Phytochemical and GCMS analysis of bioactive compounds in methanolic extract of *Syzygium laetum* (Buch. - Ham.) Gandhi leaves

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Abstract: *Humans have been intrigued by phytochemicals from the Syzygium genus (Myrtaceae) for thousands of years due to their diverse applications. The biological activity of plants is varied, including anti-inflammatory, diuretic, antifungal, antibacterial, and antimicrobial effects. There have been no reports on the phytochemical profiling of the Southern Ghats endemic, Syzygium laetum. This study aimed to examine the phytoconstituents of S. laetum leaves. The GC-MS analysis of S. laetum leaves chromatograms revealed the presence of eleven peaks including Methyl 2-hydroxy-octadeca-9,12,15-trienoate, 2,2-Dimethyl-3-vinyl-bicyclo[2.2.1]heptane, Lupeol, Cholest-4-en-3-one, and 3-Pentadecylphenol. Phytochemical analysis reveals the existence of several pharmacologically active bioactive compounds, such as alkaloids, tannins, glycosides, phenolics, carbohydrates, essential oil, reducing sugar, and saponins, and that might be responsible for their bioactivity.*

Keywords*: Syzygium laetum, endemic, phytochemical, GCMS, alkaloids, tannins, phenolics, lupeol*

Introduction: The demand for medicinal plants has significantly expanded to meet the rising demand for producing contemporary medications and exporting them. Since ancient times, traditional medicines have served as the mainstay of traditional herbal therapy among rural people around the world. Ancient traditional medical practices including Ayurveda, Chinese medicine, and Egyptian medicine all made extensive use of natural ingredients. Bioactive chemicals used in the development of several active medicinal components are primarily sourced from plants (Ranjitha et al. 2016). The plant resource *Syzygium* is thought to be significant and fruitful. Many different phytomolecules with a wide spectrum of biological effects are widely believed to be present in these plants. The Western Ghat endemic *Syzygium laetum* (Buch.-Ham.) Gandhi leaves were selected in this study for the phytochemical profiling and unraveling of the medicinal properties of *S. laetum*. The *Syzygium laetum* (Buch. - Ham.) Gandhi is an endemic medium-

sized tree that may be found in Kerala's third-largest wildlife sanctuary, Parambikulam. There were no investigations on the leaves of *S. laetum*, according to a review of the literature. So that the phytochemical profiling of the plant could be examined, the following tests were carried out.

Methodology: The collected leaves of *S. laetum* were shade dried and powdered. The soxhlet extraction method was used to extract the leaves using methanol, and distilled water. After the extraction, the solvent was evaporated using a rotary evaporator. The qualitative, quantitative, and GCMS analyses were determined. The extracts were subjected to qualitative phytochemical analysis using the usual techniques. The extracts were examined for alkaloids, tannins, glycosides, phenolics, carbohydrates, essential oil, reducing sugar, and saponins. By using standard methods, the total alkaloids, tannins, glycosides, phenolics, reducing sugar, and total carbohydrates were monitored in the leaves of S. *laetum* (Harborne 1998). GCMS analyses were carried out using standard procedures described by Mir et al. (2020). Shimadzu QP2010S was used for the analysis, along with a gas chromatograph interfaced with a mass spectrometer, and a Column Elite-5MS capillary column (30 ml × 0.25 mm ID x 0.25 m df).

Results and discussion: The common phytoconstituents found in this study include alkaloids, tannins, glycosides, phenolics, carbohydrates, essential oils, reducing sugars, and saponins (Table 1). More bioactive components are included in methanolic extracts of *S. laetum* leaves. Through several processes, phytochemicals' combined effect may boost a range of biological traits. The largest phytocompounds found in medicinal plants, phenolic compounds are the strongest hydrogen donors and make good antioxidants (Shanthi et al. 2014). The methanolic extract of *S. laetum* leaves reported 126.31 µg/mg alkaloids, 187.4 µg/mg tannins, 265.21 µg/mg glycosides, 93.3 µg/mg phenol, 71.33 mg/g total carbohydrate, and 1.8 mg/g reducing sugar. The results indicate that *S. laetum* leaf has significant glycosides, tannins, alkaloids, and phenolic content, which could explain its various biological activities including antioxidant, anti-diabetic, anti-cancer, anti-

inflammatory, and anti-microbial potential. Similar findings were reported in other species of *Syzygium* (Ramya et al. 2012).

Table 1: Secondary metabolites in the *Syzygium laetum* leaf

Secondary metabolites	**Extracts**	
	Methanol	**Distilled water**
Alkaloids	+	+
Tannins	+	+
Glycosides	+	-
Phenolics	+	+
Carbohydrates	+	+
Essential oil	+	+
Reducing sugar	+	+
Saponins	-	+

(+: Presence; -: Absence)

The GC-MS analysis of *S. laetum* leaf chromatograms revealed the presence of eleven peaks (Table 2). The mass-spectral databases of the peaks were compared to the Wiley 8 and NIST libraries to identify and characterize the peaks. By comparing the compounds' retention times and peak areas to those reported in the literature as well as by analyzing mass spectra, the compounds were identified.

The major constituents are Methyl 2-hydroxy-octadeca-9,12,15-trienoate (71.82%) and 2,2-Dimethyl-3-vinyl-bicyclo[2.2.1]heptane (12.22%). Lupeol, Cholest-4-en-3-one, and 3-Pentadecylphenol were also present in significant quantities. These all have antioxidant, antidiabetic, antimicrobial, anti-inflammatory, and anticancer properties. Similar studies were reported by various researchers including Pinto et al. (2017) and Beulah et al. (2018).

Table 2: GC-MS result of *Syzygium laetum* leaves

Compound name	**Molecular formula**	**Retention time**	**Peak area (%)**	**Molecular weight (g/mol)**
Phytol, acetate	$C_{22}H_{42}O_2$	26.620	0.63	338.6

3,7,11,15-Tetramethyl-2-hexadecen-1-o	$C_{20}H_{40}O$	27.128	0.18	296.5
Neophytadiene	$C_{20}H_{38}$	27.493	0.20	278.5
Methylpalmitate	$C_{17}H_{34}O_2$	28.412	0.23	270.5
3-Pentadecylphenol	$C_{21}H_{36}O$	38.420	1.15	304.5
2,2-Dimethyl-3-vinyl-bicyclo[2.2.1]heptane	$C_{11}H_{18}$	41.121	12.22	150.26
Methyl 2-hydroxy-octadeca-9,12,15-trienoate	$C_{19}H_{32}O_3$	41.297	71.82	308.5
Lupeol	$C_{30}H_{50}O$	42.955	9.13	426.7
(-)-Globulol	$C_{15}H_{26}O$	43.744	0.88	222.37
5-Isopropenyl-3,8-Dimethyl-1,2,3,3a,4,5,6,7-Octahydroazulene	$C_{15}H_{24}$	44.246	0.40	204.351
Cholest-4-en-3-one	$C_{27}H_{44}O$	45.913	3.16	384.6

Conclusion: The current work presents the first-ever phytochemical profile and GCMS analysis of *S. laetum* leaves. By using qualitative, quantitative, and GCMS investigations, the potential origins of bioactive compounds were discovered. Alkaloids, tannins, glycosides, phenolics, carbohydrates, essential oil, reducing sugar, and saponins were present in the methanol extracts of *S. laetum* leaves. The major phytoconstituents from GCMS analysis were Methyl 2-hydroxy-octadeca-9,12,15-trienoate (71.82%) and 2,2-Dimethyl-3-vinyl-bicyclo[2.2.1]heptane (12.22%). Significant amounts of lupeol, cholest-4-en-3-one, and 3-pentadecylphenol were also found. The findings of the present investigation demonstrated that *S. laetum* may have significant antioxidant, antidiabetic, antimicrobial, anti-inflammatory, and anticancer properties

References

Beulah GG, Soris PT, Mohan VR. (2018). GC-MS Determination of bioactive compounds of *Dendrophthoe falcata* (L.F) Ettingsh: An Epiphytic Plant. International Journal of Health Sciences and Research. 8: 261-269.

Harborne AJ.(1998). Phytochemical methods a guide to modern techniques of plant analysis, 3rd edn. Springer Netherlands https://www.springer.com/ gp/book/9780412572609. Accessed 5 Sept 2019.

Mir MA, Bashir N, Alfaify A, Oteef MDY. (2020). GC-MS analysis of *Myrtus communis* extract and its antibacterial activity against Gram-positive bacteria. BMC Complementary Medicine and Therapies. 20: 1-9. https://doi.org/10.1186/s12906-020-2863-3.

Pinto MEA, Araújo SG, Morais MI, Sa NP, Lima CM, Rosa CA, Siqueira EP, Johann S, Lima LARS. (2017). Antifungal and antioxidant activity of fatty acid methyl esters from vegetable oils. Annals of the Brazilian Academy of Sciences. 89: 1671-1681.

Ramya S, Neethirajan K, Jayakumararaj R. (2012). Profile of bioactive compounds in *Syzygium cumini* -A review. Journal of Pharmacy Research. 5:4548-4553.

Ranjitha MC, Akarsh S, Prashith Kekuda TR, Darshini SM, Vidya P. (2016). Antibacterial activity of some plants of Karnataka, India. Journal of Pharmacognosy and Phytochemistry. 5(4): 95-99.

Shanthi S, Maddali R, Fatima Grace X, Alekya PT, Latha S, Chamundeeswari D. (2014). pharmacognostical and preliminary phytochemical studies on stem bark of *Eugenia jambolana*. International Journal of Pharmaceutical Sciences Review and Research. 29(1):74-76.