

Exploration Of Bioactive Phytoconstituents In *Colebrookea Oppositifolia* Sm. Through GC–MS Analysis

Dr. Vijaya P. Chavan¹, Dr N.H. Shahare²

¹Department of Botany, Shri R. R. Lahoti Science College, Morshi, Dist- Amravati (M.S.), India

²Department of Botany, Brijlal Biyani Science College, Amravati, (M.S.), India

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Abstract—Ethnomedicine, the traditional practice of using medicinal plants and remedies derived from cultural knowledge, has demonstrated remarkable efficacy in addressing a wide spectrum of diseases. Drawing from a diverse range of sources, this section explores the implementation and effectiveness of ethnomedicine in various diseases, shedding light on the profound impact of integrating ancestral wisdom with modern healthcare practices.

Index Terms—*Colebrookea oppositifolia* Sm., Ethnomedicine, GC-MS analysis.

I. INTRODUCTION

Ethnomedicine is like a treasure trove of traditional healing wisdom found in different cultures around the world. In this review, the study will take a closer look at how communities have used their local knowledge, plants and rituals to stay healthy for generations. By studying these practices, present study can learn valuable lessons about how people have taken care of their health in the past and how it can still be relevant today.

This shrub can grow up to 2.5 meters tall and is soft-pubescent or velutinous, lacking glands throughout. The young stems are quadrangular. The leaves measure 10-20 x 5-8 cm, with a cuneate base and acuminate apex, dark green on the upper surface and whitish canescent below. The petioles are thick and range from 1-3 cm in length. The flowers are greenish-white to mauve and often gynodioecious. The panicles are widespread, with slender spikes that are 5-10 cm long in flower and up to 15 mm wide in fruit. The pedicels are about 0.5 mm or less. The calyx measures 1-2 mm in flower, with teeth that enlarge to about 6 mm and become prominently plumose in fruit. The corolla is whitish, measuring 1.5-2 mm. The nutlets are about 0.5 mm long, obovoid, not trigonous, and

densely pilose, often with only one developing methanol and was used for GC-MS analysis of *Colebrookea oppositifolia* leaves and they confirm occurrence of carbohydrates, protein and amino acid, fats, sterols, terpenoids, alkaloids, phenols, tannins, flavonoids, and anthocyanins except saponins, anthraquinones and cardiac glycosides.

II. MATERIAL AND METHODS

Preparation of Plant Samples

Plant samples were placed in shade area for air dry for a period of approximately 2-3 weeks as per season. Dry samples were mechanically pulverized to coarse powder using an electric grinder (Parekh and Chanda in 2007). Coarse powder was packed in air tight container and kept in dry place away from sunlight until further used. During further analysis, coarse sample was retrieved from sealed container and powdered using a mixer grinder.

Extraction of Phytochemicals for GC-MS analysis

The extraction of phytochemical compounds was performed utilizing the conventional Soxhlet extraction method. About 30 grams of plant powder were meticulously packed into a thimble and securely positioned within a specialized Soxhlet extractor. Six distinct solvents viz. Water, ethanol, methanol, acetone, petroleum ether and chloroform were opted for extraction process, each chosen for its specific properties. Subsequently, each solvent underwent 6-hour circulation through the plant material, persisting until the solvent within the upper chamber achieved colorlessness. (Mahire and Patel, 2020).

GCMS Analysis

To gain a deeper understanding of the chemical composition of the plant extracts, Gas

Chromatography-Mass Spectrometry (GCMS) analysis was conducted (Konappa et al., 2020). This comprehensive analysis was performed at IIT Powai Mumbai.

III. OBSERVATION AND RESULTS

Total 13 compounds were identified using GC-MS analysis of methanol extract of *C. oppositifolia* leaves. The chromatogram is represented in Fig-1.1 whereas, retention time, names of the compound, peak area, molecular weight (MW) and molecular formula and are shown in table 1.1

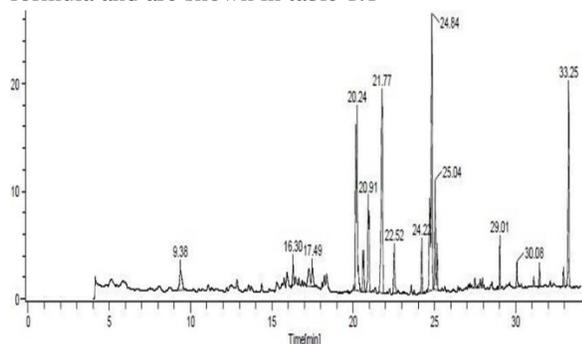
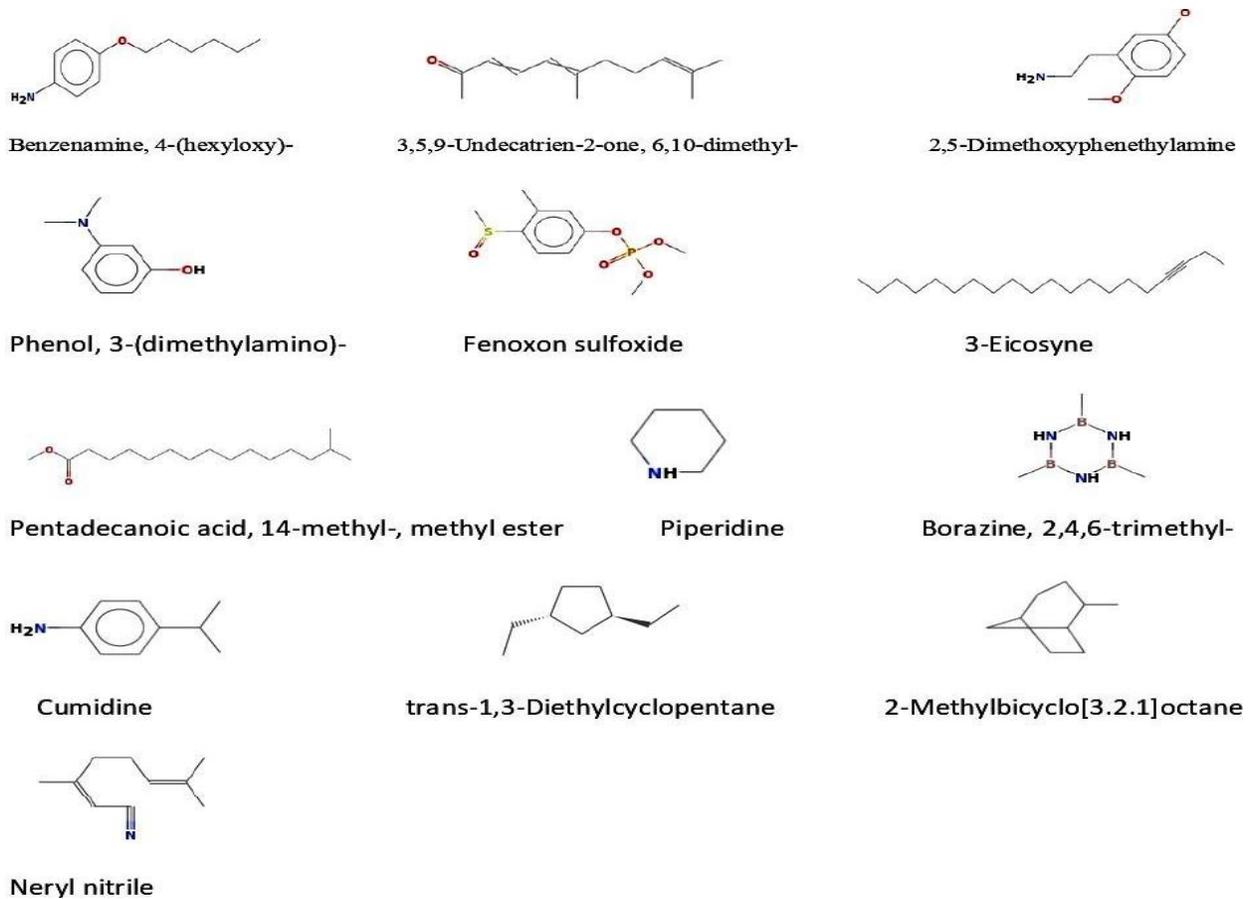
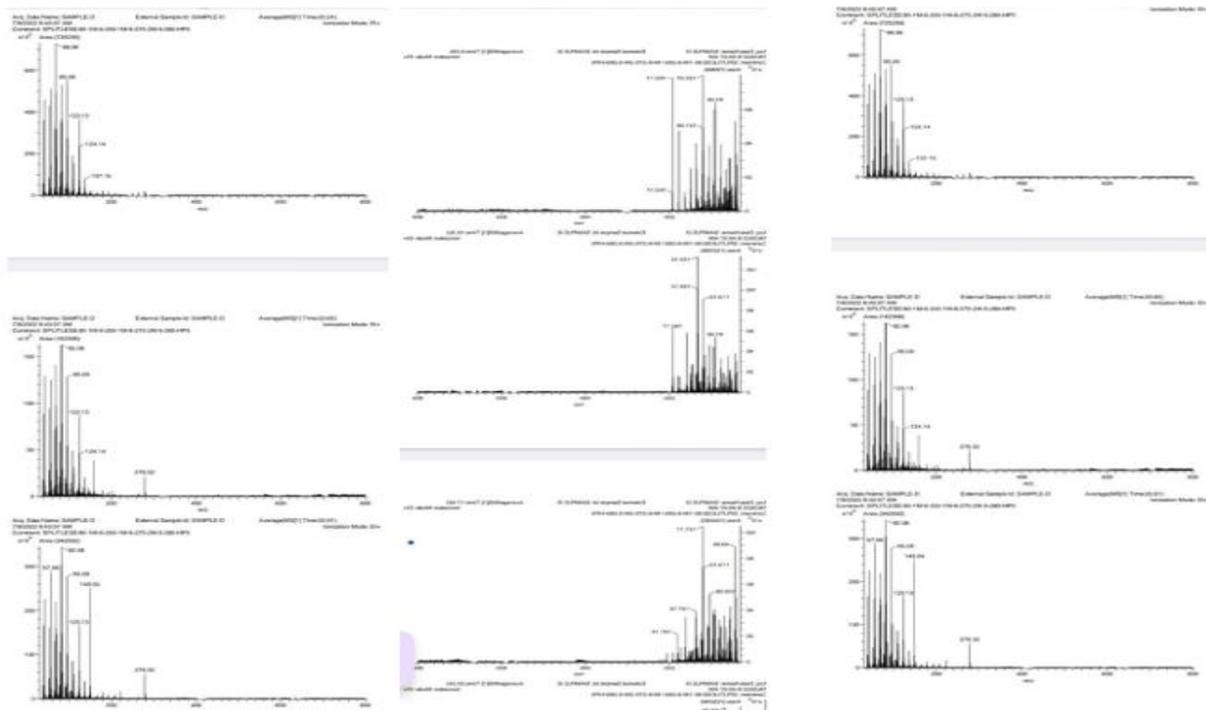


Figure.1: GC-MS chromatogram of methanolic extract of *C. oppositifolia*.

Following phyto compounds were observed in the GC-MS investigation of methanolic extract of *C. oppositifolia* leaves viz. Benzenamine, 4- (hexyloxy)-; 3,5,9-Undecatrien-2-one, 6,10-dimethyl-; 2,5-Dimethoxyphenethylamine; Phenol, 3- (dimethylamino)-; Fenoxon sulfoxide; 3-Eicosyne; Pentadecanoic acid, 14-methyl-, methyl ester; Piperidine; Borazine, 2,4,6-trimethyl-; Cumidine; trans-1,3- Diethylcyclopentane; 2-Methylbicyclo [3.2.1] octane; and Neryl nitrile. Structure of above cited compounds are given below.

Table 1.: Retention time, Compounds name, Molecular weight and formula identified from methanolic extract of *C. oppositifolia*.

Sr. No.	R.T.	Compound	% Peak area	Molecular weight	Formula
1	9.38	Benzenamine, 4- (hexyloxy)-	5.54	193.17	C ₁₂ H ₁₉ NO
2	16.30	3,5,9-Undecatrien-2-one, 6,10-dimethyl-	8.95	192.17	C ₁₃ H ₂₀ O
3	17.49	2,5- Dimethoxy phenethylamine	0.21	181.14	C ₁₀ H ₁₅ NO ₂
4	20.24	Phenol, 3- (dimethylamine)-	29.88	137.15	C ₈ H ₁₁ NO
5	20.65	Fenoxon sulfoxide	1.27	278.32	C ₁₀ H ₁₅ O ₅ PS
6	20.91	3-Eicosyne	3.99	278.32	C ₂₀ H ₃₈
7	21.77	Pentadecanoic acid, 14-methyl-, methyl ester	11.50	270.28	C ₁₇ H ₃₄ O ₂
8	22.52	Piperidine	2.55	85.07	C ₅ H ₁₁ N
9	24.22	Borazine, 2,4,6-trimethyl-	5.27	123.13	C ₃ H ₁₂ B ₃ N ₃
10	24.84	Cumidine	10.86	135.13	C ₉ H ₁₃ N
11	25.04	trans-1,3- Diethyl cyclopentane	2.23	126.15	C ₉ H ₁₈
12	29.01	2- Methylbicyclo[3.2.1]octane	11.50	124.14	C ₉ H ₁₆
13	33.25	Neryl nitrile	1.91	149.15	C ₁₀ H ₁₅ N

Figure 2: Structures of compounds detected from *Colebrookea oppositifolia*.Figure 3: Mass spectra of *Colebrookea oppositifolia*.

IV. CONCLUSION

GC-MS investigation of methanolic extract of *C. oppositifolia* leaves reported 13 compounds viz. Benzenamine, 4-(hexyloxy)-; 3,5,9-Undecatrien-2-one, 6,10-dimethyl-; 2,5-Dimethoxyphenethylamine; Phenol, 3-(dimethylamino)-; Fenoxon sulfoxide; 3-Eicosyne; Pentadecanoic acid, 14-methyl-, methyl ester; Piperidine; Borazine, 2,4,6-trimethyl-; Cumidine; trans-1,3-Diethylcyclopentane; 2-Methylbicyclo [3.2.1] octane; and Neryl nitrile. Amongst these cited compounds, 3,5,9-Undecatrien-2-one, 6,10-dimethyl is relatively unique compound but similar compound has been reported Ishtiaq et al. (2020) in essential oils of *C. oppositifolia*. Among the identified compounds from the GC-MS analysis of *C. oppositifolia* leaves, several have been reported to possess bone healing, anti-arthritis, or anti-inflammatory properties. Phenol and its derivatives are known for their anti-inflammatory properties. A study by Liu et al. (2017) demonstrated that phenolic compounds could reduce inflammation and oxidative stress in various models, which is crucial for conditions like arthritis and other inflammatory diseases. Piperidine and its derivatives have shown potential in modulating inflammatory responses. Mali et al. (2020) investigated the anti-arthritic effects of piperidine derivatives and found that they could significantly reduce joint inflammation and pain. Fatty acids, including those with methyl esters, have been associated with bone health. Zhao et al. (2018) discussed the role of fatty acids in bone metabolism and found that certain fatty acids promote bone healing and regeneration. Cumidine, while less studied, has been suggested to have anti-inflammatory properties. Valko et al. (2006) reviewed various compounds, including cumidine, and discussed their potential in reducing inflammation and oxidative stress. The presence of Phenol, 3-(dimethylamino)-; Piperidine; Pentadecanoic acid, 14-methyl-, methyl ester; and Cumidine in the methanolic extract of *C. oppositifolia* highlights its potential for anti-inflammatory, anti-arthritis, and bone healing applications. Further research and clinical studies are warranted to explore these properties in depth and validate their efficacy in medicinal applications. GC-MS analysis of *C. oppositifolia* leaf reported 13 compounds out of which Phenol, 3-(dimethylamino)-; Piperidine; Pentadecanoic acid, 14-methyl-, methyl ester; and

Cumidine had strong bone healing potential.

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