GC-MS Analysis of volatile compounds in *Alpinia* Roxb. and *Zingiber* Boehm. from South Western Maharashtra.

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** ABSTRACT**

Family Zingiberaceae is a small group having Ethno-botanically value since ancient time in known health care systems like Ayurvedic, Unani and Homoeopathic. The members of family Zingiberaceae are used for the treatment of many diseases in traditional health care system by local healers. The scientific evaluation of tubers and leaves have been carried out for antioxidant and anti-inflammatory activities. The GC-MS analysis was fruitful in identification of compounds like Beta – Pinene in *Alpinia galanga* (L.) Swatz. and *Zingiber nessanum* (Grah.) Ramam and Linalool found in *Zingiber zerumbet* (L.) and Beta- Phellandrene and Beta- Sesquiphellandrene detected in *Zingiber cernuum* D'alz.

Key words: Zingiberaceae, GC-MS analysis, *Alpinia* Roxb. and *Zingiber* Boehm.

**INTRODUCTION:**

Plants have been used worldwide in management of various health problems and the majority of people in the world-especially in the developing countries predominantly on medicinal plants as drugs. Currently, the use of medicinal herbs has been paralleled by a great scientific interest because of their importance in traditional medicines. Although modern organic chemistry has provided us with an increasing number of synthetic compounds, many important drugs of modern medicine are still extracted from medicinal plants and some of them are still used in traditional therapy. (Kasarkar *et al.* 2013) reported ethno-botanical uses of *Alpinia* Roxb. and *Zingiber* Boehm. from Western Maharashtra. Most of the traditional healers use rhizome and leaves for bone fracture, skin diseases, wounds and cuts, blood clotting, toothache, piles, etc. Chemicals present in *Alpinia* Roxb. are polyphenols, tannins, lignins, flavanoides, while in *Zingiber* Boehm polyphenols, flavanoids, lignins, saponins, etc. Major phyto-chemical, phenology and mineral studies on leaf and rhizome of all species were carried out. (Kasarkar & Kulkarni, 2010, 2011a,2011b, 2012).

It is proved that herbal medicines are in the developed world for primary health care system, because of their efficacy, safety and lesser side effects. India has vast country with different climatic conditions and rich biodiversity of natural resources, heritage of traditional knowledge. Due to awareness among our ancestors they rely on herbal medicines. Family Zingiberaceae is one of the important in ethno-medico-botanical point of view. The medicinal and aromatic qualities of Indian Zingiberaceae members are described in Materia Indica. (Ainslie 1826).

Zingiberaceae has prominent source of essential oils and Terpenes. These are Borneol, Camphor, Cineole, Camphene, Pinene, Zingiberene and Phenylpropanoids compounds present in oil cells and microscopic characters observed in rhizomes (Tun and Than 2003).

The group of Zingiberales has 52 genera and 1400 species concentrated in Indo- Malaysian region of Asia. Out of these 22 genera and 178 species are available in North-eastern and Peninsular region of India. 21 genera and 200 species are represented in India. Maharashtra state has 10 genera and 32 species of the family found in wild and cultivated state.

GC-MS studies are important to know phyto-chemical constitutes present in plant parts. In this connection, (Thanga *et al.* 2012) carried out GC-MS analysis of *Sacrostemma secamone* (L.) Bennet belonging to family Asclepiadaceae. The active principles with their retention time, molecular formula, molecular weight and concentration in the ethanol extract were recorded. Fourteen compounds were detected from the whole plant. Another important medicinal plants *Curculigo orchioides* Garten. locally known as *Kali musali*. It has different medicinal properties of roots and tubers in traditional medicines, such as oxytocic activity, antioxidant, hepatoprotective, immunomodulatory and antimicrobial. The ethanol extract of *Curculigo orchioides* were studied for GC-MS by (Daffodiil *et al.* 2012). Similar studies on GC-MS were carried out on *Stephania wightii* (Arn.) Dunn (Tubers), *Entada pursaetha* DC (Seed) and *Sesuvium portulacastrum* L by (Shunmugapriya and Uthayakumari 2012), (Devi *et al.* 2012) and (Sheela and Uthayakumari 2013) respectively. GC-MS study of family Zingiberaceae were focused by several workers in India and abroad.

Such important compounds are investigated in *Alpinia* and *Zingiber* species found in Western Ghats of Maharashtra State.

**MATERIAL AND METHOD**

Rhizome of different species of *Alpinia* Roxb. and *Zingiber* Boehm. were collected from the region of South Western Maharashtra during the year 2008-2011. Collected material was dried properly under shade for further analysis.

The dried powdered material is placed in methanol like 1 gm. in 10 ml. Kept on Rotary shaker for 12 hours. The extract was filtered through the Whatmen filter paper no.1 and filtrate was collected in vial and used for GC-MS studies on QP-2010 (Shimadzu) instrument. The injection volume was 1 µ. The compound identification was accomplished by comparing the retention times with those of authentic compounds and fragmentation pattern as well as with mass spectra in the NIST spectral library stored in the computer software of the GC-MS.

**OBSERVATIONS**

1. *Alpinia galanga* (L.) Swartz. and *Zingiber nessanum* (Grah.) Ramam. Rhizome contains compound β-Pinene.

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Plant Names</th>
<th>Systematic Name</th>
<th>Molecular Formula</th>
<th>Molecular Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Alpinia galanga</em> (L.) Swartz.</td>
<td>β-pinene</td>
<td>C₁₀H₁₆</td>
<td>136.23 g/mol⁻¹</td>
</tr>
<tr>
<td>2</td>
<td><em>Zingiber zerumbet</em> (L.)</td>
<td>Linalool</td>
<td>C₁₀H₁₈O</td>
<td>154.25 g/mol⁻¹</td>
</tr>
<tr>
<td>3</td>
<td><em>Zingiber cernuum</em> Dalz.</td>
<td>β-Phellandrene</td>
<td>C₁₀H₁₆</td>
<td>136.23 g/mol⁻¹</td>
</tr>
<tr>
<td>4</td>
<td><em>Zingiber cernuum</em> Dalz.</td>
<td>β-sesquiphellandrene</td>
<td>C₁₅H₂₄</td>
<td>204.35 g/mol⁻¹</td>
</tr>
<tr>
<td>5</td>
<td><em>Zingiber nessanum</em> (Grah.) Ramam.</td>
<td>β-pinene</td>
<td>C₁₀H₁₆</td>
<td>136.23 g/mol⁻¹</td>
</tr>
</tbody>
</table>

1. *Alpinia galanga* (L.) Swartz. and *Zingiber nessanum* (Grah.) Ramam. Rhizome contains compound β-Pinene.
Zingiber cernuum Dalz. rhizome contains β-Phellandrene and β-sesquiphellandrene.

Zingiber zerumbet (L.) Rosc. rhizome contains Linalool.

Zingiber cernuum Dalz. rhizome contains β-Phellandrene and β-sesquiphellandrene.
RESULTS AND DISCUSSION
The GC-MS study of *Alpinia galanga* (L.) Swartz. and *Zingiber nussanum* (Grah.) Ramam and *Zingiber zerumbet* (L.) Rosc. ex J.E.Sm. and *Zingiber cernuum* Dalz. shows many components, which contributes to the medicinal activity of the plant. Five compounds were reported from genus *Alpinia* Roxb. and *Zingiber* Boehm. (Nor,1991).

The GC-MS study of methanol extract was performed for the identification of the compounds present in tubers. The major compounds are β-pinene, Linalool and β - phellandrene and β - sesquiphellandrene. β-pinene is one of the important compound found in *Alpinia galanga* (L.) Swartz. and *Zingiber nussanum* (Grah.) Ramam. Linalool is only present in *Zingiber zerumbet* (L.) Rosc. ex J.E.Sm and β-phellandrene and β-sesquiphellandrene is present in *Zingiber cernuum* Dalz.

β-pinene shows the activities like Anti-inflammatory, Antisepetic, Insectifuge, Transdermal. The β-sesquiphellandrene shows the activities like Anti rhinoviral.

*Alpinia galanga* (L.) Swartz. consist of monoterpene hydrocarbon β-pinene (4-8 %). (Padalia 2010). The major compounds identified in Ginger (*Zingiber officinalis* Rosc.) methanol extract was Gingiberene (15.32 %) and β-sesquiphellandrene (11.80 %). (Shipra Bhargava et al. 2012).

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REFERENCES

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