



Phenological Monitoring

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A report prepared for

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1 Background

In the six seasons 2005-2010 collection of phenological data from five sub-regional Sauvignon blanc vineyards located in Marlborough was incorporated within the Foundation for Research Science and Technology programme “Quality New Zealand Wines, UOAX0404”. Phenological data were collected over important growth stages (budburst, flowering and from veraison to harvest), the timing of which are largely dictated by the temperature within a season. Data were collated on a weekly basis and the summaries were incorporated into the weekly Vinefax email service operated by Plant & Food Research in Marlborough. Many of the approximately 190 subscribers to Vinefax came to rely on the phenological summaries, as they provided a very good heads-up early in the growing season on whether the current season was early or late, in comparison with previous seasons. The phenological data contribute to a number of research programmes and provide a very valuable source of information for the Marlborough wine industry. The data help to quantify the season-to-season variability in harvest date and yield components as dictated by the climate.

The “Quality New Zealand Wines” programme was completed in 2010 and as a result, funding for collection of the phenological data from the sub-regional vineyards came to an end at harvest in 2010. A successful application was made to the Marlborough Research Centre Trust to provide funding for continuation of this service for the 2010/2011 growing season.

Location of the five sub-regional vineyards

Sub Region	Company	Vineyard Name
Awatere Valley	Pernod Ricard NZ Ltd	Awatere Estate
Brancott Valley	Pernod Ricard NZ Ltd	Brancott Estate
Central Rapaura	Pernod Ricard NZ Ltd	Squire Estate
Fairhall	Villa Maria Estate Ltd	Villa Maria, Winery Block
Western Wairau Plains	Oyster Bay Wines NZ Ltd	Oyster Bay, Airfields Vineyard

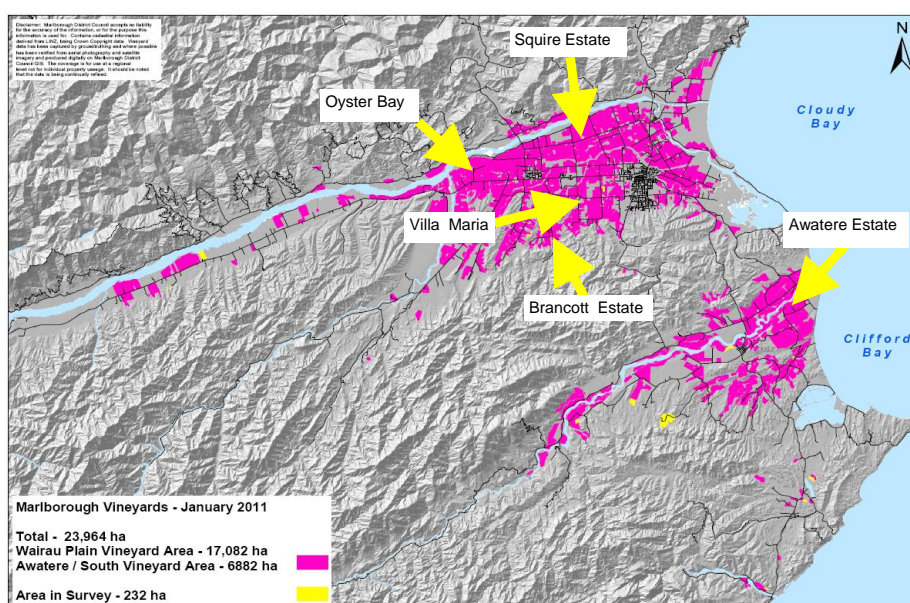


Figure 1. Map of the central Wairau plains and Awatere Valley, showing location of five Sauvignon blanc sub-regional vineyards.

2 Key results from 2011 and dissemination to industry

2.1 Monitoring of key phenological stages of the grapevine

At the beginning of the growing season, in late September and throughout October, monitored grapevines are assessed weekly as they progress from dormancy through budburst and up to the stage of green shoot tips having clearly become visible.

Over flowering in December, the same vines are assessed twice weekly from pre-flowering until flowering has been completed.

From veraison (early to mid February) through until harvest (mid March to mid April), berry samples are collected from the monitored vines on a weekly basis. These berry samples are processed in the laboratory and grape juice is measured for soluble solids (°Brix), titratable acidity and pH. The budburst, flowering and berry maturity data are collated and the summary tables are included in Vinefax, in the week following data collection.

The phenology tables summarise the development of each of the growth stages and compare the data with previous seasons at the same time point. The following are examples of the phenology tables that appeared in Vinefax in the 2010/2011 season. Vinefax was sent weekly by email, from 7 October 2010 until 30 April 2011 (30 issues), to 209 subscribers associated with the Marlborough wine industry.

Text that appears in italics accompanied the tables in Vinefax and gave interpretations of how the growth stage data for the current season compared with that recorded in the previous season.

2.2 Budburst summary tables included in Vinefax on 28 October 2010

Budburst of 2-cane pruned Sauvignon blanc vines over five seasons. The number given is the % of buds that have reached BBCH growth stage 9 = Budburst, green tips clearly visible, (or greater than 9).

Percentage budburst

Assessment Week 2010	Awatere – Seaview						Fairhall - Villa Maria					
	05	06	07	08	09	10	05	06	07	08	09	10
13 Sept	0											
14-20 Sep	34	3	-		0	0	0	0	-		0	0
21-27 Sep	84	34	14	1	30	0	9	0	0	0	0	0
28-04 Oct	100	68	69	57	49	41	69	56	17		3	0
05-11 Oct		86	94	88	80	79	94	91	70	60	48	18
12-18 Oct		100		96	98	100	97	100	88	86	90	79
19-26 Oct				98					95	99	95	96
26-31 Oct			93						98			

Assessment Week 2010	Mid Rapaura Squire						Oyster Bay Airfields					
	05	06	07	08	09	10	05	06	07	08	09	10
13 Sept	0											
14-20 Sep	13	0	-		0	0	3	0	-		0	0
21-27 Sep	34	9	1	0	23	0	59	9	1	0	0	0
28-04 Oct	75	72	15		44	22	97	27	24		8	0
05-11 Oct	97	94	84	81	80	63	100	73	87	79	62	23
12-18 Oct	100	100	89	100	93	88		97	89	95	94	85
19-26 Oct			95		95	10			98	100	98	92
26-31 Oct			100						-			

Assessment Week 2010	Upper Brancott – Booker					
	05	06	07	08	09	10
13 Sept						
14-20 Sep	3	0	-		0	0
21-27 Sep	38	0	1	0	0	0
28-04 Oct	88	16	30		8	0
05-11 Oct	97	59	81	79	55	35
12-18 Oct	97	100	86	93	95	85
19-26 Oct			95	100	100	98
26-31 Oct			98			

At all five properties, all buds have completely passed through and beyond budburst. When you look at the five properties over the past couple of weeks in comparison with the 2008 and 2009 years, there is not a great deal of difference in the percentage budburst on the comparable dates. The only thing I think we can see is that the 2010/2011 season is not an early one at this stage. It would take some sustained hot weather during November to give rise to an early flowering.

2.3 Flowering summary tables included in Vinefax on 16 December 2010

Comparison of flowering progression for Sauvignon blanc from the five sub-regional vineyards: 2-cane pruned vines. % capfall (dates in bold in the left hand column are the actual date of assessment in 2010).

Assessment Week 2010	Awatere – Seaview						Fairhall - Villa Maria						Upper Brancott - Booker					
	05	06	07	08	09	10	05	06	07	08	09	10	05	06	07	08	09	10
24 Nov																		
27-01 Dec	0	1 4					0.4	1 14					0.2	0 0				
2-5 Dec	0		0			NA	5		3			NA	2.3	5	0			NA
6-8 Dec	16	22		9		0	72	38	17	24		12	76	7	7	7		9
9-12 Dec	92	55	21	38	0	0.03	98	67	80	50		28	100	29	50	45		26
13-15 Dec	99	81	76		0.2	6.6	100	93	96		17	87		73	81		2.5	74
16-19 Dec				81 91	5	39		98		83 93	43	97		90		84 96	18	94
20-22 Dec			96	98						97	79			95	97	99	60	
24 Dec					55						92						75	
28 Dec					94													

Assessment Week 2010	Mid Rapaura Squire						Oyster Bay Airfields					
	05	06	07	08	09	10	05	06	07	08	09	10
24 Nov		1										
27-01 Dec	2.7	5 27					1.0	0 2				
2-5 Dec	20	56	2	30		1.2	8.3	16	1	15		0.1
6-8 Dec	86	72	11	62		54	85	21	12			16
9-12 Dec	100	78	59	92	3 13	66	100	45	57	51 73		27
13-15 Dec		95	90		50	90		77	90		2.5	76
16-19 Dec		98	98	96 99	77	97		94		91 97	18	97
20-22 Dec				99	93			99	100	99	60	
24 Dec					95						75	

2.4 Phenological summary included in Vinefax on 16 December 2010

The Fairhall, Booker, Squire and Oyster Bay vineyards have progressed through the main period of flowering over the past seven days. Flowering progression on these four vineyards has been fairly similar in 2010 to those experienced in December 2006, 2007 and 2008.

We included the phenological table for the Booker vineyard in Vinefax number 5 on 4 November 2010. It is worth updating this now that 50% flowering has occurred and to look at when veraison and harvest may occur in 2011.

Dates of key stages of phenological development for 2-cane pruned vines at the Booker trial site over five seasons, including corresponding growing degree-days and time in days between each of these phenological stages.

Phenological stage/duration	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
50% Budburst	5 Oct	29 Sep	8 Oct	6 Oct	3 Oct	9 Oct	13 Oct
1% Flowering	7 Dec	1 Dec	3 Dec	4 Dec	5 Dec	13 Dec	4 Dec
50% Flowering	16 Dec	5 Dec	13 Dec	10 Dec	11 Dec	20 Dec	19 Dec
100% Flowering	24 Dec	8 Dec	22 Dec	20 Dec	22 Dec	28 Dec	11 Dec
Flowering Duration- days	17	7	19	16	17	15	13
50% Veraison	24 Feb	1 Feb	17 Feb	11 Feb	17 Feb	23 Feb	14 Feb
Yield per vine (kg)	4.1	5.6	4.3	5.4	6.6	5.0	
Harvest date	4 April	15 March	27 March	20 March	2 April	8 April	25 March
Harvest °Brix	21.8	22.4	22.4	21.7	22.0	21.6	
GDD - BB to FI (days)	298 (72)	240 (67)	241 (66)	257 (65)	253 (69)	258 (72)	258 (67) (58)
GDD - FI to V (days)	504 (69)	453 (58)	415 (66)	480 (63)	477 (68)	482 (65)	
GDD - V to H (days)	232 (39)	260 (42)	265 (38)	251 (38)	209 (44)	223 (44)	
GDD - FI to H (days)	736 (109)	713 (100)	680 (104)	730 (101)	686 (112)	713 (109)	
GDD - BB to H (days)	1034 (181)	953 (167)	921 (170)	987 (166)	939 (181)	971 (177)	

GDD = growing degree days, BB = budburst, FI = flowering, V = veraison, H = harvest

Thanks to Pernod Ricard for allowing the information presented in the table to be collected on their Booker vineyard. Thanks to The Foundation for Research Science & Technology (Contract UOAX0404) and the Marlborough Research Centre for funding collection of these data.

The predicted date for 50% flowering that we made on 4 November 2010 and the number of days from budburst to flowering are left in and highlighted in yellow. It is probably quite useful to see how the prediction for 50% flowering date differed from the actual. Remember that on 4 November 2010 the growing degree-day line had been dropping fairly consistently from the beginning of October. The result of the sharp turn around to warm weather, for the five weeks from 12 November onwards, was that 50% flowering occurred about eight days earlier than we predicted.

N.B. 50% budburst at the Booker vineyard, shown above, occurred on 13 October 2010. This was the latest budburst of the seven years 2004-2010, five days later than in 2009 and 15 days later than in 2005. However, the number of days from budburst to flowering in 2010 at Booker was 58, a much shorter duration than in any of the previous years. Flowering duration in 2010 was a few days shorter than in the previous four years. However, this was nowhere near as rapid as in December 2005.

2.5 Maturity summary included in Vinefax on 31 March 2011

Comparison of °Brix, berry weight (g) and Titratable acidity (TA g/l), for Sauvignon blanc from the Booker vineyard – 2-cane pruned vines (one of five vineyard summaries included).

	Upper Brancott - Booker						
Date	05	06	07	08	09	10	11
31Jan		8.7 1.14g					Brix Ber wt TA
2Feb		11.7 1.34g	5.5 0.7g				
9Feb		14.5 1.65g	7.1 0.8g	9.4 1.14g	5.6 0.96g		5.5 1.11 g 36.4 g/l
16Feb	6.9 0.84g	16.8 1.9g	9.5 0.8g	13.5 1.41g	8.6 1.0g	5.7 1.11g 40.6	8.9 1.24 g 32.7 g/l
23Feb	11.4 1.13g	18.9 1.95g	14.1 1.2g	16.2 1.73g	12.3 1.34g	9.3 1.28g 35.2	12.1 1.43g 24.1 g/l
3Mar	14.6 1.35g	20.9 1.98g	17.0 1.4g	17.6 1.95g	14.4 1.61g	12.4 1.55g 23.5	13.8 1.68g 18.4 g/l
9Mar	16.8 1.5g	22.4 2.03g	19.2 1.6g	20.1 1.93g	15.8 1.7g	15.1 1.86g 17.8	16.6 1.85g 15.3 g/l
16Mar	19.9 1.63g	-	20.9 1.7g	21.3 2.0g	17.9 1.91g	17.2 1.94g 14.8	19.2 1.96g 12.9 g/l
23Mar	21.0 1.75g	-	22.4 1.7g	-	19.9 1.89g	18.9 2.1g 14.1	20.2 1.92g 10.5 g/l
30Mar	21.8 1.78g				22.0 1.74g	19.9 2.12g 13.1	21.5 2.02g 9.7 g/l
06Apr					22.8 1.9g	21.7 2.23g 11.4	Harv 30 Mar
Harv date	04 Apr	15 Mar	27 Mar	20 Mar	02 Apr	08 Apr	30 Mar at 21.5°

As indicated in the Vinefax tables and accompanying text, summarised growth stage information is supplied to help growers to understand the differences between seasons and to guide them with regard to the timing of upcoming growth stages within the current season. By 16 December 2010, the first prediction of harvest date in 2011 was made, based on the time of flowering. It is clearly stated that these are possible dates, based on current knowledge.

Although grape growers record the date of budburst and flowering for Sustainable Winegrowing New Zealand scorecards, they generally do not keep records of progression of the growth stages, as is carried out as part of the phenological monitoring project and as reported in Vinefax. The regional vineyard data allow viticulturists and winemakers to obtain early advice as to how the current season is progressing in relation to previous seasons. This then enables the adjustment of timing of vineyard management, according to whether the season is earlier or later than average.

Fruit maturity development – the rate of soluble solids accumulation (°Brix), degradation of acid (increasing pH and decreasing titratable acidity) and berry weight are included from veraison until harvest on 2-cane unthinned vines. At harvest, monitored bays of 2- and 4-cane vines on the five sub-regional vineyards are hand harvested in order to determine yield parameters.

Thinning is now standard industry practice for many varieties including Sauvignon blanc. However, by using unthinned vines, the yield component data can be compared from season to season.

2.6 Harvest date, soluble solids and yield component data included in Vinefax on 14 April 2011

One of the five vineyards included on 14 April.

	Mid Rapaura – Squire							
	05	06	07	08	09	10	11	Average
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	2005-2011
2-cane Harv. Brix	22.8	22.3	22.3	21.6	21.1	21.6	22.1	
4-cane Harv. Brix	20.7	21.6	21.9	21.2	19.9	19.9	20.7	
2-cane Harv date	14 Apr	13 Mar	26 Mar	22 Mar	06 Apr	31 Mar	25 Mar	
4-cane Harv. date	19 Apr	14 Mar	28 Mar	31 Mar	03 Apr	31 Mar	25 Mar	
2-cane Vine Yield (kg)	4.2	3.4	3.7	4.3	6.2	5.2	4.8	4.5
4-cane Vine Yield (kg)	8.0	4.9	5.6	7.4	8.4	7.4	8.1	7.1
2-c Bunch No/Vine	41	38	46	36	51	39	34	40.7
4-c Bunch No/Vine	76	56	75	59	70	59	57	64.6
2-c Avg. Bunch Wt. g	101	89	71	118	123	131	142	110.7 g
4-c Avg. Bunch Wt. g	105	86	75	125	120	125	143	111.3 g
2-c Avg. Berry Wt. g	1.87	1.93	2.0	1.9	1.9	2.1	2.08	1.97 g
4-c Avg. Berry Wt. g	1.80	1.83	1.9	2.1	2.0	2.0	2.03	1.95 g

2.7 Other use of the phenological data

As well as the phenological data being a vital part of the Vinefax service, the data are used to provide information for the “Designer Grapevines – C06X0707” programme funded by the Ministry of Science and Innovation (MSI). In this programme, the grapevine growth stage data are being included in phenological models that are being developed. The aim of the models is to be able to predict flowering date and harvest date.

3 Key Funding Sources and Collaborating Companies

- Marlborough Research Centre
- Plant & Food Research
- Pernod Ricard New Zealand Limited
- Villa Maria Estate Ltd
- Oyster Bay Wines New Zealand Ltd.

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