THE STORAGE OF SAUVIGNON BLANC IN DIFFERENT COLOURED BOTTLES UNDER NATURAL AND ARTIFICIAL LIGHT

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Basic Wine

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Producers often choose a bottle colour to increase marketability and brand name recognition. However, the colour of the glass is also important when it comes to protecting the quality and integrity of the wines. Bottled wines are exposed to various sources of light such as natural sunlight (during transport and shipping operations) and artificial light (wine shops and supermarkets). This blog post delves deeper into the effect of different light sources on specifically the colour of Sauvignon Blanc wine.

There are two studies that looked at the effect of the two different light sources on Sauvignon Blanc wine:

- The first study, STUDY 1 is titled, "Determination of the impact of bottle colour and phenolic concentration on pigment development in white wine stored under external conditions".
- The second study, STUDY 2 is titled, "Chemical and Sensory Effects of Storing Sauvignon Blanc Wine in Colored Bottles under Artificial Light.

STUDY 1: EFFECT OF SUNLIGHT EXPOSURE AND DIFFERENT COLOURED BOTTLES[1]

MATERIALS AND METHODS

A Sauvignon Blanc wine produced in Australia was stored in four different coloured bottles

- Flint (clear)
- French Green (pale green)
- Antique Green (dark brown/green)
- Classic Green (darker green)

The bottled wines were exposed to sunlight during the months of May, June and July in Wagga Wagga, Australia. The mean maximum daytime temperatures were around 17.5°C at the start of the experiment and 12.5°C at the end of the storage period. The bottles were placed in a straight line of a north-facing open area to allow maximum exposure to sunlight. One set of flint bottles were placed in the dark for the entire storage period and served as a Control treatment.

The bottles were opened daily to allow aeration. The reasoning behind this was to reflect storage conditions where a relatively high oxygen ingress would take place. While the conditions used may be perhaps extreme, they represent a "worst-case" scenario. Yellow colour was measured using a spectrophotometer.

RESULTS

Light transmission of different glass colours

The transmission spectrum of each glass type was recorded to assess the ability to limit or stop UV/visible light from reaching the wine. Results showed that the flint bottle is capable of transmitting all visible and some UV light, while the French Green allowed most light above 400 nm to be transmitted. Both Antique Green and Classic Green reduced the amount of visible light reaching the wine significantly, however, both glass types allowed the transmission of a small amount of UV light.

Wine colour development

After 71 days of storage, the wines bottled in Flint and French Green coloured glass had significantly lower yellow colour intensity compared to wines stored in Classic Green and Antique Green glass bottles. The Control wines (Flint stored in the dark) also showed higher measurements at 440 nm (yellow) when compared to the wines exposed to sunlight (Flint stored in sunlight). However, the Control sample had lower yellow colour intensity compared to all the other sunlight exposed treatments (other than Flint).

In summary, the yellow colour development from least to most intense:
Flint (sunlight) < Flint (dark) < French Green < Antique Green < Classic Green

The researchers suggested that this observation could be explained by the increased transmission of UV/visible light in the lighter coloured bottles (Flint and French Green) leading to the bleaching of oxidative pigments. However, the role of temperature during the storage period was also highlighted, especially considering that temperature measurements showed that the wines bottled in the darker bottles (Classic Green and Antique Green) were consistently higher by 5-12°C compared the Flint and French Green bottles. Furthermore, the two dark bottles retained the heat for a longer period. This increased temperature likely accelerated the pigment production in the wine and enhanced oxidative pigmentation production in the darker coloured bottles. After pigment formation, the darker bottles also protected the wine from light bleaching, preserving the formed pigments.

Therefore, when exposed to sunlight, the formation of yellow pigments is likely due to the increased temperature rather than the exposure to the light itself, however, this needs further investigation.

STUDY 2: EFFECT OF COMMONLY USED FLUORESCENT LIGHTING AND DIFFERENT COLOURED BOTTLES[2]

MATERIALS AND METHODS

A Chilean Sauvignon Blanc was bottled using four commercial wine glass bottle colours:

- Flint
- Amber
- Antique Green
- Dead Leaf Green

The bottled wines were stored upright in a dark room and were exposed to fluorescent light for 16 hours per day (simulating day-time). This day-night cycle was repeated for 8 months.

Temperatures of the room
March - minimum 17.0°C ; maximum 20.7°C
July – minimum 12.6°C ; maximum 15.5°C
October – minimum 16.0°C ; maximum 19.2°C

RESULTS

Light transmission of different glass colours

The light transmission of the four bottle types was measured. In agreement with the results found in STUDY 1, the Flint bottles also had the highest incident of radiation and the highest value of transmittance when compared to the coloured bottles.

Wine colour development

The use of darker glass bottles again resulted in the production of pigments that contributed to a higher colour intensity in the wine, while the wine stored in the Flint bottles showed significantly lower colour intensity values during the eight months of storage.

STUDY 3...CONTROLLING THE TEMPERATURE[3]

In a third study[3], a Chardonnay wine was exposed to light from a mercury vapour lamp for 8 hours a day for 18 days. Under a controlled temperature environment (38 ± 3°C) it was interesting to see that the colour intensity changes were the exact opposite as what was found in STUDY 1 & 2. Under these controlled (although increased) storage temperatures, the wine in the Flint bottles experienced the highest colour development while the darkest bottle (Antique Green) gave the greatest protection against colour intensity changes.

However, when the temperature was not controlled and allowed to increase to 80°C, the darker Antique Green bottles failed to protect the wine from colour and aromatic changes. Again the researchers conclude that the colour changes are probably due to the darker bottle absorbing and retaining the heat for longer than the lighter bottles do, thus when exposed to high temperatures, the darker the bottle the greater the colour intensity changes.

CONCLUSION

Ideally, wines should be stored in a temperature-controlled environment in complete darkness. This is not always possible and Sauvignon Blanc wines stored in warehouses or shipping containers may be subjected to elevated temperatures. Based on the results found in the abovementioned studies, wine stored in darker bottles may be more at risk than wines stored in lighter coloured glass bottles especially if the temperature is not controlled.

Darker coloured glass absorbs and retains more heat, driving pigmentation development in the wines within. It is important to note that the wine bottle surface temperature might differ significantly from the temperature of the surrounding air due to the retention of heat of certain glass types. Therefore, avoiding extreme fluctuations and direct sunlight for an extended period of time is critical.

Choosing the proper glass bottle colour may improve the expected shelf-life of the wine by diminishing the negative influence of light. That said, it is difficult to recommend a bottle colour without knowing the storage conditions that the wines will be subjected to. If the temperature cannot be controlled, the use of lighter coloured bottles might be safer as it will not absorb and retain heat as much as the darker coloured glass bottle would. However, if the wines are stored in a temperature-controlled environment then a darker bottle would be best for protecting the wine against light[4].

The colour of the bottle, as well as the type of light to which the wine is exposed, can affect the wine's sensory and chemical composition. However, the exact effect of different light sources and glass colours on the concentration of Sauvignon Blanc impact compounds such as methoxypyrazines and volatile thiols as well as the sensory changes needs further investigation.

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