GAS CHROMATOGRAPHY–MASS SPECTROMETRY ANALYSIS OF BIOACTIVE COMPOUNDS IN ESSENTIAL OILS OF LEAF OF *EUODIA SUAVEOLENS* SCHEFF

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ABSTRACT
This research aimed to reveal and determine the chemical constituents of essential oils from the leaf of *E. suaveolens*. Essential oils of leaf of *E. suaveolens* were extracted by steam distillation and were analyzed utilizing Gas Chromatography-Mass Spectrometry (GC-MS) methods. The GC-MS analysis revealed the presence of twenty-five different chemical constituents from the essential oils. The main chemical constituents of essential oils extracted from *E. suaveolens*' leaves were as follows menthofuran (50.38 %), p-mentha-1,8-diene (14.34 %), limonen (10.99 %), evodone (5.55 %), α-curcumene (4.65 %), globulol (1.88 %), longipinenepoxide (1.66 %), and linalool (1.40 %). This present research found three compounds, namely p-mentha-1,8-diene, globulol, and longipinenepoxide that have never been reported by any researchers working with this plant. The results showed that *E. suaveolens* contains essential oils that are potential to be explored further and utilized as medicinal products against some ailments.

Keywords: GC-MS analysis, *Euodia suaveolens*, Bioactive compounds, Essential oils

INTRODUCTION
Indonesia has huge plant biodiversity that have been utilized by their ancestor in their daily life activities. Many plant species have become the source of medicinal herbs and one of it is *Euodia suaveolens* Scheff., which is synonym with *Euodia hortensis* Forst.). The plant is originally growth in the West Papua and its vicinities such as Papua New Guinea, Samoa, Tonga, and Niue.[1,2]
Research on essential oils has been increasingly done by many researchers, since the chemical constituents in the essential oils showed important aspects to human life.[3,4] However, published data on the chemical constituents of the essential oils from the leaf of *E. suaveolens* are dearth. Therefore, this research aimed to reveal the chemical constituents of the essential oils from the leaf of *Euodia suaveolens* and to determine their potencies as pharmaceutical resources.

Experimental procedures
Fresh *E. suaveolens* leaves sample were collected, washed thoroughly, decanted to reduce the water, and put into distillation apparatus and were steamed for four hours to extract its essential oils. Ten kg of the leaf sample was put into a biomass holding chamber of the distillation unit.[4,5]
The essential oils were then analyzed utilizing GCMS-QP2010S Shimadzu (Shimadzu Ltd., Japan). The chemical constituents of the essential oil were identified by comparing the results of the chromatogram and retention time reference from Wiley mass spectra library (Wiley229. LIB).[6,7]

RESULTS & DISCUSSION
GC-MS analysis found 25 chemical constituents from the essential oils sample examined (Figure 1). Some of the chemical constituents identified were reported by earlier researchers to have bioactive applications such as antibacterial, antifungal, antitumor, anticancer, anti-inflammatory, etc. The chemical constituents revealed were also found in the essential oils of *Euodia sauveolens* in some researchs, but with some degree of differences (Table 1). Menthofuran has the highest percentage area and similar findings were reported by some researchers.[8,9] Other chemical constituents that were revealed by some researchers were limonen, evodone, α-curcumene, and linalool (Figure 1).[1,9] This present research found three compounds namely p-mentha-1,8-diene, globulol, and longipinenepoxide that have never been reported by any researchers working with this plant. Further research on these three compounds will be interesting to be done, specifically to determine their bioactivities in health care applications.

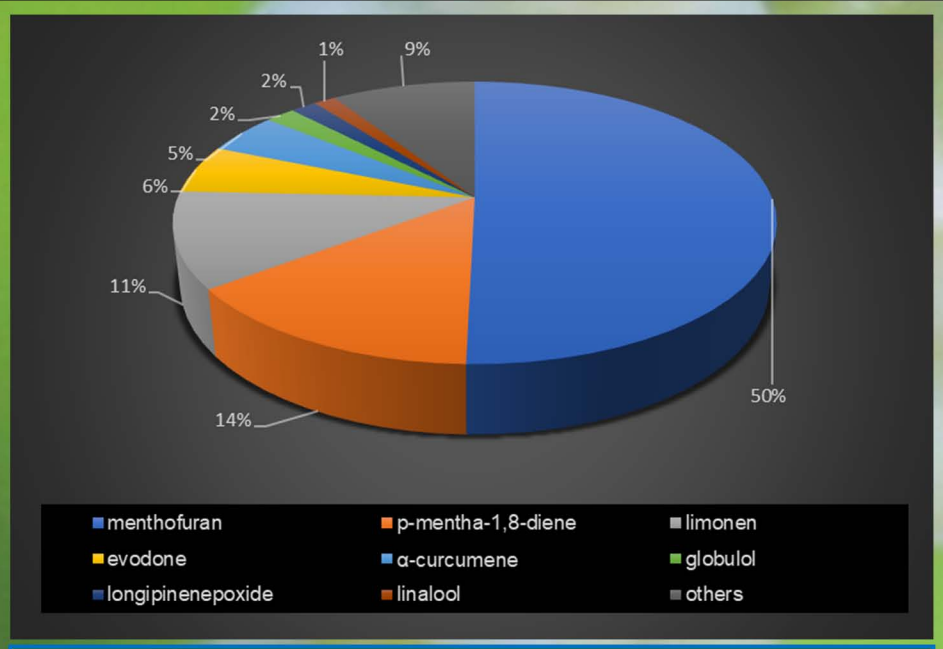

Figure 2. Main chemical constituents of essential oils extracted from *E. suaveolens*' leaves

Table 1. Comparison of chemical constituents of essential oils extracted from *E. suaveolens'* leaves

No.	Compound Name	Method, Plant, Country	Researcher(s)
1.	menthofuran, evodone (4-ketomenthofuran), limonene	steam distillation, GLC analyzed, *E. hortensis*, Fiji	[9]
2.	prenilated acetophenon, monoterpene furano (evodone), caryophyllene, α-copaen, ar-curcumene	method not mentioned, *E. hortensis*, Papua New Guinea	[1]
3.	evodone, menthofuran, limonene, curcumene, fonenol	steam distillation, GC-MS analyzed, *E. suaveolens*, Indonesia	[4]
4.	limonene	Ethanol maceration and hydrodistillation, *E. suaveolens*, Indonesia	[5]
5.	menthofuran, evodone, linalool, citronellol, α-(2) gurjunene	hydrodistillation, GCMS analyzed, *E. hortensis*, Fiji	[8]
6.	linalool	steam distillation and TLC analyzed, *E. suaveolens*, Indonesia	[6]
7.	menthofuran, p-mentha-1,8-diene, limonen, evodone, α-curcumene, globulol, longipinenepoxide, linalool	steam distillation, GCMS analyzed, *E. suaveolens*, Indonesia	**Sidharta and Atmodjo (this research)**

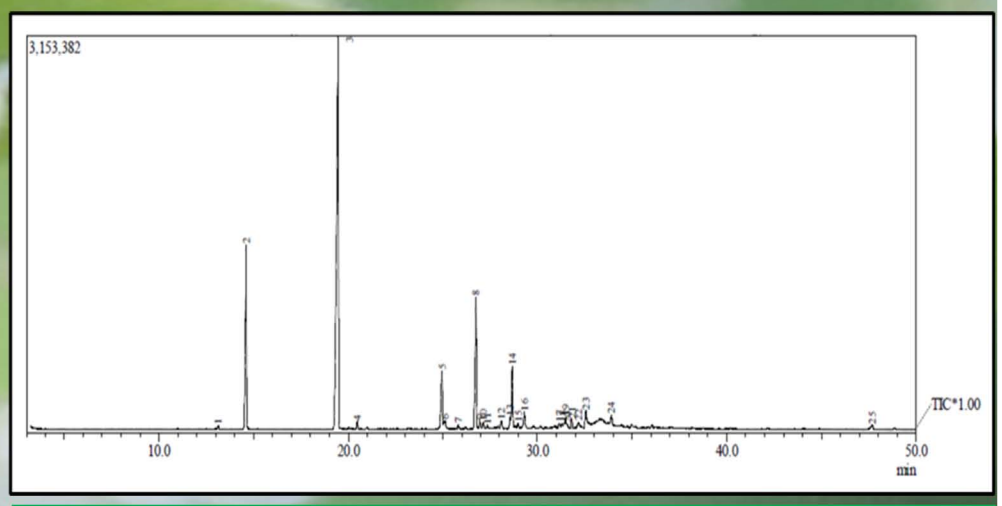

Figure 1. Chromatogram profile of the essential oils extracted from the leaf of *E. suaveolens*

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