

MECHANICAL HARVESTING OF WINE GRAPES

2. INFLUENCE OF MECHANICAL HARVESTING ON YIELD AND VIGOUR

Mechanical harvesting of wine grapes is generally used where manual labour is unaffordable or unobtainable. A vineyard is established for an economic lifespan of more than 20 years. During the process of mechanical harvesting the grapevine is shaken so that the cluster and/or berries are shaken off the grapevine by oscillating forces. This transfer of mechanical forces to the one- and multi-year grapevine structures should be such that it does not impair the future production potential of the grapevine.

2.1 The influence on yield (the mass of grapes produced per unit of soil surface)

- Here, the effectiveness of the harvest is important; in other words, how many grapes are lost from the grapevines to the load bin, as well as the presence of the amount of material other than grapes (MOG).
- Grapevines with crooked trunks can result in the skids or collection bowls not closing properly around the trunks, causing berries to fall to the ground. Therefore, grapevine development is very important to limit harvest losses.
- Anchor and inner poles can hamper effective harvesting and result in bunches being left behind in the vineyard.
- Juice stuck to the leaves is blown away with the leaves by the harvester's fans.
- A fan speed that is too high increases the amount of juice that is lost; however, this is only an adjustment problem on the machine.
- Stems left on the grapevine (Fig. 1) can account for as much as 5% of total mass (cultivar dependent). This is an advantage when the grapes are crushed at the cellar, seeing that a de-stemmer does not have to be used.
- Varietal differences can complicate or facilitate the mechanical harvesting of grapes. Some cultivars, e.g. Semillon and Pinot noir, are difficult to harvest mechanically, while others, e.g. Cabernet Sauvignon, Chardonnay, Riesling, Sauvignon blanc, Chenin blanc and Gewürztraminer, are easier to harvest mechanically.
- The time of day affects the harvest. Berries are shaken off more easily in the cool of the night and early morning, when the turgor is high, compared to in the heat of the day.



Figure 1: An example of a rachis left behind in the vineyard after mechanical harvesting. (Photo: Conrad Schutte)

- When the grapes have reached optimal ripeness and the natural processes of senescence have occurred, the berries loosen more readily compared to e.g. grapes harvested at 18 20°B for sparkling wine.
- Canopy management practices can lead to grapes being left behind in the vineyard. Where grapevine canopies are vertically shoot positioned (VSP), the number of bunches left behind in the vineyard is less when compared to grapevines with sprawling canopies.
- When spur-pruned (permanent cordon) grapevines are compared with cane-pruned (Guyot) grapevines (both with VSP canopies), fewer bunches are left behind in the vineyard in the case of the permanent cordon and more in the case of the Guyot pruning system.

2.2 The influence on vigour (the ability of a grapevine to survive and grow)

- Damage inflicted to the spur can be reduced or avoided by positioning the spur in an upright position at pruning. Damage to the spurs can result in a crop loss in the following year.
- If grapevines are pruned by hand in the latter case, this can be repaired during winter pruning. A remaining collar bud or a sucker shoot in close proximity can be left, cut back to a one-bud bearer and later on used as a spur.
 Alternatively, gaps left as a result of a damaged spur can be covered by pruning long bearers or double two bud spurs to compensate for the loss of the spur.
- Mechanically pruned grapevines must be harvested mechanically. Mechanically pruned grapevines result in more and shorter shoots with smaller bunches. It is cost ineffective to harvest the large number of smaller bunches per grapevine by hand.

2.3 Physical damage to grapevines due to mechanical harvesting

- There is a good correlation between the damage done to a grapevine and the age of the grapevine. Older grapevines (15 20 years) show the most damage, as well as the occurrence of more MOG compared to younger grapevines.
- Cultivar differences do exist. Cultivars with less elastic canes, e.g. Cabernet Sauvignon, Pinotage, Chenin blanc and Mourvèdre, are more prone to damage. The wood of cultivars like Merlot, Petit Verdot and Gewürztraminer are more elastic and these canes are less prone to damage.
- Spur-pruned unilateral permanent cordon grapevines with a vertically trained canopy show the least amount of damage done to the grapevines. In contrast, cane-pruned unilateral Guyot grapevines with a vertically trained canopy show more damage done to the grapevines compared to spur-pruned grapevines.
- Spur-pruned sprawling canopies show more damage done to the grapevines when compared to spur-pruned VSP canopies.
- Trellis systems that result in more MOG in the harvested grapes reduce wine quality.
- Furthermore, experience in South Africa shows that less damage is done to grapevines harvested by machine from an early age than to grapevines harvested by machine only at a later stage. This is as a result of the bearer positions growing more and more laterally from the cordon over time (Fig. 2).



Figure 2: Spur broken off the cordon (circled in white) as a result of mechanical harvesting. (Photo: Robert Stolk)