Chemical Components of Essential Oils of the Leaves of *Hyptis suaveolens* (L.) Poit. from Indonesia

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Abstract

Hyptis suaveolens is one of plant species in family of Lamiaceae (Labiatae) which is aromatic plant. Chemical components of the essensial oils produced from *H.suaveolen* are various, depending on geographical position. Essential oils from this plant can be obtained by hydrodistillation method and analysed by *gas chromatography-mass spectrometry* (GC-MS). The investigation of the produced essential oil showed detection of fifty component. The major components of essential oils were β-caryophyllene (34.65%), germacrene-D (10.32%), α-bergamotene (6.56%) rimuene (6.46%) and α-copaene (5.94%).

Keywords : *Hyptis suaveolens*, essential oil, β- caryophyllene, germacrene-D, rimuene

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Introduction

Family of Labiatae is also known as Lamiaceae or mint family which covers important horticultural crops having economical value. Most of this family are known as herbaceous, bushes and rarely found as trees or climber. The family is more widely known for its essential

oils, imparting aroma or flavor to whatever they combined with. Many species have culinary uses, or are used as fumigants or in domestic medicine. Some species are known as ornamental plants (Steentoef, 2004; Pistelli, 2006; Simpson, 2006 and Singh, 2010). This family consists of 6.990 species and 264 genus distributed worldwide and are mostly found in mediteranian (Keng, 1969 and Singh, 2010). Morphological characters of this family are various. The leaves often hairy which are derivative of epidermal and are also known as trichomes (Pistelli, 2006). Trichomes with glandular usually produce essential oils (Sharma, *et al*., 2007). Essential oils secreted by glandular trichomes can protect the plants from insects infestation, herbivores and pathogens (Werker, *et al.*, 1993). *Hyptis suaveolens* (L.) Poit. is one of species in family of Labiatae, having branches, aromatic herb, usully woody at the base, height 0,4-2 m, hairy stems and leaves, leaves small, oval in outline, tip broadly pointed (Henderson, 1959; Backer and Brink, 1965).

Essential oils from *H.suaveolen* can inhibit the growth of *Saccharomyces cerevisiae, Fusarium moniliforme and Mucor* sp. (Malele, *et al*., 2003), *Aspergillus plavus* and *A.ochraceus* (Sharma, *et al*., 2007; Moreira, *et al*., 2010), *A.niger* (Mandal, *et al*., 2007; Sharma, et al., Mbatchou, et al., 2010 and Moreira, et al., 2010), *A. parasiticus* and *A. fumigatus* (Moreira, et al., 2010), *Candida albicans, Cryptococcus* and *Fusarium* (Mbatchou, *et al*., 2010), *Micrococcus luteus* (Mandal, *et al*., 2007), *Fusarium oxysporum* f.sp. *gladioli* (Tripathi and Upadhyay, 2009). In addition, essential oils can also be used as insect repellant for *Callosobruhus maculates, Rhyzopertha dominica, Sitophilus oryzae dan Tribolium castaneum* (Tripathi and Upadhyay, 2009), *Aedes aegipty, Anopheles stephensi and Culex quinquefasciatus* (Arivoli and Tennyson, 2011).

Composition of the major components in essensial oils produced from *H.suaveolen* are various, depending on geographical position of the plant growing areas (Van Hac 1996; Malele, *et al*., 2003). *H.suaveolens* is a chemotype, because there are differences in components and composition of its essential oils from several results of researches conducted in several different areas and countries (Malele, *et al*., 2003) . In India, the major components of essential oils from *H. suaveolens* were 1,8-cineole (44.4%), β-caryophyllene , β-pinene and camphene (Sharma, *et al*., 2007). Another sample from India was analysed by Tripathi and Upadhyay (2009), they reported the major components of which were sabinene (41.0%), terpinen-4-ol (12.31%), β-pinene (10.0%) and β-caryophyllene (8.0%). In Malaysia, Din, *et al*., (1988) reported β-caryophyllen, 1,8-cineole, terpinen-4-o1, α-bergamotene,

sabinene and α-copaene were the major components of the essential oil from *H. suaveolens*. Van Hac, *et al*., (1996) investigated chemical composition of that essential oil from Vietnam. The main constituent identified were eugenol and germacrene-D. Peerzada (1997) studied the constituent of *H.suaveolens* essential oil from Australia. They reported 8-cineole (32%) and β-caryophyllene (29%) as the major constituent in the oil.

Till now, there is no record of the chemical component of the essential oil of these plant in Indonesia, although several studies were carried-out to investigate the chemical composition of *H. suaveolens* (L.) Poit.

Materials and Methods

Plant material

Young fresh leaves of *H.suaveolens* were collected in February 2013 in Air Tawar Utara, Padang, West Sumatera, Indonesia. The leaves were hydrodistilated with Clevenger-type apparatus for 2 hours to obtain the essential oil.

Analysis of essential oils

Analysis of the essential oils were conducted using GC-MS ULTRA SHIMADZU with colom DB-5 MS, (30 m x 0,25 mm). The column temperature was started at 60 C (2 min) then it was elevated to 230 C at rate of 3 C/min. Samples (0,5 µl) were injected with split ratio 1:20. Detector type was MS with injector temperature 250 C. Carrier gas was Helium (He) with flow rate 125 ml/min and 230 kPa in pressure. The identification was done on the basis of Retention Time (RT). Every peak appeared in chromatogram had different retention time. Components were identified by comparing data with WILEY7 and NIST27 library.

Results and Discussions

The chemical composition of *H.suaveolens* leaf essential oils was investigated by gas chromatography-mass spectrometry (GC-MS) and was summarized in Table 1. Total components in the essential oil of these plant were 50 components. The major components were β-caryophyllene (34.65%), α-bergamotene (6.56%), germacrene-D (10.32%), rimuene

(6.46%) and α-copaene (5.94%). One of the major components was β-caryophillene, the same as major component of essential oils of *H.suaveolens* were found in India (Mandal, *et al*., 2007 and Sharma, *et al*., 2007), in Malaysia (Din, *et al*., 1988) and in Australia (Peerzada, 1997), germarene-D was also found in Vietnam (Van Hac, *et al*., 1996), and then, α-copaene was also found in Malaysia (Din, *et al*. 1988), whereas rimuene not found in other countries. In Northern Thailand, α-bergamotene was also found (Tachakittirungrod and Chowwanapoonpohn, 2007), but there was not major components.

Table 1. Chemical Components of Essential Oil of the Leaves of *H.suaveoelens*

No.	RT	Components	Area%
1.	5.335	α-pinene	0.12
2.	6.343	Sabinene	1.39
3.	6.449	β-pinene	0.31
4.	7.314	α-phellandrene	0.87
5.	7.638	Benzenacetaldehid	0.06
6.	7.736	α-terpinene	0.08
7.	7.827	P-cymene	0.15
8.	8.094	1,8 cineole	4.02
9.	8.173	D-limonen	0.35
10.	9.211	γ-terpineol	0.24
11.	9.811	Fenchone	1.17
12.	10.350	α-terpinolene	0.08
13.	10.638	L-linalool	0.07
14.	11.816	Camphor	0.05
15.	13.691	Terpinen-4-ol	0.98
16.	21.940	α-cubenene	1.01
17.	23.057	α-copaene	**5.94**
18.	23.302	β-bourbonene	0.90
19.	23.544	β-cubenene	0.47
20.	23.635	β-elemene	1.62
21.	24.864	β-caryophyllene	**34.65**

22.	25.130	γ-cadinene	0.21
23.	25.663	α-bergamotene	**6.56**
24.	26.095	α-homulene	2.28
25.	26.375	alloaromadendrene	1.03
26.	26.475	β-farnesene	0.16
27.	27.249	Germacrene-D	**10.32**
28.	27.395	β-selinene	1.57
29.	27.537	Epi-bicyclosesquiphellandrene	0.18
30.	27.681	zingiberenol	0.22
31.	27.814	α-selinene	1.59
32.	28.035	α-muurolene	0.20
33.	28.140	Germacrene A	1.06
34.	28.479	Torreyol	0.63
35.	28.932	Cadinene	1.23
36.	30.811	Caryophyllene oxide	0.65
37.	32.056	Juniper camphor	0.21
38.	33.152	Calarene	0.40
39.	33.505	Globulol	1.03
40.	35.200	Bergamotol	1.13
41.	39.526	α-phellandrene	0.27
42.	45.657	Benzene	0.23
43.	46.484	Rimuene	**6.46**
44.	47.355	phenanthrene	0.74
45.	48.029	Kaurene	0.76
46.	48.470	Thumbergol	1.61
47.	51.125	podocarpene	0.08
48.	54.561	Retinol accetate	1.12
49.	54.960	Cholest-14-en-3-ol	4.10
50.	55.824	4-epidehydroabietol	0.34
Total			100.00

Percentage of major components of essential oils of the leaves of *H. suaveolens* was shown in Fig. 1.

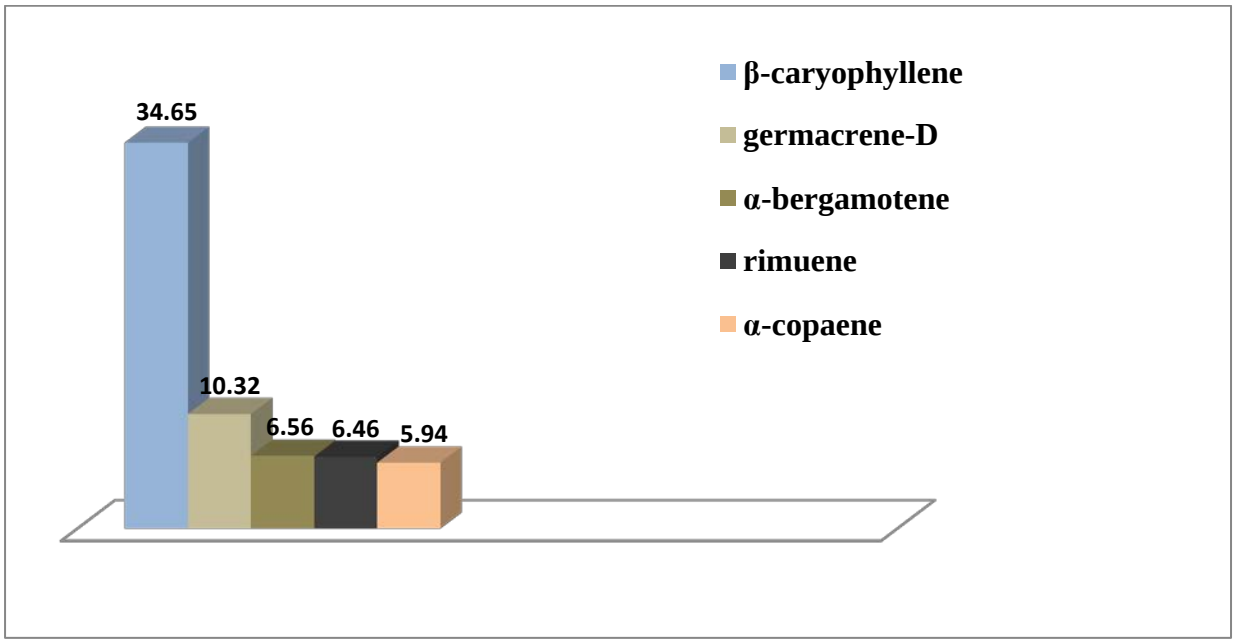

Figure 1. Percentage of Major Components of the Leaves Essential Oils of *H.suaveolens.*

Conclusion

Total components of essential oil from leaves of *H. suaveolens* were fifty components. The major components were β-caryophyllene (34.65%), germacrene-D (10.32%), α-bergamotene (6.56%) rimuene (6.46%) and α-copaene **(**5.94%).

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