

Honeybees – new applications in environmental monitoring

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Background

The analysis of honeybee products provides a novel approach to environmental monitoring in Australia. Bees typically forage several kilometres radius from the hive, making them ideal samplers of the surrounding environment for not only flora, but also contaminants in water, soil, plants and the atmosphere (Celli, G. & Maccagnani, B. (2003) Honey bees as bioindicators of environmental pollution. Bull Insectol, 56, p137 – 139).

Dr Jerry Bromenshenk , a renowned U.S. ecotoxicologist and bee researcher, pioneered the use of honeybees as monitors of environmental pollution during the late 1980's. His studies revealed the effectiveness of using beehive products as detectors and trackers of heavy metal pollution from industry source emissions, even decades after industry closure. Based on these findings, the US EPA in 1989 approved honeybees in their reference guide for the assessment of hazardous waste sites (Warren–Hicks, W. (1989) Ecological assessment of hazardous waste sites. A field and laboratory reference EPA/600/3–89/013.

This study proposes to develop this approach as a methodology in assessing environmental health in the industrialised areas of the Hunter Valley Region of NSW. Two new technologies, a portable XRF (for heavy metal analysis) and Classifynder (for pollen counting and identification), will be verified against traditional methods as rapid assessment tools for this environmental monitoring approach. Pollen samples will be cross–referenced with field flora surveys to investigate correlations in heavy metal uptake by those species and species distribution in the forage areas – all new research in Australia.

This research could also provide a rapid means of testing honey for a range of possible contaminants which would greatly assist the Australian beekeeping industry in their endeavour to enhance their potential on the international market for quality honey products.

Aim

To determine the usefulness of honeybees as monitors of environmental health (in Australia).

Research Directions and Timeline

- Validate portable XRF technology as a rapid assessment tool for heavy metal analysis of bee products ([start testing Sept 2013 – final report June 2014](#))

- Conduct a baseline survey of heavy metals in Hunter Valley beehive products (seasonal sampling from 10 hive locations over 2 years Start Sept 2013)
- Assess the reliability of the Classifynder automatic pollen analyser in identifying the major floral resources in region specific honey samples (start Sept 2013 slide prep – collaborate with NZ labs for access to Classifynder – currently not working at ANU Palynology Laboratories)

Funds Required (minimum start-up costs)

Beehive equipment (frames, pollen traps, sample containers etc)

\$1500

Laboratory analysis and consumables

\$5000

XRF & Classifynder Training/Licences

\$2000

Travel (training, site location, sample collection)

\$1500

TOTAL

\$10 000

Additional Funds Sought

PHD Scholarship half or full pa x 4yrs