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# Analysis of Environmental Contaminants in Australian Honey and Comparison to Stingless Bee Honey from Queensland and Malaysia †

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**Abstract:** Honey is a widely available natural sweetener containing sugars, and small quantities of vitamins and minerals, proteins, amino acids and fatty acids. Owing to its nutritious components, commercial honeys are sold in bulk blends or as trendy and premium products. Meanwhile, honey bees are considered as environmental monitors and have the potential to transfer environmental contaminants, if present, to honey. In high density urban and industrial environments polycyclic aromatic hydrocarbons (PAHs) and heavy metals can be prevalent, whilst pesticides and mineral and trace elements are ubiquitous. Honey hives are traditionally located in rural and forested areas, but there is a growing trend to locate hives in urban areas. This project has investigated the presence of environmental contaminants in honey samples from high density urban, peri-urban as well as rural areas. Australian honey samples (n = 211) were purchased between 2016 and 2018, including 52 honeys claiming to be of urban origin purchased online. Stingless bee honeys (n = 36) from Queensland and Malaysia were compared. Processed samples were analysed by UHPLC-MS/MS (herbicides), GC-MS/MS (pesticides and PAHs) and ICP-MS and ICP-OES (elemental analyses). The results showed low or negligible pesticide, herbicide, and PAH contamination, and that these low results were similar regardless of urban or rural origins. Wide variations of essential trace element (Fe, Zn, Cu, Mo, Co, Mn, Cr) and mineral levels (K, Na, P, Mg, Ca) were found in honey products, which are a good dietary source of K and Zn. Relatively low levels of toxic heavy metals were found in honeys.

**Keywords:** honey; environmental contaminants; Queensland; Malaysia; stingless bee honey

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