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ANALYSIS OF SECONDARY METBAOLITE CONTENT OF ETHANOL EXTRACT OF BIDEN PILOSA L. LEAVES WHICH HAS THE POTENTIAL AS AN ANTIBACTERIAL

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ABSTRACT

The potential of plants as an alternative medicine is a great gift. This potential can be explored through various preliminary tests. One of the preliminary tests is to analyze the content of secondary metabolite compounds using GC-MS. One of the plants known to have potential is Biden Pilosa L. The results of the GC-MS analysis showed that there were 9 compounds identified as having antimicrobial properties. This was discovered after analyzing the compound content and continuing with a literature review. The conclusion obtained was that there were 9 compounds in the ethanol extract of Biden Pilosa L leaves that functioned as antimicrobials.

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Introduction

As one of the countries with a high level of biodiversity, Indonesia has a very large diversity of plants. The very large diversity of plants has the potential as food, medicine, and antibacterial (Yulisma, 2023). The use of herbal plants among the community has been widely applied in the world, including Indonesia. The use of plants as an alternative treatment for a disease has become an important source of health care for most of the population because it has chemical compounds that can inhibit the growth of a disease and tends to have lower side effects on sufferers (World Health Organization, 2019).

One of the plants used by the community as herbal medicine is Bidens pilosa L. leaves. The use of these leaves is traditionally used as an alternative medicine to cure various diseases and heal wound infections. Bidens pilosa L. contains secondary metabolite compounds including tannins, saponins, alkaloids, bitter substances, tannins, and essential oils,terpenoids, phenols, phenylpropanoids, flavonoid glycosides, fats and benzos. Secondary metabolite compounds found in a plant can be used as antibacterials (Seko et al., 2021). In traditional medicine, B. pilosa is used to treat various diseases

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including anti-inflammatory (Wahyuddin et al., 2023), diabetes (Kuo et al., 2021), inflammation, hypertension (Lee et al., 2017), colorectal cancer, immune modulation, antibacterial. Various types of preparations, extracts and single compounds contained in BP have biological and pharmacological activities such as anti-malarial, anti-allergic, anti-hypertensive and smooth muscle relaxant, anti-cancerogenic, anti-diabetic, anti-inflammatory, anti-microbial, antioxidant.

Based on research conducted by Seran et al., (2021) on the antibacterial activity of ethanol extract of ketul leaves, it was reported that ketul leaf extract has antibacterial properties against Escherichia coli and Staphylococcus aureus bacteria (Seran et al., 2021). In a study conducted by Seko et al., (2021) on the antibacterial activity of ethanol extract of ketul leaves against Staphylococcus aureus bacteria, it was reported that ketul leaf extract does not yet have effective inhibitory power in inhibiting the growth of Staphylococcus aureus bacteria (Seko et al., 2021).

Based on the background above, and the enormous potential related to the utilization of these leaves, further studies are needed on the analysis of compounds from the ethanol extract of Biden Pilosa L. leaves as an antibacterial pathogen.

Materials and Methods

Bidens pilosa L. leaves were obtained from Sipirok, South Tapanuli. Bidens pilosa L. ketul leaf samples were taken by picking fresh green leaves that were not rotten. Ketul leaves were taken from the order number 3 from the leaf tip to the order number 10, this is because leaf number 3 from the tip is physiologically mature so that it has maximum secondary metabolite content (Manguntungi et al., 2017). Leaves with the same size and color and the same color indicate leaves that have maximum age and level of development (Widiastuti, 2016). The collected Biden pilosa L. leaves were then washed in running water until clean and then air-dried in a room that was not exposed to direct sunlight for ±3 days (Luliana et al., 2016). Biden pilosa L. leaves were then dried using an oven at a temperature of 50°C for 24 hours until dry. Samples that have dried are marked with leaves that can be crushed. The sample was then powdered or ground using a blender.

Preparation of Biden pilosa L. Leaf Extract 300 grams of Bidens pilosa leaf powder was macerated with 900 ml of ethanol solvent p.a. with a solvent ratio of 1: 3 (w/v). The sample was homogenized in a closed container for 3 days with occasional stirring. The liquid extract was then filtered with Whatman No. 1 filter paper, the dregs were re-macerated with the same solvent and ratio for 1 day. All maceration filtrates were combined and evaporated with a rotary vacuum evaporator until they became a thick extract using a temperature of 40°C. The extract obtained was stored in a refrigerator at a temperature of 4°C (Handayany, 2016). Then continued with GC-MS

Results and Discussion

Identification of compounds of ethanol extract of Biden Pilosa L. leaves using the GC-MS method. Based on the test results, various compounds were obtained which

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were then analyzed using a database to see compounds that have the potential to be antibacterial.

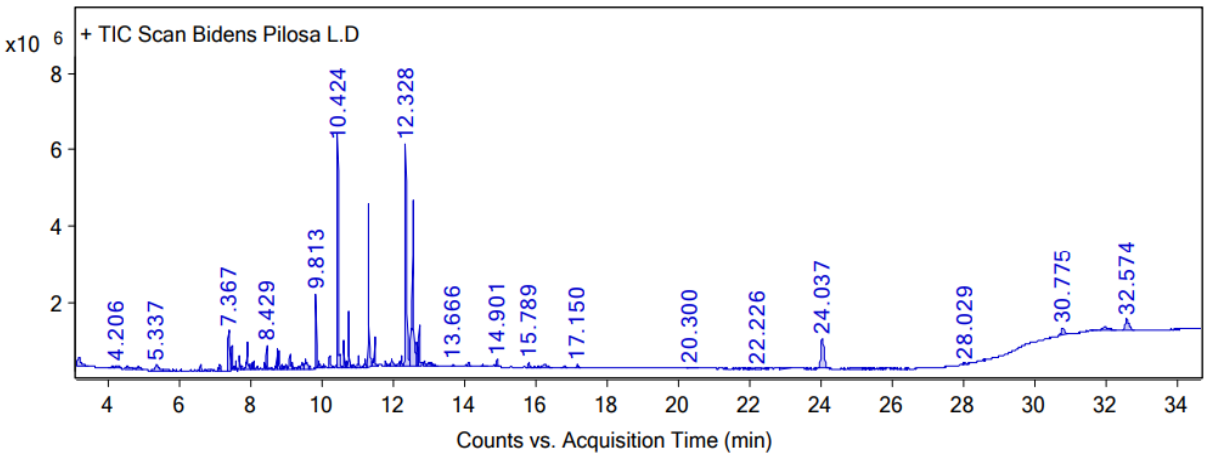

Figure 1. GCMS ethanolic extract of Biden Pilosa L.

Table 1. List of compounds from GC-MS results of ethanol extract of Biden pilosa L. leaves that have the potential as antimicrobials

No	Compound	RT	Molecule	Bioaktovity
1	3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4-methylimidazolium ion	3.156	C24H45N2O3	Antimicroba (Subavathy and Thilaga 2016; Suradkar, 2020)
2	trans-Z-.alpha.-Bisabolene epoxide	6.583	C15H24O	Antioksidan, Antimicroba (Ghavam, 2024)
3	Thiosulfuric acid (H2S2O3), S-(2-aminoethyl) ester	6.698	C2H7NO3S2	Antibateria, Anticancer (Baliou, 2021)
4	9,12,15-Octadecatrienoic acid, 2,3-bis(acetyloxy)propyl ester, (Z,Z,Z)-	6.814	C25H40O6	Antimicroba (Kumari, 2020)
5	9-Octadecenoic acid (Z)-	6.871	C18H34O2	Anti microbial, Anti oxidant (Ghavam, 2021)
6	NEROLIDOL-EPOXYACETATE	7.113	C17H28O4	Antibacteria (Sowndhariya, 2022)
7	.beta.-ylangene	7.367	C15H24	Antioksidan (Ahmad, 2023)
8	2,6,10-Dodecatrien-1-ol, 3,7,11-trimethyl-	7.563	C15H26O	Antiseptik, Antimikroba (Delmondes GDA, 2020; Wu, 2021)
9	Bicyclo[7.2.0]undec-4-ene, 4,11,11-trimethyl-8-methylene-, (E)-(1R,9S)-(-)-	7.667	C15H24	Antiinflamasi, analgesic (Asiwe, 2023)

Based on the results of GCMS that have been carried out, it appears that there are compounds that have the potential to be antimicrobials. Antibacterial is an alternative technique used to inhibit and prevent bacterial growth. In general, antibacterial content is found in an organism as a secondary metabolite compound. The way antibacterial works from each secondary metabolite compound varies, namely: (1) The content of secondary metabolites inhibits bacterial

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growth starting with the stage of destroying the synthesis of cell wall formation by denaturing the cell proteins in the bacterial cell wall (Hidayah et al., 2018). 2) Inhibiting the permeability structure of the outer layer of bacterial cells. Antibacterial compounds can increase the permeability of the layers of each bacterial cell, resulting in cell destruction. Damaged bacterial cell permeability will cause cells to be unable to carry out life activities, as a result bacterial growth will be inhibited and cause bacteria to die. 3) Damaging the components of nucleic acid synthesis and cell proteins, these components play a very important role in the process of the sustainability of a cell's life. This shows that any obstacles in the structure of bacterial life functions can cause cell damage. 4) Inhibiting microbial cell metabolism, this component will damage the cell metabolism system and can result in cell death (Lingga et al., 2015).

Conclusions

Based on the GCMS test results of the ethanol extract of Biden Pilosa L. leaves, 9 compounds were found that have antimicrobial potential, namely 3-Hexadecyloxycarbonyl-5-(2-hydroxyethyl)-4-methylimidazolium ion, trans-Z-.alpha.-Bisabolene epoxide, Thiosulfuric acid (H2S2O3), S-(2- aminoethyl) ester, 9,12,15-Octadecatrienoic acid, 2,3-bis(acetyloxy)propyl ester, (Z,Z,Z)-, 9-Octadecenoic acid (Z)-, NEROLIDOL-EPOXYACETATE, .beta.-ylangene, 2,6,10-Dodecatrien-1-ol, 3,7,11- trimethyl-, Bicyclo[7.2.0]undec-4-ene, 4,11,11-trimethyl -8-methylene-, (E)-(1R,9S)-(-)-. All of these compounds are known to have antimicrobial properties.

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