



Phenolic profile and antioxidant activity of reverse osmosis concentrates of conventional and ecological Cabernet Sauvignon red wine



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Introduction

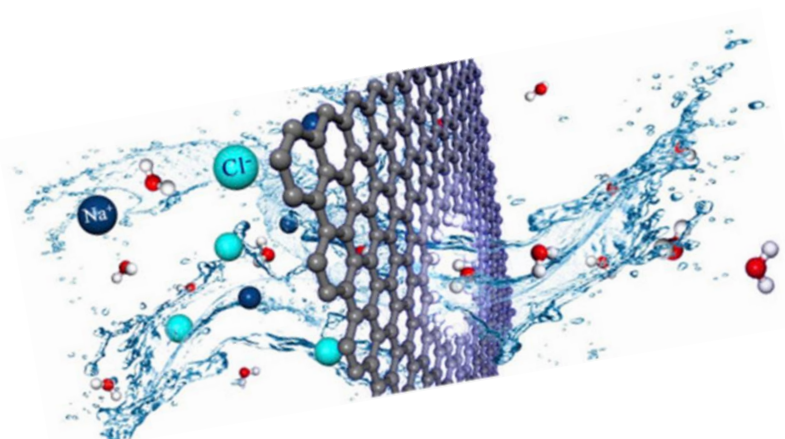
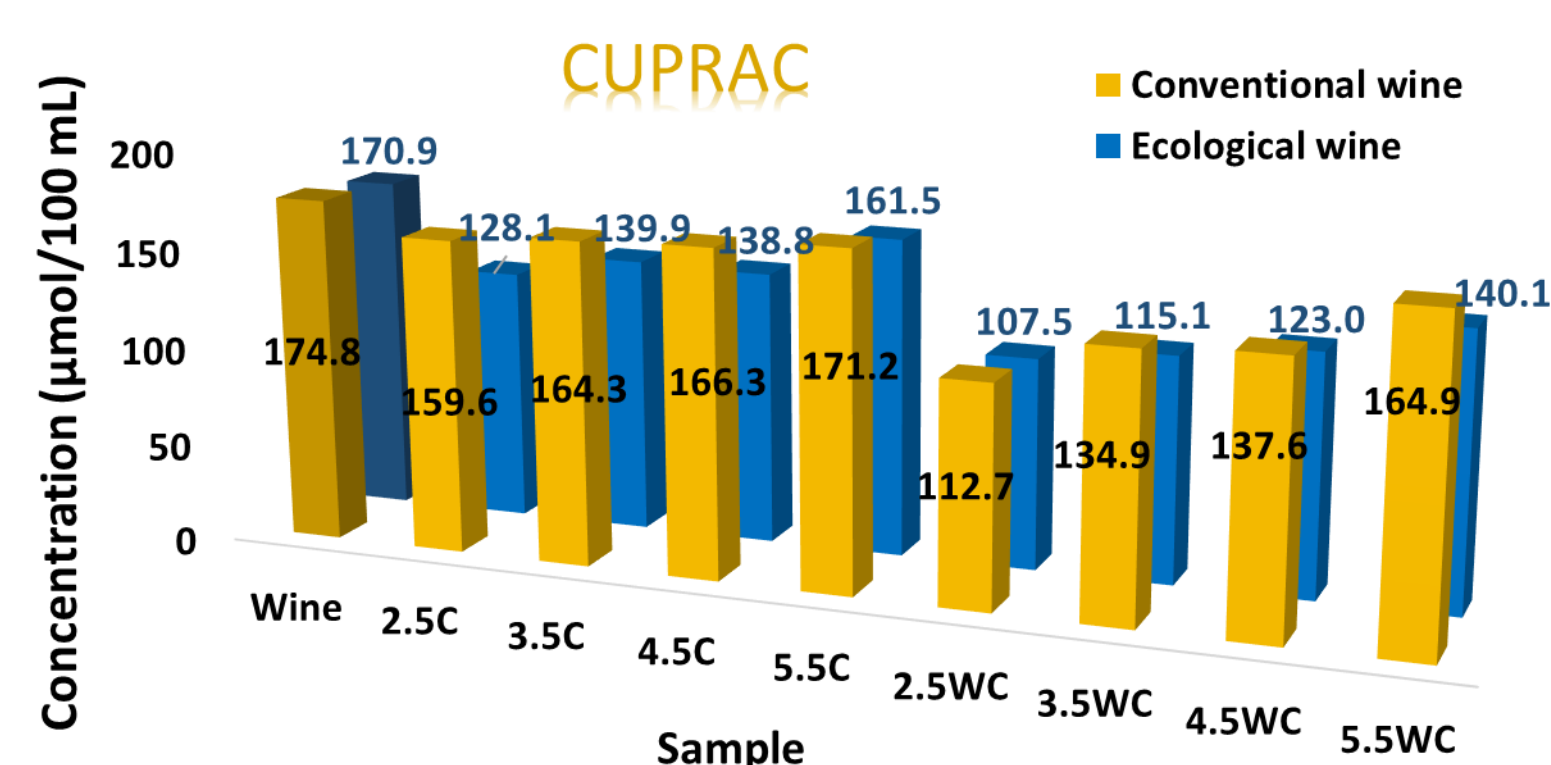
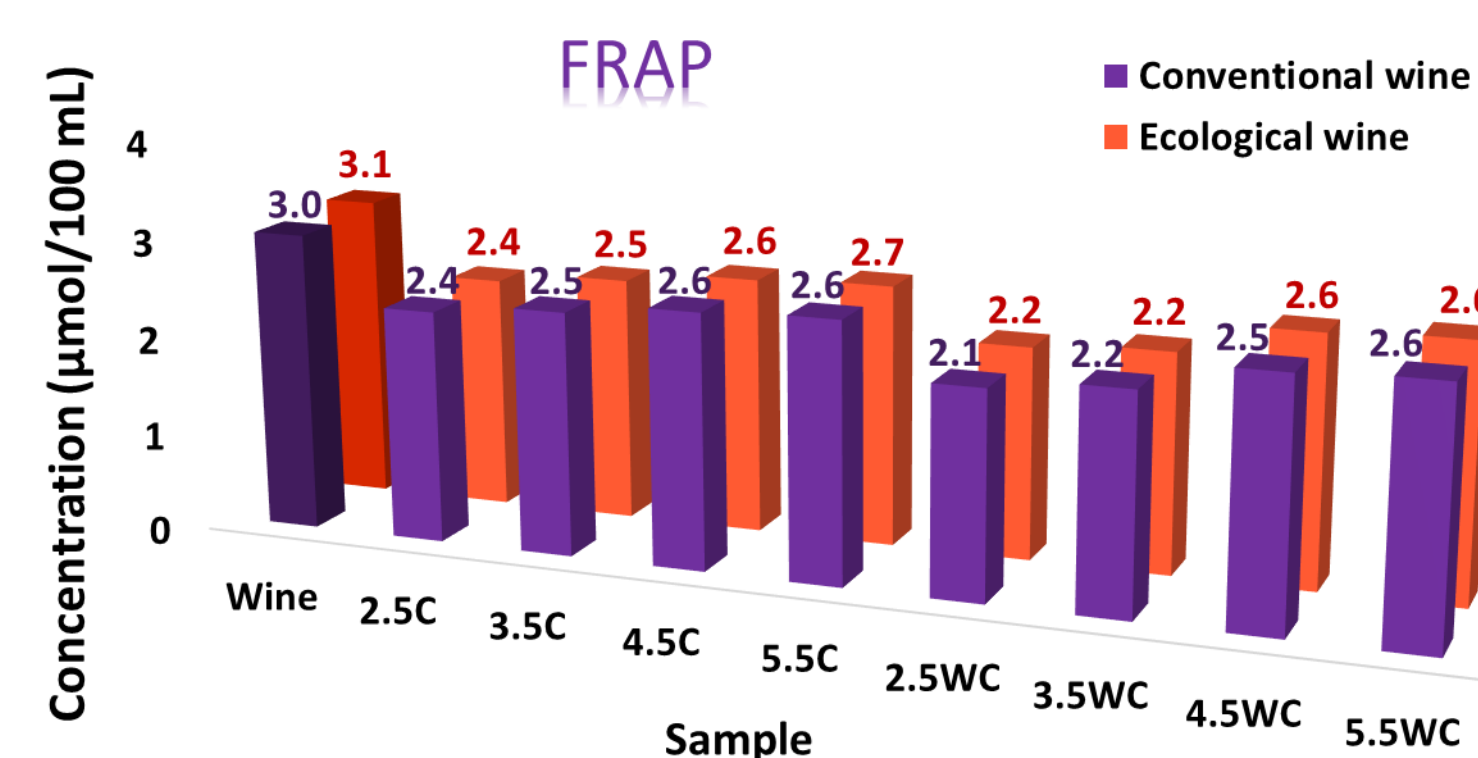
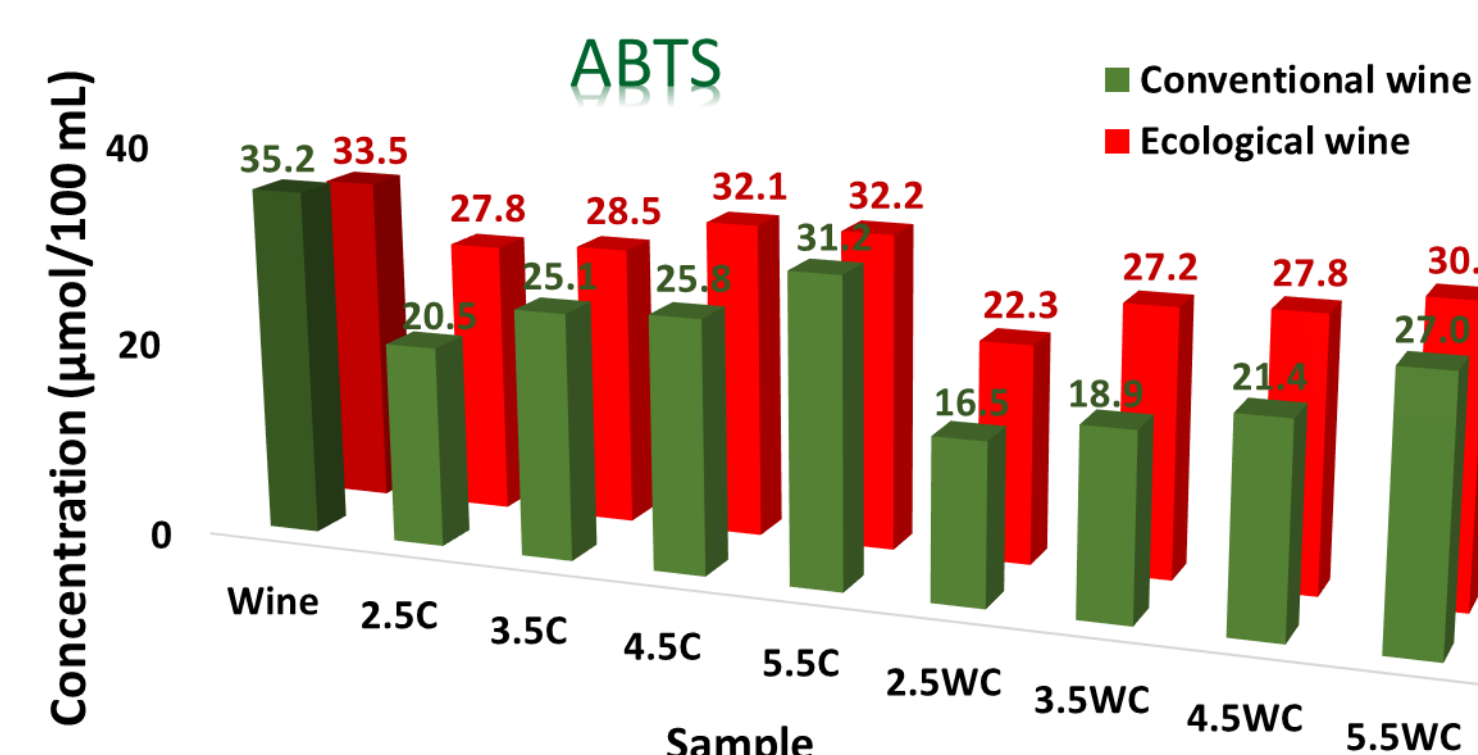
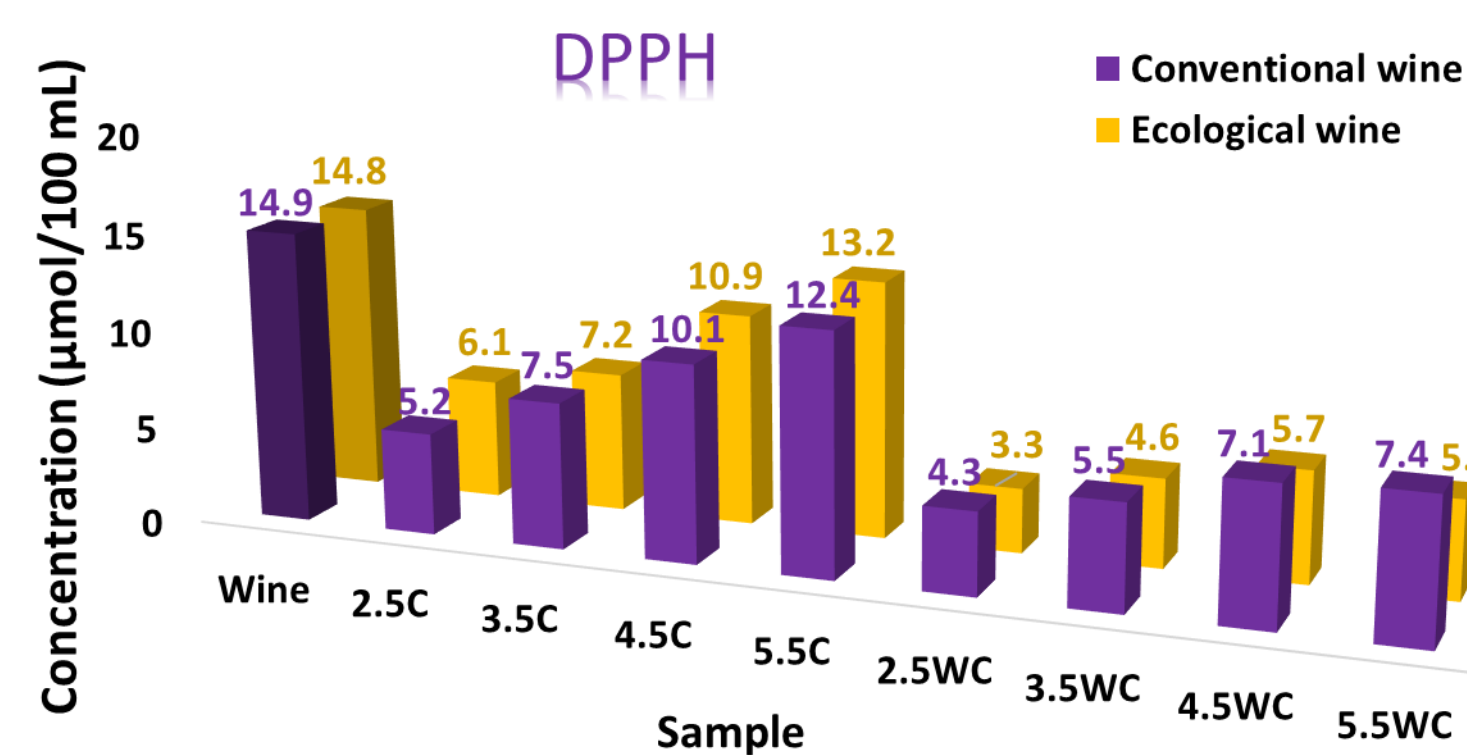
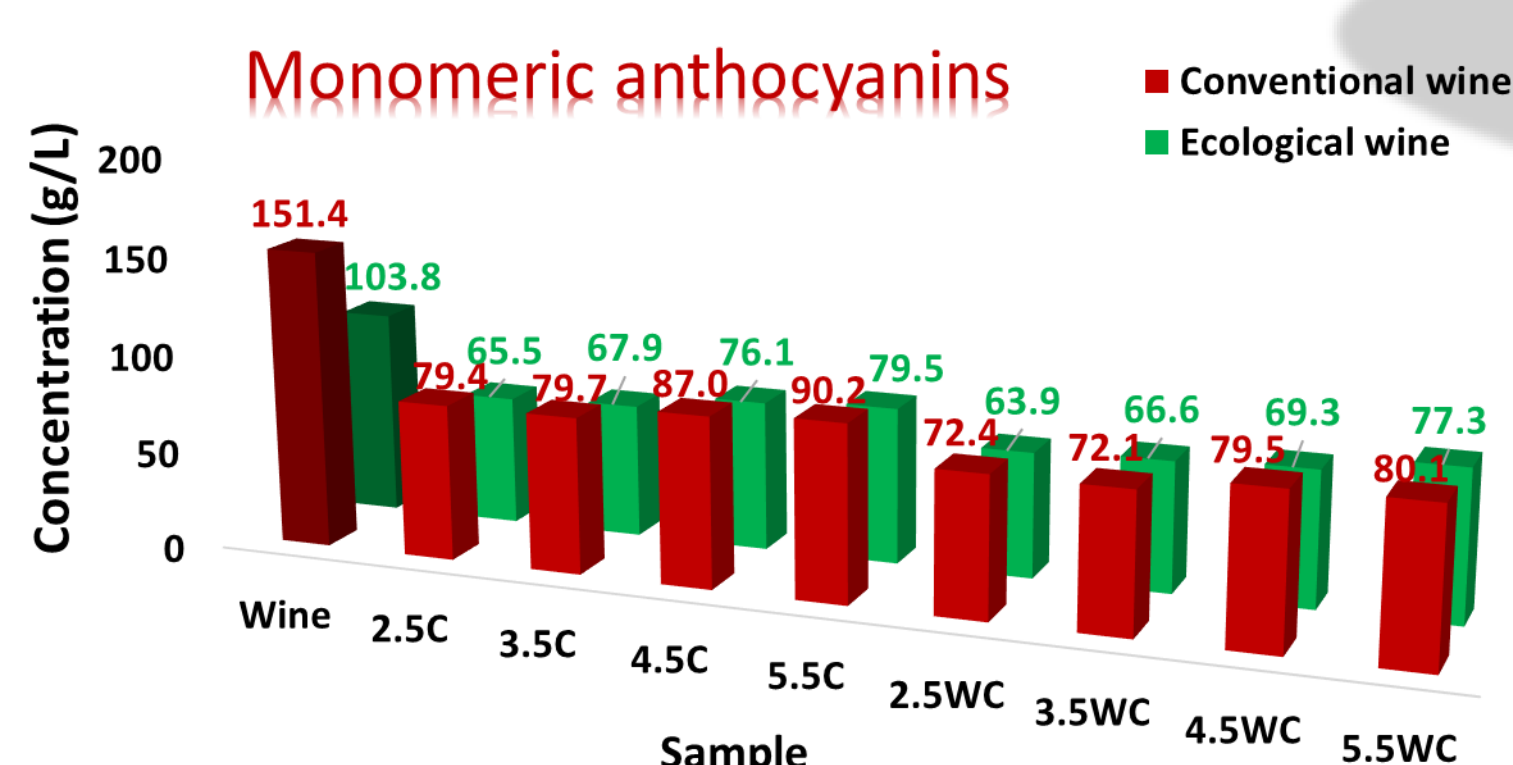
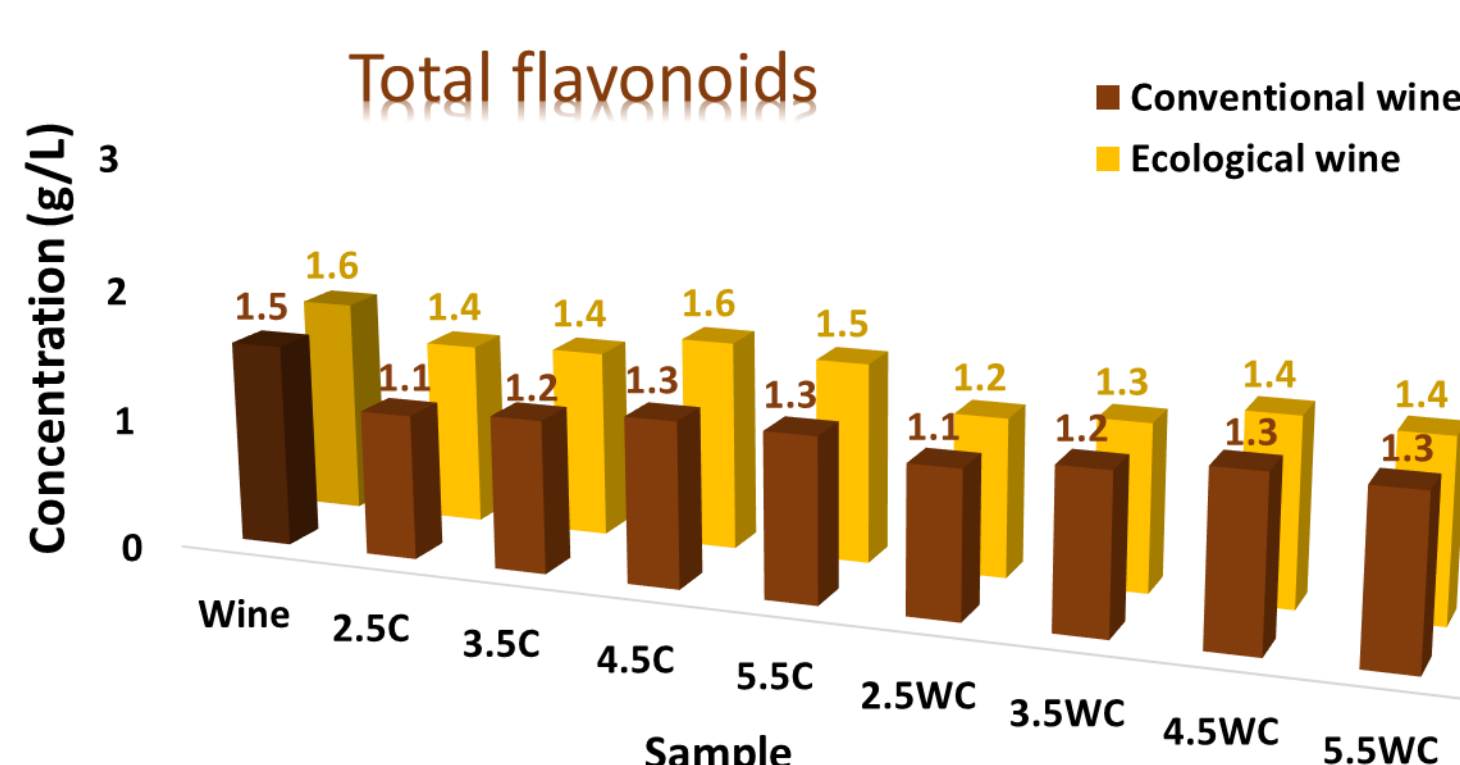
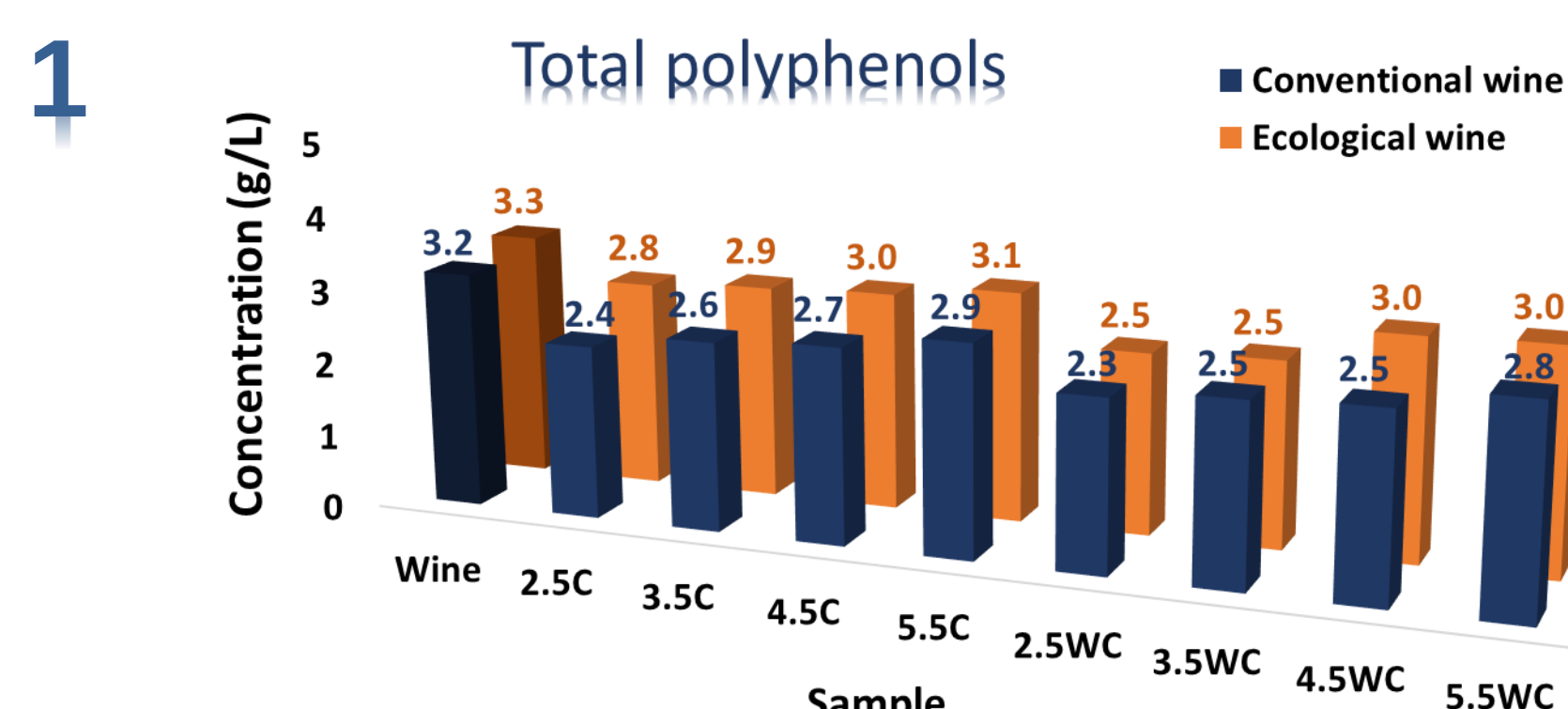
Red wine polyphenols are responsible for its colour, astringency and bitterness. They are known as strong antioxidants that protect human body from harmful effects of free radicals and prevent various diseases. Wine phenolics are influenced by viticulture methods and vinification techniques and therefore, conventionally and ecologically produced wines of same variety do not have the same phenolic profile. Ecological viticulture avoids the use of chemical adjuvants in vineyards in order to minimize their negative influence on environment, wine and human health. Phenolic profile and antioxidant activity of wine can also be influenced by additional treatments, such as concentration by reverse osmosis. The aim of this study was to investigate the influence of four different pressures (2.5, 3.5, 4.5 and 5.5 MPa) and two temperature regimes (with and without cooling) on phenolic profile and antioxidant activity of conventional and ecological Cabernet Sauvignon red wine during concentration by reverse osmosis.

Materials and methods

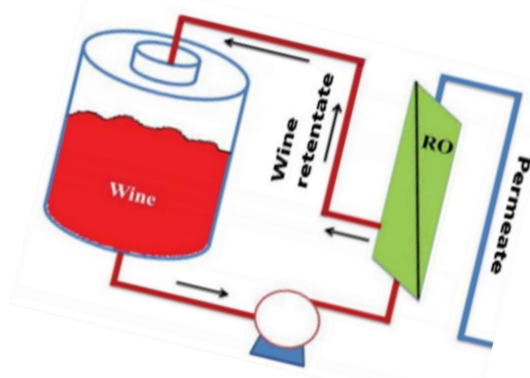
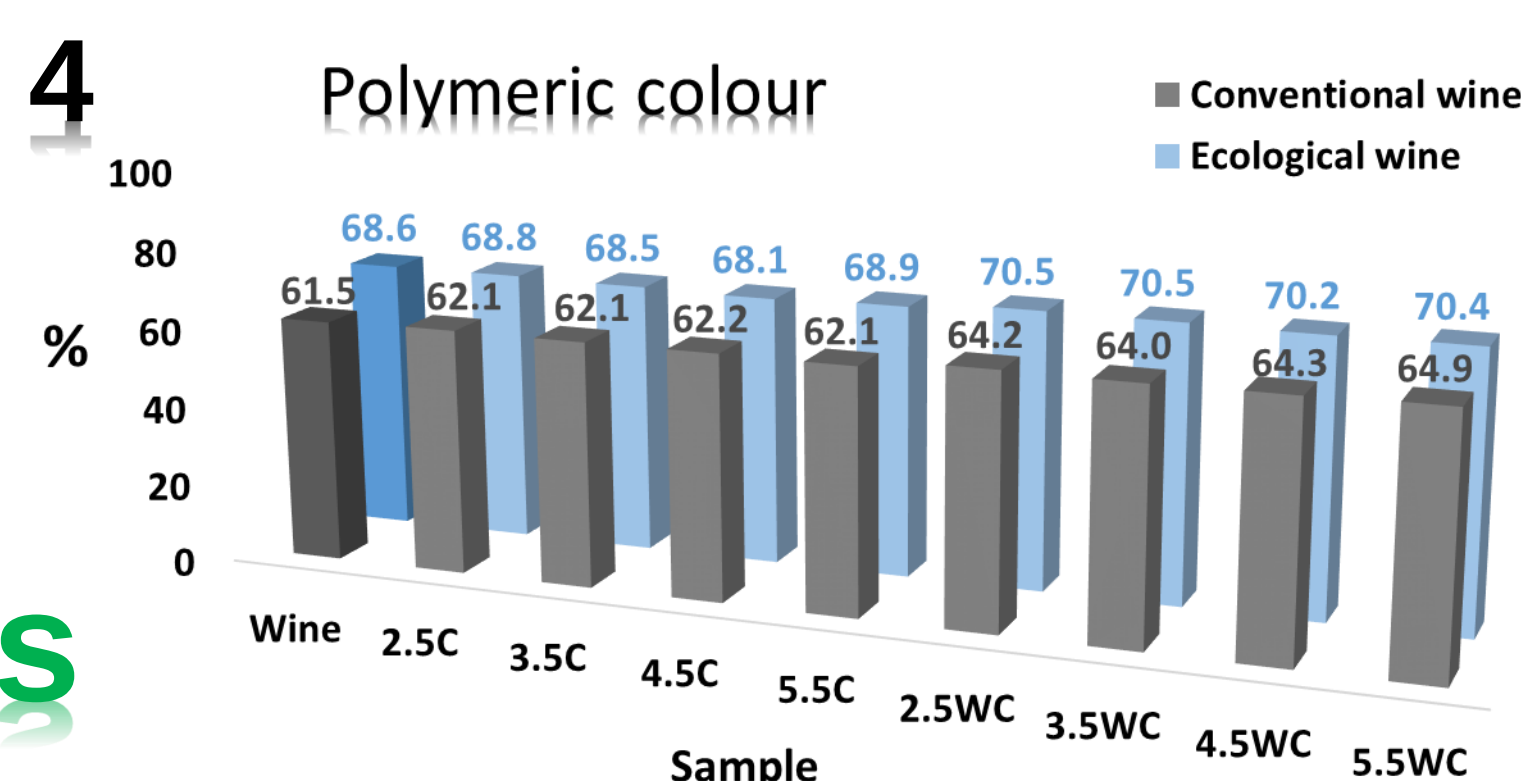
The reverse osmosis (RO) process of conventional and ecological Cabernet Sauvignon red wine was conducted on a plate-and-frame membrane filter Alfa Laval LabUnit M20, equipped with 6 composite RO98pHt M20 membranes. Initial wine volume was 3 L and the reverse osmosis process was stopped when 1.7 L of permeate and 1.3 L of concentrate was obtained. The total polyphenols (TPC), total flavonoids (TFC), monomeric anthocyanins (MAC) content, polymeric colour and antioxidant activity were determined spectrophotometrically. Antioxidant activity was determined with four different assays (DPPH, ABTS, FRAP and CUPRAC). Concentrates were diluted to initial volume with distilled water prior analysis. The phenolic content of RO retentates was compared to the phenolic content of corresponding initial wine.

Results

Figure 1-8. Total polyphenols, total flavonoids, monomeric anthocyanins content, polymeric colour and antioxidant activity (DPPH, ABTS, FRAP and CUPRAC) in initial conventional and ecological Cabernet Sauvignon red wine and reverse osmosis retentates obtained at 2.5, 3.5, 4.5, 5.5 MPa, with (W) and without cooling (WC).



LabUnit M20



Conclusions

- ✓ Higher pressure and retentate cooling favoured the retention of total polyphenols, flavonoids and monomeric anthocyanins during concentration of conventional and ecological Cabernet Sauvignon red wine by reverse osmosis.
- ✓ Comparing the retention of TPC, TFC and MAC during reverse osmosis treatment of conventional and ecological red wine, it can be observed that the retention was slightly higher in ecological wine retentates, especially at 5.5 MPa with cooling, where the highest retention was achieved.
- ✓ Similar trend was observed for antioxidant activity determined by DPPH, ABTS, FRAP and CUPRAC assay and higher values were obtained at higher pressures at cooling regime, comparing to the opposite processing parameters.
- ✓ The polymeric colour did not significantly change after RO process with cooling, but when cooling was not applied, it increased for about 2% in both wine retentates, comparing to the corresponding initial wine.
- ✓ Slight decrease of phenolic compounds content and antioxidant activity was observed after RO process in both wine retentates, comparing to the corresponding initial wine, and it depended on processing parameters, initial wine type and composition.

Literature

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