

Characterisation of bacteria isolated from stingless bee, *Heterotrigona itama*, honey, bee bread and propolis

ABSTRACT

Bacteria are present in stingless bee nest products. However, detailed information on their characteristics is scarce. Thus, this study aims to investigate the characteristics of bacterial species isolated from Malaysian stingless bee, *Heterotrigona itama*, nest products. Honey, bee bread and propolis were collected aseptically from four geographical localities of Malaysia. Total plate count (TPC), bacterial identification, phenotypic profile and enzymatic and antibacterial activities were studied. The results indicated that the number of TPC varies from one location to another. A total of 41 different bacterial isolates from the phyla Firmicutes, Proteobacteria and Actinobacteria were identified. *Bacillus* species were the major bacteria found. Therein, *Bacillus cereus* was the most frequently isolated species followed by *Bacillus aryabhatai*, *Bacillus oleronius*, *Bacillus stratosphericus*, *Bacillus altitudinis*, *Bacillus amyloliquefaciens*, *Bacillus nealsonii*, *Bacillus toyonensis*, *Bacillus subtilis*, *Bacillus safensis*, *Bacillus pseudomycooides*, *Enterobacter asburiae*, *Enterobacter cloacae*, *Pantoea dispersa* and *Streptomyces kunmingensis*. Phenotypic profile of 15 bacterial isolates using GEN III MicroPlate™ system revealed most of the isolates as capable to utilise carbohydrates as well as amino acids and carboxylic acids and derivatives. Proteolytic, lipolytic and cellulolytic activities as determined by enzymatic assays were detected in *Bacillus stratosphericus* PD6, *Bacillus amyloliquefaciens* PD9, *Bacillus subtilis* BD3 and *Bacillus safensis* BD9. *Bacillus amyloliquefaciens* PD9 showed broad-spectrum of antimicrobial activity against Gram-positive and Gram-negative bacteria in vitro. The multienzymes and antimicrobial activities exhibited by the bacterial isolates from *H. itama* nest products could provide potential sources of enzymes and antimicrobial compounds for biotechnological applications.

Keyword: Antimicrobial activity; Bacteria; Biology GEN III; Cellulase; Lipase; Protease