

## GC-MS analysis of *Santalum album* Leaves Extract

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### ABSTRACT

Sandalwood is important plant for commercial and traditional belonging to the family Santalaceae and the genus *Santalum album*. It is used to treat in skin diseases, swelling, fever, headache, gastric problem, chronic cough, blood purifier. Methanol was used as solvent for extraction by using cold extraction method. The aim of the present study was to recognize volatile and semi-volatile compounds by GC-MS analysis. The presence of some important molecules such as Flavone, Phenol, 2-propyl oleic acid and 1,3,3-trimethyl-1[2'-hydroxyphenyl] indan-6-ol has given idea towards to prepare medicine for viral and cancer diseases and used as antioxidant.

**Keywords:** *Santalum album*, volatile, semi volatile, GC-MS.

### 1. INTRODUCTION

*Santalum album* is a small tropical tree and is the most common only known source sandalwood. Sandalwood is the genus *Santalum*, family Santalaceae. It is found in Southeast Asia and India. Certain cultures have great significance on its fragrance and medicinal uses (Misra and Dey, 2012). It is also used in some religious traditions. Indian sandalwood is high prices due to production of essential oil from the plants. It is no longer used for woodworking due to size of the trees (Jain et al., 2003). The plant is extensively cultivated and lived for long term and it is harvest viable after several years. The plant height is varying between 4 to 9 metres. Sandalwood may be live to one hundred years (Rakesh Kumar et al., 2015). Up to 300 species is a source of various macronutrients such as potassium, phosphorus and nitrogen during primary phases of

growth. It can propagate through suckering process during its initial period. It is look smooth in beginning and became black from reddish or brown bark (Burdock GA and Carabin, 2008). The heartwood is change to white and thin leaves, opposite and ovate to lanceolate in shape. Bright green and shiny nature appeared in Glabrous surface with a glaucous pale reverse. Fruits and seeds can be viable after five years (Qin et al., 2010). *Santalum album* is a woody, tropical, and perennial essential oil yielding tree. The fragrant heartwood accumulates the sandalwood oil (SWO), rich in sesquiterpenoids and is reported to have many medicinal properties. Epidemic spike disease causes severe destruction, illegal poaching and corruption owing to increased demand worldwide are the reasons of it being initiated into IUCN, (IUCN, 2006) as vulnerable, thus necessitating it's in vitro micropropagation and biotechnological manipulation (Kumar et al., 2012). The *Santalum album* wood and oil are among the costliest plant products. Sandalwood tree is valued for commercial, medicinal, traditional, spiritual, aesthetic and social importance. The traditional curative properties for acne, urino- genital tract infections, bronchitis, congestion etc. are known (Misra and Dey, 2013). In 7% of the world's flora, 45,000 number of plant species occur in India. Medicinal plants consist of 8,000 species and about 50 % of higher flowering plants in India (Katiyar et al., 2003). *Santalum album* constitutes of about 11 % of flora having medicinal properties (James et al., 2002).

The commercial, traditional and social importance of this medicinal tree is:

1. Cosmetics, perfumes, soaps, musk's, face packs for its fragrance, fixative property and its oil base fix both dry and oily skin.
2. Handicrafts, luxury items and wooden furniture for domestic use due to durability and scent.
3. The unique fragrance of the oil is known as an aid to meditation, spiritual growth, emotionally it relaxes stress, soothes irritation, lifts depression and is aphrodisiac.
4. It has a long history in ethno pharmacology in India and elsewhere, for uses such as a tonic to the immune system, effective against strep throat, gastrointestinal ailments, skin infections, reducing vomiting, fever, thirst and so on, though the perfumery use has outweighed the medicinal uses.

## **2. MATERIALS AND METHODS**

## 2.1 Preparation of Extract

Sandal wood leaves were collected from Coimbatore, Tamilnadu, India. The leaves were dried under shade for 15 days. The leaves were powdered about 10 g of Sandalwood leaves was weighed and soaked in methanol. The supernatant was filtered and condensed in a hot plate at 50°C, which yields pale-green gummy extract.

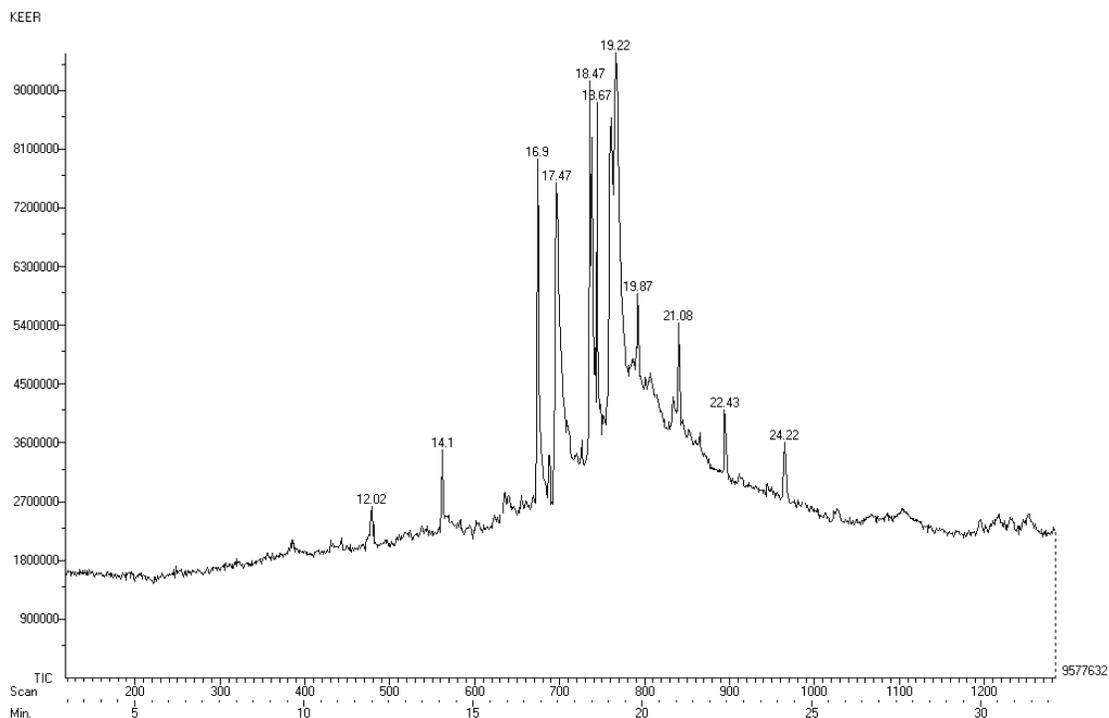
## 2.2. Gas chromatography–Mass Spectrometry (GC–MS)

Methanol leaves extract of *Santalum album* was introduced into a column (HP-5), using JEOL GC Mate II GC-MS model. Carrier gas of Helium, 1 mL/min- flow rate, and column temperature was maintained from 50-250°C and flow rate of 10°C/min. The compounds were identified by using the database of NIST having 62,000 patterns. NIST was used for interpretation of unknown compound on mass spectrum of GC. The unknown compound in the mass spectrum was compared with known components of the spectrum which is stored in the NIST library.

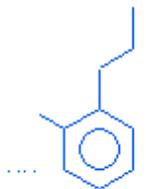
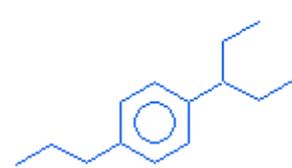
## 3. RESULTS AND DISCUSSION

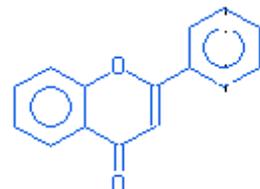
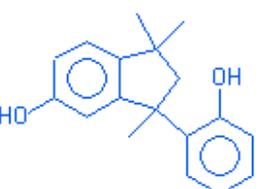
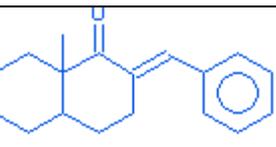
### 3.1 GC-MS analysis

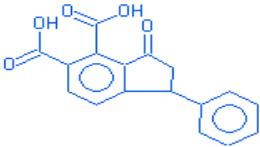
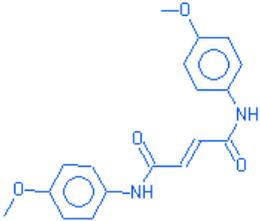
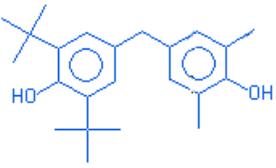
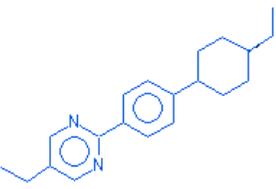
Table 1 shows the GC-MS spectrum of methanol leaves extract of *Santalum album*. Different components are identified from the extracts. In this, important compounds like flavone (antioxidant) (5,7-dihydroxy-3-phenylchromen-4-one) compound and oleic acid were identified and recorded. The eluted compounds were characterized and identified by comparing the mass spectra with library.



**Figure 1:** GCMS analysis of leaves extract of *Santalum album*

S. No	Compound name	RT	Compound structure	Mol. weight g/mol	Mol. formula
1.	Phenol,2-propyl	12.02		136.0	C <sub>9</sub> H <sub>12</sub> O
2.	Benzene ,1(1-ethylpropyl)-4-	14.1		190.0	C <sub>14</sub> H <sub>22</sub>

	propyl				
3.	Phenol,2-4-bis(1,1-dimethyl ethyl)-	16.9		206.0	$C_{18}H_{26}O$
4.	Flavone	17.47		222.0	$C_{15}H_{10}O_2$
5.	1,3,3-trimethyl-1[2'-hydroxyphenyl]indan-6-ol	18.67		268.0	$C_{18}H_{20}O_2$
6.	1[2H]-Naphthalenone,octahydro-8a-methyl-2-[phenyl methylene]-trans-	18.47		254.0	$C_{10}H_{16}O$
7.	Oleic acid	19.22		282.00	$C_{18}H_{34}O_2$

8.	3 phenyl- 6,7dicarboxyindan- 1-one	21.68		296.0	C <sub>17</sub> H <sub>12</sub> O <sub>5</sub>
9.	But-2-endiamide N,N'-bis(4- methoxyphenyl)-	22.43		326.00	C <sub>12</sub> H <sub>14</sub> O <sub>3</sub>
10.	Phenol,2,6-bis[1,1- dimethylethyl]-4-[(4- hydroxy- 3,5dimethyl phenyl)methyl]-	24.22		346.00	C <sub>15</sub> H <sub>24</sub> O
11.	Pyrimidine,5-ethyl- 2-[4-[4- ethylcyclohexyl)phe nyl]-	19.87		294.0	C <sub>6</sub> H <sub>8</sub> N <sub>2</sub>

**Table 1:** GCMS analysis of leaves extract of *Santalum album*

#### 4. Conclusion

We obtained eleven compounds in sandal wood leaves methanol extract in gas-chromatography and mass spectroscopy (GC-MS). From the results extracts contains different biochemical constituents which have been used for biomedical field and also for treating various diseases.

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