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IDENTIFICATION OF ESSENTIAL OIL COMPONENTS FROM *AMOMUM* SPECIES USING GC-MS ANALYSIS

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Abstract

The essential oil of leaves and stem of *Amomum* sp. from Laha, Kerala, India was analyzed using GC-MS, which possess brick red in color with prominent aroma. Overall thirty-four constituents were obtained from essential oil of *Amomum* sp. The major components are Spathulenol (80.29%), Isopropyl myristate (7.28%), Ethyl heptadecanoate (2.79%), Zingiberene (2.65%) and Tetradecanoic acid (2.11%).
Key words: Spathulenol, isopropyl myristate, ethyl heptadecanoate, zingiberene, tetradecanoic acid

Introduction

The family Zingiberaceae recognized for its therapeutic property and are extensively distributed throughout the tropics and subtropics with 47 genera and 500 species, whereas India is represented with 20 genera comprises of more than 200 species (Holttum, 1950; Sabu, 2006). Most of the species such as *Zingiber officinale* (ginger), *Curcuma domestica* (tumeric), *Kaempferia galanga* (cekur) and *Alpinia galanga* (lengkuas) are extensively utilized as spices and also utilized for processing of food. The family Zingiberaceae is significant plant family consists of most of the essential oil bearing plants. The genus *Amomum* consists of over 90 species extensively distributed in Africa, Tropical Asia, Australia and the Pacific Islands (Mabberley, 1990; Jain and Prakash, 1995). These are mostly terrestrial, rhizomatous herbs. The seeds of *Amomum* are used as spices and many other plant parts are used in traditional medicine in healing of toothache, dysentery, diarrhea, rheumatism and lung diseases (Manjunath, 1948; Dutta *et al.,* 2000). Essential oils are organic multi-component systems, they are made up of largely in small molecules, such as terpenes, generally formed from only carbon and hydrogen, but most oftenly made up of oxygen. Essential oils are usually used in perfumes and make-up industries, as groceries and additives, in hygienic products, in farming sector, and as natural remedies. The biological components of the extracts of various species of Zingiberaceae have been investigated in biological and pharmacological effects of antiemetic, anticancer, anti-inflammation, hypolipidemic, anti-oxidant, antibacterial and antifungal (Selvam *et al.,* 1995; Claeson *et al.,* 1996; Babu and Srinivasan, 1997; Limtrakul *et al.,* 1997; Sharma *et al.,* 1997). The efficacy of the extracts has been studied in many studies to be attributed in identification of the chemical components of the essential oils of the many other plants (Pattnaik *et al.,* 1997). In this study, the composition of essential oils from leaves and stem of *Amomum* sp. were analyzed using GC-MS technique.

Experimental

Amomum sp. was collected from the Laha, Kerala, India (Longitude 09°22'46.09"N and Latitude 76°55'35.85"E), in October 2017. A voucher specimen is deposited at Department of Botany, Karnatak University, Dharwad, India. Further, the plant was identified with reference by Prof. Sabu, Department of Botany, Calicut University, Kerala, India. The collected plant specimens were chopped into small pieces, which help in rendering of oil glands. Clevenger type of apparatus further helps in extraction of essential oil by hydrodistillation technique for about 4 hours of continuous extraction leads to the collection of essential oil based on European Pharmacopoeia 3. Anhydrous sodium sulphate is used in separation of water from essential oil. The collected essential oil is stored in Amber Glass tubes at 4°C.

The identification of essential oil was detected by gas chromatography-mass spectrometry technique using Shimadzu GCMS-QP2010S model. GC-MS is fixed with a fused silica ZB-5 (5% phenyl methyl siloxane) capillary column (30 m x 0.25 mm, 0.25 µm film thickness). Column temperature was carried out at 60°C to 250°C at 3°C/min, and helium was utilized as transporter gas (1.1 mL/min). Ionization of the sample constituents was determined using EI mode, (70 eV), with scan range 40-450 amu and 1 µl of essential oil was directly injected.

Results and Discussion

Essential oils from leaves and stem of *Amomum* sp. were extracted by hydro-distillation. The physical observation of obtained essential oil was brick red in color with prominent aroma. In present study 34 essential oil component was identified and represented in table 1 and fig. 1. The major components are Spathulenol (80.29%), Isopropyl myristate (7.28%), Ethyl heptadecanoate (2.79%), Zingiberene (2.65%) and Tetradecanoic acid (2.11%). Spathuleol was observed as one of the major component in many of the plant family, particularly in *Annona*, *Guatteria*, *Xylopia* and several other plant species (Costa *et al.,* 2009). Spathulenol showed various biological activities such as anti-feedant, anti-fouling, anti-oxidant, anti-inflammatory, anti-proliferative, insect repellent activity and anti-microbial activity (Nascimento *et al.,* 2018). Earlier report by Durán-Peña *et al.* (2015) showed activities against *Staphylococcus aureus* and *Proteus mirabilis*. Iso-propyl myristate mainly used as vectors in transferring lipophilic [such as isopropyl myristate (IPM), ethyl oleate] and hydrophilic [ethanol, prophylene glycol (PG)], mainly utilized for transdermal delivery, which ultimately helps to increase permeation by enhancing the thermodynamic activity (Tuntiyasawasdikul *et al.,* 2014). Ethyl heptadecanoate was analyzed for GC-MS chromatogram, which showed the anticancer activity in chloroform root extract of *A. papuana* Becc. due to presence of asethyl linoleate, bicyclo (3.3.1) non-2-ene, ethyl palmitate, palmitic acid, and ethyl heptadecanoate (Elizabeth *et al.,* 2016). The sesquiterpene hydrocarbon zingiberene showed the significant spectrum of organic movement such as antiviral, antiulcer and anti-fertility effects (George and Tejinder, 2003). Tetradecanoic acid showed predominance in larvicidal and repulsive activity adjacent to *A. aegypti* and *C. quinquefasciatus* mosquitoes (Sivakumar *et al.,* 2011).

Conclusion

GC-MS analysis of leaves and stems of *Amomum* sp. reveals the presence of medicinally valued bioactive components like spathulenol, isopropyl myristate, ethyl heptadecanoate, zingiberene and tetradecanoic acid. As the medicinal value with similar components in various other plant extract proved to be phenomenal in field of medicine, hence these components obtained from *Amomum* sp may also have similarly efficient. The work is in progress to determine its biological activity and brighten the pharmacological outline of it in the field of traditional medicine.

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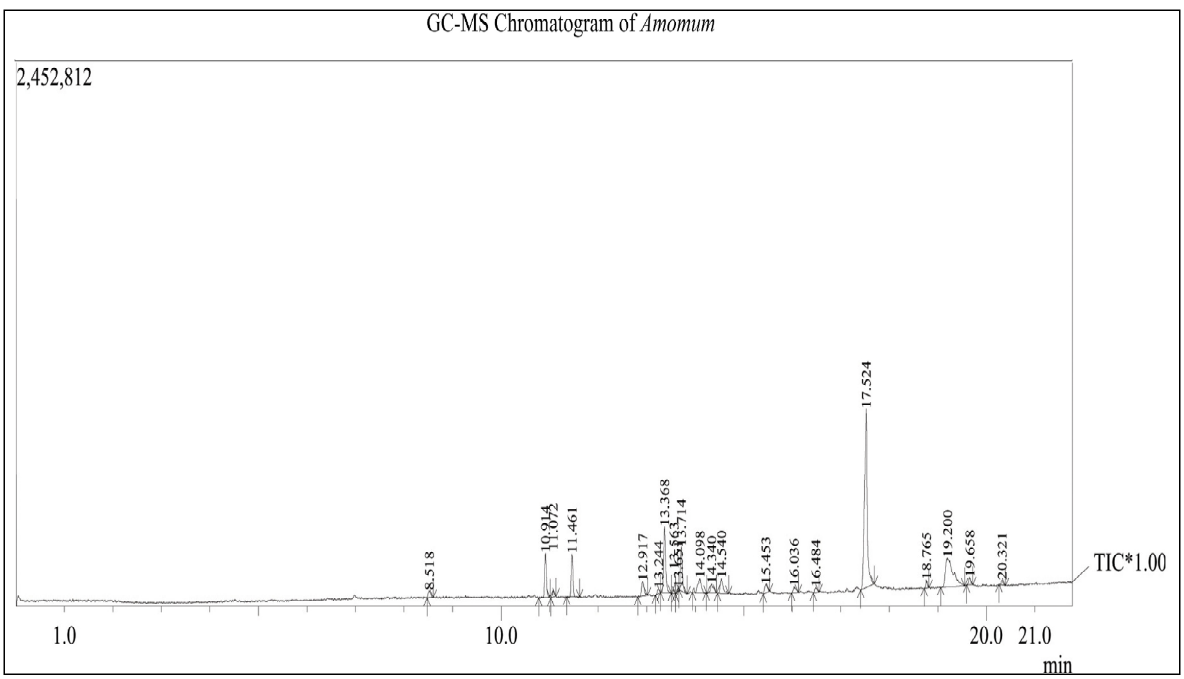

Fig. 1: GC-MS Chromatogram of *Amomum* species essential oil.

Table 1 : List of essential oil components obtained from *Amomum* species.

Peak	RT* (min)	Compounds**	Area (%)
1	6.784	Nerol	0.03
2	7.516	Oleyl Alcohol	0.01
3	7.926	1,8-cineole	0.01
4	8.258	Geraniol	0.01
5	8.840	Menthol	0.02
6	9.256	Camphor	0.02
7	9.411	Borneol	0.03
8	10.630	Geranyl acetate	0.08
9	10.948	Methyl jasmonate	0.01
10	11.009	Lauric acid	0.01
11	11.340	Zingiberene	2.65
12	11.795	β-caryophyllene	0.05
13	11.881	(Z)-nerolidol	0.04
14	12.307	2-undecanone	0.24
15	13.148	Lauryl alcohol	0.85
16	13.256	Pentadecanoic acid	0.23
17	13.526	Spathulenol	80.29
18	13.831	Humulene epoxide	0.17
19	14.190	Humulene epoxide II	0.16
20	14.406	Humulene epoxide III	0.09
21	14.593	Caryophyllene oxide	0.22
22	14.889	(Z,E)-farnesol	0.13
23	15.114	Tetradecanal	0.81
24	15.473	Tetradecanoic acid	2.11
25	15.803	Virelure	0.28
26	16.078	Octadecanal	0.08
27	16.486	Oleic acid	0.08
28	17.235	Ethyl oleate	0.40
29	17.520	Isopropyl myristate	7.28
30	17.950	Citronellyl valerate	0.05
31	18.178	Nonadecanal	0.41
32	18.767	(Z)-phytol	0.08
33	19.167	Hexadecanal	0.14
34	19.302	Ethyl heptadecanoate	2.79

* Retention Time (RT)

**Tentative assignments of compounds based on GC-MS results.

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