Optimisation of the eco-friendly extraction of bioactive monomeric phenolics and useful flavour precursors from grape waste

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Grape marc is an underutilised bio-waste comprising predominantly grape skin and seeds. It is produced as a waste product of winemaking on the million-tonne scale annually. The most important high-value current use of grape marc is in the production of oenological tannins - widely-used additives in the food and beverage industry. More commonly, grape marc is simply either disposed of, or used as feed or fertiliser. With recent evidence showing that extracts enriched in grape tannins contain significant amounts of the thiol precursors 3-*S*-cysteinylhexan-1-ol and 3-*S*-glutathionylhexan-1-ol, and the possibility that these could influence food and beverage aroma[1], it was decided to investigate grape marc extraction procedures, in order to try to define extraction protocols that could maximise the recovery of these compounds.

Two thiol precursors and eight monomeric phenolics were identified and simultaneously extracted from Sauvignon Blanc grape marc using solid-liquid extractions.[2] The optimal solvent ratio of acetone:water:ethanol was explored across 66 different solvent combinations. Effective extraction of thiol precursors required a high water content, which is an advantage from an economic and environmental perspective, while for the most abundant phenolic, quercetin 3-*O*-glucoside, optimal extraction levels were achieved using a 40:50:10 solvent mixture. In addition, this is the first identification of thiol precursors in grape marc, which adds a significant potential commercial value to this underutilised waste product.

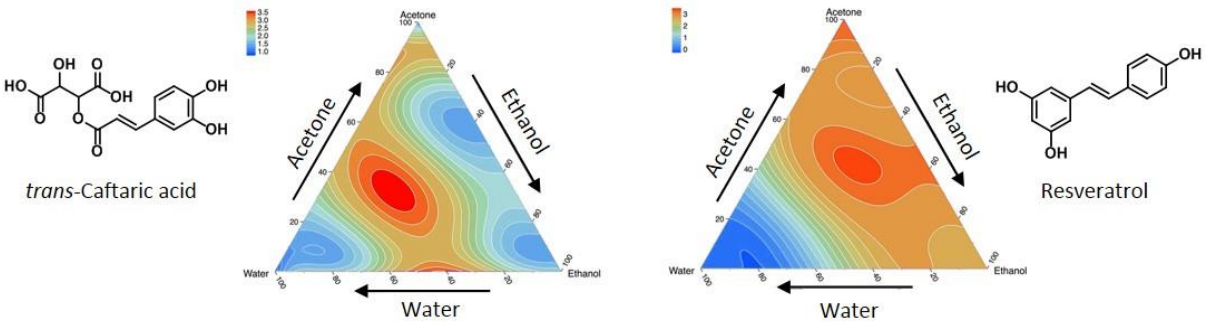

Figure 1. Ternary diagrams illustrating the extraction effectiveness of various solvent combinations for the selected phenolics, *trans*-caftaric acid and reservatrol from grape marc.

1. Larcher, R. et al. Food Chem. **2015**, *166*, 56–61.
2. Jelley, R. E. et al. ACS Sustain. Chem. Eng. **2016**, *4* (9), 5060–5067.