



IJCRR

Section: Healthcare

ISI Impact Factor
(2019-20): 1.628

IC Value (2019): 90.81

SJIF (2020) = 7.893



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High Therapeutic Properties of Honey from the Borneo Stingless Bee, *Heterotrigona itama*

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ABSTRACT

Introduction: Stingless bee acts as a pollinator and is commonly found in tropical dry and humid forest. Various phenolic compounds have been reported in stingless bee honey which gave antibacterial, antifungal, and antiviral properties.

Objective: The current study focuses on the chemical profiling of honey from *Heterotrigona itama* on Borneo and evaluation for potential therapeutic properties.

Methods: The honey was extracted via liquid-liquid extraction method and analyzed using spectroscopic methods.

Results: Strong fatty alcohol signals (3.5-4.5 ppm) indicated significant markers in 1H-NMR. The honey demonstrates excellent antibacterial activity against *Escherichia coli* (*E. coli*) (19.0 mm) and stronger antioxidant properties (IC50 33.78 ppm) compared to the Tualang honey (54.90 ppm). Bornean *H. itama* honey produced lower glucose (61.65-147.44 g/L) and heavy metals content (0.003-0.204 ppm) which is significant in food products.

Conclusion: The phenolic, aliphatic acids and fatty alcohols identified in honey contributing to excellent biological properties. This study demonstrated that Borneo *H. itama* honey is a potential source of antimicrobial and antioxidant agents.

Key Words: Antibacterial, Antioxidant, Chemical profiling, Turbidimetry

INTRODUCTION

Borneo is one of the world's largest tropical forests island. Its humid tropical climate is one of the world's biodiversity hotspots and home to many resin-secreting Dipterocarpaceae trees, which provide an excellent condition for stingless bees to thrive.¹ The strategic location of Borneo, in particular Sarawak, with dipterocarp and Palmae forests, dense canopy and relatively undisturbed flora could be associated with excellent properties of honey with high anti-oxidant activity and low environmental contaminant.² Around 30 species of stingless bees or kelulut have been found on Borneo, in particular Sarawak, from which *H. itama* is one of the typical indigenous species reported.³ *H. Itama* species are less receptive to changes in season and capable of surviving in rough environments.⁴ Significantly, *H. itama* has been reported to produce high quality of honey and nutrient compared to other species of stingless bee.³

Stingless bee acts as a pollinator and is commonly found in tropical dry and humid forest.⁵ The diminutive size of stingless bees offers advantages to retrieve pollen and nectars more efficiently from small-size plants and a higher number of flowers.⁶⁻⁸ Due to its high nutrition and therapeutic properties, chemical profiling study of honey from the stingless bee has received much attention and high market demand.^{2,9} Various phenolic compounds have been reported in stingless bee honey which gave antibacterial, antifungal, and antiviral properties.¹⁰ Honey rendered by *H. itama* has been reported to have greater antioxidant property than Manuka honey made by *Apis mellifera* honey bees.⁹ The medicinal property of honey is associated with floral resources.^{10,11}

Honey is reported to be of excellent quality based on the physicochemical properties and originality from its botanical, geographical and entomological origins.¹² The composition of honey is varied and significantly influenced by the climatic conditions as well as plant bio- and chemotype.¹³

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ISSN: 2231-2196 (Print)

ISSN: 0975-5241 (Online)

Received: 18.10.2020

Revised: 14.11.2020

Accepted: 16.12.2020

Published: 23.02.2021