

## Aromatic Plants of Bangladesh: Constituents of Leaf and rhizome Oil of *Etingera linguiforme*

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### Abstract

Essential oils obtained by hydrodistillation from the rhizomes and leaves of *Etingera linguiforme* (Zingiberaceae) were analyzed by Gas Chromatography Mass Spectrometry (GC-MS). Thirty nine compounds in the leaf oil and twenty compounds in the rhizome oil were identified. The leaf oil contains eucalyptol (39.7%),  $\beta$ -pinene (13.3%),  $\alpha$ -pinene (7.8%), linalool (7.4%),  $\beta$ -elemene (6.6%) and  $\alpha$ -selinene (5.5%) as major constituents and the rhizome oil contains methyl chavicol (49.9%), methyleugenol (32.3%) and  $\beta$ -pinene (4.7%) as major constituents.

**Key words:** *Etingera linguiforme*, essential oils, GC-MS, eucalyptol, methyl chavicol.

### I. Introduction

*Zingiberaceae* is one of the essential oil bearing plant families. The genus *Amomum* in this family has over ninety species distributed in Africa, tropical Asia, Australia and the Pacific Islands.<sup>1,2</sup> *Etingera linguiforme* (Roxb.) R.M. Smith [Syn. *Alpinia linguiforme* Roxb., *Amomum linguiforme* Benth & Hook.f., *Hornstedtia linguiforme* (Roxb.) K. Schum., *Achasma linguiforme* (Roxb.) Loesm.] is a tall stout plant having oblong leaves and long, stout, horizontal rhizome found throughout the hilly areas of Chittagong, Chittagong Hill Tracts, Moulavibazar grows in shady hill slopes, forest floors and stream banks. It is distributed in Bangladesh, Bhutan and India. Pieces of rhizome are chewed with betel leaf to relief from the throat pain due to cold in different areas of Chittagong.<sup>3</sup> These plants are mostly terrestrial, rhizomatous herbs. It's seeds are used as spices and their plant parts are used in traditional medicine for curing toothache, dysentery, diarrhoea, rheumatism, vomiting, dyspepsia and lung diseases.<sup>3,4,5</sup> Dutta *et al* reported that  $\alpha$ -Pinene was the major constituent in the oils from the rhizomes and leaves of *A. linguiforme*. The essential oils of the rhizome of *A. linguiforme* growing in Northeast India was investigated by GC and GC/MS. The major component being methyl chavicol (93.2%).<sup>6</sup> *E. linguiforme* is a rare endemic species distributed in hilly regions of moist evergreen forests in Bangladesh and has not been previously investigated. Hence, we report the chemical composition of oils from the rhizomes and leaves of *E. linguiforme*.

### II. Materials and Methods

The leaves and rhizomes of *E. linguiforme* were collected from the wild sources of Chittagong during September 2006. The oils were isolated by hydro distillation of the fresh leaves and rhizomes separately using a Clevenger-type apparatus for four hours. The oil obtained was dried over anhydrous sodium sulphate. A voucher specimen was deposited in the Herbarium of BCSIR Laboratories, Chittagong.

**GC-MS analysis:** The essential oil from leaves and rhizomes of *E. linguiforme* were analyzed by GC-MS

electron impact ionization method on GC-17A gas chromatograph (Shimadzu) coupled to a GC-MS QP 5050A Mass Spectrometer (Shimadzu); fused silica capillary column (30m x 0.25mm; 0.25  $\mu$ m film thickness), coated with DB-5 ms (J&W); column temperature 100°C (2 min) to 250°C at the rate of 3°C/min; carrier gas, helium at constant pressure of 90Kpa. Acquisition parameters full scan; scan range 40-350 amu. The compounds were identified by comparing with the NIST library data.

### III. Results and Discussions

The leaves and rhizomes of *E. linguiforme* contain 1.15% and 2.40% oil respectively. The oils were colourless, having pleasant smell. Thirty nine compounds in the leaf oil and twenty compounds in the rhizome oils were identified (Table-1). The leaf oil contains eucalyptol (39.69%), linalool (7.39%),  $\beta$ -pinene (13.34%),  $\alpha$ -pinene (7.80%),  $\beta$ -elemene (6.63%),  $\alpha$ -selinene (5.45%) and asarone (4.53%) as major constituents and the rhizome oil contained methyl chavicol (49.93%), methyleugenol (32.3%) and  $\beta$ -pinene (4.66%) as major constituents. Other major constituents above 1% level in the leaf oil were 2,3<sup>1</sup>-Bifuran, 2, 2<sup>1</sup>,3<sup>1</sup>,5-tetrahydro (1.65%), germacrene D (1.72%), juniper camphor (2.63%),  $\alpha$ -phellandrene (2.73%), 4-terpineol (1.78%),  $\beta$ -terpinyl acetate (3.62%) and in rhizome oil were eucalyptol (2.72%) and  $\alpha$ -pinene (2.60%). On the other hand, comparison of our oils with those reported from different places in the world earlier showed that our oil is especially different to others. But it is very interesting to note that comparison of our results reported on the rhizome oil composition from the different places showed different results in the percent content of some of the major and minor constituents. Methyl chavicol (49.93%), which has been reported as major constituents in our oils as well as in almost all the rhizome oils of the world. This is in agreement with previous reports on other *Amomum* oils.<sup>5,6</sup> However, the leaf oil did not contain methyl chavicol and methyl eugenol. On the basis of above fact it may be concluded that *E. linguiforme* growing widely in Bangladesh, may be utilized as a source for the isolation of natural eucalyptol & methyl chavicol respectively.

**Table. 1. Constituents of leaf and rhizome essential oil of *E. lingniforme***

SL	Name of Chemical Constituents	%	
		Leaf Oil	Rhizome Oil
1.	Anethole	--	0.14
2.	p-anisaldehyde	--	0.06
3.	Aromadendrene oxide	0.07	--
4.	Asarone	--	4.53
5.	Benzene, 1,2-dimethoxy -4-(2-propenyl)	0.05	--
6.	Cymene	0.37	--
7.	Benzene,-2-(2-butenyl)-1,3,5-trimethyl	0.05	--
8.	Fenchol	0.04	--
9.	Sabinene hydrate	0.04	--
10.	2,3 <sup>1</sup> -bifuran, 2, 2 <sup>1</sup> ,3 <sup>1</sup> ,5- tetrahydro	1.65	--
11.	Borneol	--	0.07
12.	δ-cadinene	0.12	--
13.	Camphene	0.05	0.08
14.	Camphor	--	0.08
15.	2-carene	0.39	--
16.	Caryophyllene	0.20	0.10
17.	α-caryophyllene	0.28	--
18.	Copaene	0.06	--
19.	Cubenol	0.22	--
20.	Dimethoxydurene	--	0.67
21.	β-elemene	6.63	0.48
22.	Ethanone, 1-(1,3a, 4,5,6,7-hexahydro-4-hydroxy-3, 8-dimethyl-5, azulenyl	0.34	--
23.	Eucalyptol	39.69	2.72
24.	Germacrene D	1.72	--
25.	Guaiol	0.17	--
26.	4-hexen-1-ol	0.27	--
27.	3-hexenal	0.09	--
28.	Juniper camphor	2.63	--
29.	Lanceol, cis	0.05	--
30.	Limonene	--	0.44
31.	Linalool	7.39	0.12
32.	Longipinocarveol, trans,	0.10	--
33.	Methyl chavicol	--	49.93
34.	Methyleugenol	--	32.3
35.	Trans-nerolidol	0.12	--
36.	Z-ocimene	0.29	--
37.	α-phellandrene	2.73	--
38.	β-pinene	13.34	4.66
39.	α-pinene	7.80	2.60
40.	Sabinene	0.37	0.03
41.	β-selinene	0.21	--
42.	α-selinene	5.45	0.45
43.	γ-terpinene	0.78	--
44.	1-terpinenol	0.13	--
45.	4-terpineol	1.78	0.11
46.	Terpinolene	0.32	--
47.	β-terpinyl acetate	3.62	--
48.	α-thujene	0.22	--

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