MECHANICAL HARVESTING OF WINE GRAPES

12. FUTURE OF MECHANICAL HARVESTING

The efficiency of mechanical harvesting is constantly improving, not only through development of the machines, but also due to the improvement of farm infrastructure and vineyard dynamics. These changes have an ongoing positive influence on the quality of mechanically harvested grapes.

12.1 Remote sensing and GPS technology

In the states of California and Washington different grape quality grades within the same block are identified with the help of NDVI (normalised difference vegetation index) remote sensing as well as intensive sampling. With a light system connected to GPS technology, the different grape quality grades are collected in two different pressing bin trailers. Flashing lights indicate to the drivers when their bins should receive grapes. When moving from one quality grade to the next, the grapes from a buffer zone is collected in a different pressing bin. After this, the pressing bin trailer which must receive the identified quality grade moves back into position to collect grapes. For this purpose there are adapted machines with two horizontal conveyor belts (gutters), one to the left and the other to the right of the harvester (Fig. 1). The grapes from the respective identified quality grades are separately transported, crushed and separate wines are made. Tasting panels could taste differences in wine quality from experiments where grapes were harvested in the abovementioned way.

Figure 1: Adapted harvester with two gutters to deposit grapes from different zones with different grape quality grades, as identified by NDVI images into the pressing bins. (Kurtural *et al*., 2011)

12.2 Precision mechanisation in cool climate vineyards

Precision mechanisation in cool climate vineyards can contribute to the improvement of grape and wine quality and thus to financial sustainability. Advanced job opportunities are also obtained in this way. The mechanisation of certain vineyard practices can lead to savings of 30-80% compared to hand-driven operations. Multifunctional harvesters (used for pest and disease control, canopy management, etc.) lead to better distribution of debt repayments, compared to harvesters which are used for one purpose only. Machines which can thin summer shoots on the cordon system contribute to improved crop control (Fig. 2), better grape quality because of increased exposure to sunlight and improved disease control due to more effective penetration of disease control agents. The utilisation of recyclable spray apparatus and lighter rubber fingers help to lower the carbon footprint of the vineyard and thus to strengthen sustainability. The lighter rubber fingers beat against the stems of the vines below the cordon to get rid of snails. Viticulturists that convert to mechanisation or use multi-functional grape harvesters increase their return on capital investment.

Figure 2: Example of a machine which thins summer shoots on cordon systems (left) and a machine which applies crop control by shaking clusters off (right). (Intrieri, 2013; Dokoozlian, 2013)

The following are normally the drivers of mechanisation:

- Shortage and cost of labour
- Continuous increases in capital costs
- Decrease in earnings on investment per hectare
- Environmental impact and carbon footprint
- The requirements of workplace health and safety and the responsibilities they are associated with

Precision mechanisation can lead to improved accuracy, timing and replicability of the related action, as well as improvement in quality. It should facilitate vineyard management and contribute to increased environmental and economic sustainability. In this way the future success of grapevine cultivation can be assured.

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