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PRELIMINARY PHYTOCHEMICAL AND PHARMACOGNOSTIC INVESTIGATION OF INDIAN CHARCOAL TREE

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ABSTRACT
Medicinal plants are used to treat variety of ailments from the prehistoric period. The standardization of a crude drug involves Pharmacognostic methods such as organological, physico– chemical and phytochemical analysis. The present investigation aimed to analyse the medicinal plant, Indian charcoal tree, *Trema orientalis* (L.) Bl. by organological, physico – chemical and phytochemical analysis. Phytochemical tests showed the presence of terpenoids, reducing sugars, sugars, alkaloids, phenolic compounds, saponins, tannins, anthroquinones and amino acids. The present study on fluorescence analysis, physico-chemical determination and preliminary phytochemical screening can be used as a diagnostic tool in the correct identification of plants.

KEYWORDS: Ulmaceae, *Trema orientalis*, Phytochemical, Physicochemical.

INTRODUCTION
Pharmacognosy is the study of plant based medicines. *Trema orientalis* is an evergreen tree which belongs to the family Ulmaceae. In Tamil it called as Munnai *or* Amathalai. It is used locally for the treatment of malaria.[1] Similarly it also used to cure asthma and bronchitis.[2] It has an *in-vitro* antimalarial activity.[3] Ihe root of *T. orientalis* plants is used in folk medicine for treatment of trauma, blood stasis, hematuria and bleeding of intestines and stomach.[4] The stem bark decoctions are used as vermifuge and anti-dysenteries.[5] The stems and twigs infusion are used to treat fever and toothache.[6] The present study includes the organoleptical, physico – chemical and phytochemical analysis.

MATERIALS AND METHODS
Mature and healthy leaves, stems and roots of *Trema orientalis* were collected in the month of February from the foot hill of Western Ghats, Tirunelveli District, Tamil Nadu. The identified plant species was confirmed with Voucher specimen available in the Department of Botany, Rani Anna Govt. College for women, Tirunelveli. The specimens were authentified by Dr. M. Padma Soma Subramanian, Research Officer (Scientist-II) in Botany, (CCRS, Govt. of India), Mettur Dam. The collected plant materials were shade- dried to retain its vital phytoconstituents and then subjected to size reduction for further extraction process. The powdered plant material was sieved for uniform size and includes for organoleptic study. The fluorescence analysis was also studied by standard method.[7] Physico-chemical analysis was carried out by standard procedure.[8] The preliminary phytochemical analysis was done by the methods described by.[9,10]

Extraction of plant material: The dried powder of *Trema orientalis* leaves, stem and roots were charged into the thimble of a Soxhlet apparatus and continuously extracted using petroleum ether, benzene, chloroform and methanol. The extract was then transferred into the previously weighed empty beaker and evaporated to a thick paste on the water bath, maintained at 50°C to get respective solvent extract. The extract was finally air dried thoroughly to remove all traces of the solvent, and the percentage yield was calculated. The perfectly dried extract was then stored in an airtight container in a refrigerator below 10°C. Distilled water extract prepared by boiling the shade dried powder for 2 hours in water bath. It was filtered and concentrated.

OBSERVATIONS AND RESULTS
Macroscopic study: *Trema orientalis* (Indian charcoal tree) is a tree grows up to 18 m tall. The wood is very light and somewhat stringy, pinkish in colour. Bark is smooth and light grey. The leaves are simple, alternate, stipulate and 3 nerved from the base. Leaves taper from the base to the apex, and vary from 60 to 150 mm long and 25 to 50 mm wide. Leaf margins are finely serrated, and the young leaves are rough and hairy. Flowers are small, inconspicuous and greenish, carried in short dense bunches. They are usually unisexual, i.e. male and

female are separate, occasionally they are found together. Fruits are small, round and green, becoming black when ripe.

The taxonomic features collected from the species have been confirmed with the Flora of Presidency of Madras.[11,12]

Synonyms

Celtis orientalis Linn.
Celtis guineensis Schum. and Thonn.
Trema bracteolate Hochst Blume
Sponia orientalis (Linn.) Decne.
Trema guineensis (Schum. and Thonn.) Ficalho.

Distribution

This tree has a very wide distribution, occurring from tropical Africa southwards to South Africa and eastwards to southern Asia, Australia and the Western Ghats throughout.

Powder analysis

Purified powder was evaluated as per WHO guidelines. The organoleptic evaluations means conclusions drawn from studies resulted due to impression on organs of senses. The color, texture, odour and taste of the plant powder were analyzed. It is presented on a Table 1.

Table. 1: Powder analysis.

S. No.	Particulars	Plant part		
		Leaf	Stem	Root
1	Color	Green	Yellowish green	Brown
2	Odour	Agreeable smell	Agreeable smell	Agreeable smell
3	Taste	Bitter	Slightly bitter	Bitter
4	Texture	Smooth	Coarse	Coarse

Fluorescence analysis

The behavior of the powdered leaf, stem, root samples in different solution and their extracts towards ordinary light and U.V light (365 nm) were observed and the results were recorded in Table 2. It can be as a diagnostic tool for testing the adulterations.

Table. 2: Fluorescence analysis.

S.No	Treatment	Plant part	Under visible light	Under UV light
1	Powder + Petroleum ether	Leaf	White	Pale yellow
		Stem	Light green	Dark green
		Root	White	Light brown
2	Powder + Benzene	Leaf	Light green	Dark green
		Stem	Yellowish green	Green
		Root	Light brown	Brown
3	Powder + Chloroform	Leaf	Dark green	Deep brown
		Stem	Light green	Dark green
		Root	Light brown	Dark brown
4	Powder + Methanol	Leaf	Dark green	Brownish green
		Stem	Yellowish green	Light green
		Root	Brown	Dark brown
5	Powder + 5%$FeCl_3$	Leaf	Orange	Dark orange
		Stem	Orange	Orange
		Root	Brown	Dark brown
6	Powder + acetone	Leaf	Green	Greenish brown
		Stem	Dark green	Dark green
		Root	Yellow	Greenish yellow
7	Powder + 1N HCL	Leaf	White	White
		Stem	White	White
		Root	Yellow	Greenish brown
8	Powder + 1N NaOH (dis.water)	Leaf	Light green	Deep brown
		Stem	Dark green	Dark green
		Root	Brown	Yellowish brown
9	Powder + Con. HNO_3	Leaf	Dark green	Black
		Stem	Dark green	Greenish black
		Root	Brown	Deep brown
10	Powder + 1N NaOH(ethyl alcohol)	Leaf	Light green	Dark green
		Stem	Dark green	Dark green
		Root	Brown	Yellowish brown

11	Powder + 5% iodine	Leaf	Light green	Dark green
		Stem	Pale yellow	Green
		Root	Light brown	Brownish green
12	Powder + 1% H_2SO_4	Leaf	Light brown	Dark brown
		Stem	White	White
		Root	Brown	Brown
13	Powder + Dil. Ammonia	Leaf	Greenish yellow	Light green
		Stem	Blackish green	Dark green
		Root	Light yellow	Brown
14	Powder + dis. water	Leaf	White	White
		Stem	White	Yellowish white
		Root	Light brown	Dark brown
15	Powder + acetic acid	Leaf	Greenish black	Black
		Stem	Yellowish green	Dark green
		Root	Dark brown	Dark brown
16	Powder as such	Leaf	Light green	Dark green
		Stem	Green	Dark brown
		Root	Brown	Black

Physico - chemical analysis

Ash values are helpful in determining the quality and purity of crude drugs, especially in the powered form. The different physico-chemical standards and solvent extractive value were presented in Table 3. Extractive value of leaf, stem and root powders are high in methanol extract whereas very low in chloroform extract.

Table. 3: Physico - chemical analysis.

S.No	Test	Leaf %	Stem %	Root %
1	Total ash	14.05	12.59	16.59
2	Water soluble ash	2.05	2.2	3.35
3	Acid insoluble ash	1.485	8.35	1.35
4	Sulphated ash	1.615	9.85	3.76
5	Moisture content	37.5	30.13	41.0
6	Water soluble extractive value	6.8	5.0	5.35
7	Alcohol soluble extractive value	8.3	5.35	5.65
Extractive value				
8	Petroleum ether	2.721	1.64	2.19
9	Benzene	0.52	0.87	1.07
10	Chloroform	0.12	0.27	0.43
11	Methanol	6.718	8.123	13.75
12	Dis. water	0.18	0.53	0.97

Preliminary phytochemical screening

Phytochemical screening study on various extracts of plant powder was showed significant results. The results are presented in Table 4. Chloroform extract of root shows the presence of terpenoids and saponins. Saponins are present all root extracts. Presence of tannins reported in chloroform and methanol extract of stem and leaf. Catechins is absent in all extracts. Amino acids are reported in the benzene and methanol extracts of leaf and stem. Phenol is absent in petroleum ether and methanol extract of all plant parts. Previous report on the leaves of *T. orientalis* also exhibits the similar results that stated that the presence of tannins, saponins, flavanoids and triterpenoid.[13] The aerial parts and root of *T. orientalis* exhibit various pharmacological activities this may due to the presence of the various active compounds present in the sample. Much analysis reported that phenolic compounds in herbs significantly contributed to their antioxidant and pharmaceutical properties.[14,15,16] Some studies claim that the antioxidant phenolic compounds present in herbs might also play a major role in their antimicrobial effect.[17] The presence of the secondary metabolites in this selected species may involve in treating variety of human ailments.

Table. 4: Preliminary phytochemical screening.

S. No	Extract	Plant parts	Terpinoids	Reducing sugars	Sugars	Alkaloids	Phenolic compounds	catechins	Saponins	Tannins	Anthroquinones	Amino acids
1	Petroleum ether	Leaf	+	-	-	-	-	-	+	+	-	-
		Stem	+	-	-	-	-	-	+	+	-	-
		Root	-	+	-	+	-	-	+	+	-	-
2	Benzene	Leaf	-	+	-	-	+	-	-	-	-	+
		Stem	-	+	+	-	+	-	-	-	-	+
		Root	-	-	+	+	+	-	+	-	-	-
3	Chloroform	Leaf	+	-	+	+	+	-	-	+	+	-
		Stem	+	+	+	+	+	-	-	+	+	-
		Root	+	-	-	-	-	-	+	-	-	-
4	Methanol	Leaf	-	-	+	-	-	-	+	+	+	+
		Stem	-	-	+	+	-	-	+	+	+	+
		Root	-	-	+	-	-	-	-	+	-	+
5	Dis. water	Leaf	+	-	+	+	+	-	+	+	-	-
		Stem	+	-	+	+	+	-	+	+	-	-
		Root	-	-	+	+	-	-	+	+	-	-

CONCLUSION

The comparative and multidisciplinary approach to the study of *Trema orientalis* does help in understanding their identification taxonomical determination, and medicinal importance in depth. The adulterants in drugs obtain from Trema orientalis can be identified by this investigation.

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