

Supercritical Carbon Dioxide Extraction of Fatty Acids Compositions from *Epiphyllum oxypetalum* (DC.) Haw. Leaves Oil

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In traditional medicine, *Epiphyllum oxypetalum* (*E. oxypetalum*) is used to treat and promote wound healing and general health management. Due to the drawbacks of conventional extraction methods, such as using toxic solvents, supercritical fluid extraction using carbon dioxide was proposed as a green extraction method for better results. This research aims to extract the *E. oxypetalum* leaves oil using supercritical fluid extraction with carbon dioxide as the solvent and to determine the fatty acids composition in the extract of *E. oxypetalum* leaves oil. The extract of *E. oxypetalum* leaves oil was obtained via supercritical fluid extraction using carbon dioxide due to non-toxic, lower temperature, non-flammable, economical, and readily available. To identify the ideal operating conditions, the extraction was carried out at different temperatures (40 and 60 °C) and pressures (20 and 30 MPa) for one hour. At a temperature of 40 °C and a pressure of 30 MPa, the maximum oil yield percentage (3.2 ± 0.20 %) was obtained. Gas chromatography mass spectrometry (GC-MS) analysis revealed that the extract *E. oxypetalum* leaves oil contained six fatty acids compounds which are oleic acid (30.70 mol %), *n*-hexadecanoic acid (18.43 mol %), linoelaidic acid (10.27 mol %), myristic acid (6.56 mol %), dodecanoic acid (3.99 mol %), and phytol (3.41 mol %). The fatty acids composition presented in the extract of *E. oxypetalum* leaves oil have shown possible to be useful for subsequent applications in health and industrial uses.

Keywords: *Epiphyllum oxypetalum*; bakawali; GC-MS; supercritical fluid extraction; fatty acids; carbon dioxide

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The Cactaceae family member *Epiphyllum oxypetalum* (DC.) Haw. (*E. oxypetalum*) is regarded as one of the best-known *Epiphyllum* species. Other names for it include Wijayakusuma, Queen of Night, Brahmakamal, Bakawali, and Dutchman's Pipe. *E. oxypetalum* is a tropical plant that is used traditionally for the treatment of wound healing and improving hydration of the skin [1–3]. Upendra et al. [4] reported that the nutritive values of the extract of *E. oxypetalum* leaves showed a significant presence of fatty acids (4.6 mg/g), proteins (14 mg/g), and vitamins (0.18 mg/g), when the absence of carbohydrates was discovered. According to reports in Upendra et al. [4] work, the steroids, glycosides, saponins, phenolic, tannins, terpenoids, and resins compounds were detected using the gas chromatography mass spectrometry (GC-MS) analysis in the extract of *E. oxypetalum* leaves. Meanwhile, Dandekar et al. [2] reported that the extract of *E. oxypetalum* leaves contained various types of phytochemical constituents, including megastigmatrienone, cycloocta-1,3,6-triene, 2,3,5,5,8,8-hexamethyl, 4-((1*e*)-3-hydroxy-1-propenyl)-2-methoxyphenol, 2,5-

dihydroxy-4-isopropyl-2,4,6-cycloheptatrien-1-one, stigmaterol, cholesta-22,24-dien-5-ol, 4,4-dimethyl, 22-stigmasten-3-one, heptacosane, 2-methyl-octadecane, 2-methyl-eicosane, hentriacontane, stig mast-4-en-3-one, testosterone cypionate, and hentriacontane. As reported, the majority of the phytochemical constituents present in the *E. oxypetalum* leaves were found to be steroids [2]. Mahmad et al. [3] also reported that the extract of *E. oxypetalum* leaves contained fatty acids (dodecanoic acid and *n*-hexadecanoic acid) and phenolic compounds (2-methoxy-4-vinylphenol and vanillyl alcohol). From the results, it could be concluded that the extract of *E. oxypetalum* leaves contains various bioactive compounds with various medicinal properties.

In addition, Dandekar et al. [5] studied the anti-inflammatory of the extract of *E. oxypetalum* leaves by using *in vitro* method, which included human red blood cell membrane stabilization and inhibition of protein denaturation method with albino Wistar rats. The percentage inhibition was seen