

**UNIVERSITI TEKNOLOGI MARA**

**ANTIMICROBIAL ACTIVITIES OF MALAYSIAN  
STINGLESS BEES PROPOLIS ON *KLEBSIELLA*  
*PNEUMONIAE***

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## ABSTRACT

Propolis is a resinous material that was collected by honeybees from various plants. Previous study had shown that propolis possess few important properties such as antimicrobial, antifungal, antiviral, anti-inflammatory and antioxidant. Thus, the aim of this study is to examine the antimicrobial properties of the Malaysian stingless bees propolis, MIC range and the correlation between the total phenolic compounds with the strength of the antimicrobial action. Stingless bees used in this study were *H. itama* and *G. thoracic*. From each bee species, samples were taken from the sealant and the pot of the bee hives. For this study, the microorganism used was *Klebsiella pneumoniae* ATC 13883. In order to examine the antimicrobial properties, agar well diffusion method with concentration range from 32 mg/mL to 128 mg/mL was used. Meanwhile, microwell plate method was used to examine the MIC range of the propolis sample. Then, the total phenolic compound was investigated by using Folin-ciocalteu reagent and comparison with the standard curve of gallic acid. Study revealed that for concentration 128 mg/mL, the diameter inhibition of zone range from  $14.44 \pm 1.40$  mm to  $17.33 \pm 3.20$  mm while for concentration 64 mg/mL, the diameter of inhibition zone range from  $11.67 \pm 1.80$  mm to  $16.44 \pm 1.67$  mm. Meanwhile, for the concentration of 32 mg/mL, the diameter inhibition of zone range from 0.00 mm to  $14.00 \pm 2.06$  mm. On the other hand, HIS and HIP sample had shown the lowest MIC range of 8 mg/mL to 16 mg/mL while GTP sample with 16 mg/mL to 32 mg/mL. GTS sample exhibited the highest MIC range with 32 mg/mL to 64 mg/mL. In addition, both sealant samples had shown the highest total phenolic compounds (HIS, 0.1128 GAE mg/mL and GTS, 0.1067 GAE mg/mL) as compared to the pot samples (HIP, 0.1053 GAE mg/mL and GTP, 0.1010 GAE mg/mL). As the conclusion, all samples from Malaysian stingless bees propolis possess the antimicrobial activity and it is correlated with the total phenolic compounds that contained in each sample. Further study is highly recommended to be done in order to identify specific chemical compositions of the propolis.

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Background of Study**

Propolis is a resinous bee material collected by honeybees from various plant species. Numbers of studies have been done to prove its efficiency in medical treatments, both human and animal (Pastor et al., 2010; Carvalho et al., 2011). It has been shown to manifest antibacterial, antiviral, antifungal, antioxidant, anti-inflammatory, immunostimulating and cytostatic properties (Dimov et al. 1991; Amoros et al. 1992). This material is augmented with salivary and enzymatic secretions which used by bees to cover hive walls, fill cracks or gap and kill invader insects (Castaldo and Capasso, 2002). Bees use propolis in the combs as protection to repair damage, to build aseptic locals and as a thermal insulator (Cardoso et al., 2011).

Due to the successful medical applications of the propolis, there is increment of interest specifically on the chemical composition and the origin. Propolis chemical composition depends on the species of the plant, geographic and climates characteristics at the site of the collection (Bankova, 2005). Variability of plant species growing around the hive