McLAREN VALE
GRAPE, WINE
& TOURISM

Comparison of short frequent irrigations and longer less frequent irrigations in relation to water use efficiency and winegrape quality.

FINAL REPORT to

GRAPE AND WINE RESEARCH & DEVELOPMENT CORPORATION

Project Number: **RT 02/01-1**

Principal Investigator: **Lucy Hyde, on behalf of Mike McCarthy, Tony Hoare and Paul Mathews**

Research Organisation: **McLaren Vale Grape, Wine and Tourism**

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Executive Summary

A preliminary trial was undertaken during the 2002/03 season to assess the impact of the frequency of irrigation applications on wine quality. The efficiency of water use as it relates to quality was also considered as this is an important issue in the Mclaren Vale region where a cap of 1.1ML/ha applies for growers irrigating with bore water. The trial has been continued for the 2003/04 season and additional funding will be sought to continue the trial in future seasons.

Shiraz and Cabernet on clay loam soils in Tyrrells, Willunga and Wirra Wirra, McLaren Vale vineyards were subjected to treatments that varied the frequency and amount of water applied for each irrigation but not the total amount for the entire season. Although the study is being carried out at two sites McLaren Vale Grape, Wine and Tourism hopes to use the soil moisture data, vine assessment records and wine making information collected over a number of seasons to provide a local workshop for winegrowers to demonstrate the impact of management practices on water use efficiency and winegrape quality.

It should be noted that initiatives such as this project encourage growers to explore the impact of their management practices on wine quality. Whilst the project is region and site specific it highlights the intricacies of irrigation scheduling as they relate to water use and quality and provides a foundation for all growers to challenge their current practices regardless of site. It is for these reasons that McLaren Vale Growers view this project to be of importance.

Background Information

- McLaren Vale is a premium winegrape region and seeks to maintain this standard through greater understanding of the critical influence irrigation has on wine quality.
- This project is a continuation of outcomes from the regional exercise conducted by the McLaren Vale Best Practice Viticulture Group (MVBPVG), the objective of which was to benchmark irrigation practices in the region and evaluate and interpret their influence on the production of quality winegrapes in McLaren Vale.
- Results of the survey indicated that the frequency of irrigations may have some impact on quality and/or water use efficiency.
- The study aims to assist in the preservation of water resources within the Willunga Basin catchment area through improved efficiency of irrigation management.
- Recent restrictions (1.1 ML/ha/yr) in water use for McLaren Vale growers irrigating from Willunga Basin bores mean that techniques that improve water use efficiency whilst maintaining quality are invaluable to the sustainability of the industry in the region.
- The results of the study will be discussed with growers at the 2004 McLaren Vale Growers Day.

Objectives

- To accurately establish the critical link between the duration and frequency of irrigation on winegrape quality. This in turn would lead to improved efficiency of irrigation management while maintaining or improving winegrape quality.
- The study involved Shiraz and Cabernet vines on clay loam soils in two vineyards (Tyrells, Willunga and Wirra Wirra, McLaren Vale). Cabernet was included at each site to assess varietal differences (original application specified Shiraz only)
- Logistical difficulties at participating wineries and limited funding resulted in only Tryells being able to keep parcels of fruit separate through winemaking and this was done as eight tonne lots for both varieties.

- To account for seasonal variability the study will be conducted over a 3 year period with funding granted from GWRDC for the initial year.

Method

Cabernet Sauvignon and Shiraz Blocks at Wirra Wirra and Tyrrells Vineyards were subjected to two treatments; long less frequent and short frequent irrigation schedules were implemented. Amount of water and timing of irrigations were adjusted to seasonal requirements. For example the irrigation schedule at Tyrrells is detailed below.

Dripper and spacing details: 2L/Hr x 0.6m apart 35yr vines 1.8x 3.6m
11th Oct - 8hrs all
31st Oct - 8hrs all
16 Nov - 8hrs all
17th Dec - 8hrs all post fruit set
27 Dec - 8/16 SF/LI
2 Jan - 8/0
9th Jan - 10/20
30 Jan - rain 18mm
15th Jan - 10/0
3rd Feb - 10hrs all
16th Feb - rain 10mm
20th Feb - rain 22mm splitting 30%
6 March picked

Diviner sites were installed and soil moisture levels and movement of water through the profile were recorded during the growing season. A qualitative assessment of vine health was made in all blocks.

Results and Discussion

Water use efficiency

The 2001/2002 season was unusually dry and hot, vines in the McLaren Vale region sustained significant water stress. At the Wirra Wirra site signs of water stress were observed on vines in both treatments and of both varieties, vines irrigated with longer less frequent irrigations appeared to retain a higher percentage of functional leaf area than those irrigated with short frequent irrigations. No noticeable difference was observed at Tyrrells. No noticeable differences were recorded between varieties. This trend should be monitored and quantified over a number of different seasons before any conclusions can be drawn. In addition influences of soil type need to be considered before extrapolations to other vineyard situations can be made.

Wine Evaluation

The fruit from each treatment on Shiraz at Tyrrells was harvested in 8 ton lots and kept separate for chemical and sensory analysis. Results are detailed below in Table 1. Further trials over a number of seasons and at different sites are required to provide valid information to growers and winemakers.

Table 1. Results of small batch winemaking

	Shiraz 1 Long & Infrequent		Shiraz 2 Short & Frequent	
Picked	3/06/2003		3/06/2003	
Tonnes	8.02t		7.56t	
pH	3.74		3.71	
TA	5.06		5.19	
Brix	27.5		27.5	
	Static Fermenters, Pump out and back via irrigator			
Date	^{o}Brix	Must temperature (^{o}C)	^{o}Brix	Must temperature (^{o}C)
11-Mar	26	18	25	17
12-Mar	23	23	23	22
	21'	21	21	20
13-Mar	19	21	15	22
	15	25	11	22
14-Mar	9	25	6	24
	6	28	5	28
15-Mar	5	21	3	20
	3	22	2	20
16-Mar	1'	22	1	21
	0	22'	1	21

Description

Long & Infrequent:

Dense Red/Purple colour, ripe fruit cake and mulberry nose with a slight herbal edge. The palate has powerful up front fruit sweetness high fruit tannins and touch a short.

Short & Frequent

Very similar to above, if anything this wine has slightly more vibrant colour, increased herbal notes but essentially minimal differences.

Outcomes and Conclusions

Mike McCarthy intends to work in collaboration with Tyrrells, Wirra Wirra and McLaren Vale Grape, Wine and Tourism to replicate the trail over the 2003/04 season. The trail will be expanded to include small batch winemaking for Wirra Wirra treatments as well as Tyrrells treatments. Comprehensive soil moisture data will be recorded for analysis. Preliminary data will be presented at the 2004 growers' day and wines will be made available at a grower workshop for sensory evaluation. It is the intention of the above collaborators to continue this trial into the 2004/05 season. Additional funding will be sought for monitoring, data analysis and extension, it is hoped that field sessions can take place in the 20004/05* season to demonstrate to growers the two techniques and their impact on wine quality and vine health.

*It is thought that by year three sufficient understanding will be gained to demonstrate the two techniques and provide guidelines for growers to implement similar trails in their own vineyards – clear cut recommendations will not be made given the site specificity of the project.

Extension of information to growers

Growers have been made aware of the project, the treatments and the objectives through presentations to grower groups and an article in a grower newsletter. Interest in the project has been significant.

Given the above results it is the view of McLaren Vale Grape, Wine and Tourism and Mike McCarthy that one season of data, especially after a winter/spring of below average rainfall provided insufficient information for useful guidelines to be developed for growers. Preliminary data, however, suggests that the trial is worth pursuing given its relevance to water use efficiency and grape quality – two issues clearly identified by grower groups within the region to be of high importance.

Budget reconciliation

Budget	Funding required from GWRDC	Actual expenditure**
Soil moisture logging equipment*	$2650	$2,650
Operating		
Irrigation modifications	$500	$500
Analysis cost	$500	$500
Workshop & field day costs***	$200	$200
Soil water monitoring	$1,400	$1,400
Trail site(s) maintenance & contract winemaking		
In kind support from regional groups		
Total	$5,250	$5,250
Add 10 % GST	$525	$525
Total funds requested from GWRDC	$5,775	$5,775
Funding received to date	$2887.50	
Funding outstanding – requested from GWRDC	$2887.50	

*This removed the need for labour and car hire outlined in the initial budget and has made possible the continuation of the project into the 2003/04 season
**Does not includes expenditure and time/labour from McLaren Vale Grape, Wine and Tourism, Yandilla Park, Tyrells and Wirra Wirra (approx $27, 000)
***This cost will be incurred at the 2003/04 Growers day