Introduction

Harvest efficiency is a measure of the proportion of the crop that arrives at the winery relative to the total amount of fruit present in the block on the day of harvest. A better understanding of harvest efficiency is useful as it is a key area of uncertainty during the yield estimation process. Improving harvest efficiency can also increase vineyard productivity as there are very few additional costs associated with a yield increase due to harvesting a higher proportion of the fruit. A better understanding of magnitude and causes of variation in harvest efficiency will improve the accuracy of yield estimation and potentially allow the development of more efficient harvesting practices.

Experiments

Harvest efficiency was estimated in four machine harvested blocks; a Chardonnay and Shiraz vineyard in each of Orange and the Clare regions. Shortly after machine harvest, twenty two-panel segments distributed across each block were hand harvested and the fruit weighed to determine the amount of fruit left on the vine. Of those, in each block, two two-panel segments were chosen randomly and all the fruit that had fallen on the ground was laboriously collected and weighed, with the weight of bunches and loose berries being recorded. The total length of the two-panel segments was scaled up to match the total row length in each block and compared with the total volume of fruit delivered to the winery by machine harvesting.

Results for overall harvest efficiency and breakdown of fruit left in the vineyard

Harvesting at Clare

Towed harvester, machine pruned with hand clean-up and sprawling canopy

Harvesting at Orange

Self-propelled harvester, hand pruned, VSP

Harvester efficiency varied between sites and varieties due to the variety, pruning and canopy training systems and the type and setup of the harvester. Harvest efficiency ranged between 84 and 96%, which confirmed the harvest efficiency factors proposed by Martin et al. [1] once the unharvested rachis weight was accounted for. In three of the vineyards the greatest proportion of uncollected fruit was individual berries that dropped onto the ground during harvest. The exception being Chardonnay at Clare where most of the uncollected fruit remained on the vine. There was very little fruit left on the vines at Orange as hand pruning deliberately aimed to reduce the amount of spurs around poles and the harvesting was conducted quite late, causing the berries to be shaken off easily.

Conclusion

The results have shown that substantial variation in harvester efficiency exists amongst the study blocks. Since the majority of the fruit left in the vineyard was loose berries dropped on the ground, improvements to mechanical harvester set-up are recommended. Other mechanical improvements may also help to reduce the amount of fruit on the vine, with a self-propelled harvester showing notably better results than a towed harvester. The maturity of the bunches is likely to have an effect on harvest efficiency. An increase in harvester efficiency of 5% thus increases absolute yield, e.g. saving $20,000 for a 10Ha vineyard cropping at 10 t/Ha.

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