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GC-MS ANALYSIS OF SECONDARY METABOLITES OF SENGGANI LEAVES (*Melastoma malabatrichum* L.)

Mhd Yusuf Nasution[1*], Marlinda Nilan Sari Rangkuti [1], Nurbaity Situmorang[2], Fery Kurniawan[3]
[1]Program Studi Pendidikan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Medan, Indonesia
[2]Program Studi Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Medan, Indonesia
[3]Progam Studi Tadris Biologi, Fakultas Tarbiyah dan Ilmu Keguruan, Universitas Islam Negeri Syekh Ali Hasan Ahmad Addary Padang Sidempuan, Indonesia
* Corresponding author : mhdyusufnasution@yahoo.com

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ABSTRACT

Traditional medicinal plants have long been used and trusted by the community to treat various diseases. The senggani plant is useful for reducing fever (antispiretic), pain reliever (analgesic), urine laxative (diuretic), treating vaginal discharge (leukorrhea), and as a medicine for various types of wounds. This research was conducted using extracts of *Melastoma malabatricum* (L.) leaves extracted using methanol as a solvent. GC-MS analysis of secondary metabolites of senggani leaves (*Melastoma malabatrichum* L.) was carried out as a first step to determine the content of active secondary metabolite compounds contained in senggani leaves. The results of this study show that 8 peaks were observed during maximum run time of 40 min. The results revealed that, compounds such as 3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4-methylimidazolium, Melezitose, Thiosulfuric acid, Neophytadiene, 9-Icosyne, Phytol, Hexadecanoic acid dan 9-Octadecenoic acid (Z) were present in the methanolic extract of *Melastoma malabatrichum* (L.) which can mostly contribute to several therapeutic activities such as antimicrobial.
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Introduction

Traditional medicinal plants have long been used and trusted by the community to treat various diseases. The use of natural ingredients as medicine has been carried out for generations because it has been proven to have potential as medicine. Medicinal plants are a source of natural exogenous antioxidants (Fransiska *et al*., 2023). Indonesia is one of the countries that rich with various types of plants, this is supported by fertile soil conditions and a suitable climate. Many of these plants can be used as one of the active substances in medicine, which is commonly known as traditional medicine. The use of traditional medicine has begun to be widely used with the aim of saving increasingly expensive medical costs and utilizing the potential of Indonesia's very diverse natural resources.

The senggani plant is useful for reducing fever (antispiretic), pain reliever

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(analgesic), urine laxative (diuretic), treating vaginal discharge (leukorrhea), and as a medicine for various types of wounds (Nurhayat *et al*., 2020). This plant has medicinal properties that are actually believed by the community and are used to treat various infectious diseases including diarrhea. Other benefits that come from this tropical plant are antibacterial, antihypertensive (Septiana et al, 2023), anti-inflammatory (Khairani, 2021).

GC-MS analysis is a phytochemical screening method or a way of analyzing the content of bioactive compounds found in plants being studied, either as a whole or in parts (Harahap & Situmorang, 2021). Phytochemical screening of simplicia powder and samples in wet form includes examination of the content of alkaloids, flavonoids, terpenoids/steroids, tannins and saponins according to procedures that have been carried out (Minarno, 2015).

Based on several previous studies, the results of phytochemical screening of this plant showed that the ethanol extract of senggani leaves contains alkaloids, saponins, tannins, and flavonoids. The role of these active compounds is that they have medicinal properties as anticancer, antioxidant and antibacterial (Kusumowati *et al*., 2014).

Melastoma malabathricum (L.) or senggani is a medicinal plant that has been used as an antibacterial because all parts of the organs in this plant can be used, the fruit of this plant is also reported to contain polyphenols, because the color of the fruit is pitch black and its taste is bitter. The part of the senggani plant that is widely used by the local community is the leaves (Mudaffar, 2022).

Therefore, in this study, GC-MS analysis of secondary metabolites of senggani leaves (*Melastoma malabatrichum* L.) was carried out as a first step to determine the content of active secondary metabolite compounds contained in senggani leaves.

Materials and Methods

Sample Preparation

The sample used was 10 kg of Senggani (*Melastoma melabathricum* L.) leaves. Senggani leaves were taken by picking bright green leaves from sequence number 3 from the leaf tip to sequence number 7. The secondary metabolite content in young plants is higher than in old plants. The collected senggani leaves were washed with running water until clean and then air-dried in a room that was not exposed to direct sunlight for ±3 days, then dried using an oven at a temperature of 50°C for 1x24 hours. The sample was then ground using a blender until it formed dry leaf powder.

Preparation of *Melastoma malabathricum* L. Leaf Extract.

200 grams of fine powder was soaked in two liters of 96% ethanol solvent with a solvent ratio of 1:10 (w/v). The maceration process was carried out 2 repetitions. In the first maceration, it was soaked for 3 days and stirred every 1x24 hours. After 3 days, the soaking was filtered using a Bunchner to obtain filtrate and residue and collected in different containers. After that, the filtrate obtained was concentrated using a rotary vacuum evaporator at a temperature of 40°C to obtain a thick extract.

Secondary Metabolite Compound Test

The secondary metabolite compound test was carried out on a qualitative scale using color reagents to determine metabolite compounds in the form of alkaloids, saponins, flavonoids, steroids and tannins and continued with the GC-MS Gas Test.

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Results and Discussion

Based on the results of GC-MS analysis, data on active compounds classified as secondary metabolite compounds contained in *Melastoma malabatrichum* (L.) samples were obtained. The results of GC-MS analysis of ethanol extract of *Melastoma malabatrichum* (L.) are shown in the chromatogram in Figure 1.

Figure 1. GC-MS chromatogram of *Melastoma malabatrichum* (L.) leaves

From the GC-MS chromatogram results, 8 identified compounds were obtained as presented in Table 1.

Table 1. Phytochemical compounds of *Melastoma mabatrichum* (L.) leaves using GC-MS analysis

RT	% Area	Name	DB Formula
4436	31,18	3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4-methylimidazolium	C24H45N2O3
7687	64,63	Thiosulfuric acid	C2H7NO3S2
7834	**72,58**	**Melezitose**	**C18H32O16**
10402	**97,57**	**Neophytadiene**	**C20H38**
10568	28,36	9-Icosyne	C20H38
10697	47,46	Phytol	C20H40O
11233	**33,72**	**Hexadecanoic acid**	**C16H32O2**
23849	70,86	9-Octadecenoic acid	C18H34O2

GC-MS analysis revealed the presence of bioactive compounds in the methanolic extract of *Melastoma malabatrichum* (L.) leaves. A total of 8 peaks were observed during maximum run time of 40 min. The results revealed that, compounds such as 3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl) -4-methylimidazolium, Melezitose, Thiosulfuric acid, Neophytadiene, 9-Icosyne, Phytol, Hexadecanoic acid dan 9-Octadecenoic acid (Z) were present in the methanolic extract of *Melastoma malabatrichum* (L.) as shown in Table 1.

The three peaks with a maximum area of intensity of 97.57%, 72.58% and 33.72% in the GC-MS analysis corresponds to Neophytadiene, Melezitose and Hexadecanoic acid respectively (Fig. 1).

Neophytadiene is classified as a diterpenoid compound which present in many plants and marine algae. Hasheem *et al*, (2019) reported that Neophytadiene was found in *Aeschynomene*genus plants showed hepatoprotective, cytotoxic,

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antimicrobial, antioxidant and anti-inflammatory activities.

Melezitose is a type of sugar that belongs to the group of oligosaccharides, specifically a trisaccharide: α-d-glucopyranosyl-(1->3)-β-d-fructo-furanosyl-(2->1)-α-d-glucopyranoside. It pertains to the turanose disaccharide. The molecule formula of melezitose is $C_{18}H_{32}O_{16}$, and it is classified as a non-reducing sugar because it does not possess a free aldehyde or ketone functional group (Behera & Balaji 2021). Surprisingly, research shows that melezitose has anti-infectivity and anti-cancer therapeutics Ghazarian & Oppenheimer (2014). A study by Zhou *et al.* (2024) findings unequivocally show that melezitose has a therapeutic impact on lung cancer in an *in vitro* experiment.

Hexadecanoic acid is a group of fatty acid compounds that have biological properties as anti-oxidant, anti-bacterial and anti-fungal. The *n*-hexadecanoic acid showed that moderate antibacterial activity against *S. aureus*, *B. subtilis*, *E. coli*, and *K. pneumoniae* was 7.96 ± 0.05 mm, 10.96 ± 0.15 mm, 11.10 ± 0.17 mm, and 11.93 ± 0.11 mm at the maximum concentration of 50 µg/ml. Hence, the good biological activity of the *n*-hexadecanoic acid from *I. eriocarpa* could be used as a natural antioxidant and antibacterial agent in the future pharmaceutical industry (Ganesan *et al.*, 2022)

These reveals the presence bioactive functional groups are present in the methanolic extract of *Melastoma malabatrichum* (L.) and it requires further detailed investigation.

Conclusions

Based on the results of the study, it can be concluded that *Melastoma malabatrichum* (L. leaves contain several bioactive compounds. A total of 8 peaks were observed during maximum run time of 40 min. The results revealed that, compounds such as 3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4-methylimidazolium, Melezitose, Thiosulfuric acid, Neophytadiene, 9-Icosyne, Phytol, Hexadecanoic acid dan 9-Octadecenoic acid (Z) were present in the methanolic extract of *Melastoma malabatrichum* (L.) which can mostly contribute to several therapeutic activities such as antimicrobial. However, isolation of individual phytochemical constituent and further study of its biological activity will give more fruitful results. Hence, further research is necessary to identify and purify the active compounds responsible for the antimicrobial activity..

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