Report to Grape and Wine Research and Development Corporation

GWRDC Contract RT 06/02-2

Vine Balance, Winter Pruning and Wine Quality in Pinot Noir in Northern Tasmania

2006 Tasmanian Field Day Project

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INTRODUCTION

Tasmania is regarded as having one of the best climates in the world for producing premium quality Pinot Noir table and sparkling wines. At present average yields are around 5 tonnes per hectare with quite a wide range. However there is a considerable body of opinion that this could be increased significantly to still produce fruit and wine of acceptable quality but with much improved economic returns.

This demonstration trial was set up to be the focus of an industry field day (November 2006) which has already been reported on in detail (Farquhar unpublished) in fulfilment of the original agreement. However we were encouraged to submit a further report including the harvest and post-harvest data. Some of this data was also presented to producers at subsequent field days in November 2007 and January 2008. It is also our intention to prepare an article for publication in the Australian and New Zealand Grapegrower and Winemaker.

The trial aimed to "push the limits" in terms of bud numbers, and consequently yield per hectare, and to determine the effects on fruit and wine characteristics.

METHODS

It must be emphasised from the outset that the trial was set up as a demonstration for one season and as will be seen from the design the treatments have not been randomly allocated thus limiting its value in a statistical sense. Consequently only basic statistical tests (simple correlation coefficients) have been used at this stage although there is a possibility that more sophisticated techniques might be employed in future to combine the data with that from other sites and thus enable wider conclusions to be drawn.

The trial was set up on two rows of Scott Henry (SH) and two rows of Vertical Shoot Position (VSP) trellis on the Relbia Vineyard of Josef Chromy Wines. There were six panels of three vines in each row and treatments were allocated to panels in order of increasing bud number. The treatments were replicated in the second row in each trellis type but in order of decreasing bud number to take account of possible site effects. Target bud numbers ranged from 8 to 96 per vine. The details of the treatments are shown in Figure 1.

Figure 1 - Trial Layout and Treatments

PANEL	VSP ROWS		SCOTT HENRY ROWS	
	33	31	30	28
1	8 canes/vine 12 buds/cane 96 buds/vine 231840 buds/ha	2 canes/vine 4 buds/cane 8 buds/vine 19320 buds/ha	4 canes/vine 4 buds/cane 16 buds/vine 38640 buds/ha	8 canes/vine 12 buds/cane 96 buds/vine 231840 buds/ha
2	6 canes/vine 12 buds/cane 72 buds/vine 173880 buds/ha	2 canes/vine 8 buds/cane 16 buds/vine 38640 buds/ha	4 canes/vine 8 buds/cane 32 buds/vine 77280 buds/ha	6 canes/vine** 12 buds/cane 72 buds/vine 173880 buds/ha
3	4 canes/vine 12 buds/cane 48 buds/vine 115920 buds/ha	2 canes/vine 12 buds/cane 24 buds/vine 57960 buds/ha	4 canes/vine 12 buds/cane 48 buds/vine 115920 buds/ha	6 canes/vine* 12 buds/cane 72 buds/vine 173880 buds/ha
4	2 canes/vine 12 buds/cane 24 buds/vine 57960 buds/ha	4 canes/vine 12 buds/cane 48 buds/vine 115920 buds/ha	6 canes/vine* 12 buds/cane 72 buds/vine 173880 buds/ha	4 canes/vine 12 buds/cane 48 buds/vine 115920 buds/ha
5	2 canes/vine 8 buds/cane 16 buds/vine 38640 buds/ha	6 canes/vine 12 buds/cane 72 buds/vine 173880 buds/ha	6 canes/vine** 12 buds/cane 72 buds/vine 173880 buds/ha	4 canes/vine 8 buds/cane 32 buds/vine 77280 buds/ha
6	2 canes/vine 4 buds/cane 8 buds/vine 19320 buds/ha	8 canes/vine 12 buds/cane 96 buds/vine 231840 buds/ha	8 canes/vine 12 buds/cane 96 buds/vine 231840 buds/ha	4 canes/vine 4 buds/cane 16 buds/vine 38640 buds/ha

* 2 canes top wire, 4 canes bottom wire
** 4 canes top wire, 2 canes bottom wire

The vines were pruned on August 11 2006 at which time node and shoot counts and pruning weights per vine were obtained.

On November 7 2006 shoot and sucker counts per vine were obtained and shoot lengths measured.

The fruit was harvested on April 6 and 7 2007. Data obtained were primary and secondary bunch counts and fruit weights, and juice titratable acidity, pH and sugar level.

The vines were pruned again on June 29 2007 and pruning weights obtained.

Fruit from the two replicates was combined and 10 kg samples used to make individual wines from each treatment and trellis combination giving a total of 12 wines. The wines were made at the Experimental Micro-Vinification Facility at Tamar Ridge Estates. Various wine colour data was obtained from the wines (see results for details) and they were subjected to an informal tasting. They were also made available for tasting by producers at two separate field days.

RESULTS AND DISCUSSION

The raw data and the treatment means are presented in Appendix 1. Data from a small number of vines has been eliminated, as they were not considered representative of their treatment.

Response of the Vines to Pruning Level

The data presented in Figure 2 indicate that, as expected, there is a strong association between number of nodes laid down and number of shoots developing (r^2 = 0.96 SH and 1.00 VSP). However, the vines have compensated at both ends of the pruning scale with more shoots than nodes at the bottom of the range and less shoots than nodes at the top. Towards the middle of the range there is more agreement between target and actual. The message here perhaps is that no matter what we do the vine will fight back and endeavour to retain its own natural balance.

In Figure 3 it can be seen that pruning level had a marked effect on shoot length (r^2 = 0.88 SH & VSP). Once again it was expected that the more shoots there are, the shorter they will be. There was also a weak association between pruning level and the occurrence of suckers (Figure 4, r^2 = 0.53 SH & VSP). The vines again appear to be compensating for the low number of shoots by suckering from the trunk.

There was a strong association between pruning level and number of primary bunches (Figure 5, r^2 = 0.96 SH & VSP) and between pruning level and yield (Figure 6, r^2 = 0.90 SH, 0.81 VSP). Yields ranged from 8 to 28 tonnes per hectare. The photos in Appendix 2 show the fruit load at each end of the spectrum for both trellis types. The relationship between pruning level and secondary bunch number was weak or non-existent (Figure 7, r^2 = 0.00 SH, 0.12 VSP).

FIGURE 2 - ACTUAL SHOOT COUNT VS PRUNING LEVEL
(r = 0.98 SH, 1.00 VSP)

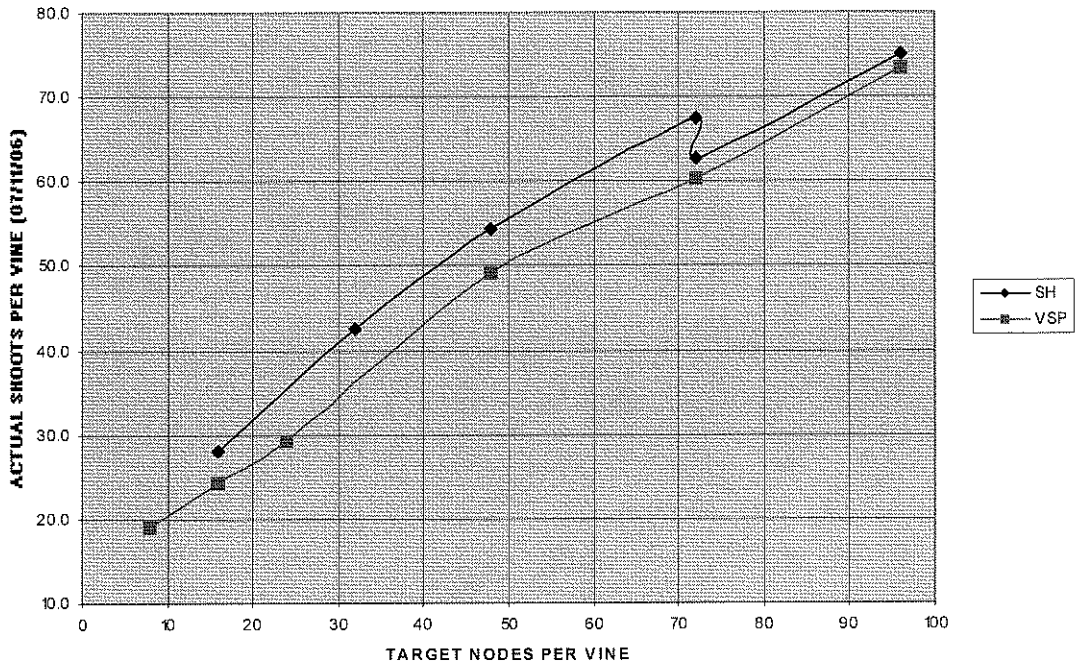


FIGURE 3 - MEAN SHOOT LENGTH VS PRUNING LEVEL
(r = -0.94 SH, -0.94 VSP)

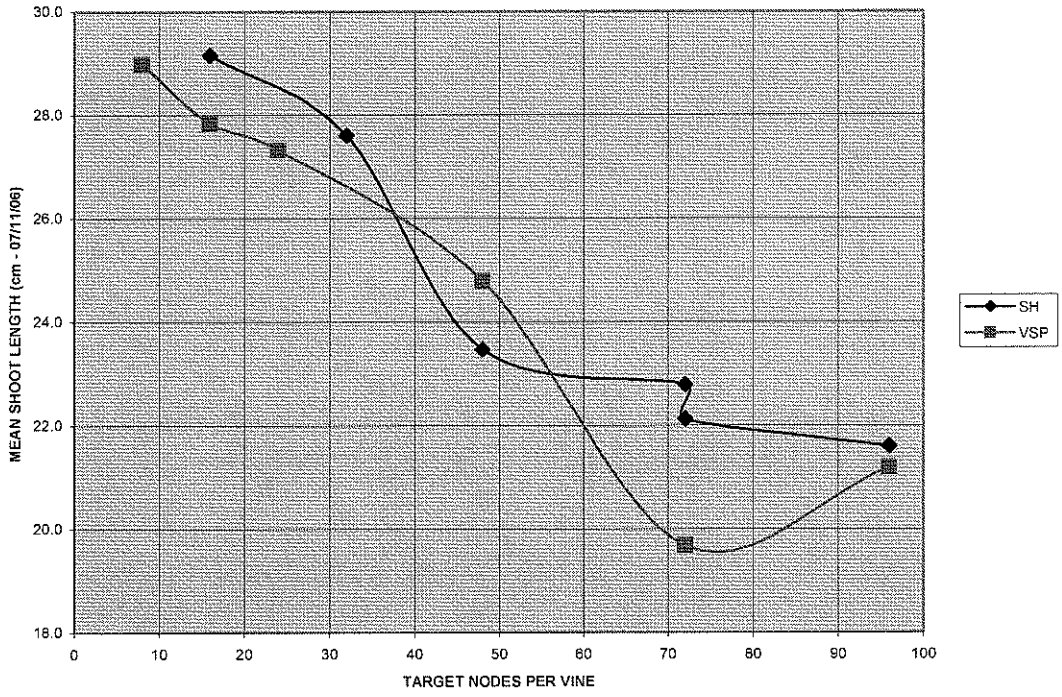


FIGURE 4 - SUCKER COUNT VS PRUNING LEVEL
(r = -0.73 SH, -0.73 VSP)

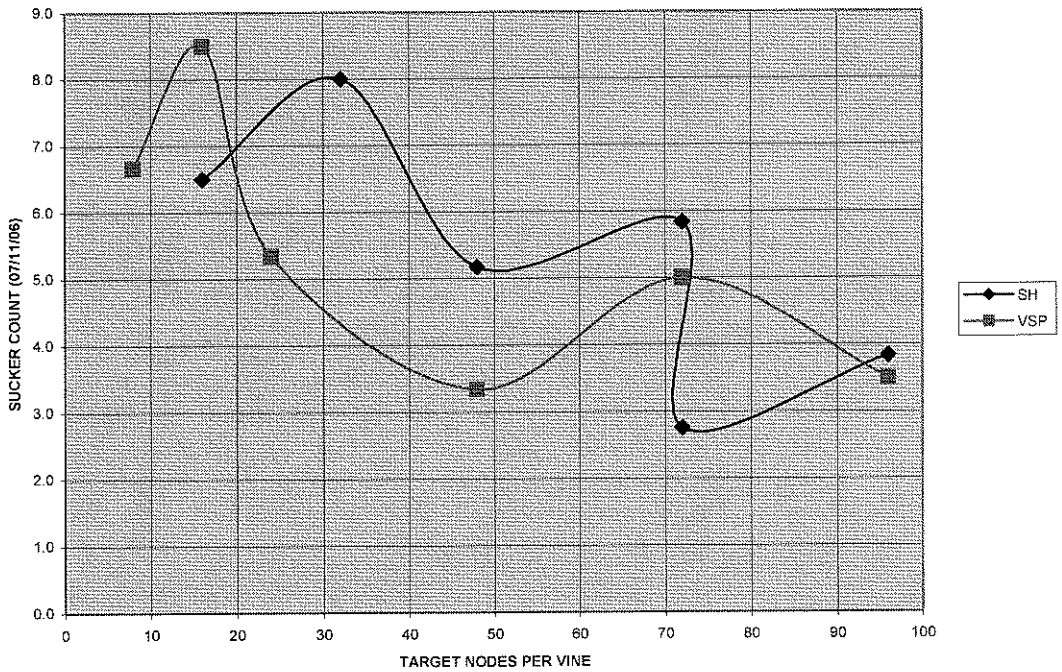


FIGURE 5 - PRIMARY BUNCH NUMBER VS PRUNING LEVEL
(r = 0.98 SH & VSP)

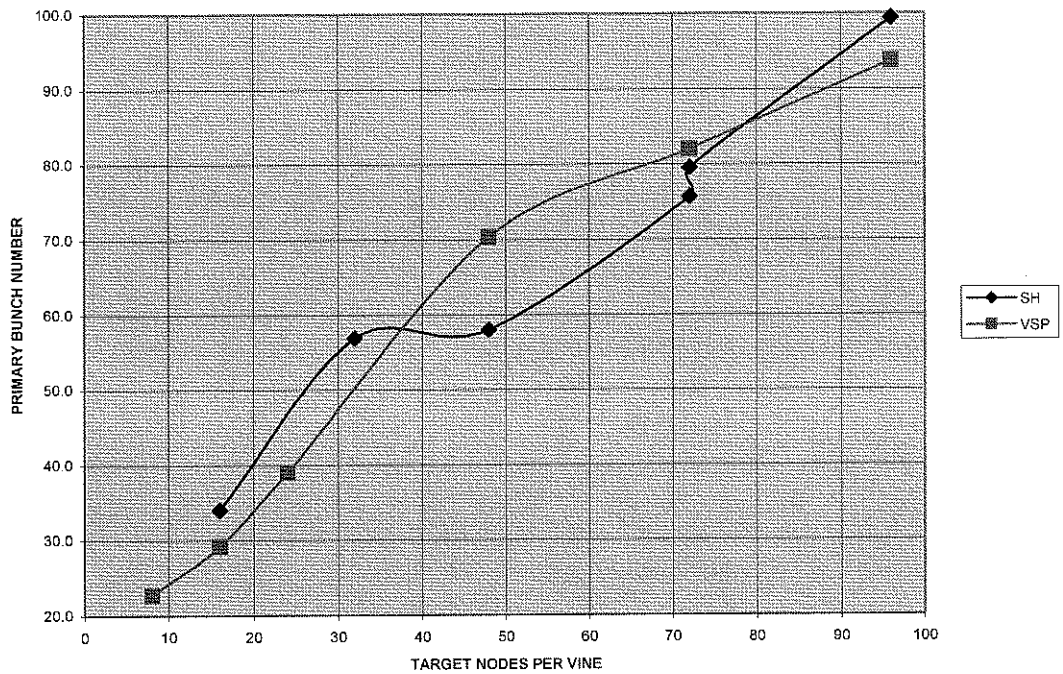


FIGURE 6 - YIELD VS PRUNING LEVEL
(r = 0.95 SH, 0.90 VSP)

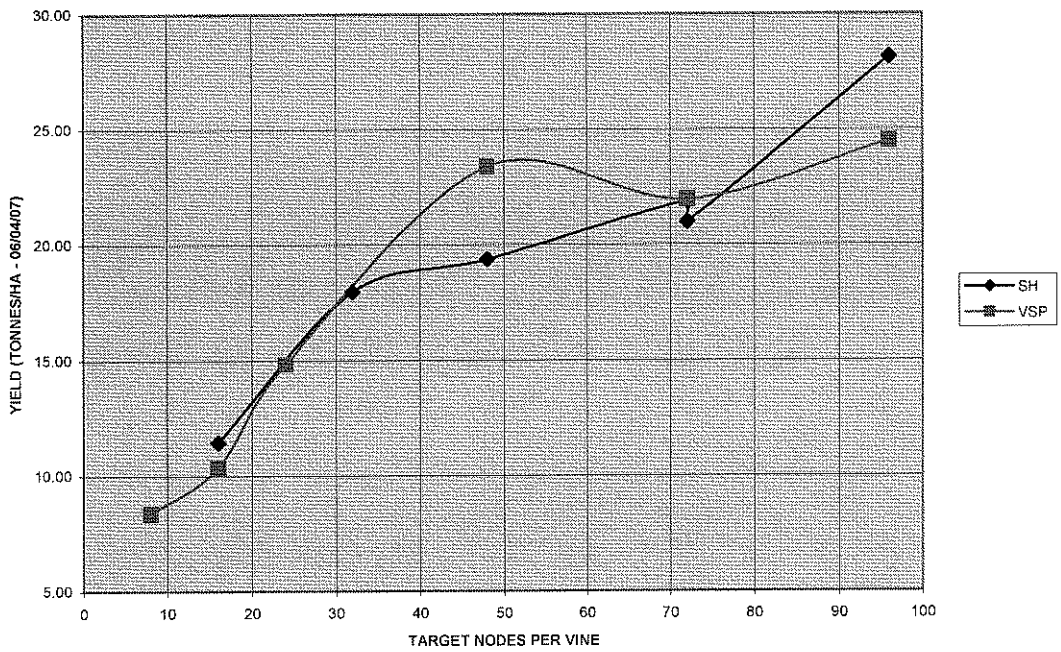
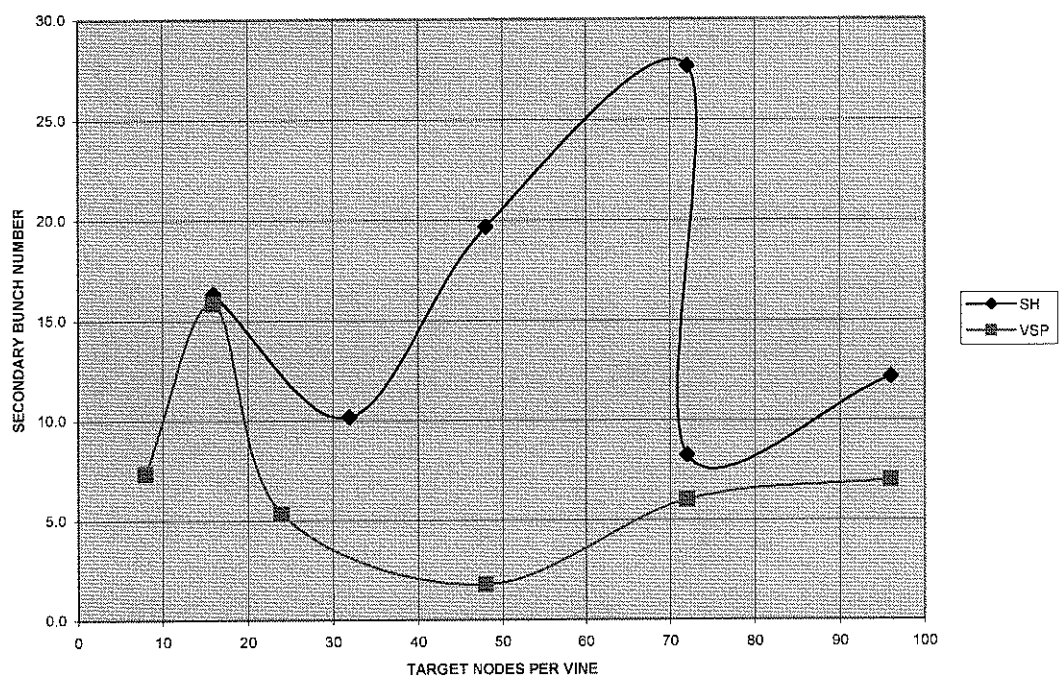


FIGURE 7 - SECONDARY BUNCH NUMBER VS PRUNING LEVEL
(r = 0.01 SH, -0.34 VSP)

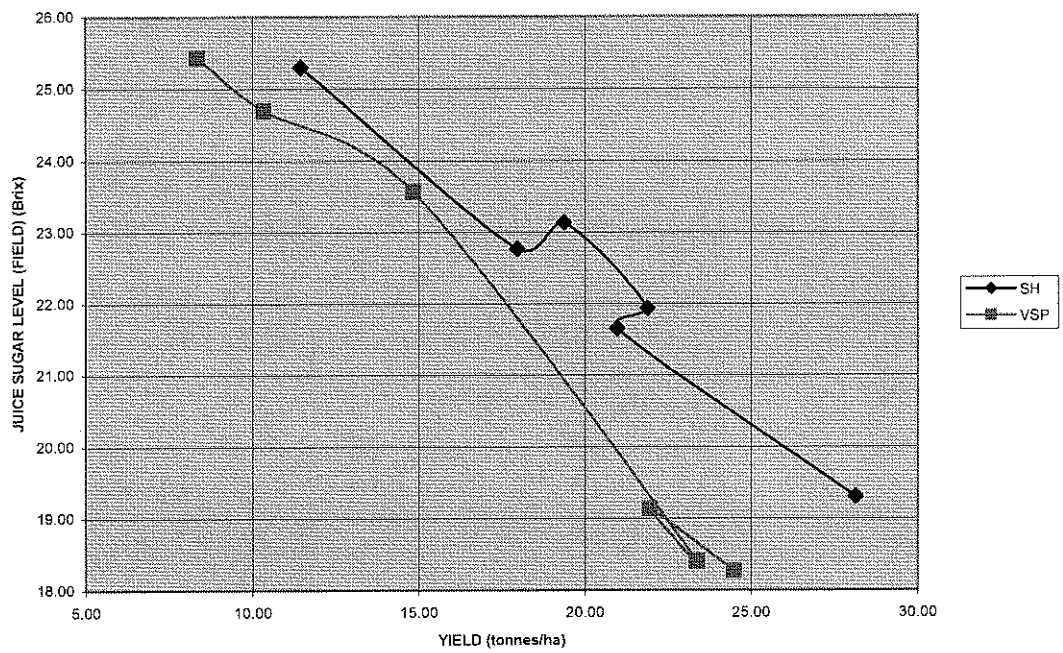


The Effect of Yield on Juice Parameters

The relationship between yield and both the juice sugar level (Figure 8, $r^2 = 0.96$ SH, 0.98 VSP) and pH (Figure 9, $r^2 = 0.92$ SH, 0.90 VSP) was as expected with both declining at the higher cropping levels. As yield increased from 8 to 28 tonnes per hectare, sugar dropped from above 25^0 Brix to around $18\text{-}19^0$ Brix. Similarly pH fell from around 3.12 to around 2.95. To be "fair" to the higher yielding treatments it should be pointed out that all treatments were harvested over the same two-day period and there is every chance that the higher yielding treatments would have achieved more acceptable numbers had the fruit been allowed to remain on the vine until later in the season – the canopy was certainly still capable of further ripening the fruit at the time of picking.

It is also interesting to note that in both the case of sugar level and pH the Scott Henry trellis performed better than the VSP at similar yields thus indicating its potential for comparable quality at higher yields on a vigorous site such as this.

FIGURE 8 - JUICE SUGAR LEVEL (FIELD) VS YIELD
(r = -0.98 SH, -0.99 VSP)



An unexplained anomaly in the results was the relationship between yield and titratable acid of the juice. The results obtained from the field samples were impossible to reconcile with the pH picture and must be attributed to technique. However, samples analysed at the winery showed only a weak correlation between the two parameters (Figure 10, $r^2 = 0.42$ SH, 0.30 VSP).

FIGURE 9 - JUICE pH (FIELD) VS YIELD
(r = -0.96 SH, -0.95 VSP)

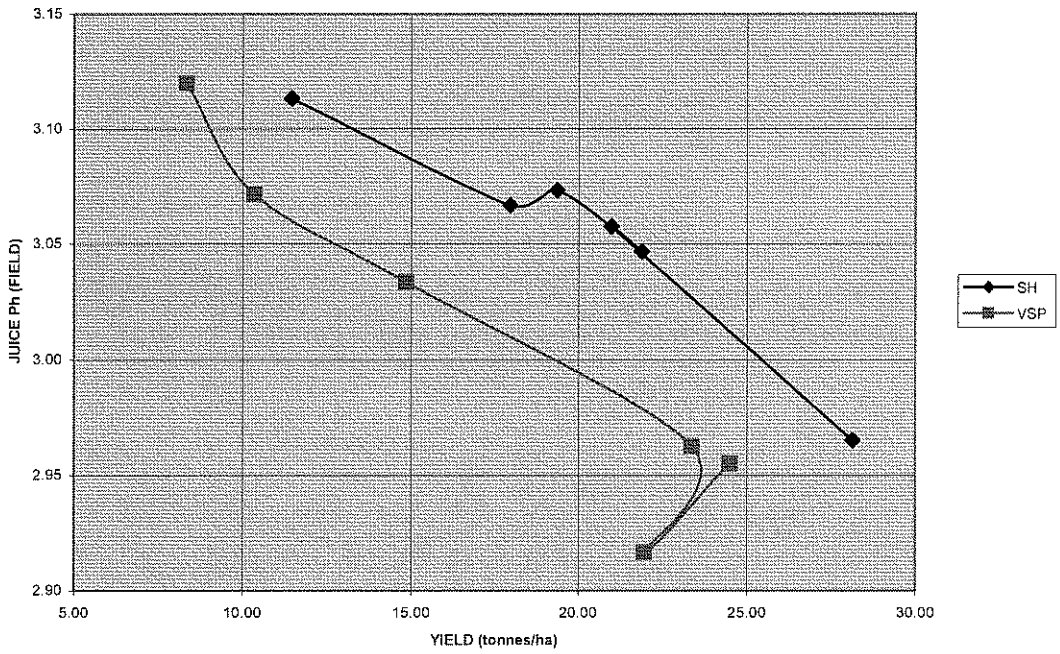
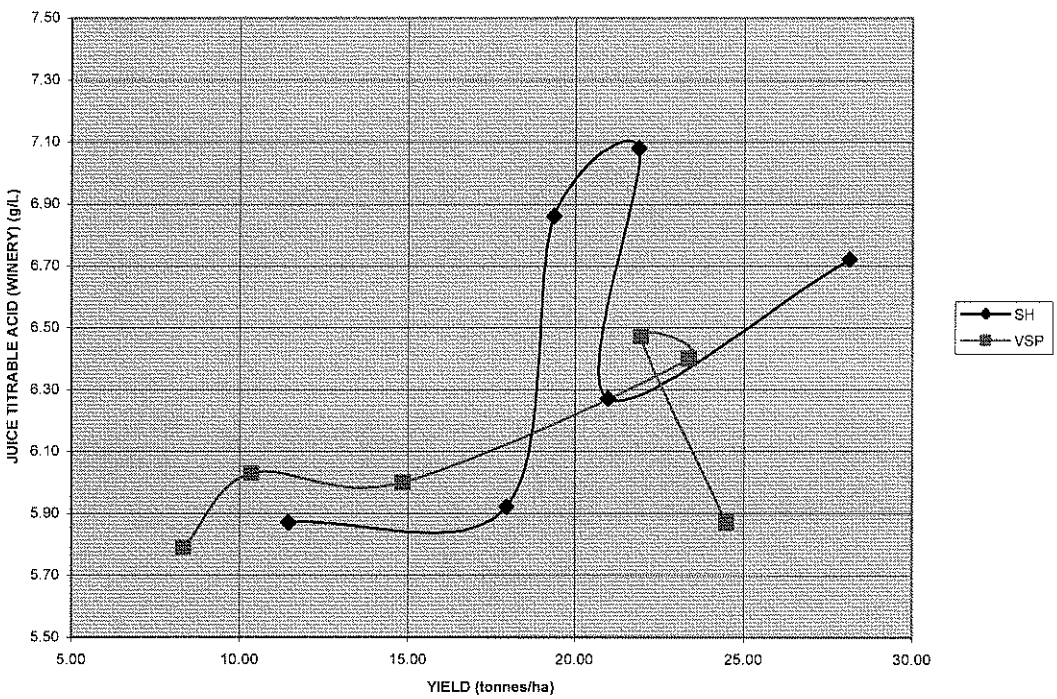


FIGURE 10 - JUICE TITRATABLE ACID (WINERY) VS YIELD
(r = 0.65 SH, 0.55 VSP)



The Effect of Yield on Wine Colour Parameters

Figures 11-15 illustrate the relationships with yield for the colour measures total anthocyanins, total phenolics, wine colour density, wine colour density (SO_2 effects removed), and wine colour hue respectively.

Total anthocyanins (r^2 = 0.96 SH, 0.92 VSP), total phenolics (r^2 = 0.96 SH, 0.83 VSP), wine colour density (r^2 = 0.88 SH, 0.96 VSP) and wine colour density with SO_2 effects removed (r^2 = 0.90 SH, 0.96 VSP) were all strongly negatively correlated with yield. Once again the Scott Henry trellis performed better than the VSP at the same yield presumably due to better fruit exposure and/or higher canopy to fruit ratio.

Wine colour hue presented a different picture with only a weak association with yield and a tendency for higher values towards the middle of the yield range particularly in the Scott Henry treatments.

FIGURE 11 - TOTAL WINE ANTHOCYANINS VS YIELD
(r = -0.98 SH, -0.96 VSP)

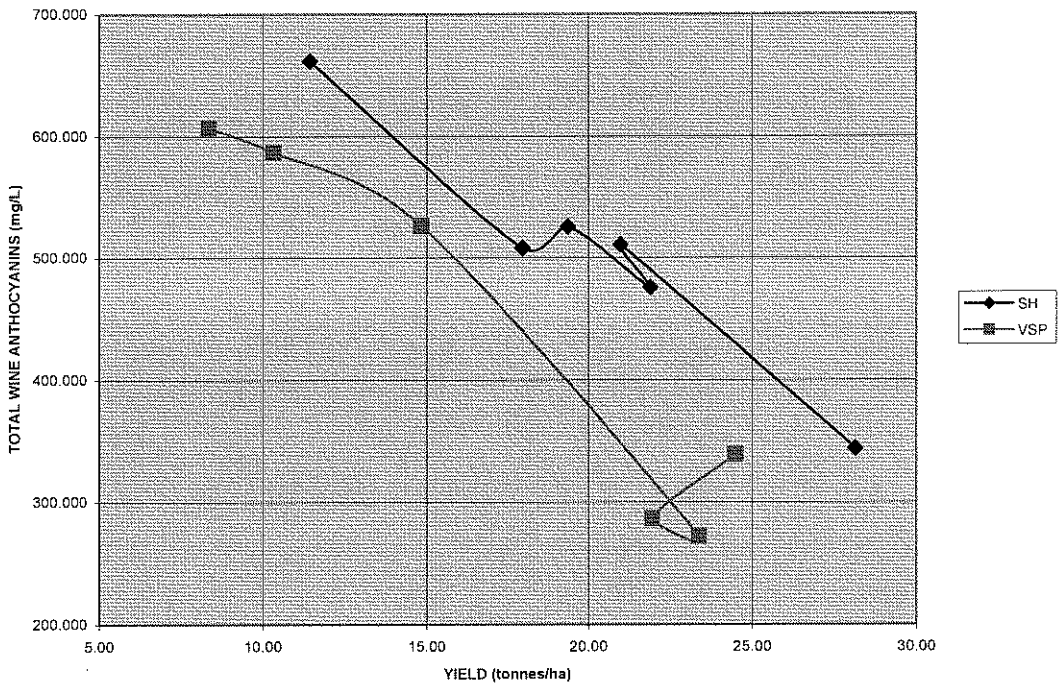


FIGURE 12 - TOTAL WINE PHENOLICS VS YIELD
(r = -0.98 SH, -0.91 VSP)

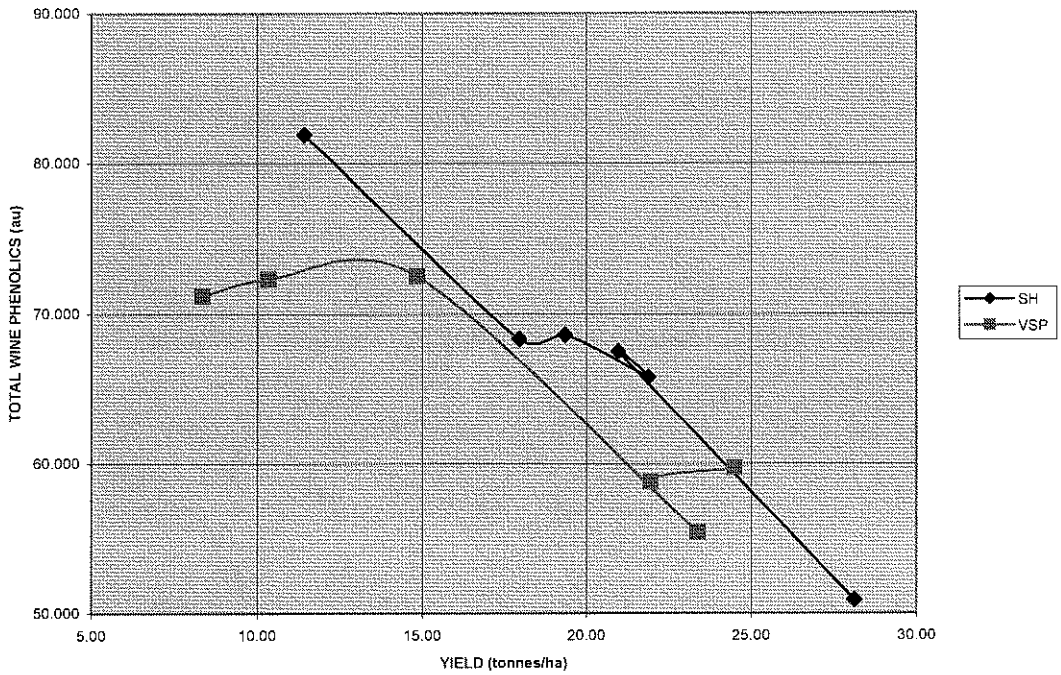


FIGURE 13 - WINE COLOUR DENSITY VS YIELD
(r = -0.94 SH, -0.98 VSP)

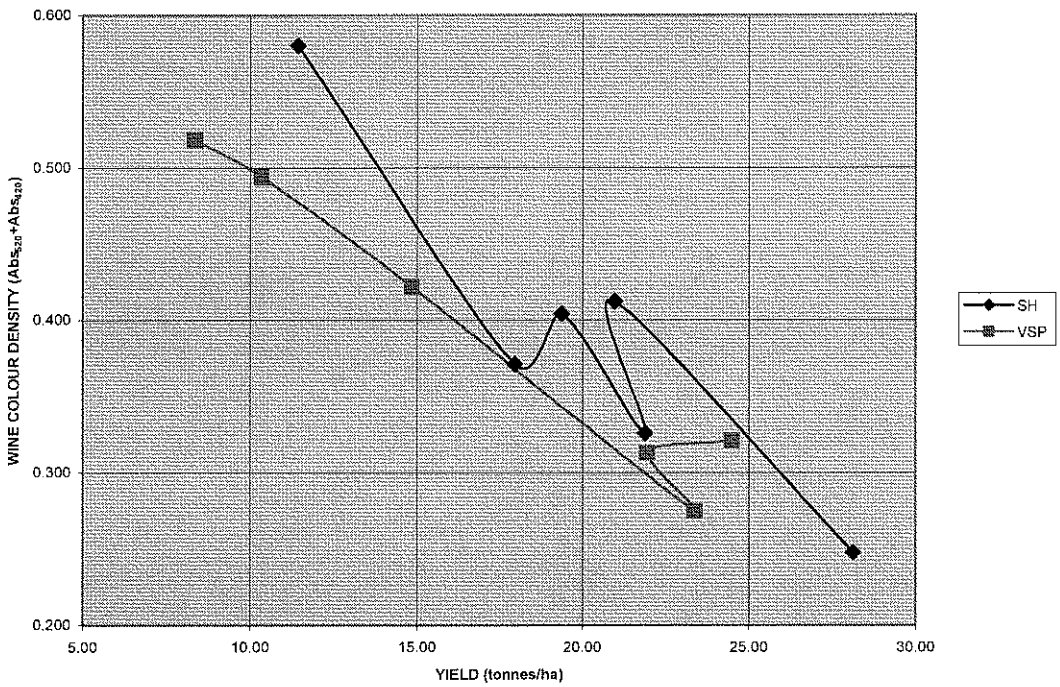


FIGURE 14 - WINE COLOUR DENSITY REMOVING SO2 EFFECTS VS YIELD
(r = -0.95 SH, -0.98 VSP)

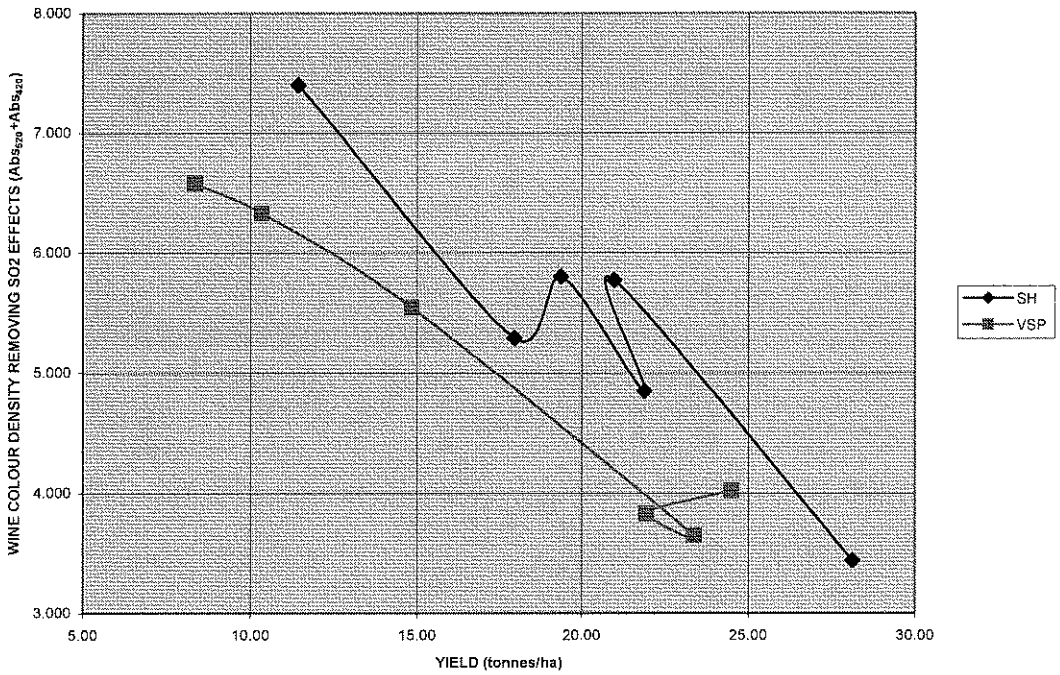
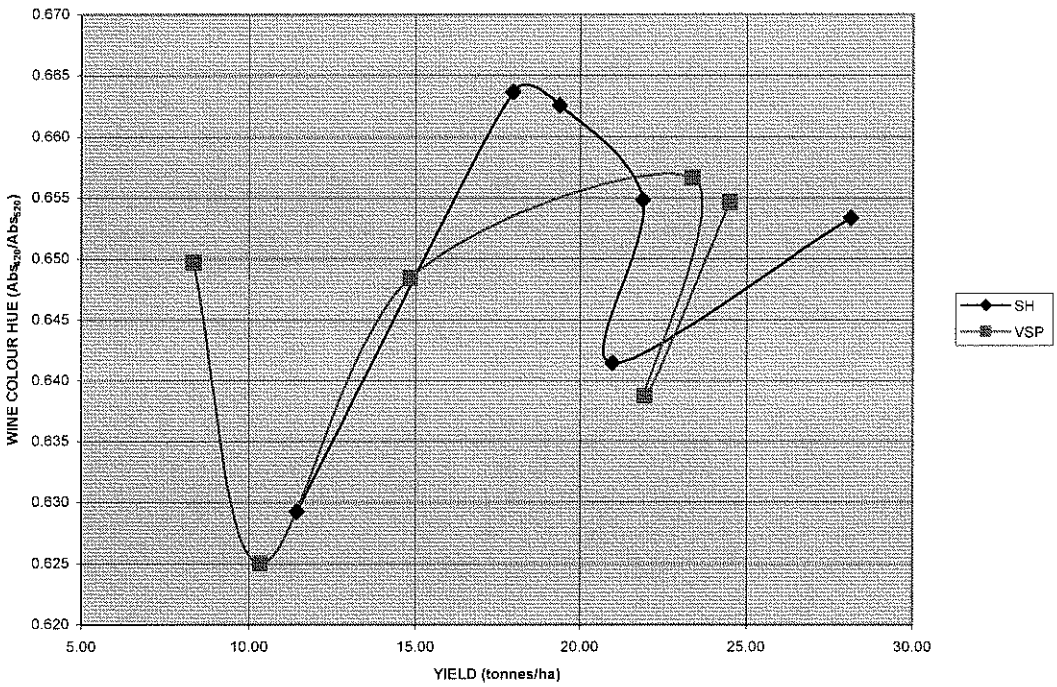


FIGURE 15 - WINE COLOUR HUE VS YIELD
(r = 0.47 SH, 0.48 VSP)



The Effect of Yield on Wine Quality

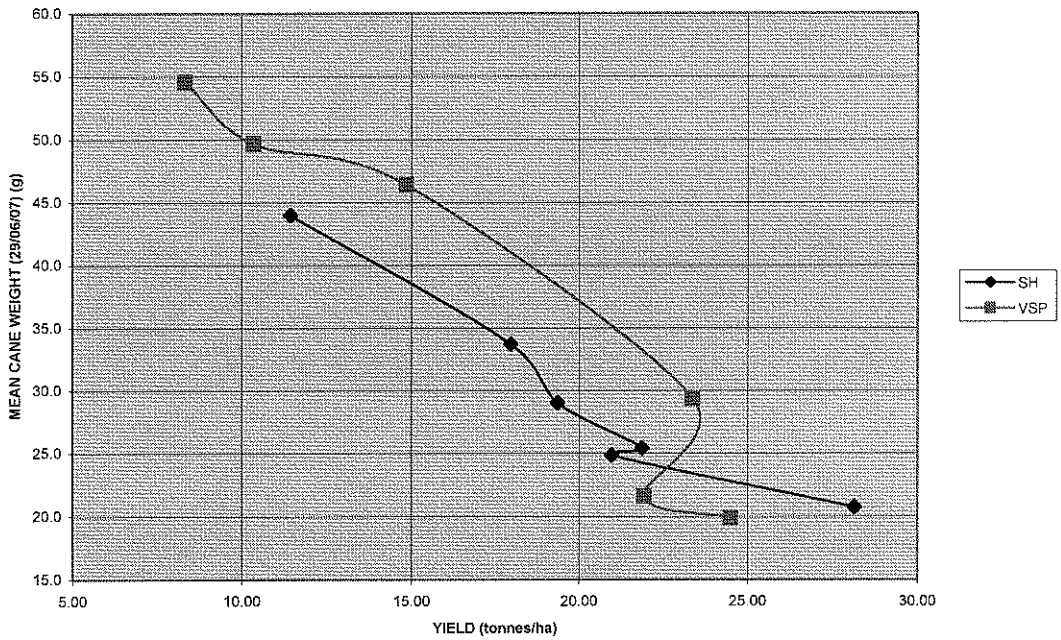
The wines were informally tasted on several occasions by a range of people. It is hard to come to a firm conclusion but it appears possible that an "acceptable" wine could be produced from fruit cropped as high as about 20 tonnes per hectare on the Scott Henry trellis and about 15 tonnes on the VSP trellis. Given that the fruit was all picked at the same time, this impression may have been further strengthened if the fruit had been harvested later at the higher cropping levels.

The Effect of Yield on Post-Harvest Parameters

The relationship between yield and mean cane weight, pruning weight and yield to pruning weight ratio are shown in Figures 16-18 respectively.

As expected mean cane weight was strongly negatively associated with yield falling from around 55g at the low yield to around 20g at the high yield (r^2 = 0.92 SH & VSP).

FIGURE 16 - MEAN CANE WEIGHT VS YIELD
(r = -0.96 SH & VSP)
(Smart & Robinson optimum 20-40g)



Pruning weight, on the other hand, was positively associated with yield as one would expect from the number of nodes laid down at the previous pruning. However the association (r^2 = 0.55 SH, 0.77 VSP) was much weaker than for mean cane weight.

Yield to pruning weight ratio was strongly positively associated with yield (r^2 = 0.92 SH, 0.98 VSP).

Relating these measures to the optimal values proposed by Smart and Robinson (1991) the pruning weights are somewhat confusing but if we concentrate on the mean cane weight and yield to pruning weight ratio it appears that the vines were in balance when yields were above about 15 tonnes per hectare.

FIGURE 17 - PRUNING WEIGHT VS YIELD
(r = 0.74 SH, 0.88 VSP)
(Smart & Robinson optimum 0.54-1.08kg/vine)

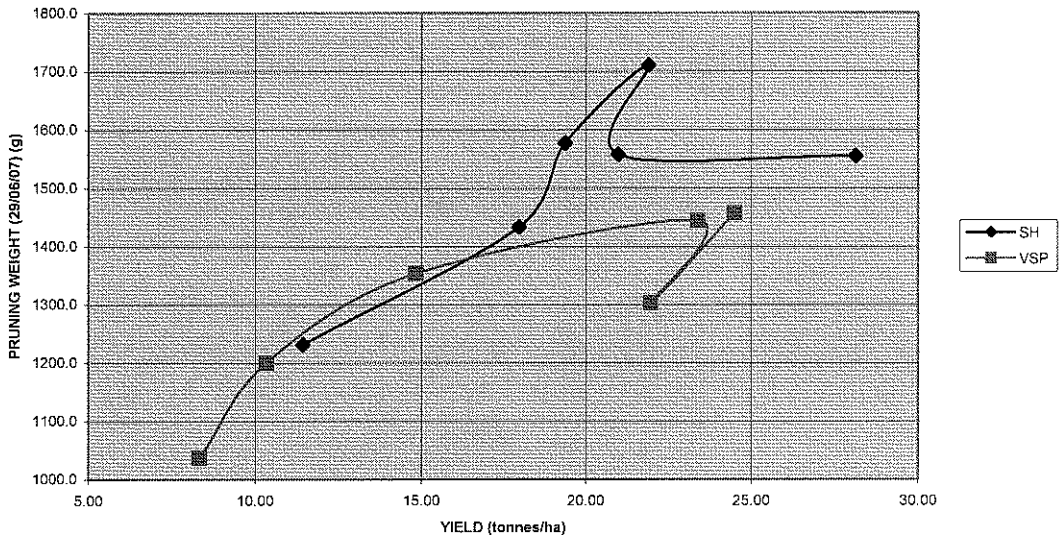
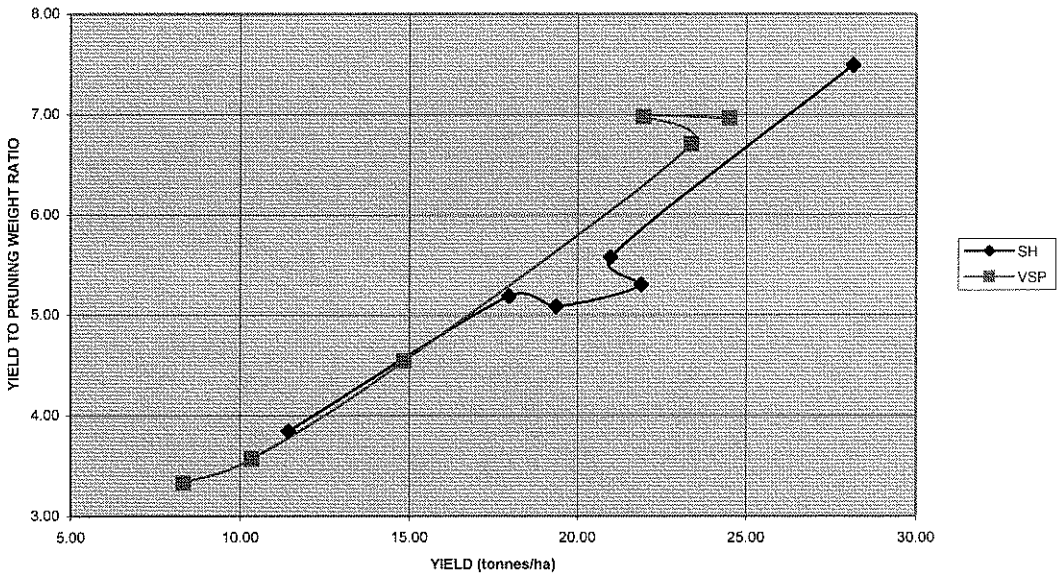


FIGURE 18 - YIELD TO PRUNING WEIGHT RATIO VS YIELD
(r = 0.96 SH, 0.99 VSP)
(Smart & Robinson optimum 5-10)



CONCLUSIONS

As stated at the outset this trial was designed as a demonstration rather than a rigorous scientific experiment. It was also run for only one season so no account is taken of carryover effects. Consequently, a certain amount of caution must be exercised in interpreting the results. However it does give some indication that Pinot Noir could be cropped at higher levels in some parts of Tasmania and still produce quality fruit. We are certainly not suggesting that producers start aiming for 15 or more tonnes per hectare but if it were possible to lift yields by even one or two tonnes the impact on the profitability of wine production in this cool climate region would be significant.

Further work on various aspects of the yield/quality relationship in this environment is warranted and the availability of the Experimental Micro-Vinification Facility at Tamar Ridge Estates provides the distinct advantage that such work can be carried right through to the end product.

REFERENCES

Farquhar, Duncan (unpublished) – Tasmanian Field Day, 9 November 2006, Quality Management, Pruning and Rootstocks (Field Day Report - GWRDC Project Number RT 06/02-2)

Smart, Richard and Robinson, Mike (1991) – Sunlight into Wine (Winetitles, Adelaide, South Australia)

ACKNOWLEDGEMENTS

We express our gratitude to many people who have contributed to this work and apologise for any omissions.

The project was conceived by the Technical Committee (Chair Jeremy Dineen) of the now defunct Vineyards Association of Tasmania and its successor, Wine Industry Tasmania. Duncan Farquhar (Department of Primary Industries and Water), Richard Smart (Tamar Ridge Estates) and Mark Brewer (Institute of TAFE Tasmania) were among the prime instigators.

It was conducted on the Relbia Vineyard of Josef Chromy Wines with the backing and input of Jeremy Dineen, Winemaker/Manager. Vineyard Manager, Steve Nash, and Vineyard Leading Hand, Michelle Cox, also provided significant support. With the blessing of the management Margarete Pfarr did an immense amount of work pruning, shoot counting and measuring, and harvesting. Kirsten Potowski (Assistant Winemaker) also assisted at harvest.

Sue Briggs of TAFE Tasmania assisted with the analyses at harvest.

Reuben Wells and Fiona Chopping, PhD students of the Tasmanian Institute of Agricultural Research, and their supervisor, Richard Smart, made the individual wines at the Experimental Micro-Vinification Facility at Tamar Ridge Estates.

APPENDIX 1

RAW DATA AND MEANS

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROMY VINEYARD - 2006-2007

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	28

TRELLIS:	SCOTT HENRY

PANEL NO.	VINE NO.	TREATMENT TARGETS				PRE-TREATMENT 11/08/06			CANOPY 07/11/06		
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	NODE COUNT	SHOOT COUNT	PRUNING WEIGHT (g)	SHOOT COUNT	SUCKER COUNT	MEAN SHOOT LENGTH (cm)
6	18	4	4	16	38640	34	23	1520	32	9	29.0
	17					26	27	1850	18	8	29.5
	16					35	31	2300	30	8	29.6
MEAN #1		4	4	16	38640	31.7	27.0	1890.0	26.7	8.3	29.4
5	15	4	8	32	77280	37	27	1720	38	7	26.4
	14					35	26	1820	37	4	25.7
	13					46	33	2400	39	16	30.1
MEAN #2		4	8	32	77280	39.3	28.7	1980.0	38.0	9.0	27.4
4	12	4	12	48	115920	26	29	1400	51	8	19.8
	11					34	36	2020	51	4	24.2
	10					33	28	1600	58	3	23.4
MEAN #3		4	12	48	115920	31.0	31.0	1673.3	53.3	5.0	22.5
3	9	6	12	72	173880	29	27	1350	71	3	26.9
	8					29	29	1420	65	9	21.2
	7					21	28	2900	77	6	21.8
MEAN #4		6	12	72	173880	26.3	28.0	1890.0	71.0	6.0	23.3
2	6	6	12	72	173880	0	2	150	14	7	23.8
	5					31	29	1800	57	1	22.5
	4					34	30	1800	59	3	25.0
MEAN #5		6	12	72	173880	32.5	29.5	1800.0	58.0	2.0	23.8
1	3	8	12	96	231840	30	31	1320	70	3	21.8
	2					19	21	880	64	5	23.1
	1					20	32	1880	70	7	19.3
MEAN #6		8	12	96	231840	23.0	28.0	1360.0	68.0	5.0	21.4

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROM

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	28

TRELLIS:	SCOTT HENRY

PANEL NO.	VINE NO.	TREATMENT TARGETS				HARVEST 06/04/07				FRUIT PARAMETERS 06/04/07			PRUNING 29/06/07	ELIMINATE DATA
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	1^0 BUNCH NO.	2^0 BUNCH NO.	1^0 FRUIT WEIGHT (kg)	2^0 FRUIT WEIGHT (kg)	TA (g/L)	pH	SUGAR (Brix)	PRUNING WEIGHT (g)	
6	18	4	4	16	38640	49	13	7.69	0.12	7.30	3.01	23.00	920	
	17					27	21	4.04	0.25	7.50	3.09	25.60	850	
	16					30	15	3.88	0.30	7.90	3.06	25.40	1250	
MEAN #1		4	4	16	38640	35.3	16.3	5.20	0.22	7.57	3.05	24.67	1006.7	
5	15	4	8	32	77280	64	7	8.99	0.15	7.10	3.01	21.20	1020	
	14					45	7	6.18	0.10	7.20	3.09	22.40	1180	
	13					56	4	5.72	0.10	6.90	3.05	24.20	1230	
MEAN #2		4	8	32	77280	55.0	6.0	6.96	0.12	7.07	3.05	22.60	1143.3	
4	12	4	12	48	115920	59	7	7.97	0.10	7.20	3.03	22.40	1220	
	11					62	28	8.64	0.40	7.80	3.04	22.60	1420	
	10					66	22	9.54	0.30	6.80	3.05	21.80	1330	
MEAN #3		4	12	48	115920	62.3	19.0	8.72	0.27	7.27	3.04	22.27	1323.3	
3	9	6	12	72	173880	60	32	5.98	0.40	6.90	3.06	22.00	1200	
	8					62	29	7.61	0.70	7.00	3.08	22.40	1480	
	7					72	71	9.30	1.70	7.80	3.09	23.80	2900	
MEAN #4		6	12	72	173880	64.7	44.0	7.63	0.93	7.23	3.08	22.73	1860.0	
2	6	6	12	72	173880	17	0	1.61	0.00	6.90	3.11	24.00	60	WEAK VINE
	5					72	15	8.05	0.20	7.40	3.10	22.40	1530	
	4					65	4	8.05	0.10	6.70	3.10	22.60	1340	
MEAN #5		6	12	72	173880	68.5	9.5	8.1	0.2	7.1	3.1	22.5	1435.0	
1	3	8	12	96	231840	104	10	10.45	0.20	6.70	3.01	19.40	1600	
	2					103	15	10.90	0.40	6.60	2.93	18.20	1480	
	1					108	6	15.07	0.13	6.60	2.92	19.00	2080	
MEAN #6		8	12	96	231840	105.0	10.3	12.14	0.24	6.63	2.95	18.87	1720.0	

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROMY VINEYARD - 2006-2007

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	30

TRELLIS:	SCOTT HENRY

PANEL NO.	VINE NO.	TREATMENT TARGETS				PRE-TREATMENT 11/08/06			CANOPY 07/11/06		
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	NODE COUNT	SHOOT COUNT	PRUNING WEIGHT (g)	SHOOT COUNT	SUCKER COUNT	MEAN SHOOT LENGTH (cm)
1	1	4	4	16	38640	43	30	1850	31	3	28.9
	2					39	41	2030	28	2	30.6
	3					37	30	1550	29	9	27.3
MEAN #1		4	4	16	38640	39.7	33.7	1810.0	29.3	4.7	28.9
2	4	4	8	32	77280	37	40	3950	46	6	26.2
	5					32	34	1500	44	9	30.9
	6					33	34	2400	51	6	26.3
MEAN #2		4	8	32	77280	34.0	36.0	2616.7	47.0	7.0	27.8
3	7	4	12	48	115920	39	34	2030	55	6	23.7
	8					44	35	2380	54	6	25.3
	9					37	32	2300	57	4	24.4
MEAN #3		4	12	48	115920	40.0	33.7	2236.7	55.3	5.3	24.5
4	10	6	12	72	173880	45	33	1450	48	5	23.3
	11					34	35	1950	75	6	20.9
	12					41	43	2620	68	6	22.6
MEAN #4		6	12	72	173880	40.0	37.0	2006.7	63.7	5.7	22.3
5	13	6	12	72	173880	8	9	180	22	2	20.6
	14					43	33	2800	71	6	19.3
	15					28	27	1750	64	1	21.7
MEAN #5		6	12	72	173880	35.5	30.0	2275.0	67.5	3.5	20.5
6	16	8	12	96	231840	36	29	1350	87	4	23.0
	17					42	30	1480	84	4	20.0
	18					40	28	1800	75	0	22.4
MEAN #6		8	12	96	231840	39.3	29.0	1543.3	82.0	2.7	21.8

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROM

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	30

TRELLIS:	SCOTT HENRY

PANEL NO.	VINE NO.	TREATMENT TARGETS				HARVEST 06/04/07				FRUIT PARAMETERS 06/04/07			PRUNING 29/06/07	ELIMINATE DATA
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	1^0 BUNCH NO.	2^0 BUNCH NO.	1^0 FRUIT WEIGHT (kg)	2^0 FRUIT WEIGHT (kg)	TA (g/L)	pH	SUGAR (Brix)	PRUNING WEIGHT (g)	
1	1	4	4	16	38640	32	26	4.37	0.77	7.70	3.14	24.00	1550	
	2					32	11	4.16	0.30	7.90	3.22	27.40	1400	
	3					34	12	4.26	0.20	6.90	3.16	26.40	1420	
MEAN #1		4	4	16	38640	32.7	16.3	4.26	0.42	7.50	3.17	25.93	1456.7	
2	4	4	8	32	77280	60	26	5.17	0.50	7.90	3.14	24.80	2250	
	5					56	9	9.11	0.15	7.40	3.04	21.60	1040	
	6					60	8	9.44	0.22	7.40	3.07	22.40	1880	
MEAN #2		4	8	32	77280	58.7	14.3	7.91	0.29	7.57	3.08	22.93	1723.3	
3	7	4	12	48	115920	49	17	6.26	0.25	6.80	3.12	24.40	1600	
	8					60	25	7.72	0.50	7.10	3.11	24.00	1840	
	9					52	19	7.97	0.36	6.70	3.09	23.60	2050	
MEAN #3		4	12	48	115920	53.7	20.3	7.32	0.37	6.87	3.11	24.00	1830.0	
4	10	6	12	72	173880	80	14	10.42	0.30	6.10	3.05	21.00	1300	
	11					88	8	12.74	0.18	7.00	2.97	20.00	1500	
	12					92	12	8.33	0.32	7.60	3.03	22.40	1880	
MEAN #4		6	12	72	173880	86.7	11.3	10.50	0.27	6.90	3.02	21.13	1560.0	
5	13	6	12	72	173880	9	0	1.37	0.00	6.50	3.01	20.00	150	WEAK VINE
	14					113	8	11.15	0.30	6.70	2.99	19.60	1820	
	15					68	6	7.49	0.15	7.00	3.04	22.00	1540	
MEAN #5		6	12	72	173880	90.5	7.0	9.3	0.2	6.9	3.0	20.8	1680.0	
6	16	8	12	96	231840	94	10	11.45	0.30	6.90	2.99	19.00	1100	
	17					88	20	10.23	0.40	6.90	2.98	19.20	1150	
	18					99	12	11.79	0.25	7.50	2.96	21.00	1920	
MEAN #6		8	12	96	231840	93.7	14.0	11.16	0.32	7.10	2.98	19.73	1390.0	

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROMY VINEYARD - 2006-2007

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	31

TRELLIS:	VERTICAL SHOOT POSITIONED

PANEL NO.	VINE NO.	TREATMENT TARGETS				PRE-TREATMENT 11/08/06			CANOPY 07/11/06		
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	NODE COUNT	SHOOT COUNT	PRUNING WEIGHT (g)	SHOOT COUNT	SUCKER COUNT	MEAN SHOOT LENGTH (cm)
1	1	2	4	8	19320	19	23	2440	16	8	30.8
	2					17	20	1040	19	4	28.9
	3					17	26	1840	16	7	26.8
MEAN #1		2	4	8	19320	17.7	23.0	1773.3	17.0	6.3	28.8
2	4	2	8	16	38640	19	27	1700	22	7	31.5
	5					16	24	2480	24	10	23.7
	6					16	17	1980	25	4	34.8
MEAN #2		2	8	16	38640	17.0	22.7	2053.3	23.7	7.0	30.0
3	7	2	12	24	57960	22	20	2200	33	3	29.3
	8					21	33	2450	28	8	39.6
	9					18	14	2100	33	6	26.5
MEAN #3		2	12	24	57960	20.3	22.3	2250.0	31.3	5.7	31.8
4	10	4	12	48	115920	21	28	1090	51	7	23.1
	11					20	18	2850	55	10	24.8
	12					19	22	1650	49	1	24.3
MEAN #4		4	12	48	115920	20.0	25.0	1370.0	50.0	4.0	23.7
5	13	6	12	72	173880	20	20	2700	66	6	25.3
	14					19	18	850	62	5	17.3
	15					20	23	980	65	7	22.9
MEAN #5		6	12	72	173880	19.7	20.3	1510.0	64.3	6.0	21.8
6	16	8	12	96	231840	18	25	1380	76	2	19.6
	17					17	18	1050	69	3	21.1
	18					15	16	1650	82	8	22.8
MEAN #6		8	12	96	231840	16.7	19.7	1360.0	75.7	4.3	21.2

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROM

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	31

TRELLIS:	VERTICAL SHOOT POSITIONED

PANEL NO.	VINE NO.	TREATMENT TARGETS				HARVEST 05/04/07				FRUIT PARAMETERS 06/04/07			PRUNING 29/06/07	ELIMINATE DATA
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	1^0 BUNCH NO.	2^0 BUNCH NO.	1^0 FRUIT WEIGHT (kg)	2^0 FRUIT WEIGHT (kg)	TA (g/L)	pH	SUGAR (Brix)	PRUNING WEIGHT (g)	
1	1	2	4	8	19320	16	25	2.33	0.90	8.25	3.15	25.60	1100	
	2					21	7	3.05	0.20	6.90	3.22	26.00	880	
	3					22	12	3.20	0.40	7.28	3.13	26.00	820	
MEAN #1		2	4	8	19320	19.7	14.7	2.86	0.50	7.48	3.17	25.87	933.3	
2	4	2	8	16	38640	26	31	3.49	1.20	8.48	3.12	26.40	1280	
	5					24	50	3.64	2.12	9.23	3.07	24.40	1150	
	6					28	14	5.05	0.40	7.35	3.08	25.00	1320	
MEAN #2		2	8	16	38640	26.0	31.7	4.06	1.24	8.35	3.09	25.27	1250.0	
3	7	2	12	24	57960	45	5	7.67	0.10	7.50	3.04	24.00	1480	
	8					24	10	3.32	0.36	7.80	3.11	26.00	1580	
	9					61	17	6.98	0.37	8.03	3.00	22.00	1480	
MEAN #3		2	12	24	57960	43.3	10.7	5.99	0.28	7.78	3.05	24.00	1513.3	
4	10	4	12	48	115920	55	5	7.50	0.14	8.03	2.96	17.00	1020	
	11					9	8	0.80	0.16	8.18	2.96	18.00	2200	BIRDS?
	12					77	2	10.46	0.11	9.08	2.89	17.80	1450	
MEAN #4		4	12	48	115920	66.0	3.5	9.0	0.1	8.6	2.9	17.4	1235.0	
5	13	6	12	72	173880	111	8	11.71	0.39	8.63	2.90	20.60	2050	
	14					77	5	7.94	0.18	8.18	2.86	18.80	880	
	15					78	7	7.90	0.14	8.63	2.86	17.20	1040	
MEAN #5		6	12	72	173880	88.7	6.7	9.18	0.24	8.48	2.87	18.87	1323.3	
6	16	8	12	96	231840	83	11	8.15	0.23	7.73	2.85	17.80	1160	
	17					94	1	9.06	0.05	7.73	2.85	18.00	1220	
	18					112	5	11.44	0.08	7.35	2.94	17.80	1460	
MEAN #6		8	12	96	231840	96.3	5.7	9.55	0.12	7.60	2.88	17.87	1280.0	

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROMY VINEYARD - 2006-2007

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	33

TRELLIS:	VERTICAL SHOOT POSITIONED

PANEL NO.	VINE NO.	TREATMENT TARGETS				PRE-TREATMENT 11/08/06			CANOPY 07/11/06		
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	NODE COUNT	SHOOT COUNT	PRUNING WEIGHT (g)	SHOOT COUNT	SUCKER COUNT	MEAN SHOOT LENGTH (cm)
6	18	2	4	8	19320	20	19	2200	21	9	29.6
	17					16	24	2450	21	6	33.6
	16					19	26	1870	21	6	24.2
MEAN #1		2	4	8	19320	18.3	23.0	2173.3	21.0	7.0	29.1
5	15	2	8	16	38640	15	24	2100	28	5	25.8
	14					16	21	2100	24	17	24.6
	13					19	23	2050	22	8	26.6
MEAN #2		2	8	16	38640	16.7	22.7	2083.3	24.7	10.0	25.7
4	12	2	12	24	57960	17	19	1780	28	9	22.5
	11					18	22	1780	25	1	22.2
	10					18	18	2200	28	5	23.8
MEAN #3		2	12	24	57960	17.7	19.7	1920.0	27.0	5.0	22.8
3	9	4	12	48	115920	12	19	2100	47	3	25.1
	8					16	18	1820	46	4	25.6
	7					17	22	2020	52	1	26.9
MEAN #4		4	12	48	115920	15.0	19.7	1980.0	48.3	2.7	25.9
2	6	6	12	72	173880	15	18	1480	47	1	12.4
	5					17	20	2000	63	4	20.7
	4					16	16	1050	59	7	19.5
MEAN #5		6	12	72	173880	16.0	18.0	1510.0	56.3	4.0	17.5
1	3	8	12	96	231840	19	23	2000	75	5	21.1
	2					17	28	1700	65	3	20.1
	1					11	21	800	73	0	22.4
MEAN #6		8	12	96	231840	15.7	24.0	1500.0	71.0	2.7	21.2

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROM

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW NO.	33

TRELLIS:	VERTICAL SHOOT POSITIONED

PANEL NO.	VINE NO.	TREATMENT TARGETS				HARVEST 05/04/07				FRUIT PARAMETERS 06/04/07			PRUNING 29/06/07	ELIMINATE DATA
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	1^0 BUNCH NO.	2^0 BUNCH NO.	1^0 FRUIT WEIGHT (kg)	2^0 FRUIT WEIGHT (kg)	TA (g/L)	pH	SUGAR (Brix)	PRUNING WEIGHT (g)	
6	18	2	4	8	19320	31	---	5.20	0.61	7.05	3.09	25.00	1220	
	17					27	---	4.00	0.42	7.05	3.08	25.00	1300	
	16					19	---	2.95	0.46	7.20	3.05	25.00	900	
MEAN #1		2	4	8	19320	25.7	0.0	4.05	0.50	7.10	3.07	25.00	1140.0	
5	15	2	8	16	38640	39	---	5.40	0.23	7.43	3.06	23.40	1380	
	14					26	---	3.10	0.72	7.28	3.09	25.00	920	
	13					32	---	5.00	0.26	7.58	3.01	24.00	1150	
MEAN #2		2	8	16	38640	32.3	0.0	4.50	0.40	7.43	3.05	24.13	1150.0	
4	12	2	12	24	57960	41	---	6.80	0.14	7.50	3.00	23.00	1200	
	11					30	---	5.30	0.31	8.10	3.03	24.00	1180	
	10					33	---	6.80	0.32	7.50	3.02	22.40	1200	
MEAN #3		2	12	24	57960	34.7	0.0	6.30	0.26	7.70	3.02	23.13	1193.3	
3	9	4	12	48	115920	73	---	11.80	0.36	7.28	2.99	20.40	1820	
	8					72	---	9.85	0.08	6.75	2.98	17.60	1380	
	7					79	---	9.50	0.02	6.53	3.03	20.20	1760	
MEAN #4		4	12	48	115920	74.7	0.0	10.38	0.15	6.85	3.00	19.40	1653.3	
2	6	6	12	72	173880	79	---	6.50	0.04	8.02	2.94	20.00	1120	
	5					71	13	11.00	0.13	7.28	2.98	20.00	1480	
	4					76	3	9.50	0.04	6.90	2.96	18.20	1250	
MEAN #5		6	12	72	173880	75.3	5.3	9.00	0.07	7.40	2.96	19.40	1283.3	
1	3	8	12	96	231840	108	7	14.30	0.17	6.75	3.00	19.00	2140	
	2					84	9	9.80	0.15	6.53	3.05	19.20	1450	
	1					81	9	8.11	0.25	7.05	3.04	17.80	1310	
MEAN #6		8	12	96	231840	91.0	8.3	10.74	0.19	6.78	3.03	18.67	1633.3	

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW	PRUNING LEVEL	TREATMENT TARGETS				PRE-TREATMENT 11/08/06			CANOPY 07/11/06		
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	NODE COUNT	SHOOT COUNT	PRUNING WEIGHT (g)	SHOOT COUNT	SUCKER COUNT	MEAN SHOOT LENGTH (cm)
28	1	4	4	16	38640	31.7	27.0	1890.0	26.7	8.3	29.4
SH	2	4	8	32	77280	39.3	28.7	1980.0	38.0	9.0	27.4
	3	4	12	48	115920	31.0	31.0	1673.3	53.3	5.0	22.5
	4	6	12	72	173880	26.3	28.0	1890.0	71.0	6.0	23.3
	5	6	12	72	173880	32.5	29.5	1800.0	58.0	2.0	23.8
	6	8	12	96	231840	23.0	28.0	1360.0	68.0	5.0	21.4
30	1	4	4	16	38640	39.7	33.7	1810.0	29.3	4.7	28.9
SH	2	4	8	32	77280	34.0	36.0	2616.7	47.0	7.0	27.8
	3	4	12	48	115920	40.0	33.7	2236.7	55.3	5.3	24.5
	4	6	12	72	173880	40.0	37.0	2006.7	63.7	5.7	22.3
	5	6	12	72	173880	35.5	30.0	2275.0	67.5	3.5	20.5
	6	8	12	96	231840	39.3	29.0	1543.3	82.0	2.7	21.8
31	1	2	4	8	19320	17.7	23.0	1773.3	17.0	6.3	28.8
VSP	2	2	8	16	38640	17.0	22.7	2053.3	23.7	7.0	30.0
	3	2	12	24	57960	20.3	22.3	2250.0	31.3	5.7	31.8
	4	4	12	48	115920	20.0	25.0	1370.0	50.0	4.0	23.7
	5	6	12	72	173880	19.7	20.3	1510.0	64.3	6.0	21.8
	6	8	12	96	231840	16.7	19.7	1360.0	75.7	4.3	21.2
33	1	2	4	8	19320	18.3	23.0	2173.3	21.0	7.0	29.1
VSP	2	2	8	16	38640	16.7	22.7	2083.3	24.7	10.0	25.7
	3	2	12	24	57960	17.7	19.7	1920.0	27.0	5.0	22.8
	4	4	12	48	115920	15.0	19.7	1980.0	48.3	2.7	25.9
	5	6	12	72	173880	16.0	18.0	1510.0	56.3	4.0	17.5
	6	8	12	96	231840	15.7	24.0	1500.0	71.0	2.7	21.2

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

ROW	PRUNING LEVEL	TREATMENT TARGETS				HARVEST 06/04/07					FRUIT PARAMETERS 06/04/07			PRUNING 29/06/07
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	1^0 BUNCH NO.	2^0 BUNCH NO.	1^0 FRUIT WEIGHT (kg)	1^0 FRUIT PER HA (tonnes)	2^0 FRUIT WEIGHT (kg)	TA (g/L)	pH	SUGAR (Brix)	PRUNING WEIGHT (g)
28	1	4	4	16	38640	35.3	16.3	5.20	12.57	0.22	7.57	3.05	24.67	1006.7
SH	2	4	8	32	77280	55.0	6.0	6.96	16.82	0.12	7.07	3.05	22.60	1143.3
	3	4	12	48	115920	62.3	19.0	8.72	21.05	0.27	7.27	3.04	22.27	1323.3
	4	6	12	72	173880	64.7	44.0	7.63	18.43	0.93	7.23	3.08	22.73	1860.0
	5	6	12	72	173880	68.5	9.5	8.05	19.44	0.15	7.05	3.10	22.50	1435.0
	6	8	12	96	231840	105.0	10.3	12.14	29.32	0.24	6.63	2.95	18.87	1720.0
30	1	4	4	16	38640	32.7	16.3	4.26	10.30	0.42	7.50	3.17	25.93	1456.7
SH	2	4	8	32	77280	58.7	14.3	7.91	19.09	0.29	7.57	3.08	22.93	1723.3
	3	4	12	48	115920	53.7	20.3	7.32	17.67	0.37	6.87	3.11	24.00	1830.0
	4	6	12	72	173880	86.7	11.3	10.50	25.35	0.27	6.90	3.02	21.13	1560.0
	5	6	12	72	173880	90.5	7.0	9.32	22.51	0.23	6.85	3.02	20.80	1680.0
	6	8	12	96	231840	93.7	14.0	11.16	26.94	0.32	7.10	2.98	19.73	1390.0
31	1	2	4	8	19320	19.7	14.7	2.86	6.91	0.50	7.48	3.17	25.87	933.3
VSP	2	2	8	16	38640	26.0	31.7	4.06	9.80	1.24	8.35	3.09	25.27	1250.0
	3	2	12	24	57960	43.3	10.7	5.99	14.47	0.28	7.78	3.05	24.00	1513.3
	4	4	12	48	115920	66.0	3.5	8.98	21.69	0.13	8.56	2.93	17.40	1235.0
	5	6	12	72	173880	88.7	6.7	9.18	22.18	0.24	8.48	2.87	18.87	1323.3
	6	8	12	96	231840	96.3	5.7	9.55	23.06	0.12	7.60	2.88	17.87	1280.0
33	1	2	4	8	19320	25.7	0.0	4.05	9.78	0.50	7.10	3.07	25.00	1140.0
VSP	2	2	8	16	38640	32.3	0.0	4.50	10.87	0.40	7.43	3.05	24.13	1150.0
	3	2	12	24	57960	34.7	0.0	6.30	15.21	0.26	7.70	3.02	23.13	1193.3
	4	4	12	48	115920	74.7	0.0	10.38	25.08	0.15	6.85	3.00	19.40	1653.3
	5	6	12	72	173880	75.3	5.3	9.00	21.74	0.07	7.40	2.96	19.40	1283.3
	6	8	12	96	231840	91.0	8.3	10.74	25.93	0.19	6.78	3.03	18.67	1633.3

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

TRELLIS MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

TRELLIS	PRUNING LEVEL	TREATMENT TARGETS				PRE-TREATMENT 11/08/06			CANOPY 07/11/06			
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	NODE COUNT	SHOOT COUNT	PRUNING WEIGHT (g)	SHOOT COUNT PER VINE	SHOOT COUNT PER HA	SUCKER COUNT	MEAN SHOOT LENGTH (cm)
SH	1	4	4	16	38640	35.7	30.3	1850.0	28.0	67620	6.5	29.2
	2	4	8	32	77280	36.7	32.3	2298.3	42.5	102638	8.0	27.6
	3	4	12	48	115920	35.5	32.3	1955.0	54.3	131215	5.2	23.5
	4	6	12	72	173880	33.2	32.5	1948.3	67.3	162610	5.8	22.8
	5	6	12	72	173880	34.0	29.8	2037.5	62.8	151541	2.8	22.1
	6	8	12	96	231840	31.2	28.5	1451.7	75.0	181125	3.8	21.6
VSP	1	2	4	8	19320	18.0	23.0	1973.3	19.0	45885	6.7	29.0
	2	2	8	16	38640	16.8	22.7	2068.3	24.2	58363	8.5	27.8
	3	2	12	24	57960	19.0	21.0	2085.0	29.2	70438	5.3	27.3
	4	4	12	48	115920	17.5	22.3	1675.0	49.2	118738	3.3	24.8
	5	6	12	72	173880	17.8	19.2	1510.0	60.3	145705	5.0	19.7
	6	8	12	96	231840	16.2	21.8	1430.0	73.3	177100	3.5	21.2

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

TRELLIS MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

TRELLIS	PRUNING LEVEL	TREATMENT TARGETS				HARVEST 06/04/07				
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	1^0 BUNCH NO.	2^0 BUNCH NO.	1^0 FRUIT WEIGHT (kg)	1^0 FRUIT PER HA (tonnes)	2^0 FRUIT WEIGHT (kg)
SH	1	4	4	16	38640	34.0	16.3	4.73	11.43	0.32
	2	4	8	32	77280	56.8	10.2	7.44	17.96	0.20
	3	4	12	48	115920	58.0	19.7	8.02	19.36	0.32
	4	6	12	72	173880	75.7	27.7	9.06	21.89	0.60
	5	6	12	72	173880	79.5	8.3	8.69	20.97	0.19
	6	8	12	96	231840	99.3	12.2	11.65	28.13	0.28
VSP	1	2	4	8	19320	22.7	7.3	3.46	8.34	0.50
	2	2	8	16	38640	29.2	15.8	4.28	10.34	0.82
	3	2	12	24	57960	39.0	5.3	6.15	14.84	0.27
	4	4	12	48	115920	70.3	1.8	9.68	23.38	0.14
	5	6	12	72	173880	82.0	6.0	9.09	21.96	0.15
	6	8	12	96	231840	93.7	7.0	10.14	24.50	0.16

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

TRELLIS MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

TRELLIS	PRUNING LEVEL	TREATMENT TARGETS				FRUIT PARAMETERS 06/04/07			KAYENA DATA 06/04/07*		
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	TA (g/L)	pH	SUGAR (Brix)	TA (g/L)	pH	SUGAR (Brix)
SH	1	4	4	16	38640	7.53	3.11	25.30	5.87	3.27	-
	2	4	8	32	77280	7.32	3.07	22.77	5.92	3.21	-
	3	4	12	48	115920	7.07	3.07	23.13	6.86	3.22	-
	4	6	12	72	173880	7.07	3.05	21.93	7.08	3.17	-
	5	6	12	72	173880	6.95	3.06	21.65	6.27	3.20	-
	6	8	12	96	231840	6.87	2.97	19.30	6.72	3.10	-
VSP	1	2	4	8	19320	7.29	3.12	25.43	5.79	3.35	25.4
	2	2	8	16	38640	7.89	3.07	24.70	6.03	3.23	24.6
	3	2	12	24	57960	7.74	3.03	23.57	6.00	3.20	23.4
	4	4	12	48	115920	7.70	2.96	18.40	6.40	3.12	19.4
	5	6	12	72	173880	7.94	2.92	19.13	6.47	3.05	18.6
	6	8	12	96	231840	7.19	2.96	18.27	5.87	3.12	19.2

* Data from Micro-Vinification Facility

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

TRELLIS MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

TRELLIS	PRUNING LEVEL	TREATMENT TARGETS				PRUNING 29/06/07		
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA	PRUNING WEIGHT (g)	YIELD TO PRUNING WEIGHT RATIO	MEAN CANE WEIGHT (g)
SH	1	4	4	16	38640	1231.7	3.84	44.0
	2	4	8	32	77280	1433.3	5.19	33.7
	3	4	12	48	115920	1576.7	5.08	29.0
	4	6	12	72	173880	1710.0	5.30	25.4
	5	6	12	72	173880	1557.5	5.58	24.8
	6	8	12	96	231840	1555.0	7.49	20.7
VSP	1	2	4	8	19320	1036.7	3.33	54.6
	2	2	8	16	38640	1200.0	3.57	49.7
	3	2	12	24	57960	1353.3	4.54	46.4
	4	4	12	48	115920	1444.2	6.70	29.4
	5	6	12	72	173880	1303.3	6.98	21.6
	6	8	12	96	231840	1456.7	6.96	19.9

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

TRELLIS MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

TRELLIS	PRUNING LEVEL	TREATMENT TARGETS				Buf A420	Buf A520	Ace A420	Ace A520	NaMET A420	NaMET A520
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA						
SH	1	4	4	16	38640	0.224	0.356	0.265	0.475	0.132	0.104
	2	4	8	32	77280	0.148	0.223	0.185	0.344	0.098	0.072
	3	4	12	48	115920	0.161	0.243	0.206	0.374	0.093	0.067
	4	6	12	72	173880	0.129	0.197	0.173	0.312	0.085	0.061
	5	6	12	72	173880	0.161	0.251	0.208	0.369	0.094	0.076
	6	8	12	96	231840	0.098	0.150	0.124	0.220	0.057	0.042
VSP	1	2	4	8	19320	0.204	0.314	0.240	0.418	0.123	0.094
	2	2	8	16	38640	0.190	0.304	0.226	0.407	0.106	0.082
	3	2	12	24	57960	0.166	0.256	0.200	0.354	0.097	0.071
	4	4	12	48	115920	0.109	0.166	0.135	0.230	0.069	0.060
	5	6	12	72	173880	0.122	0.191	0.140	0.243	0.072	0.064
	6	8	12	96	231840	0.127	0.194	0.148	0.254	0.078	0.063

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

TRELLIS MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

TRELLIS	PRUNING LEVEL	TREATMENT TARGETS				HCI A280	HCI A420	HCI A520	CAGE1	CAGE2	IONANT
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA						
SH	1	4	4	16	38640	0.859	0.109	0.348	0.219	0.030	7.621
	2	4	8	32	77280	0.723	0.082	0.266	0.209	0.027	5.945
	3	4	12	48	115920	0.726	0.087	0.274	0.179	0.024	6.696
	4	6	12	72	173880	0.698	0.078	0.248	0.196	0.025	5.718
	5	6	12	72	173880	0.715	0.085	0.268	0.206	0.028	6.854
	6	8	12	96	231840	0.549	0.055	0.179	0.191	0.023	6.279
VSP	1	2	4	8	19320	0.752	0.100	0.319	0.225	0.029	7.253
	2	2	8	16	38640	0.763	0.094	0.307	0.201	0.027	7.568
	3	2	12	24	57960	0.765	0.086	0.275	0.201	0.026	7.030
	4	4	12	48	115920	0.594	0.052	0.146	0.261	0.041	7.794
	5	6	12	72	173880	0.628	0.052	0.154	0.263	0.042	8.860
	6	8	12	96	231840	0.637	0.059	0.180	0.248	0.035	7.729

VINE RESPONSE TO PRUNING LEVELS

JOSEF CHROMY VINEYARD - 2006-2007

TRELLIS MEAN VALUES - OUTLYING DATA ELIMINATED

ROW WIDTH 2.3M, VINE SPACING 1.8M, VINES/HA 2415

TRELLIS	PRUNING LEVEL	TREATMENT TARGETS				TOTANT	WCD	WCD SO2	HUE	TOTAL PHEN	FRUIT PER HA
		CANES PER VINE	NODES PER CANE	NODES PER VINE	NODES PER HA						
SH	1	4	4	16	38640	661.333	0.580	7.400	0.629	81.900	11.43
	2	4	8	32	77280	508.000	0.371	5.290	0.664	68.300	17.96
	3	4	12	48	115920	525.666	0.404	5.800	0.663	68.600	19.36
	4	6	12	72	173880	475.666	0.326	4.850	0.655	65.800	21.89
	5	6	12	72	173880	510.666	0.412	5.770	0.641	67.500	20.97
	6	8	12	96	231840	344.000	0.248	3.440	0.653	50.900	28.13
VSP	1	2	4	8	19320	606.666	0.518	6.580	0.650	71.200	8.34
	2	2	8	16	38640	586.666	0.494	6.330	0.625	72.300	10.34
	3	2	12	24	57960	526.333	0.422	5.540	0.648	72.500	14.84
	4	4	12	48	115920	272.000	0.275	3.650	0.657	55.400	23.38
	5	6	12	72	173880	286.666	0.313	3.830	0.639	58.800	21.96
	6	8	12	96	231840	339.000	0.321	4.020	0.655	59.700	24.50

VINE RESPONSE TO PRUNING LEVELS - JOSEF CHROMY VINEYARD - 2006-2007

DATA EX KAYENA - BULK SAMPLES FROM 2 REPS OF EACH TRELLIS TYPE

PRUNING LEVEL	VSP 05/04/07		
	BRIX	pH	TA
1	25.4	3.35	5.79
2	24.6	3.23	6.03
3	23.4	3.20	6.00
4	19.4	3.12	6.40
5	18.6	3.05	6.47
6	19.2	3.12	5.87

PRUNING LEVEL	SH 06/04/07		
	BRIX	pH	TA
1	-	3.27	5.87
2	-	3.21	5.92
3	-	3.22	6.86
4	-	3.17	7.08
5	-	3.20	6.27
6	-	3.10	6.72

APPENDIX 2

PHOTOS



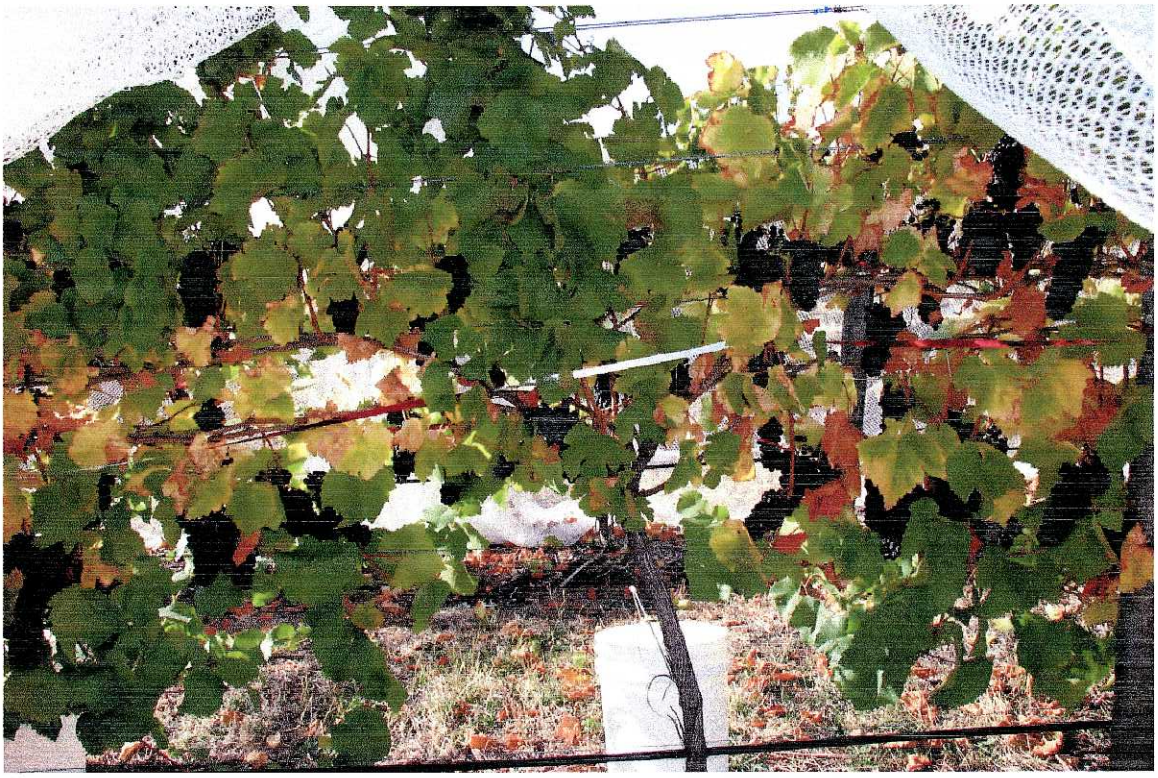
VSP PRUNING LEVEL 1



VSP PRUNING LEVEL 6



SH PRUNING LEVEL 1



SH PRUNING LEVEL 6