Australian Manuka: Tracing *Leptospermum* genetic diversity

Molecular studies have increased understanding of *Leptospermum* species in Australia, providing a unique opportunity to expand Australia's Manuka honey production.

Bioactive honey is fast becoming a popular medicinal product due to its antimicrobial and wound healing properties. The production of high quality and traceable bioactive honey is a potential growth market for the Australian honey industry.

Bioactive honey is primarily produced from *Leptospermum* plants within the Myrtle family. They are highly valued for their premium essential oil (such as tea tree oil) and honey products (such as Manuka honey).

Leptospermum scoparium, found in both Australia and New Zealand, is globally recognised as a source of bioactive honey. In Australia, the *Leptospermum* genus is represented by 88 species, 85 of which are endemic to Australia. Many species contain the chemical compound (dihydroxyacetone, DHA) that facilitates bioactive honey production.

Australia is rich with many *Leptospermum* species that contain the chemical compound DHA that facilitates bioactive honey production, broadening our capacity to produce Manuka honey.

However, there are classification and identification uncertainties across the *Leptospermum* genus, including species boundaries, genetic make-up, and diversity through field plant misidentification.

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genetic diversity

bioactive honey

breeding

Overcoming these uncertainties will enable the development of breeding programs, provide consumer confidence in the source of products, and ensure the production of high-quality bioactive honey products.

Researchers Dr Rachel Binks and Dr Margaret Byrne from the Department of Biodiversity, Conservation and Attractions, in collaboration with Dr Peter Wilson and Margaret Heslewood from the Australian Institute of Botanic Science, undertook a molecular study and found that the genus, as presently defined, is not a single evolutionary lineage. They recommended dividing Leptospermum into five genera, and this is currently being worked on by taxonomists.

One insight gained by this finding is that DHA is produced across each of these putative genera. This indicates value in further investigating other species from other genera for their ability to produce bioactive honey.

A second molecular study by Dr Binks and Dr Byrne also found high levels of natural hybridisation between Western Australian species of *Leptospermum*. This explains the difficulties in identifying species and necessitates that only seed, leaf or nectar that has been confidently identified should be used for breeding purposes.

Molecular studies indicate that other *Leptospermum* genera may also produce DHA. This warrants a wider exploration for DHA-producing plants.

The molecular approach taken will help to provide a stable taxonomy for Australian *Leptospermum* as the basis for breeding programs. More broadly, by resolving classification, identification and genetic issues of Australian *Leptospermum*, this research provides foundational knowledge that highlights opportunities and obstacles associated with establishing and expanding bioactive honey production in Australia.

While final plant-naming decisions are in the hands of the taxonomists, for those interested in plant improvement and establishing honey bee gardens, understanding why certain species refuse to hybridise with others and their capacity to produce DHA, is a major step forward.

Leptospermum in the Western Australian landscape (*Image: R. Binks*)

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