

**Discrimination of Malaysian stingless bee honey from different entomological origins based on physicochemical properties and volatile compound profiles using chemometrics and machine learning**

**ABSTRACT**

Identification of honey origin based on specific chemical markers is important for honey authentication. This study is aimed to differentiate Malaysian stingless bee honey from different entomological origins (*Heterotrigona bakeri*, *Geniotrigona thoracica* and *Tetrigona binghami*) based on physicochemical properties (pH, moisture content, ash, total soluble solid and electrical conductivity) and volatile compound profiles. The discrimination pattern of 75 honey samples was observed using Principal Component Analysis (PCA), Hierarchical Clustering Analysis (HCA), Partial Least Square-Discriminant Analysis (PLS-DA), and Support Vector Machine (SVM). The profiles of *H. bakeri* and *G. thoracica* honey were close to each other, but clearly separated from *T. binghami* honey, consistent with their phylogenetic relationship. *T. binghami* honey is marked by significantly higher electrical conductivity, moisture and ash content, and high abundance of 2,6,6-trimethyl-1-cyclohexene-1-carboxaldehyde, 2,6,6-trimethyl-1-cyclohexene-1-acetaldehyde and ethyl 2-(5-methyl-5-vinyltetrahydrofuran-2-yl)propan-2-yl carbonate. Copaene was proposed as chemical marker for *G. thoracica* honey. The potential of different parameters that aid in honey authentication was highlighted.

**Keyword:** Stingless bee honey; Physicochemical properties; Volatile compounds profiling; Chemometrics and machine learning; Discrimination; Chemical markers