varieties, and the region shows an average bud break of Apr-22 with a 4-day standard deviation (Table 4).

Table 4 – Umpqua Valley reference vineyard average phenological dates for 2006. The data come from 25-35 observations for each event; however note that some of the varieties are only observed at a few sites.

Variety	*Bud Break*	*Flowering*	*Véraison*	*Harvest*
Average for all Varieties				
Median	4/22	6/14	8/14	10/8
Standard Deviation	4 days	5 days	9 days	9 days
Maximum	4/30	6/25	9/8	10/28
Minimum	4/13	6/1	8/3	9/26
Interim Varieties				
Merlot				
Median	4/22	6/14	8/14	10/18
Standard Deviation	6 days	5 days	13 days	12 days
Pinot Noir				
Median	4/22	6/9	8/17	10/5
Standard Deviation	3 days	10 days	9 days	4 days
Tempranillo				
Median	4/20	6/14	8/9	10/1
Standard Deviation	4 days	3 days	4 days	9 days
Syrah				
Median	4/23	6/17	8/18	10/11
Standard Deviation	5 days	4 days	5 days	5 days
Pinot Gris				
Median	4/24	6/9	8/9	10/13
Standard Deviation	2 days	2 days	5 days	15 days
Trial Varieties				
Tempranillo Clone 1				
Median	4/19	6/13	8/8	10/4
Standard Deviation	3 days	2 days	8 days	8 days
Tempranillo Clone 2				
Median	4/18	6/12	8/7	10/8
Standard Deviation	4 days	3 days	2 days	7 days
Syrah Clone 1				
Median	4/19	6/13	8/20	10/10
Standard Deviation	4 days	5 days	4 days	4 days
Grenache Clone 1				
Median	4/22	6/17	8/29	10/6
Standard Deviation	5 days	5 days	9 days	6 days
Malbec Clone 4				
Median	4/17	6/14	8/13	10/12
Standard Deviation	2 days	4 days	9 days	2 days
Viognier 1				
Median	4/22	6/19	8/27	10/12
Standard Deviation	2 days	7 days	10 days	7 days

Bud break was observed as early as Apr-13 and as late as Apr-30. Bloom averaged Jun-14 with a range of Jun-1 to Jun-25 across the reference vineyards. Véraison averaged Aug-14

occurring over a month long window from early August to early September. Harvest dates where observed across a wide range of time from the third week in September to the last week in October, with an average of Oct-8. Across the interim varieties, the phenological observations reveal minor to moderate differences in bud break, flowering, and véraison, while harvest showed the greatest variation (Table 4). Average bud break dates were very similar across the varieties while average flowering dates were earliest for Pinot Noir and Pinot Gris (Jun-9) and latest for Syrah (Jun-17). Average véraison dates occurred during mid to late August with Tempranillo and Pinot Gris the earliest (Aug-9) and Pinot Noir and Syrah the latest (8/17 and 8/18, respectively). Harvest dates by variety are typically more widely spread due the time needed to achieve either grower or winemaker style characteristics (Table 4). On average, optimum ripeness appears to have been achieved earliest with Tempranillo (Oct-1), while Merlot was the latest (Oct-18).

The trial varieties had their first observations this year, and while the data comes from fewer observations the information will start to provide more insight. Bud break and bloom across the trial varieties and sites occurred within a more narrow time period than that of véraison and harvest. In addition, observed phenological events over the trial varieties where consistent with the interim varieties.

Average intervals between phenological events (an important measure of vine and berry development timing) show that during 2006 bud break to flowering was 54 days on average; that flowering to véraison was 62 days on average; and that véraison to harvest was 51 days on average (Table 5). The intervals had an 6-10 day variation across both sites and varieties. To ripen fruit to the desired level, required an median bud break to harvest period of 168 days with some varieties requiring as few as 155 days, while others needed 184 days. The shorter intervals this year were largely the result of the delayed bud break.

Table 5 – Umpqua Valley reference vineyard average intervals between phenological dates for 2006.

Interval	*Median*	*Standard Deviation*	*Maximum*	*Minimum*
Bud Break to Flowering	54 days	6 days	63 days	40 days
Flowering to Véraison	62 days	8 days	81 days	52 days
Véraison to Harvest	51 days	10 days	71 days	35 days
Bud Break to Harvest	168 days	8 days	184 days	155 days

Comparison to Previous Years

With the exception of a nearly three week delay in bud break, the 2006 vintage had similar phenology with roughly similar site to site variability compared to 2004 and 2005 (Table 6). In the earlier bud break years (2004 and 2005) site differences stood out more (more variability), while in 2006 the delayed bud break resulted in more consistent inter-site variations. The delayed bud break also resulted in shorter intervals between bud break and bloom and bud break and harvest in 2006. However, bloom to véraison and véraison to harvest intervals appear to be consistent among the years (Table 6).

Table 6 – Reference vineyard average phenology comparisons for each year of the project.

Region	*2004*	*2005*	*2006*
Bud Break			
Median	4/1	4/2	4/22
Standard Deviation	7 days	11 days	4 days
Flowering			
Median	6/5	6/13	6/14
Standard Deviation	5 days	7 days	5 days
Véraison			
Median	8/13	8/14	8/14
Standard Deviation	7 days	10 days	9 days
Harvest			
Median	10/5	10/10	10/8
Standard Deviation	9 days	12 days	9 days
Bud Break to Flowering			
Median	65 days	76 days	54 days
Standard Deviation	7 days	14 days	6 days
Flowering to Véraison			
Median	68 days	61 days	62 days
Standard Deviation	6 days	8 days	8 days
Véraison to Harvest			
Median	55 days	51 days	51 days
Standard Deviation	11 days	15 days	10days
Bud Break to Harvest			
Median	185 days	194 days	168 days
Standard Deviation	13 days	13 days	8 days

Composition

Reference vineyard varietal sampling on September 13, 2006 resulted in a "snapshot" of ripening parameters commonly observed by growers and winemakers. A total of 35 samples across all interim and trial varieties were collected and analyzed. °Brix levels averaged 20.5 across all of the samples with the highest sugar values observed in Tempranillo (22.4) and the lowest in Merlot (19.0) (Table 7). Titratable acidity averaged 7.7 g/L with the highest values seen for Grenache (11.4 g/L), while Tempranillo levels where the lowest (5.5 g/L). Average sample pH values were 3.05 with values ranging as high as 3.51 for Tempranillo (clone 1) to a low of 2.92 for Syrah. Varietal berry weights (per 100 berries) averaged 152.4 grams with Pinot Gris having the lowest weights and Tempranillo and Malbec the highest weights. Across the varieties, Merlot and Grenache were clearly developmentally behind the other varieties (Table 7).

Harvest composition data submitted by growers or wineries (26-35 observations depending on the variable) indicates an average °Brix of 24.5 with a range from 23.0 for Grenache to 26.5 for Syrah (clone 1) (Table 7). Titratable acidity averaged 6.5 g/L with a low of 5.1 g/L for Malbec (clone 4) and Tempranillo (clone 2) to a high of 8.1 g/L for Grenache (clone 4). Harvest pH numbers averaged 3.45 with a spread of 0.54 from Pinot Noir and Tempranillo (clone 1, 3.60) to Grenache (clone 4, 3.06). Harvest yields averaged 2.8 tons per acre across all reference vineyards and interim varieties only. Lowest average yields were reported for Pinot Noir (2.2 tons/acre), while highest average yields were seen with Pinot Gris and Tempranillo (3.7 and 3.8 tons/acre, respectively).

Table 7 – Umpqua Valley reference vineyard °Brix, titratable acidity (TA, g/L), pH, and 100 berry weights (g) statistics from the sampling conducted on September 13, 2006 and from harvest numbers submitted. Note that in some cases the values come from small samples and should be considered carefully.

Variety(Clone)	*September 13th Sample*				*Harvest Numbers*			
	°Brix	*TA*	*pH*	*Weight*[1]	*°Brix*	*TA*	*pH*	*Yield*[2]
Average	20.5	7.7	3.05	152.4	24.5	6.5	3.45	2.8
Interim Varieties								
Merlot	19.0	6.5	2.96	121.4	24.5	6.0	3.46	2.4
Pinot Noir	21.0	7.5	3.06	148.7	24.5	5.8	3.60	2.2
Tempranillo	22.4	5.5	3.38	187.7	24.0	6.5	3.43	3.8
Syrah	20.4	8.1	2.92	154.1	25.5	6.3	3.46	2.9
Pinot Gris	20.2	7.8	3.15	108.1	24.1	6.6	3.41	3.7
Trial Varieties								
Tempranillo (1)	22.4	5.5	3.51	179.0	25.5	5.8	3.60	NA
Tempranillo (2)	21.0	5.8	3.29	204.5	23.4	5.1	3.59	NA
Syrah (1)	20.4	7.7	2.92	142.6	26.5	5.8	3.50	NA
Grenache (4)	19.4	11.4	2.84	179.5	23.0	8.1	3.06	NA
Malbec (4)	21.4	8.3	3.04	195.7	24.6	5.1	3.52	NA
Viognier (1)	20.5	8.1	3.10	137.7	25.0	6.8	3.45	NA
Pinot Noir (P)	No Fruit – 2nd Leaf				No Fruit – 2nd Leaf			
Pinot Gris (3)	No Fruit – 2nd Leaf				No Fruit – 2nd Leaf			
Riesling (W)	No Fruit – 2nd Leaf				No Fruit – 2nd Leaf			

[1] Weight of 100 berries, [2] Tons per acre (however yields not applicable in 3rd leaf)

Comparison to Previous Years

For the sampling conducted on September 13th, the three years were very similar with 2006 being marginally more similar to 2004 than 2005 (Table 8). Similar to the sampling, average harvest composition between the two years was very similar with largest difference coming in higher °Brix and yields in 2006 compared to the previous two years. While the three years were different in terms of heat accumulation (Table 3) and phenological timing (Table 6), composition levels appeared to have reached similar values over the three years.

Table 8 – Comparison of the ripening sample and harvest composition values for the three years of the project.

Parameter	*Ripening Sample*			*Harvest Numbers*		
	2004	2005	2006	2004	2005	2006
°Brix	20.2	20.0	20.6	24.1	24.0	24.4
TA (g/L)	7.1	7.9	7.1	6.6	6.9	6.5
pH	3.05	3.06	3.09	3.50	3.38	3.46
Weight (g and t/a)	142.2	136.4	144.0	1.7	2.4	2.8

Conclusions and Future Issues

The third year of the project has started to provide a longitudinal set of climate, phenology, and compositional information over the Umpqua Valley AVA. In addition, 2006 saw at least four vineyards with viable trial varieties becoming established. This year the initial varieties chosen for the trial plantings are starting to contribute information to the project in terms of phenology and composition. These varieties include Tempranillo clone 01, Tempranillo clone 02, Syrah clone 01, Grenache clone 04, Malbec clone 04, and Viognier clone 01. Furthermore second leaf indications show that the other trial varieties, Pinot Noir (Pommard clone), Pinot Gris (clone 2), and Riesling (Wente clone) will come into observation next year.

Funding for the future is being pursued with the hope that the project and the potential understanding it can provide will continue. In the meantime, the following items are being addressed and/or planned:

- An overview presentation will be given a future Umpqua Valley Winegrowers Association meeting (see monthly newsletter announcements for further details).
- The results will also be used to provide a Southern Oregon component to the Oregon Wine Industry Symposium's "Vintage Overview" on March 4, 2007 in Eugene.

Overall, the first three years of the project has provided a spatial overview of climate for the Umpqua Valley AVA. In addition, the initial observations of phenology and composition have helped establish and document the regional and site similarities and differences for the area. The project is intended to be a long-term collaborative effort that better documents and develops a sound understanding of some of the most important factors that influence high quality grape and wine production. As time unfolds the information will provide more insights into the potential and character that are Southern Oregon wines.

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