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## GC-MS ANALYSIS OF BIOACTIVE COMPONENTS ON THE FRUIT EXTRACTS OF *ARTOCARPUS HIRSUTUS* LAM.: A POTENTIAL WILD EDIBLE PLANT

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### Keywords:

*Artocarpus hirsutus*, GC-MS, Bioactive compounds, NIST

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**ABSTRACT:** Wild fruits play a significant role in human nutrition, especially as sources of carbohydrates, proteins, vitamins, minerals, dietary fibers, and enormous medicinal potential. Local people in different parts of the country have learned to live on many wild edible fruits available around their localities. *Artocarpus hirsutus* Lam. is an important wild edible fruit plant belongs to the family Moraceae and is commonly known as Wild Jackfruit, Ayani, Aanjili, etc. The present study was to trace out the variations in the profile of bioactive compounds from petroleum ether and chloroform extracts of *Artocarpus hirsutus* fresh fruit pulp using Gas chromatography-Mass spectrometry analysis (GC-MS). The identification of the bioactive components of the extracts was established by GC retention indices, by comparing their mass spectra with National Institute of Standards and Technology (NIST) data center. According to GC-MS spectral data, in petroleum ether extract five major compounds were identified. And in chloroform extract, seven major compounds were detected.

**INTRODUCTION:** *Artocarpus hirsutus* belongs to the family Moraceae, and this comprises 50 varieties of species. They are deciduous and evergreen tall tree grows up to 75 meters in height in southern regions of India. It is known by a variety of names such as Aani, Aini, Aini-maram, Anjili, and Anhili. *Artocarpus hirsutus* is an endemic tree species of the southern Western Ghats of peninsular India and Maharashtra Sahyadris, popularly known as wild jack tree in the Malabar Coast<sup>1</sup>. According to Ahmedulla and Nair among the species in *Artocarpus*, *A. hirsutus* is the only endemic species. This tree is considered as the “keystone species”<sup>11</sup>.

The plant image is shown in **Fig. 1**. Many wild plants serve as alternatives to staple foods during period of food deficit and are valuable supplements for a nutritionally balanced diet<sup>14</sup>. Wild fruits are generally used as raw or processed, which help to compensate for the day-to-day requirement of calories. Wild fruits play a significant role in human nutrition, especially as sources of carbohydrates, proteins, vitamins, minerals, dietary fiber and enormous medicinal potential<sup>15</sup>.

Many wild plants, used by rural and tribal populations and contributing significantly to their livelihood and food security have escaped recognition and scientific inquiry<sup>7</sup>. Plants are vital for the remedies as well as existence for human disease because they contain components of therapeutic value<sup>5</sup>. Plants are a rich source of secondary metabolites with remarkable biological activities. The secondary metabolites are a significant source with a variety of structural arrangements and properties<sup>10</sup>.

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Natural products which come out from medicinal plants are important for pharmaceutical research and drug development as a source of therapeutic agents<sup>12</sup>. At presents, the demand for herbal or medicinal plant products has increased significantly<sup>1</sup>.



FIG. 1: PLANT OF *ARTOCARPUS HIRsutus*

GC-MS is the best technique to identify the bioactive constituents of long-chain hydrocarbons, alcohols, acids, esters, alkaloids, steroids, amino and nitro compounds, *etc.*<sup>4</sup> A wide range of medicinal plant parts is used for extract as raw drugs and they possess varied medicinal properties<sup>8</sup>. Traditionally used medicinal plants have recently attracted the attention of the biological scientific communities. This has involved the isolation and identification of secondary metabolites produced by plants and their use as active principles in medicinal preparations<sup>9</sup>. The present study was aimed to evaluate the bioactive components of *Artocarpus hirsutus* fruit pulp.

#### MATERIALS AND METHODS:

**Collection of Plant Material:** The fruits of the plant collected from Karimbam, Kannur district, Kerala during April 2018-August 2018. The plant specimens were identified using Local flora available field keys and with the help of eminent taxonomists at M.S. Swami Nathan Research Foundation- Community. Agrobiodiversity Centre (MSSRF-CAbC) Kalpetta and Department of Botany, Calicut University, Kerala. The herbarium was prepared based on the collection and availability of the fruits was deposited in Sir Syed College Botany Herbarium. Data on the plant species, local names, and parts used.

**Preparation of Powder and Extract:** The collected fruits were washed for 3-4 times with

running tap water, and the pulp is separated and dried in hot air oven at 60 °C for 12 days. The dried material was powdered. The coarse powder (100 gm) were extracted by using successive Soxhlet extraction using a solvent in increasing order of polarity such as petroleum ether, chloroform, methanol for 72 h. After completion extracts were filtered and the solvent evaporated in rotary evaporator<sup>6</sup>.

**GC-MS Analysis of Bioactive Compounds:** The dried powder of *Artocarpus hirsutus* was subjected to GCMS at Sir Syed College, Thaliparamba, Kannur for the determination of volatile bioactive compounds. GC-MS analysis of the samples was carried out using thermo scientific trace 1300 gas chromatograph × equippe with ISQ-QD mass spectrometer with TG-5MS column (30 mm × 0.25 mm ID × 25µm). Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/minute and an injection volume of 1µl was employed. An injection port temperature of 280 °C and an ion source temperature of 200 °C was set. The oven temperature was programmed from 60 °C for 3 min with an increase of 5 °C/min to 240 °C with a hold time of 3 min. The temperature was increased at a rate of 35 °C/min till 280 °C with a hold time of 5 min. Scan interval was programmed for 0.2 sec with a mass range of 40-50 amu. Total GC running time was 45 min. The components in the extract were identified based on the mass spectra of NIST library data<sup>4</sup>. The constituents obtained from GCMS analyzer are given in **Table 1** and **2**, **Fig. 2** and **3**.

**RESULTS AND DISCUSSION:** Now a day the study of the organic compounds from plants and their activity has increased. The combination of the best separation technique (GC) with the best identification technique (MS) made GC-MS an ideal technique for qualitative analysis for volatile and semi-volatile bioactive compounds<sup>3</sup>. The GC-MS analysis was utilized successfully for the investigation and characterization of the bioactive compound profile of *Artocarpus hirsutus* fruit sample prepared by successive extraction with different polarity solvents. The method applied provided good separation for each compound and their abundance of compounds detected, retention time (RT), peak percentage varies with different polarity solvents. GC-MS chromatograms of total

ion concentration (TIC) of extracts are shown in **Fig. 2** and **3**, while detected compounds are displayed in **Table 2** and **3**. The most abundant compounds found in the petroleum ether extract of fruits were Dodecanal (2.95%), Methyl 9-Cis,11-trans-octadecadienoate(0.35%), Methyl 9-cis, 11-trans-octadecadienoate (.84%), Medowlactone (3.64%), Squalene (62.36%). And compounds in the chloroform extracts of fruits were 4H-Pyran-4-one,2,3-dihydro-3,5-dihydroxy-6-methyl (3.54%), Hexadecanol (.89%), Cetene (1.36%), Heptadecenal (1.50%), Heneicosene (1.46%), Heptacos-1-ene (1.10%), Sitosterol (23.21%).

The GC-MS analysis revealed that the petroleum ether and chloroform extracts were mainly

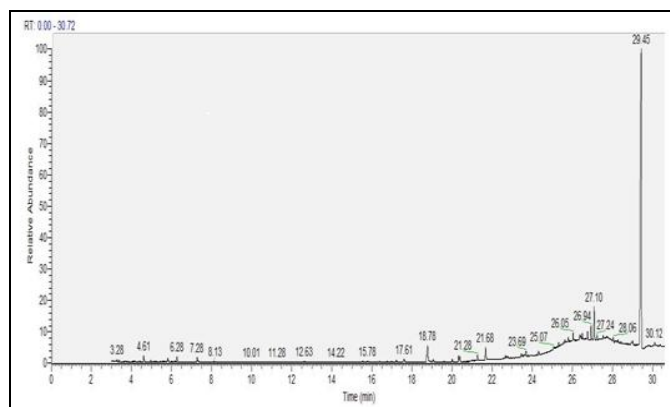
composed of oxygenated hydrocarbons, alkane hydrocarbon, class of acid, ketone, amines. These phytochemicals are responsible for various pharmacological actions like hepatoprotective activity, antioxidant property, wound healing and antimicrobial activity, treating urinary problems related to BPH, High cholesterol, cancer<sup>8</sup>, etc. This study is only a preliminary study of the occurrence of certain properties of *Artocarpus hirsutus* fruit extract an in-depth study will provide a good concrete base for all the biochemical and phytochemical functions mentioned above<sup>13</sup>. *Artocarpus hirsutus* is a potential folklore medicinal plant used for antimicrobial activity<sup>11</sup>, anti-ulcer activity and many traditional medicines<sup>2</sup>.

**TABLE 1: BIOACTIVE COMPOUNDS DETECTED FROM PETROLEUM ETHER EXTRACT OF A. HIRSUTUS FRUITS**

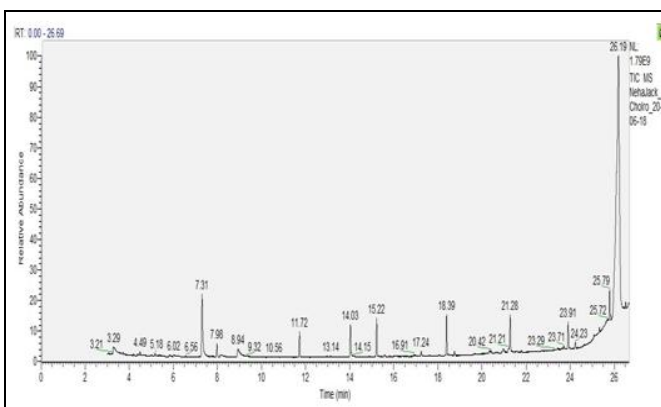
S. no.	RT (Min)	Name of compounds	Molecular Formula	Molecular Weight	Area %
1	18.78	Dodecanal	C <sub>12</sub> H <sub>24</sub> O	184	2.95
2	21.68	Methyl 9-Cis,11-trans-octadecadienolate	C <sub>19</sub> H <sub>34</sub> O	294	0.35
3	23.69	4H-pyran-3-carboxylic, 6- amino-5-cyano-2-methyl- 4phenyl,benzyl ester	C <sub>21</sub> H <sub>18</sub> N <sub>2</sub> O <sub>3</sub>	346	.84
4	27.10	Medowlactone	C <sub>20</sub> H <sub>38</sub> O	310	3.64
5	29.45	Squalene	C <sub>30</sub> H <sub>50</sub>	410	62.36

**TABLE 2: BIOACTIVE COMPOUNDS DETECTED FROM CHLOROFORM EXTRACT OF A. HIRSUTUS FRUITS**

S. no.	RT (Min)	Name of compounds	Molecular Formula	Molecular Weight	Area %
1	7.30	4H-Pyran-4-one,2,3- dihydro-3,5-dihydroxy-6-methyl	C <sub>6</sub> H <sub>8</sub> O <sub>4</sub>	144	3.54
2	11.72	Hexadecanol	C <sub>16</sub> H <sub>34</sub> O	242	0.89
3	15.22	Cetene	C <sub>16</sub> H <sub>34</sub>	224	1.36
4	18.40	Heptadecenal	C <sub>17</sub> H <sub>32</sub> O	252	1.50
5	21.28	Heneicosene	C <sub>21</sub> H <sub>42</sub>	294	1.46
6	23.91	Heptacos-1-ene	C <sub>27</sub> H <sub>54</sub>	378	1.10
7	26.19	Sitosterol	C <sub>29</sub> H <sub>50</sub> O	414	23.21



**FIG. 2: GC-MS SPECTRUM OF PETROLEUM ETHER EXTRACT OF FRUITS OF ARTOCARPUS**



**FIG. 3: GC-MS SPECTRUM OF CHLOROFORM EXTRACT OF FRUITS OF ARTOCARPUS HIRSUTUS**

**CONCLUSION:** In the present investigation, twelve bioactive compounds have been identified from petroleum and chloroform extracts of

*Artocarpus hirsutus* by GC-MS. A significant difference between petroleum ether, and chloroform were observed. The presence of various

bioactive compounds in *A. hirsutus* proved that the pharmaceutical importance. However, further studies will require finding out its bioactivity, toxicity profile.

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**CONFLICT OF INTEREST:** The authors declare that there is no conflict of interest regarding the above article.

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