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ORIGINAL ARTICLE

Chemical profile and antimicrobial activity of essential oil and methanol extract from peels of four *Durio zibethinus* L. varieties

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Abstract

Durio zibethinus L. (durian) belongs to the Malvaceae family. It is known as the "King of Tropical Fruit" because of its unique characteristics. The edible part of durian, however, is only about 33% of the fruit while the non-edible parts such as the seed and peels (rinds) are considered as fruit waste responsible for environmental pollution. Thus, the present study was carried out to compare the percentage yields and volatile components from methanol extract and essential oils of the peels of four varieties of durian (Raja Kunyit [D197], Hajah Hasmah [D168], Sultan [D24], and Golden Bun [D13]). The antimicrobial activity of all the extracts and their volatile chemical constituents were also evaluated. Cold maceration was used for the solvent (methanol) extraction. The essential oil extraction was carried out using hydro-distillation and solvent-free microwave extraction (SFME) methods. The antimicrobial activity was evaluated against selected microbes using the well diffusion method while the characterization of chemical constituents in the essential oils and crude methanolic extracts was carried out using gas chromatography-mass spectrometry (GC–MS). The highest yields of essential oils were obtained from D24 which were 0.030% and 0.014% from SFME and hydro-distillation extraction, respectively, while the highest and most significant ($p < 0.05$) yield of methanol extract (8.79%) was obtained from D197. From the GC–MS analysis, butanoic acid was the major compound in the essential oil of durian peels in the four varieties of durians evaluated. Besides butanoic acid, 1-tridecene, 1-pentadecene, and 1-heptadecene were also present in the four varieties. The D168 possesses strong activity against three bacteria (*Bacillus subtilis*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*). More novel extraction techniques, bioactivity assays, and characterization are, however, recommended to further explore the potential benefits of durian peels.

Keywords *Durio zibethinus* L. · Antimicrobial · Essential oil · Hydro-distillation · Solvent-free microwave extraction

Highlights
- The peels of *Durio zibethinus* L. (durian) can be bioconverted into an antimicrobial agent.
- D24 durian variety yields a high amount of essential oils.
- Butanoic acid is a major compound in the essential oil of durian peels.
- Solvent-free microwave extraction method is more attractive for essential oil extraction.

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1 Introduction

Durio zibethinus L. otherwise referred to as "durian" belongs to the Malvaceae family. Durian is believed to be a native fruit of Southeast Asia, mainly Malaysia, Indonesia, and Thailand. Durian is entitled "King of Tropical Fruit" because of its unique characteristics like a formidable thorn, strong odor, and large size [19, 21, 33]. In Malaysia, the Jabatan Pertanian (Ministry of Agriculture and Food Industries) had registered all the varieties of durian being cultivated since 1934 until date. The thirteen popular varieties commonly cultivated by most of the durian producers in Malaysia are Sultan (D24), Kop Kecil (D99), Chanee (D123), Berserah (D145), Kan Yau (D158), Mon Thong (D159), Hajjah Hasmah (D168) or known as IOI, Tok Litok (D169), Golden Bun (13), Udang Merah (D175), Malaysian

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