

Composition of the Steam Volatile Oil from *Hyptis suaveolens* Poit

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Key words: *Hyptis suaveolens*; essential oil; β -caryophyllene.

ABSTRAK

Minyak pati hasil persulingan wap dari bahagian atas tumbuhan *Hyptis suaveolens* telah dikaji dengan gabungan KG - SJ. Daripada 70 komponen yang dikesan, 38 komponen yang membentuk kira-kira 86% daripada jumlah minyak tersebut telah dicamkan. β -Kariofilena wujud dalam jumlah 41% dan komponen utama yang lain ialah 1,8-sineol, terpinen-4-ol, α -bergamotena, sabinena dan α -kopaena. Kandungan kimia minyak ini berbeza daripada yang dilaporkan untuk minyak *H. suaveolens* dari Amerika Selatan.

ABSTRACT

The steam volatile oil from the aerial parts of *Hyptis suaveolens* has been examined by combined GC-MS. Of the 70 components detected, 38 have been identified accounting for approximately 86% of the oil. β -Caryophyllene was present to 41% and 1,8-cincol, terpinen-4-ol, α -bergamotene, sabinene and α -copaene were the other major components. This oil appears to be chemically distinct from the one reported from *H. suaveolens* collected in South America.

INTRODUCTION

Hyptis suaveolens, Poit (Labiatae) occurs widely throughout Peninsular Malaysia, especially in the sandy areas resulting from tin-mining operations. Although the plant is commonly regarded as a weed, it finds extensive use in traditional folk medicine practised with a variety of effects attributed to it (Burkill, 1966). For example, a decoction of leaves is used to stimulate muscle contraction and the crushed leaves are used for fever and headache. The plant is also reported to be an effective treatment for catarrh, as a stimulant for the secretion of milk and useful as a poulticing agent for skin. In addition, the leaves have been used for food flavouring and as an adulterant for patchouli oil.

H. suaveolens has been the subject of some previous chemical work. In the past efforts have been directed towards the non-volatile components, and a number of di- and triterpenoids (Manchand *et al.*, 1973, 1974; Misra *et al.* 1983) and steroids (Saluja *et al.* 1981) have been identified. Some work has also appeared on the essential oil from this species, largely on plant material collected from South America. However, substantial differences in composition have been noted.

As part of our continuing interest in the chemotaxonomy of the medicinally important flora of the Malayan peninsula we present results obtained from the examination of the essential oil extracted from this species.

MATERIALS AND METHODS

H. suaveolens (Labiatae) was collected from Batu Gajah in Perak on the west coast of Peninsular Malaysia. A voucher specimen has been deposited at the Herbarium in the Department of Botany at Universiti Kebangsaan Malaysia.

A sample of the air dried aerial parts of the plant (500g) was steam distilled in an all-glass Dean and Stark apparatus modified to give lower phase return, to give a mobile pale yellow oil (1.9g, 0.38%, RI = 1.4895 at 29°C, ρ = 0.9732 at 29°C, α = -1.45°).

The oil was examined by GC-MS using a Shimadzu GC6-AMP gas chromatograph fitted with an FFAP-coated SCOT column (85m x 0.5 mm) coupled to an AEI MS12 mass spectrometer through an all glass straight split. Helium was used as the carrier gas. The gas chromatograph was programmed from 65° to 230° at 3° per minute with the m.s. operating at 70 eV and with an ion source temperature of 170°. Spectra were acquired and processed by a V.G. Digispec Display data system which produced standard bar graphs. Identifications were made by g.l.c. analysis with either co-injection with authentic materials or by GC-MS analysis. Mass spectra were compared directly with those from authentic materials or from published data (Stanhagen *et al.*, 1974; Heller and Milne, 1978, 1980, 1983).

RESULTS AND DISCUSSION

Steam distillation of the aerial portion of *H. suaveolens* gave a pale yellow oil with a pungent smell

in 0.38% yield. Analysis of the oil by capillary GC resolved it into 70 components of which 38 were identified by GC-MS (Table 1 and Figure 1). In addition, one trace component was tentatively assigned as linalool oxide. One component, β -caryophyllene, predominated in the oil, and accounted for 41.1% of the total. This result was in contrast to previously published works for the oil of South American grown plants where 1,8-cineol was reported to be the major component (30.4%) in one instance (Luz *et al.*, 1983) and fenchone (42.3%) in another (Flores *et al.*, 1970).

In the latter report, published prior to the advent of capillary GC columns, five components were identified (camphene 0.8%, γ -terpinene 5.1%, β -pinene 3.2%, limonene 13.5%, and fenchone trace) and five other monoterpenes, eleven sesquiterpenes and three diterpenes were detected but could be not assigned. In the more recent of the two reports, 24 components were identified accounting for approximately 78% of the oil, including β -caryophyllene (10.4%) and γ -elemene (13.6%) (Luz *et al.*, 1983). It is also interesting to note that the earliest report on this oil was from plant material collected in the Philippines and occurrence of menthol was noted (Bacon, 1909); this component, however, has not been detected in any of the more recent investigations.

From comparison of the various results, the Malaysian and South American oils seem quite distinct. Whereas sesqui- and monoterpenes account for 93% of the Malaysian oil, they are only present to approximately 78% in the South American variety; the difference being accounted for by an increase in the percentage of volatile,

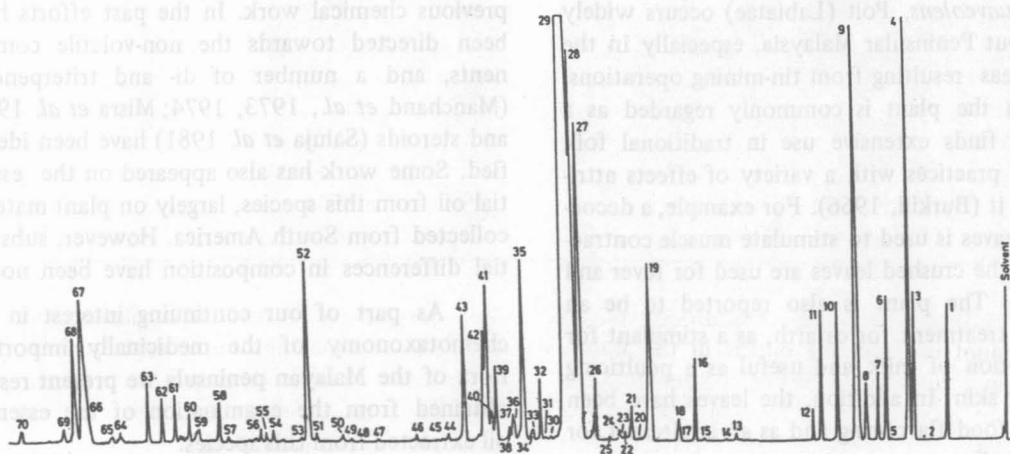


Fig. 1: Gas chromatogram of volatile oil from *Hyptis suaveolens* Poit

TABLE 1
Composition of the essential oil from *H. suaveolens*

Peak No.	Assignment	%	Peak No.	Assignment	%
1.	α -pinene	1.0	36.	α -terpineol	tr
2.	camphene	tr	37.	C ₁₅ H ₂₄	0.1
3.	β -pinene	1.6	38.	borneol	0.1
4.	sabinene	4.9	39.	germacrene D	0.9
5.	myrcene	tr	40.	C ₁₅ H ₂₄	0.2
6.	α -phellandrene	1.2	41.	β -selinene	2.0
7.	α -terpinene	0.6	42.	α -selinene	1.1
8.	limonene	0.7	43.	δ -cadinene	1.5
9.	1,8-cineole	7.9	44.	cada-1,4-diene	0.1
10.	γ -terpinene	1.2	45.	C ₁₅ H ₂₆ ⁰	tr
11.	ρ -cymene	1.1	46.	calamanene	tr
12.	terpinolene	0.2	47.	C ₁₅ H ₂₆ ⁰	tr
13.	linalool oxide	tr	48.	calacorene	tr
14.	fenchone	tr	49.	C ₁₅ H ₂₄ ⁰	tr
15.	α - ρ -dimethylstyrene	tr	50.	C ₁₅ H ₂₆ ⁰	0.1
16.	oct-1-ene-3-ol	0.5	51.	C ₁₅ H ₂₄ ⁰	0.1
17.	C ₁₀ H ₁₈ ⁰	tr	52.	caryophyllene oxide	2.4
18.	α -cubebene	0.2	53.	C ₁₅ H ₂₆ ⁰	tr
19.	α -copaene	3.9	54.	C ₁₅ H ₂₆ ⁰	0.1
20.	benzaldehyde	tr	55.	C ₁₅ H ₂₆ ⁰	0.1
21.	β -bourbonene	0.5	56.	C ₁₅ H ₂₆ ⁰	0.1
22.	C ₁₅ H ₂₄	tr	57.	C ₁₅ H ₂₄ ⁰	tr
23.	C ₁₀ H ₁₈ ⁰	tr	58.	C ₁₅ H ₂₆ ⁰	0.5
24.	α -cubebene	0.1	59.	C ₁₅ H ₂₆ ⁰	tr
25.	C ₁₀ H ₁₈ ⁰	tr	60.	C ₂₀ H ₃₂ ⁰	0.3
26.	fenchol	0.8	61.	C ₁₅ H ₂₆ ⁰	0.4
27.	terpinen-4-ol	4.3	62.	C ₁₅ H ₂₆ ⁰	0.5
28.	α -bergamotene	4.6	63.	C ₁₅ H ₂₆ ⁰	0.5
29.	β -caryophyllene	41.1	64.	C ₁₅ H ₂₆ ⁰	tr
30.	C ₁₅ H ₂₄	tr	65.	C ₁₅ H ₂₆ ⁰	tr
31.	C ₁₅ H ₂₄	tr	66.	C ₂₀ H ₃₂	tr
32.	alloaromadendrene	0.5	67.	C ₂₀ H ₃₂	5.2
33.	β -farnesene	tr	68.	C ₂₀ H ₃₂	1.7
34.	C ₁₅ H ₂₄	tr	69.	C ₂₀ H ₃₂	0.2
35.	humulene	2.5	70.	C ₂₀ H ₃₂	0.2

but unidentified diterpenes. In addition, only a trace amount of fenchone occurs in the Malaysian grown plant and this is not compensated for in terms of an increase in fenchol. The pattern of monoterpenoids also appears different, with sabinene, 1,8-cineole, α -copaene and terpinen-

4-ol dominating in the Malaysian variety and α -pinene, 1,8-cineole, terpinolene and camphor in the latter. It is possible, therefore, that the plant may occur as distinct chemotypes, as had been noted for various Australian *Melaleuca* species.

ACKNOWLEDGEMENTS

We thank the Network for the Chemistry of Biologically Important Natural Products for support and Mohd Nor Ibrahim for his assistance.

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(Received 11 November, 1987)

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