Post-harvest sun exposure can potentially lead to a decrease in volatile thiols

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Basic Wine

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What exactly is the source of New Zealand's Sauvignon Blanc elevated thiol concentration? One of the environmental factors that have been thought to play a critical role in the creation of these unique wines is the larger peak ultra-violet (UV) light that New Zealand (and especially the Marlborough region) experience compared to other wine growing regions around the world.

Auckland researchers investigated the effect of UV irradiation on Sauvignon Blanc grapes post-harvest with a specific interest in the role UV play in volatile thiol formation. Their results were published in a paper titled [“The impact of postharvest ultra-violet light irradiation on the thiol content of Sauvignon blanc grapes”][1].

Method

Grapes (20 kg) were hand harvested from the Wairau valley in Marlborough, New Zealand. The grapes were frozen and transported to the research facility in Auckland where the frozen bunches were divided into batches and thawed.

For the first set, they simulated hand harvesting and kept the bunches whole (WB). For the second set, they simulated machine harvesting (MH) and damaged the grapes using a potato masher. They added 40 ppm free SO_2 to MH to protect the free run juice from oxidation. For each of these sets, they had a control treatment and a treatment exposed to UV light. The experiment was done in triplicate.

WB UV – whole bunch exposed to UV
WB C – whole bunch control (not exposed to UV)
MH UV – machine harvest exposed to UV
MH C – machine harvest control (not exposed to UV)

UV exposure was done in 3 sessions. Each session consisted of a 30-minute exposure after which the samples were kept in the dark for 30 minutes. The control samples were treated in a similar manner however instead of exposing the grapes to UV, it was kept in a dark box.
The grapes were then processed for winemaking. After pressing, the WB treatment received 25 ppm sulphur dioxide. After settling, the juice was inoculated with Lalvin QA23 yeast from Lallemand. After fermentation the wine was sulphured (25 ppm), cold settled, racked and sampled.

Results

Eighteen aroma compounds were measured in the wines in order to determine the effect of UV exposure on the aromatic composition. In general, there was a difference in the overall tendency between WB and MH. For WB, seven of the 18 aroma compounds were higher in the UV exposed grapes while 11 were higher in the control treatment. The opposite was observed for the MH treatment where 11 of the measured compounds were higher in the UV exposed samples and seven were higher in the control samples. However, only six of the 18 aroma compounds showed statistically significant differences between the treatments.

	WB UV	WB C	MH UV	MH C
Number of aroma compounds that were higher in concentration (18 in total)	7	11	11	7

For both WB and MH, lower volatile thiol (3MH and 3MHA) content was measured in the UV exposed samples compared to the control. For the C6 alcohol, hexan-1-ol (a compound potentially involved in the formation of thiols) and hexyl acetate, the concentration was also lower in the UV exposed samples. Two other alcohols, isobutanol and isoamyl alcohol showed higher concentrations in the UV exposed grapes when compared to the control. A range of other compounds showed contradicting results between WB and MH making it difficult to draw conclusions regarding the exact effect of the treatment.

The authors also reported the effects of UV exposure post-harvest on certain volatile thiol precursors, however, as discussed in a previous blog post, analysing a select few of the precursors is only one piece of the puzzle.

UV or temperature or both?

The lower concentrations of certain aroma compounds seen in the UV exposed samples could be due to the secondary effect of UV irradiation such as temperature. The samples experienced a significantly higher temperature when exposed to UV compared to the control samples. Therefore, the decrease in the aroma compounds could be due to the higher temperature rather than the actual effect of the UV. This factor should be considered in practice as well, as it is an intrinsic factor of UV irradiation contributing to the concentration of various metabolites.

In-vineyard exposure vs post-harvest exposure

The effect of UV exposure in the vineyard has been investigated[2] and main findings showed that reducing the UV radiation in the bunch zone also reduced the volatile thiol content in the resulting wine. The current study investigated the effect of UV exposure *post-harvest* on the composition of the juice and wine and delivered somewhat contradictory results to the study looking at *in-vineyard* UV exposure.

What's next?

The outcomes of the study lead to further questions and a different strategy regarding the experimental layout should be considered in future investigations. Conducting the treatments on a larger sample size, extending the UV exposure times to represent a realistic timelapse and finding a way to control the temperature could deliver clearer results.

The study does, however, show the potential of UV exposure and/or higher temperature post-harvest to decrease volatile thiol concentrations in the resulting wine. Practically, this supports what is already practiced widely in the industry: harvest during the cool hours of the day and get the grapes out of the sun and heat as soon as possible.

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References

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(2) Šuklje, K.; Antalick, G.; Coetzee, Z.; Schmidtke, L. M.; Baša Česnik, H.; Brandt, J.; du Toit, W. J.; Lisjak, K.; Deloire, a. Effect of Leaf Removal and Ultraviolet Radiation on the Composition and Sensory Perception of Vitis Vinifera L. Cv. Sauvignon Blanc Wine. *Aust. J. Grape Wine Res.* **2014**, *20* (2), 223–233. https://doi.org/10.1111/ajgw.12083.

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