A preliminary investigation of the potential of near infrared spectroscopy to predict sensory properties in white wines

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Figure 1. Correlation between NIR-predicted and mean panel score for the sensory attribute *estery*

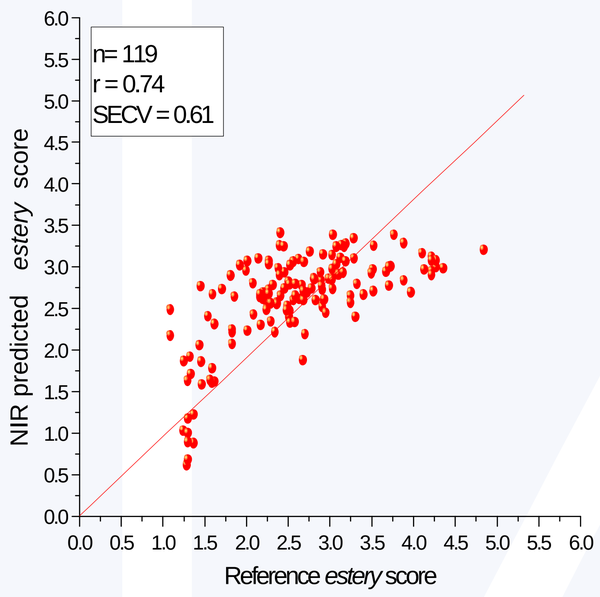
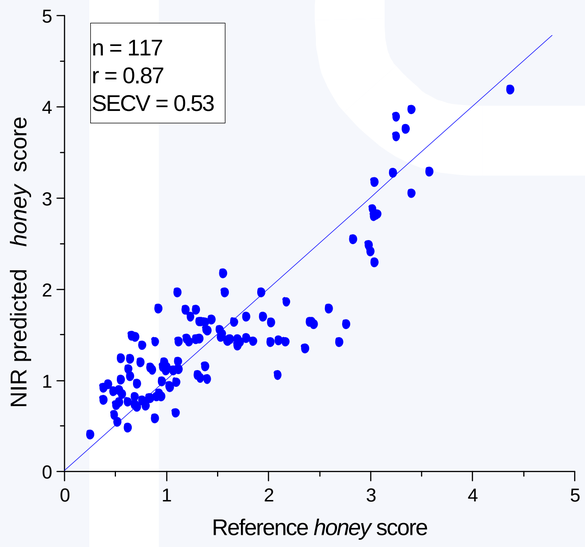


Figure 2. Correlation between NIR-predicted and mean panel score for the sensory attribute *honey*



Introduction

Near infrared (NIR) spectroscopy provides a global signature of composition, which can be used by advanced pattern recognition software techniques to infer particular characteristics not readily detected by traditional analytical techniques. This opens the possibility of using NIR spectra to determine attributes of complex characteristics of foods, which can be related to molecular chromophores, quality grading scores or even sensory characteristics. Preliminary work has been carried out to investigate the feasibility of using NIR together with multivariate regression techniques to predict the scores of some sensory attributes of commercial unwooded Chardonnay and Riesling wines.

Materials and methods

The samples used in the study were three bottles each of 20 different brand labels of commercial unwooded Chardonnay and Riesling wines from a number of Australian regions, and while most were from the 2001 and 2002 vintages, included wines up to ten years old. Samples (n=120) of wines were scanned (400 – 2500 nm) in a 1 mm cuvette in transmission mode using a FOSS *NIRSystems6500* spectrophotometer. Spectral data collection and manipulation were achieved using the *VISION* software. Partial least square (PLS) regression models between spectral and reference data were developed using *The Unscrambler* software. The sensory attributes modelled (i.e. reference data) using the NIR spectral data were obtained from mean sensory ratings from a larger set of aroma and flavour attributes scored for these samples by a trained panel, namely the attributes *honey*, *estery*, and *lemon.* The regression model for the attribute *toasty* was developed using the Riesling wines only.

Results and conclusion

The results showed that relatively good correlations (r > 0.70) were obtained between the scores allocated by a tasting panel and those predicted by NIR for the sensory attributes *estery* (Figure 1), *honey* (Figure 2), *lemon* (Figure 3), and *toasty* (Figure 4). This degree of correlation suggests that NIR spectroscopy appears to have potential as a tool for screening wines, for example, in research studies to assist in targeted sample selection to reduce sensory analysis workload, and identify trends within a given set of wines. The correlations between NIR data and sensory scores are likely to be due to collinear relationships (co-correlations) among chemical compounds in the wine matrix.

Further studies are needed to investigate the relationships between the wavelengths of most influence on the calibration models and the individual chemical compounds contributing to the particular sensory property.

Figure 3. Correlation between NIR-predicted and mean panel score for the sensory attribute *lemon*

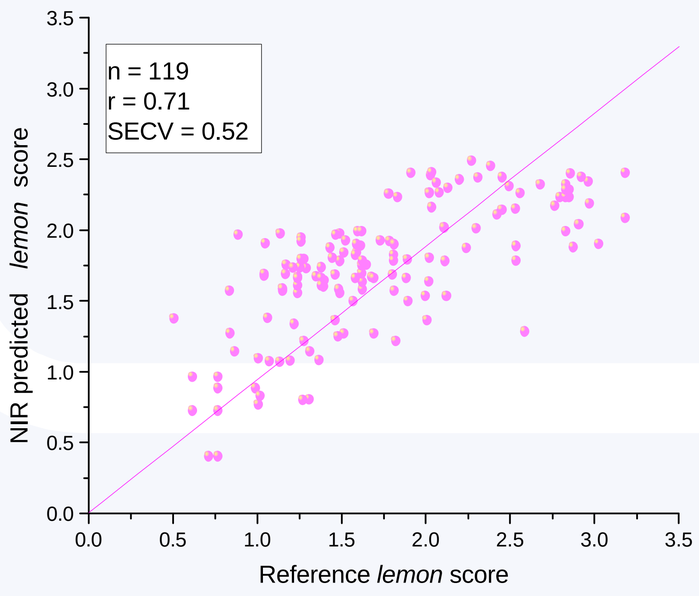
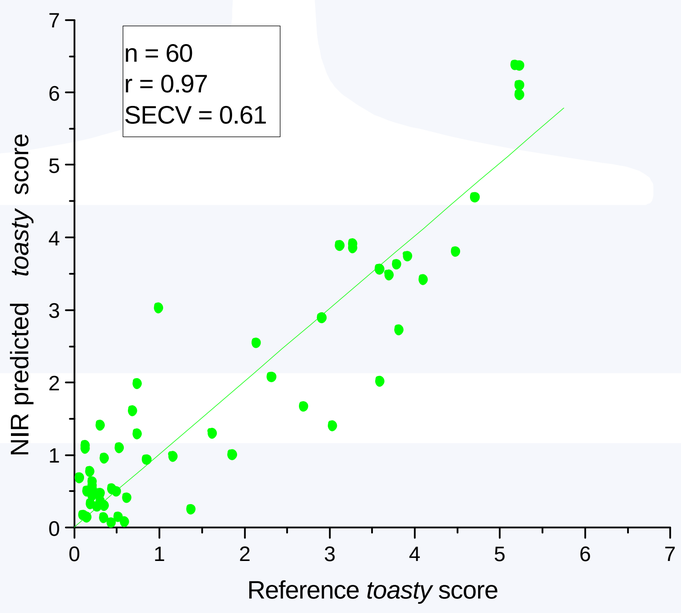


Figure 4. Correlation between NIR-predicted and mean panel score for the sensory attribute *toasty* in Riesling wines only



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