Subcritical water : an original eco-sustainable process for wine lees valorization ?

Unité de Recherche Oenologie

Benjamin POULAIN[1], Delphine WINSTEL[1], Claudia NIOI[1]

[1]*Univ. Bordeaux, Bordeaux INP, Bordeaux Science Agro, INRAE, OENO, UMR 1366, ISVV, F-33140 Villenave d'Ornon, France*

INTRODUCTION

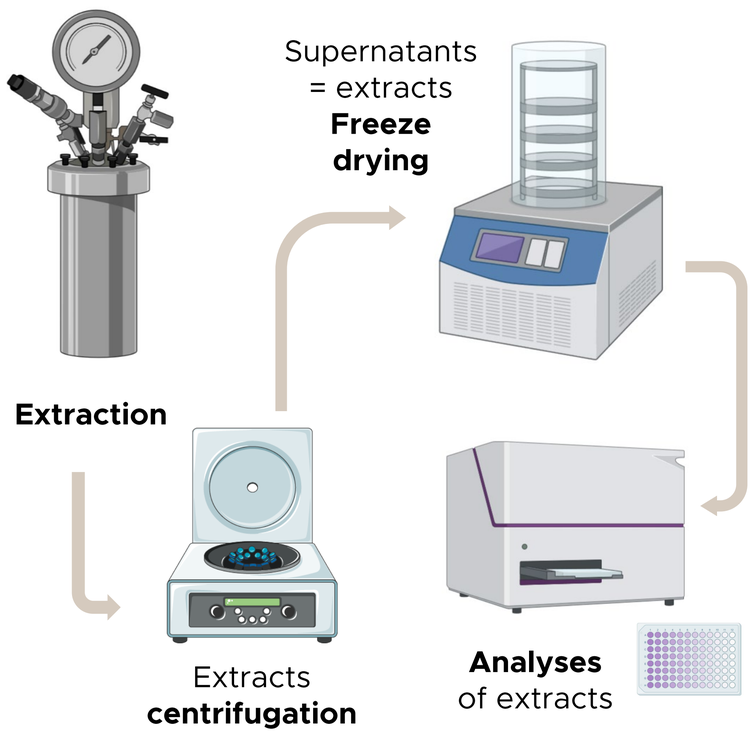
Wine lees are the second most important wine by-product in terms of quantity after grape stalk and marc [1]. During ageing of white wine on lees, it is well known that lees release compounds that limit oxidation of wine [2]. The antioxidant potential of wine lees is not totally elucidated. Glutathione seems to be one of the most important compounds involved in antioxidant activity [2]. In this way, white wine lees are a promising by-product to obtain biomolecules of interest.

In this study, we propose an eco-sustainable process to extract compounds with antioxidant activity from white wine lees.

METHODS

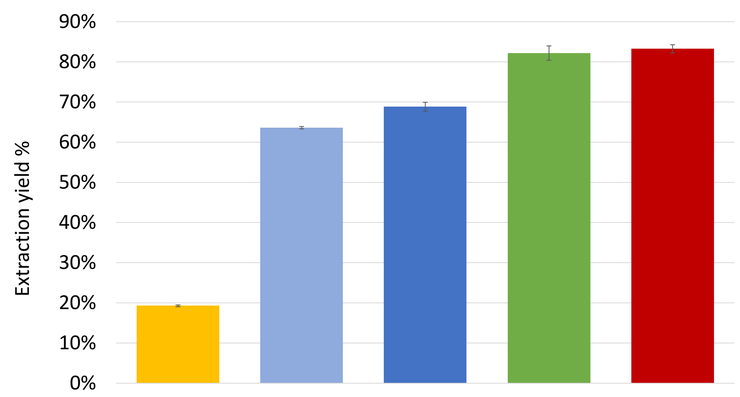
Raw material :
Sémillon wine lees (2021) from AOC Pessac-Léognan (France).

1. **Impact of operating conditions and solvents on extraction yield and antioxidant activity** :
   - Solvents impact : Water at 20 °C (W), Ethanol 50 % (v/v)(EtOH), Subcritical Water (SW) at 100, 150 and 200 °C at 30 bars (and 60 bars).
   - Optimised operating conditions : initial lees concentration 10 g/L and 15 min of extraction.
2. **Evaluation of the antioxidant activity (antiradical and ferric reducing power) :**
   - DPPH and FRAP method (colorimetric).
3. **Evaluation of glutathione in extracts :**
   - DTNB method (colorimetric).



RESULTS

Impact of operating conditions and solvent

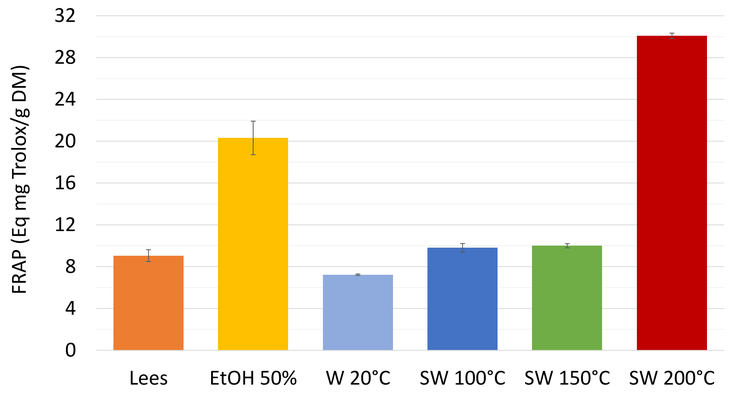


Solvent impact :
Subcritical water and water 20 °C allow a better extraction yield compared to conventional solvent.

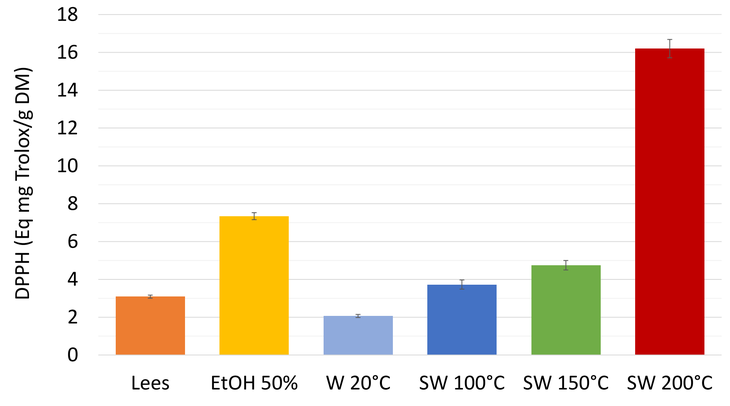
Subcritical water extraction :
Temperature has a positive impact on extraction yield.

Evaluation of the antioxidant activity

Evaluation of the ferric reducing power of extracts - **FRAP**



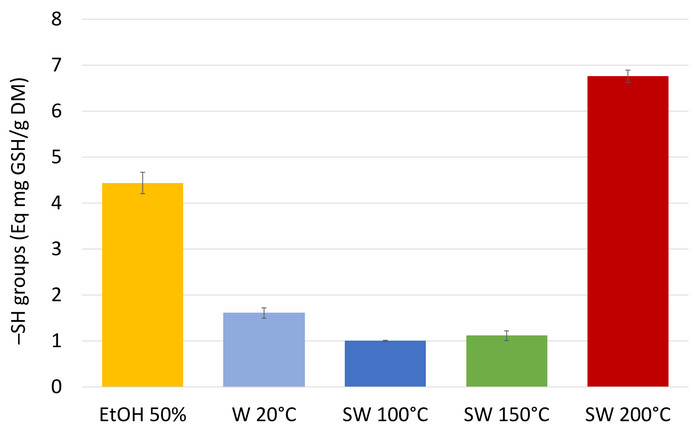
Evaluation of antiradical power of extracts - **DPPH**



Ethanol 50 % and **subcritical water at 200 °C** extractions are favourable to obtain extracts with **high antiradical and ferric reducing power**.

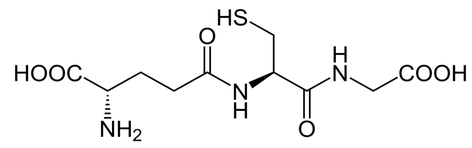
Any differences observed between subcritical water at **30 and 60 bars** (data not shown).

Evaluation of glutathione in extracts



Conventional solvent and **subcritical water at 200 °C** are best solvents **for glutathione extraction.**

The **higher glutathione extraction** with **SW 200 °C** could be one of the reason of it **better antioxidant activity.**



CONCLUSION

Subcritical water is a promising solution for **gluthatione extraction** and to obtain **antioxydants extracts** from white wine lees.

In conclusion, **subcritical water** seems to be an **original eco-sustainable** process for **wine lees valorization.**

WHAT IS NEXT ?

- Optimisation of subcritical extraction with DOE.
- Identification of molecules implicate in antioxidant activity of extract and lees.

REFERENCES

[1] C. Dimou, N. Kopsahelis, A. Papadaki, S. Papanikolaou, I. K. Kooks, I. Mandala, A. A. Koutinas, Food Res. Int. (2015) 81-87.

[2] V. Lavigne et D. Dubourdieu, J. Int. Sci. Vigne Vin. (1996), 30, n°04, 201-206

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