



## **Preliminary Phytochemical Screening of *Bauhinia Tomentosa* by GC- MS Analysis**

**Devika R<sup>1\*</sup>, Mohanapriya P<sup>2</sup> and Vemuri Lakshminarayana<sup>3</sup>**

<sup>1,2</sup>Department of Biotechnology, Aarupadai Veedu Institute of Technology,  
Paiyanoor, India

<sup>3</sup>Principal, Aarupadai Veedu Institute of Technology, Paiyanoor, India

**Abstract :** *Bauhinia tomentosa*(yellow bell) is an orchid tree found widely in Tropical countries of more than 300 species was selected as the plant source in the present investigation. The plant was segregated into leaf, stem and flower and were air dried and powdered. The powdered samples were subjected to methanolic extract and were analysed for phytochemicals using GC-MS. The methanolic extract registered the maximum number of phytochemicals than the flower and stem extracts. The retention time of the leaf extract varied from 2.5 to 25.5 during the period of study. The percentage area varied from 3 to 48.9 which revealed that the bioactive compounds are permanent and stable which can be used as alternate constituent in the manufacture of tablets and medicines.

**Keywords :** Phytochemicals, extract, GC-MS, peak, retention time, methanol.

### **Introduction**

Our Mother India has been recognized as the World's top mega diversified nation by its diverse agro climatic conditions, topography, latitude, longitude <sup>1,2</sup>. Medicinal plants extracts are used for minor to major ailments disease in all the developing countries for maintenance of personal health<sup>3</sup>. *Elaeocarpus ganitrus* Roxb commonly known as Rudraksha (in Hindi) or bead tree (in English) despite being a secret tree, it has great mythological and medicinal importance and are used in various ailments like stress, depression, nerve pain, migraine etc.<sup>4</sup> and this plant has been evaluated phytochemically and pharmacologically in support of its medicinal values<sup>5</sup>. *Vitex negundo* (verbenaceae) is significant for its therapeutic value in India, China, Nepal, Srilanka, Thailand, Malaysia and Eastern Asia <sup>6,7</sup> and the extract is used to treat rheumatoid, headache, bronchitis, cold, fever, cough etc.<sup>8,9</sup>. The tree *Olea europaea* L. is widespread in the Mediterranean countries as prime source of olive oil <sup>10,11</sup> and the leaves processes secondary metabolites such as oleuropein, oleacein, secoldridoid<sup>12-14</sup>. The recent trend in research is identification of phytochemicals in different fields of taxonomical analysis, chemosystematics, pharmacognosy and herbal quality control etc. <sup>15-17</sup> and these metabolites are known for its wider ethnic medicinal importance and biochemical uniqueness<sup>18,19</sup>. The genus *Casearia* extract is widely used in folk medicines since, Vedic era as antioxidant<sup>20</sup>, antimicrobial<sup>21</sup>, cytotoxic and anti- inflammatory <sup>22</sup> excellent hypoglycaemic effect <sup>23,24</sup>. In the present investigation *Bauhinia tomentosa* plant has been selected to prove that the plant has high therapeutic value inspite of its religious significance. The various parts of the plant (leaf, stem and flower) methanolic extract were subjected to GC-MS analysis to identify the various phytochemical presences.

## Materials and Methods

*Bauhinia tomentosa* commonly known as yellow bell orchid tree belongs to Fabaceae family and it is best versatile and most commonly used household remedy for many manifestations. These plants were found in coastal strip from Southern Kwazala- Natal to Maputo land, Mpumalanga, Mozambique, Zimbabwe, Tropical Africa, India and Srilanka.<sup>25</sup> This genus comprises of more than 300 species and is found in the tropical areas. The word “tomentosa” means hairy and it refers to the velvety/ hair pods. It is a small tree with maximum height of 4cm with drooping slender branches and scrambling stem usually are multi-stemmed. Leaves are greenish, deeply divided and elliptic in nature and entirely margined. Flowers are yellow bell shaped with large petals. The adult plants can tolerate a moderate amount of frost, but the seedlings and younger plants should be shielded from the frost. It prefers sunlight and needs a moderate amount of water.

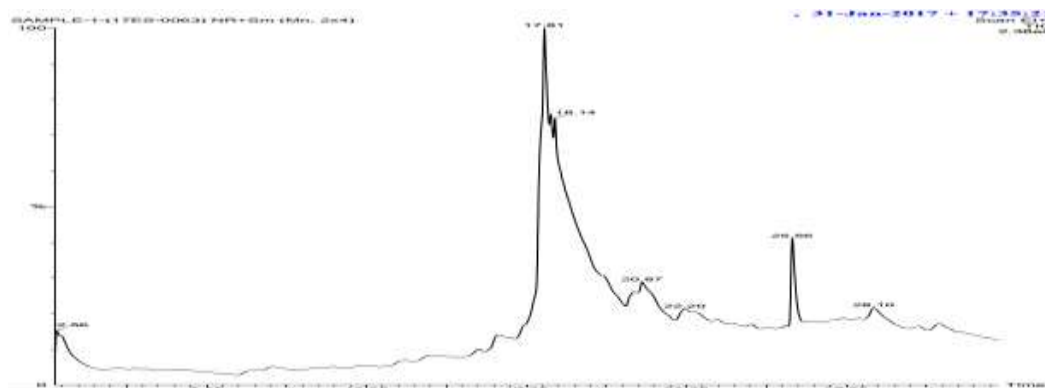
Diseased free plant *Bauhinia tomentosa* was collected from farming fields of Kanchipuram, Tamilnadu. The plant were cleaned in tap water, segregated into parts (leaf, stem and flower) and air dried for three to four weeks. Then dried plant parts were powdered and stored in air tight container by proper labelling for future investigation. A known amount of powdered samples (Leaf, Stem and Flower) were subjected for extraction by soaking into different solvents (methanol, ethanol and chloroform) for seven days. The extract was filtered by using Whatman No. 1 filter paper and used for various qualitative phytochemical analyses by using standard procedure and methanol extracts showed maximum 12 positive results out of 15 phytochemicals analysis. Then the methanol extracts were subjected to GC- MS analysis.

Gas chromatography – Mass spectrometry (GC- MS) analysis for methanol extracts was carried by using GC- MS - EI Clarus 680 model with column (Elite- 5MS) length (30.0m), diameter (0.25mm) and 250 micrometer and the components were separated by Helium as carrier gas at a constant flow of 1ml/min. The 1 micro litre of methanol extract sample (leaf, flower and stem) of *Bauhinia tomentosa* was injected into instrument. The spectrums of the components were compared with the database of spectrum of known components stored in the GC-MS NIST (2008) library.

## Results and Discussion

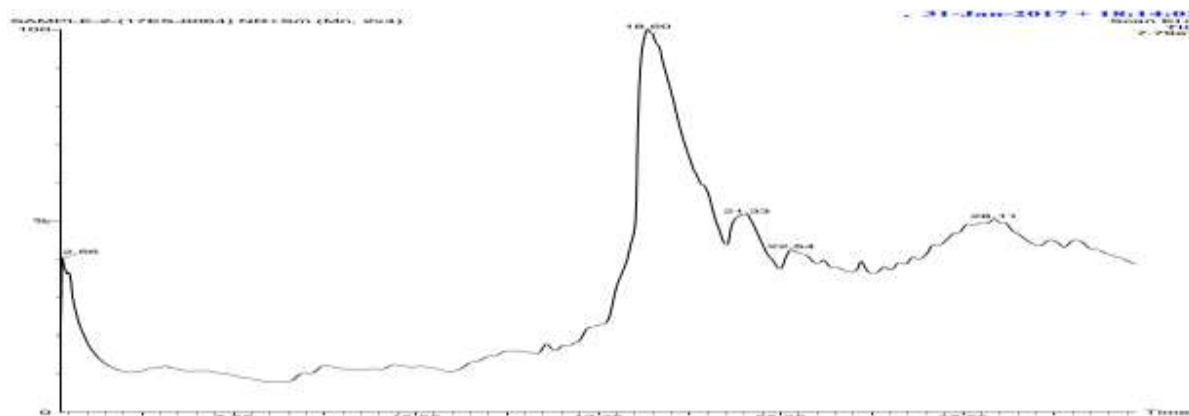
From the qualitative phytochemical analysis methanolic extract showed maximum 12 positive phytochemicals such as carbohydrate, tannins, saponin, flavonoids, alkaloids, quinine, cardiac glycerides, terpenoids, phenols, coumarins and steroids. Therefore, the methanolic extract of leaf, stem and flower of *Bauhinia tomentosa* were subjected to GC- MS analysis.

In the present study, the leaf registered maximum number of peaks and the stem and flower registered 3 maximum peaks with retention time and the area percentage. The leaf sample registered the highest peak obtained at the retention time of 17.795 with area percentage is 37.565 and the minimum peak obtained at retention time of 2.538 with area percentage is 3.002 and next the minimum peak was registered at 2.729 RT with 5.907 area percentage. The second maximum peak obtained at retention time of 18.140 with area percentage is 48.920 and to continue the peak was obtained at retention time of 25.548 with area percentage of 4.607. The GC-MS studies of *Ormocarpum sennoides* (leaf) shows that the leaf contains about 18 phytochemical compounds such as menthol, eudesmolmyrtenol, elemol, hotrienol, bisabool, octanol, geraniol and other compounds and these are responsible for antimicrobial, antifungal, antioxidant, antimutagenic, antiangiogenic, antitermitic and antiinflammatory and insecticidal activities<sup>26</sup>.



**Fig 1.GC- MS Analysis of Methanolic Leaf Extract of *Bauhinia tomentosa***

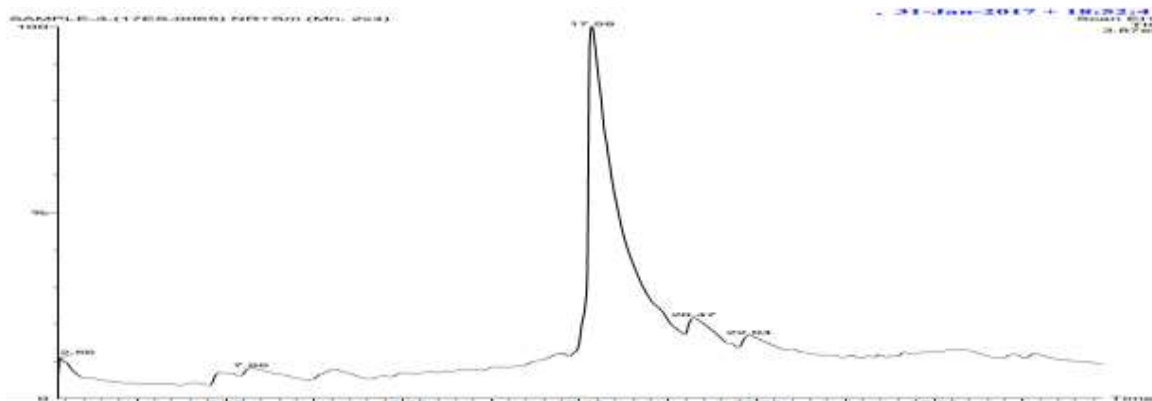
In the present investigation, the stem registered three peaks and the maximum peak was obtained at the retention time of 18.735 with area percentage is 88.592 and followed by a peak at retention time of 21.081 with area percentage is 5.074. The minimum peak obtained with area percentage of 6.335 at the retention time of 21.326.



**Fig 2.GC- MS Analysis of Methanolic Stem Extract of *Bauhinia Tomentosa***

The GC-MS studies of *Zehneria scabra* tuber hydroalcohol extract contains about 33 phytochemical compounds such as terpinolene, citral, nerol, hexanol, heptadiene, linalool oxide, geranyl acetate and other compounds and these compounds were responsible for antimicrobial, antifungal, sedative, antitumor, antioxidant and anti-inflammatory and insecticidal activities<sup>26</sup>.

The highest peak obtained at the retention time of 17.624 with area percentage 88.438 was registered in the flower sample and continued to that the peak registered at RT of 20.501 with area percentage 8.385. The peak obtained with 3.177 area percentage at retention time of 22.041.



**Fig 3. GC- MS Analysis of Methanolic Flower Extract of *Bauhinia tomentosa***

The GC- MS analysis of *Sphagnticola trilobata* methanolic flower extract registered 8- Octadecanone followed by Pentadeconoic acid, 5- $\alpha$  androstane, 2-cylo pentene-1- carboxylic acid, N-(3-Azepan 1-yl-1,4 dioxo-1,4-dihydro-napthalene-2-yl), 1,3-cyclotetradecanediane, Hydroxyandaracapimarinic acid, 2,3 Di (2,2 dimethyl ethyl thiophene 1,1,4 Benzyloxy phenyl acetone), Cyclohexane carboxylic acid and 7-Octadecynoic acid<sup>27</sup>.

## Conclusion

The GC- MS studies of *Bauhinia tomentosa* in the present investigation revealed that the methanolic extract of the leaf registered maximum number of phytochemicals than stem and flower. This has proved that the leaf has high therapeutic value and it can be utilized for various disease treatment after further critical clinical studies.

## References

1. Tripathi YC, Pratibha Shukla, Devesh Tewari. Phytochemical evaluation and antihyperglycemic effects of *Elaeocarpus ganitrus* Roxb (Rudraksha) in Streptozotocin induced diabetes. *Int.J. of Pharma and Pharmaceutical Sci.* 2015, 7(1); 280- 283.
2. UNESCO, Culture and Health, Orientation Texts. World Decade for cultural development 1988- 1997. Document CLT/DEC/PRO: 1996, p. 129.
3. Cowan MM. plant products as antimicrobial agents. *Clin. Microbial Rev.* 1999, 12 (4); 564- 82.
4. Swami G, Nagpal N, Rahar S, Singh P, Singla S, Parwal A, et al., *Elaeocarpus sphaericus* medical and scientific facts. *Der. Pharm. Let.* 2010, 2; 297- 306.
5. Tewari D, Kumar P, Sharma P. Pharmacognostical evaluation of *Elaeocarpus sphaericus* (rudraksha) leaves. *Int. J. of Pharm. and Phytochem. Res.* 2013, 5(3); 147- 50.
6. Harsha LAD, Deepti Dixit, Ankita Joshi, Deepak Bhatnagar. Antioxidant and anti-inflammatory effects of *Vitex negundo* or freund's complete adjunct induced arthritis. *Int. J. of Pharma and Pharmaceutical Sci.* 2015, 7(1); 81- 85.
7. Sabins M, Chemistry and Pharmacology of Ayurvedic medicinal plants. Ist Ed. Varanasi: Chaukambha Amarbharathi Prakashan. 2006, 363- 366.
8. Tandon VR. Medicinal Uses and Biological Activities of *Vitexnegundo*. *Nat Prod Radiance.* 2005, 4;162- 165.
9. Kale M, Rathore N, John S, Bhatnagar D. Lipid peroxidative damage on pyrethroid exposure and alteration in antioxidant status in rat erythrocytes a possible involvement of reactive oxygen speies. *Toxicol.Lett.* 1999, 197- 205.
10. Ghazghazi Hanene, ChediaAqvadhi, Safa Hamrouni, WissemMnif. Antibacterial, antifungal and antioxidant activities of *Tunisian olea Eurpaea* sps.,*Oleaster* fruit pulp and its essential fatty acids. *Int.J. of Pharma and Pharmaceutical Sci.* 2015, 7(1); 52- 55.

11. Silva S, Games L, Leitio F, Coelbo AV, Vilas Boss L. Phenolic compounds and antioxidant activity of *Olea uropora* L fruits and leaves. Food Sci. Tech. Int. 2006, 12; 385- 96.
12. Hansen K, Adversen A, Christensen B, Broeogger S, Rosendal JS, Nyman U, et al., Hypoglycemic activity of olive leaf. Planta. Med. 1992, 58; 513- 515.
13. Benavente Garcia O, Castillo J, Lorente J, Ortuno A. Del Rio JA. Antioxidant activity of phenolics extracted from *Olea europaea*L. leaves. Food Chem. 2000, 68; 457- 462.
14. Altarejos A, Saldo S, Perez- Banilla M, Linares Palomino PI, Van Beek TA, Noguera M, et al., Preliminary assay on the radical scavenging activity of olive wood extracts. Fitoterapia. 2005, 76; 348- 51.
15. VinarsDawane, Fulekar MH. High Performance Thin Layer Chromatography (HPTLC) fingerprinting pattern of mangrove *Avicennia marina*. Int. J. of Pharma and Pharmaceutical Sci. 2017, 9(4); 65- 72.
16. Bandarnayake WM. Bioactivities, bioactive compounds and chemical constituents of mangrove plants. Wetland Ecol.Manoge. 2002, 10; 421- 53.
17. Monika WK, Joseph S, Teresa K. Thin Layer Chromatography in Phytochemistry. Vol. 99. CRC Press. Taylor and Francis Group. London. 2008, 1- 10.
18. Bandarnayake WM. Traditional and medicinal uses of mangroves. Mangroves Salt Marshes. 1998, 2; 133- 48.
19. Fabricant DS, Farnsworth NR. The Value of Plants used in traditional medicine for drug discovery. Environ.Hlth.Persp. 2001, 109 (1); 69- 75.
20. Lixia, QiangGuo, Pengfei TU, Xingyum Chai. The genus *Casearia*: a phytochemical and pharmacological overview. Phytochem. Rev. 2015, 14; 99- 135.
21. Oberlies NH, Burgess JP, Nawarro HA, Pinos RE, Fairchild CR, Peterson RW, et al., Novel bioactive clerodanediterpeneoids from the leaves and twigs of *Caseariasylvestris*. Nat. Prod. 2002, 65; 95- 99.
22. RituTyagi, AbhaShukla, Rishi Kumar Shukula. Phytochemical screening and pharmacological evaluation of different extracts of plant *Casearia tomentosa* leaves. 2017, 9(4); 166- 171.
23. Prakasam A, Sethupathy S, Pugalendi KV, Antihyperglycaemic effect of *Casearia exculenter* root extracts in streptozocin induced diabetic rats. Pharmazie. 2002, 57; 758- 60.
24. Chandramohan Govidasamy, Khalid S AL- Numaira, Mohammed A Alsaif, Kodukkur Pugalendi Viswanathan. Influence of 3- hydroxymethyl xylitol, a novel antidiabetic compound isolated from *Casearia esculenta* (Roxb) root, on glycoprotein components in streptozotocin diabetic rats. J. Asian Nat. Prod. Res. 2011, 13; 700- 706.
25. Rita Anusha Grace N, Santhi Swaroop.M ,Vijaya Lakshmi N. A Review On *Bauhinia T omentosa*Linn. Int. J. of Universal Pharmacy and Bio Sci. 2014, 3(4); 13-16.
26. Thamacin Arulappan M, JohnBritto S, IgnaceKindo.Gc-MS Analysis Of Phytochemical Compounds Present In *ZehneriaScabra* (L.F.) Sond. (Tuber), *Ormocarpum Sennoides* (Willd) Dc. (Leaf) and *Bauhinia tomentosa* L. (Leaf). European J. of Biomed.and Pharmaceutical Sci. 2014, 1(2); 324- 342.
27. Devika R, Krishnapriya S, Padmapriya M and Sugashini PK.Phytochemical Screening Of Bioactive Compounds From *Sphagneticola trilobata* By GC-MS Analysis. Int. J. of Pharmaceutical Sci and Hlth. Care. 2106, 6(4);s32- 36.

\*\*\*\*\*