

Australian Government **Department of Industry and Science** **Business** Cooperative Research Centres Programme



RAPID DIAGNOSTIC METHODOLOGY - RAMAN AND FTIR FOR HONEY IDENTIFICATION

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Introduction

Interest in verifying the floral origin and composition of mono-floral honeys has grown with the increased market value attained for specific characteristics attributed to honeys from some floral sources.



The rapid diagnostic testing techniques Raman and Fourier Transform Infrared, have potential to act as screening tools for bulk honey purchase. The techniques can assist with onsite quality control or allow rapid onsite assessments that can assist in the identification of dilution, substitution or fraudulent activity.

Scope

Using pollen certified reference honey for monofloral Jarrah, Marri, Yate and Powderbark varieties and blends field collected to capture natural variation characteristics, compare the discrimination of handheld and benchtop rapid diagnostic instruments using two techniques

- Fourier Transform Infrared
- Raman Spectroscopy

Materials and Methods

Five instruments are to be assessed for rapid diagnostic capability;

- Hazmat ID Elite with Diamond ATR sensor handheld
- Nicolet iS5 FTIR with Diamond ATR sensor
- Nicolet 6700 FTIR with Diamond ATR sensor
- Tactic ID Raman handheld
- Renshaw inVia Raman Microscope

A. Fourier Transform Infrared (FTIR) spectral outcomes of Jarrah, Marri and Mixed floral honeys with Diamond ATR optical pathway to FTIR spectrometry B. Raman Spectroscopic spectral outcomes with Raman spectrometry optical pathways

Vibrational spectra of honey samples were recorded using each of the optical techniques these will be compared to traditional compositional and identification analysis using chemometric assessment including data preprocessing and multivariate statistical analysis.

NATA accredited quantitative primary analysis for compositional chemistry of each honey will be compared to the secondary analysis spectral scans to establish calibrations

The discriminatory capability, interpretive value and functionality of handheld instruments will be compared to desktop rapid techniques using the same reference honey database and the same comparative analysis techniques.



Result and Discussion

- Early data comprising spectral analysis of a selected range of 32 samples from our reference collection containing both Jarrah and Marri mono-floral honeys and blends with other honeys, show significant differences in several spectral regions.
- Chemometric analysis will be utilized to assess spectra collected for correlation to mono-floral identity, also specific chemical signatures aligned with sample composition will be assessed. Individual technique and instrument will also then be examined to assess the discrimination capabilities of these techniques.
- Comparison will be made between low cost handheld and benchtop rapid diagnostic techniques

Summary and Future Work

- Both hand held and rapid diagnostic screening methods have significant potential to provide onsite, rapid and cheap indicative analysis that can significantly benefit the industry.
- Benefits can include more timely point of sale analysis onsite that can result in more informed purchase and onsite quality control.
- Additional benefits might include better management of storage issues such as crystallization or glucose oxidase enzyme function.
- Results are indicative but sufficient to suggests additional work is warranted using the full 400 sample database available.

ChemCentre Handheld HazMat Elite and Benchtop Nicolet FTIR 6700 and IS5 FTIR ChemCentre Handheld Tactic ID Raman and benchtop Renshaw invia Raman Microscope

Acknowledgements

Funding for this ongoing study was provided by the WA Honey Industry and The WA Department of Primary Industries and Regional Development through their Grower Groups Research and Development Grants Program - Round 2 — GGRD2 2016-1700179 — INDUSTRY STANDARDS OPTIMISING **STORAGE AND SUPPLY VOLUME OF WA MONO-FLORAL HONEY.**

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