

MECHANICAL HARVESTING OF WINE GRAPES

3. INFLUENCE OF MECHANICAL HARVESTING ON THE QUALITY OF WHITE WINE

Producers and winemakers have many questions about the effect mechanical harvesting will have on the quality of the final wine. The greatest issues are about oxidation during the harvest and transport of the harvested grapes. South Africa's temperatures are higher during harvest time than those of Europe, but can be compared with certain parts of Australia, Argentina and California. Mechanically harvested grapes must be delivered to the cellar as cool and as quickly as possible. Long distances in hot temperatures are thus not ideal for wine quality.

3.1 Experience abroad

During mechanical harvesting the berry skins are damaged and the extraction of phenols from the skins can take place. The extraction of phenols (aromatic compounds) and the oxidation of the extracted phenols are temperature sensitive. This oxidation can already start taking place at temperatures just above 16°C and it is thus important that mechanically harvested grapes be kept below this temperature to counter phenolic oxidation.

With Chenin blanc and Colombar it was found that mechanical harvesting did not have a noticeable influence on wine quality. These wines were indeed darker in colour (a sign of oxidation) compared to the hand-harvested control. The same effect was caused by the addition of crushed leaves. The phenolic content of the wine had increased with the

addition of crushed leaves as well as by an increase in grape damage.

Machine harvesting at night or early in the morning is ideal with white cultivars because the grapes are cooler and less energy is required for cooling (Fig. 1). Die shaking off of grapes is then also easier because the turgor pressure in the berries is higher during the day. During high temperatures a greater shaking action is required to shake the berries off.



Figure 1: Mechanical harvesting by night to prevent phenolic oxidation and keep the temperature of the harvested grapes low. (Photo: Robert Stolk)

Protection against phenolic oxidation by inert gases, dry ice, liquid $SO_{2'}$ potassium metabisulphite and/or ascorbic acid during mechanical harvesting of white cultivars is therefore important.

If Sauvignon blanc is to be produced with a prominent tropical and green character, machine-harvested grapes will be preferred, as it makes these characteristics more prominent. On the other hand machine-harvested grapes contain more C6 alcohols and their acetate esters and in most cases also the 3MH (3-mercapto hexanol) and 3MHA (3-mercaptohexilacetate) thiols. Higher values of C6 alcohols are also obtained where the juice is extracted harder.

The quality of white wine can be improved if the juice is separated from the solid components. This is done with an adapted pressing bin which consists of two compartments which are divided horizontally by a sieve. The fluid component moves through the sieve where it is covered with CO_2 to protect it against oxidation. The solid component then lies on top of the sieve. The gas in the lower compartment changes partly into dry ice. Excess CO_2 can then be used to also protect the grape mass at the top. At the cellar the must is then moved to the tanks by gravitation without a pressing action. The quality of wine made from vineyard-separated must and skins is of a better quality than that which is harvested and transported in the traditional manner.

Post-harvest treatments with inert gases decrease the loss of natural anti-oxidants in wine derived from grapes which are mechanically harvested. The addition of dry ice (solid form of CO₂) is also handy to decrease the temperature of the berries to prevent phenolic oxidation. Similar conditions can be achieved by harvesting the grapes at night. Volatile components which are associated with pleasant and beneficial wine aromas are positively affected by treatments of the harvested grapes. Machine-harvested grapes do not affect the wine composition negatively, provided that the correct vineyard practices are applied, such as the training of the vines, the correct machine settings and the correct post-harvest treatments.

Grape skins contain proteins which are known as pathogenesis-related proteins (proteins which are formed by genes to counter disease incidence and infections). Great amounts of these haze forming proteins are extracted from skins after mechanical harvesting and this can lead to milky wines. The greatest cause of the increase in protein content originates from extraction during long periods of transport from the vineyard to the cellar following grape damage during mechanical harvesting. Bentonite can be added to prevent the incidence of milky wines.

With Sauvignon blanc which was harvested by hand and with mechanical harvesters and transported 400 km, the mechanically-harvested grapes contained more heat unstable proteins and required double the amount of bentonite.

3.2 Experience in South Africa

Under South Africa conditions it was found that the temperature of Sauvignon blanc grapes decreased during the night to a minimum at about 07:30 in the morning. Thereafter the temperature increased systematically to a maximum by about 15:00. During the morning there was little difference in the temperature of hand-harvested and mechanically harvested grapes. In both cases the temperature however increased drastically after 12:30. To limit the adverse effect of high temperatures on wine quality, it is recommended that grapes are harvested in the morning and transported to the cellar as speedily as possible. Further it is recommended that due to the weight loss of stems which are left behind

in the vineyard, the producer should be duly compensated. The total sugar concentration of mechanically harvested Sauvignon blanc grapes was not significantly higher than those which had been harvested by hand. In contrast, the acid concentration of machine-harvested grapes was lower.

With Chenin blanc grapes it was found that an increased MOG (material other than grapes) percentage (Fig. 2), the temperature at which it is harvested, and the time that elapses until pressing are individually or jointly responsible for increased total polyphenols which have an adverse effect on wine quality.



Figure 2: Mechanically harvested grapes with a high MOG (leaves, stems, etc.) percentage. (Photo: Robert Stolk)

Within a four hour period there was no significant deterioration in wine quality, provided the grapes were pressed at low temperature. At higher temperatures the time lapse had to be decreased to three hours with a low MOG percentage to produce wine of the same quality. With a high MOG percentage the quality was significantly lower even after only one hour had elapsed.

3.3 Conclusion

- Transporting mechanically harvested white grapes at high temperatures over long distances is detrimental to wine quality.
- Long waiting times on the farm or at the cellar (Fig. 3) where there is no shade available (Fig. 4) is detrimental to quality.
- Start harvesting shortly after midnight with mechanical harvesting and stop the harvesting process of white cultivars by 10:00 am.
- The off-loading capacity of the cellar must be such that grapes which were harvested early morning need not wait for hours in the sun at the cellar to be off-loaded (Figs. 3 & 4).
- Protection against oxidation right from the vineyard is important.
- The settings of the machine must be optimal for the cultivar and trellising system to produce minimal MOG percentage.



Figure 3: Grapes which wait a long time at the cellar to be off-loaded. This must be avoided as far as possible. (Photo: Robert Stolk)



Figure 4: Grapes waiting in the shade (two loads at left) decrease phenolic oxidation compared to grapes waiting in the sun (load at the right). (Photo: Robert Stolk)

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