

Comparison of Phytochemicals in Grapes and Wine from Shenton Park Winery

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Abstract : Introduction: Health benefits associated with wine consumption have been well documented; these include anticancer, anti-inflammatory, and cardiovascular protection. The majority of these health benefits have been linked to polyphenols found within wine and grapes. Once consumed polyphenols exhibit free radical quenching capabilities. Environmental factors such as rainfall, temperature, CO₂ levels and sunlight exposure have been shown to affect the polyphenol content of grapes. The objective of this work was to evaluate the effect of growing conditions on the antioxidant capacity of grapes obtained from a single plot vineyard in Perth. This was achieved through the analysis of samples using; oxygen radical antioxidant capacity (ORAC), cellular antioxidant activity (CAA) in human red blood cells, ICP-MS and ICP-OES, total polyphenols (PP's), and total flavonoid's (FLa). The data obtained was compared to observed climate data. The 14 Selected Vitis Vinefera L. cultivars included Cabernet franc, Cabernet Sauvignon, Canelian, Chardonnay, Grenache, Melbec, Merlot, Orange muscat, Rousanne, Sauvignon Blanc, Shiraz, Temprnillo, Verdelho, and Voignier. Results: Notable variation's between cultivars included results ranging from 125 mg/100 g-350 mg/100 g for PP's, 93 mg/100 g-300 mg/100 g for FLA, 13 mM T.E/kg-33 mM T.E/kg for ORAC and 0.3 mM Q.E/kg-27 mM Q.E/kg CAA were found between red and white grape cultivars. No correlation was found between CAA and the ORAC obtained in this study; except that white cultivars were consistently lower than red. ICP analysis showed that seeds contained the highest concentration of copper followed by skins and flesh of the grape. A positive correlation between copper and ORAC was found. The ORAC, PP's, and FLA in red grapes were consistently higher than white grape cultivars; these findings were supported by literature values. Significance: The cellular antioxidant activities of white and red wine cultivars were used to compare the bioactivity of these grapes against the chemical ORAC measurement. The common method of antioxidant activity measurement is the chemical value from ORAC analysis; however this may not reflect the activity within the human body. Hence, the measurements were also carried out using the cellular antioxidant activity to perform a comparison. Additionally, the study explored the influence of weather systems such as El Niño and La Niña on the polyphenol content of Australian wine cultivars grown in Perth.

Keywords : oxygen radical antioxidant activity, cellular antioxidant activity, total polyphenols, total flavonoids, wine grapes, climate

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