Understanding the variability of juice extraction methods for quality analysis

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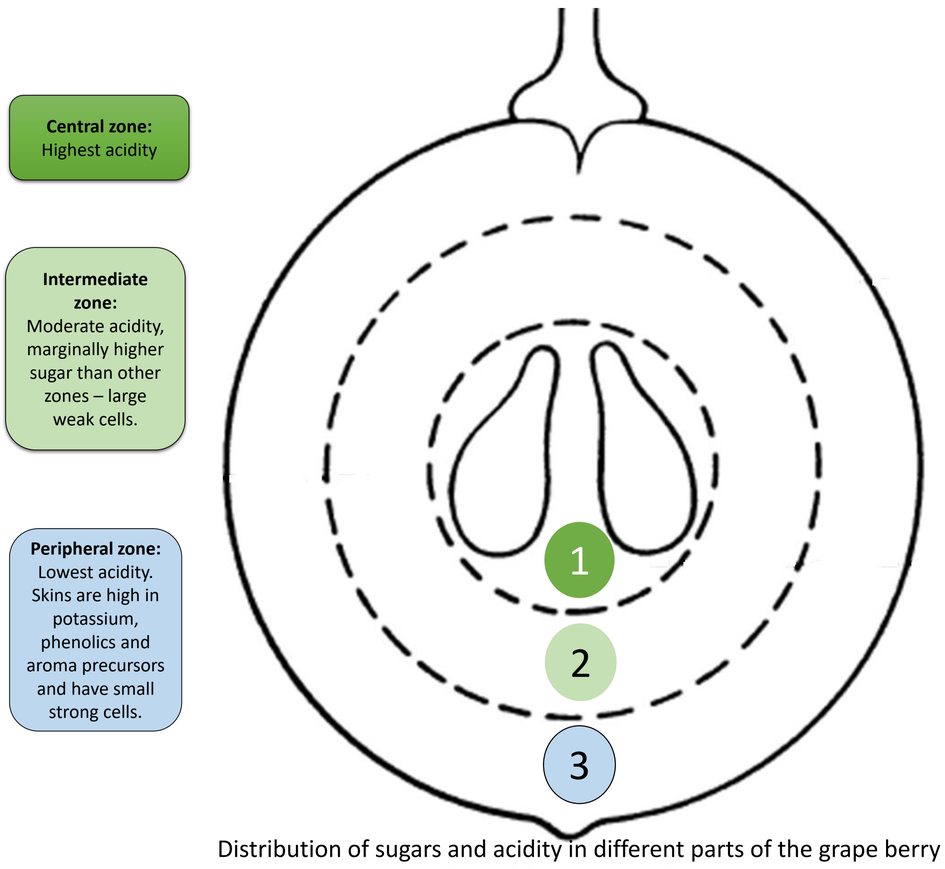
BACKGROUND

- An important step for a range of common analytes (e.g. sugars, pH, TA) when analysing wine grapes is to extract juice from the grapes and then analyse that juice.
- Common extraction techniques in a lab or vineyard include hand-pressing; manual or mechanical pressing followed by sieving; or homogenisation followed by centrifugation.
- At the receival point at a winery, processes are similar; however, for machine-harvested fruit, free-run juice present in the bottom of the harvest bin is sometimes used for analysis.
- For more representative sampling of a load of grapes, screw core sampling mechanisms can be used to obtain grapes for juice extraction.
- Juice extraction methods vary significantly between vineyards and wineries, and this may have an impact on analytical outcomes.

BERRY COMPOSITION



Distribution of sugars and acidity in different parts of the grape berry (adapted from Peynaud 1984)

LABORATORY TRIALS

Vintage 2021: accessed three SA-based receival points to assess loads of grapes using different sampling/extraction methods, to better understand the variability of each method.

Methods involved: free-run juice, hand-pressed full berries and mechanic screw core sampler.

- **Key findings:** free-run juice sampling tended to result in lower overall TSS (Brix) levels in red grapes compared to hand-pressing and mechanical screw core sampling.
- Free-run juice cannot be considered representative of the load and sampling free-run juice is not recommended.
- Variability of TSS across bins from the same load/vineyard was between 0.7 and 1.0°Brix.
- Representative sampling across a load is essential in achieving a valid outcome.

WINERY RECEIVAL TRIALS

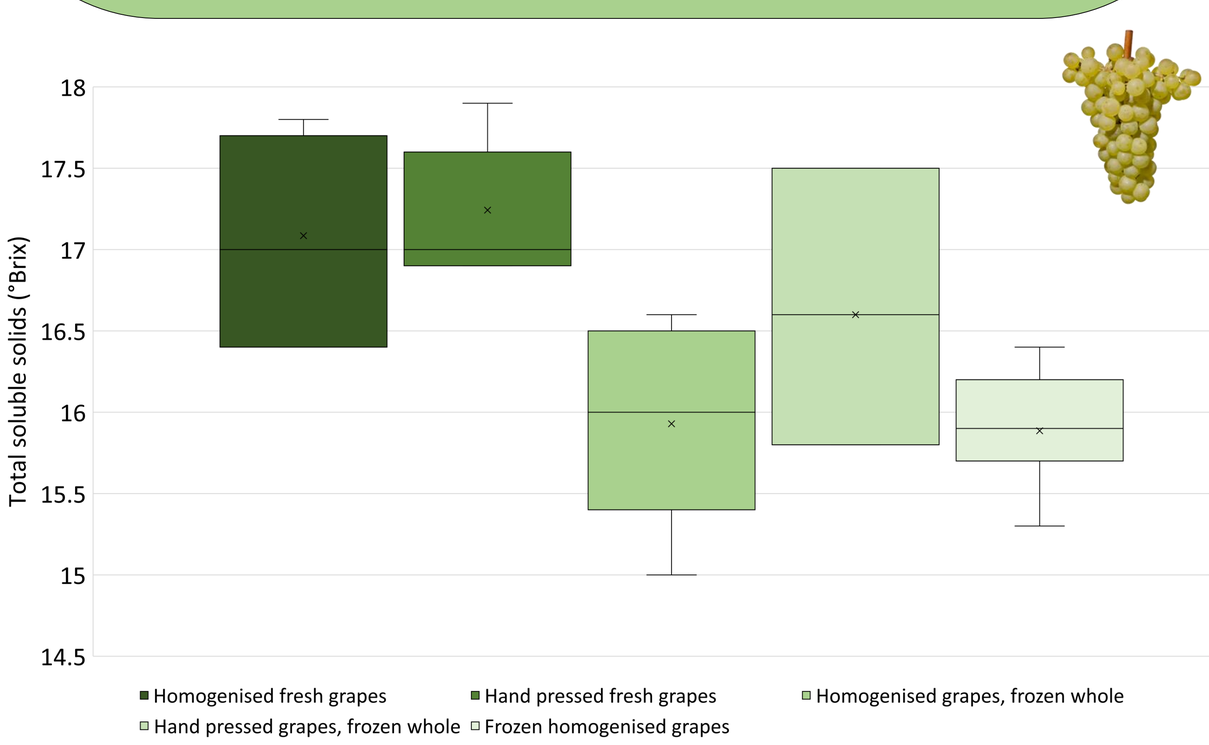
Primary objective: to evaluate the variability and reproducibility of analytical results obtained after differing extraction methods.

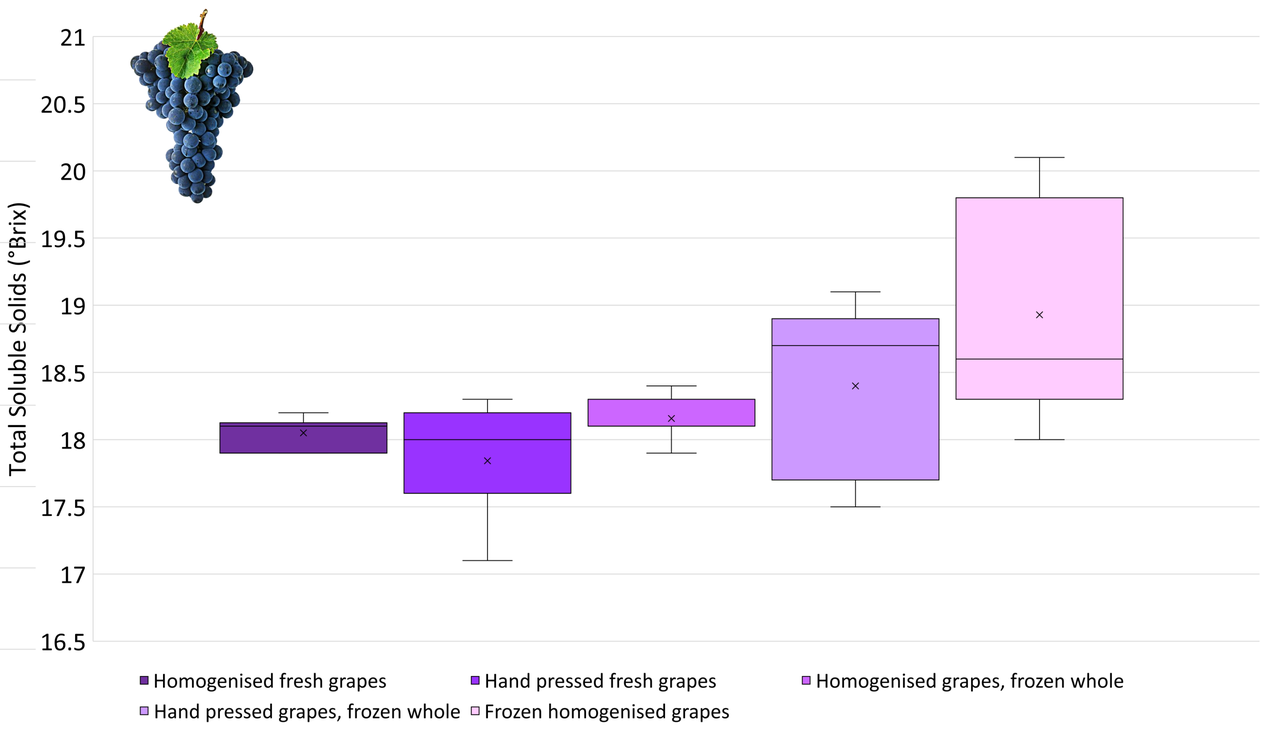
Table grapes used as a substitute for wine-grapes.

Extraction methods included: homogenisation, hand-pressing and combinations including frozen storage.

Total soluble solids (measured in °Brix), pH and titratable acidity measured.

- **Key findings:** measurement of total soluble solids in grapes was not greatly influenced by the juice extraction method employed.
- Extraction methods did have a greater influence on results for pH and TA, which could potentially be attributed to the distribution of acids within grape berries.
- Freezing affected the spread of results for total soluble solids.
- Berry-to-berry variation within bunches can have a significant impact on analytical results.





Range of results for total soluble solids (TSS) measured following different juice extraction methods for white (left) and red (right) table grapes.

Wine Australia

The AWRI is a member of the Wine Innovation Cluster.

Reference
Peynaud, E. 1984. *Knowing and making wine.* Chichester, UK: Wiley-Interscience.

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