Innovative Mechanisation in Commercial Vineyards for Product Quality and Financial Sustainability.

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Introduction

With the recent tight financial times in the Australian Wine Industry due to the Global Financial Crisis (GFC) and other related factors, growers and company vineyards are being asked to produce grapes with lower financial input costs while maintaining or improving quality. This movement in the Australian Wine Industry towards mechanisation has been rapid and well adopted in general. Although a constant and ongoing commitment towards improving and refining these methods is required from the industry. Yalumba South East Vineyards over the past few years has looked at new and current innovative ways to mechanise or streamline vineyard tasks in commercial and premium vineyards. This poster covers the trials conducted with the machine harvesting units to investigate and refine canopy / crop load management, quality improvement and pest regulation techniques. The techniques covered in this poster have been adopted into the current & ongoing management program for commercial and semi premium vineyards within the South East and other regions.

Snail Removal Utilising Grape Harvesters

The evaluation of the methods took into account:

- Effect on quality of the final fruit harvested and wine produced.
- The reduction in inputs and impact on environmental sustainability.
- Evaluation of costs and inputs of each of the new methods.

The traditional method of snail management has been to apply pellet bait, based on metaldehyde or methiocarb. Although this control method is cost effective, it shows little impact during spring or periods of dry weather as the snails move up the vines for their summer resting spots. In the past hand removal has been trialled with the addition of hand spread baits at these times of the season, a process that is slow and labour Intensive and not very cost effective over a large area. It was however this process of hand knocking the vines that established our interest in whether a mechanical method (*figure 2*) could be utilised to simulate the hand knocking activities. In 2008 a trial was commenced to look at this process. The refined setup from the 3yr trial is below.

Equipment setup:

Table 1. *Snail removal equipment setup (figure 1)*

Beater rods	2-3 per side below cordon
Operating speeds	Upto 5km/hr
Head speed	Lowest possible to avoid damage
Timing	BB to 10cm – before aestivate
Machine height	Lowest possible for maximum capture

Figure 1. *Head setup for snail removal*

Figure 2&3. *Machine setup for snail harvesting early season & end result.*

Note *capturing device at end of discharge chute for easy removal of snails from vineyard.*

Results

- Limited damage to newly emerging shoots
- 1000 snails per row (400m) removed
- 1.4ha per hour covered @ $150/hr
- Cost $100/ha vs hand removal at $170/ha
- Lower environmental impact (less bait)

Cost Saving = $70 per ha + reduced hand labour requirement

Winter MOG Removal Utilising Grape Harvesters

Hedge pruning of Cabernet Sauvignon vines in the Coonawarra region is a common practice, but associated with this pruning method is the ever increasing problem of excessive Matter Other than Grape (MOG) in the harvested grapes. Hand removal of old broken sections of wood in winter is one option, while hand picking and sorting of bins at harvest is another. Both methods are labour intensive and add considerable costs to the bottom line. The ability of the harvester to remove this wood in harvest time is what led to the trial in 2005 of putting a machine harvester over these same vines during the winter period.

Equipment setup:

Table2. *MOG removal equipment setup*

Beater rods	Full set – covering canopy
Operating speeds	3 – 3.5 km/hr
Head speed	Harvest speed
Pinch	Tight on canopy

Figure 4. *MOG removed by harvester winter 2006.*

Note *Debris cleaned out each 4-5th row*

Over a period of 5 years this method has led to far less MOG being presented in the final loads. This has resulted in less vintage labour and tiresome winter hand removal of wood.

Cost Saving = $88.46 per ha + reduced hand labour requirement

Crop Load Management Utilising Grape Harvesters

2004/2005 saw a year of high winter rains that continued till flowering, leading to very large crops. With a lack of hand thinning labour and a need to reduce the crop load on the vines, trials at the Yalumba SE vineyards were established to look at the possibility of utilising grape harvesters to remove some of this excess fruit. Results of this initial investigation were mixed but the overall goal of reducing the cost of labour inputs and the level of fruit to ensure full ripening was achieved.

Over the next 5 years work has continued on the method to refine the initial work to a point where operators can confidently estimate the percentage of fruit to be removed or retained, and with the process having no negative, but rather beneficial effects to the final wine quality. Although the setup for all machines is different, the following criteria are important:

- Temperatures between 25 – 35°C to ensure good desiccation.
- Low humidity to avoid disease problems.
- Conduct at berries pea size to ensure acid levels and time for desiccation.

Equipment setup:

Figure 5. *Head setup - 2 beater rods*

Table 3. *Setup for bunch thinning*

Crop Thinning Setup
2-3 beaters per side
Rod Positioning = 2-5cm below cordon to avoid spur damage
Ground Speed = 2.8km/hr
Head speed = Variable for each machine 500-510rpm – light (picking head speed) and 530-540rpm heavy crop removal
Temperature = 28°C

Figure 6. *Fruit removed with heavier thinning technique*

Results

The trial work has shown that biggest benefit has been the labour cost savings of the activity. The effects on the ripening rate of the fruit has been minimal (*figure 7*) when conducted with parameters set out above. The results of work in 2009 (*table 4*) indicated how much change can occur from small machine alterations. Finally there has been the added benefit of less overall canopy disturbance than that of traditional hand thinning through veraison.

Table 4*. Results of 2 thinning trial treatments applied to VSP single cordon Merlot SE vineyards 2009*

Heavy Thinning Results (530-540rpm)	Light Thinning Results (500-510rpm)
Tonnage estimate pre thin = 17tn/ha	Tonnage estimate pre thin = 17tn/ha
Tonnage desired post thin = 8.5 - 9tn/ha	Tonnage desired post thin = 10-12tn/ha
Harvested Tonnage 8.0tn/ha	Harvested Tonnage 11tn/ha
Reduction = 53%	Reduction = 35%
Cost per ha = $242.00	**Cost per ha = $242.00**

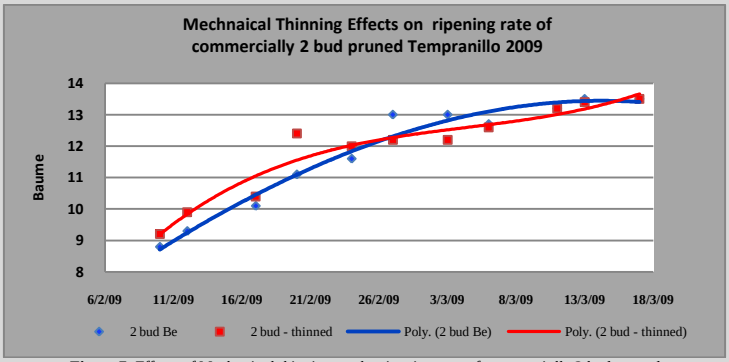

Figure 7. *Effects of Mechanical thinning on the ripening rate of commercially 2 bud pruned Tempranillo SE vineyards 2009.*

Cost Saving = $458 per ha + reduced hand labour requirement

Acknowledgements:
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Yalumba Nursery

vines for the times

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