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Phytochemicals screening of bark of *Madhuca indica* G. F Gamel: A multipurpose tree

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Abstract
Madhuca indica is a plant having tremendous therapeutic potential but not fully utilized. It is hidden from eyes of researchers and other botanist. It is a multipurpose tree used in traditional medicine, was investigated for for its phytochemcals composition. In present study the bark was taken for investigation of bioactive compounds. The bark of *Madhuca indica* is extracted using aqueous, ethanol and acetone solvents, and the resulting extracts were screened for the various bioactive compounds. The phytochemical analysis revealed the presence of flavonoids, terpenoids, phenolic compounds, steroids, alkaloids, reducing sugar, tannins in the extracts. The results suggested that *Madhuca indica* bark is rich source of bioactive compounds, which may contribute to their potential medicinal and therapeutic properties. The study provides a comprehensive understanding of the phytochemicals constituents of *Madhuca indica* bark and highlighted the importance of exploring traditional medicines. In future the plants may contribute to the new drugs development.

Keywords: Multipurpose tree, traditional medicine, phytochemicals, bark, bioactive compounds

Introduction
Medicinal plants are considered as awesome healers. They play a critical role in keeping up human wellbeing & life from the ancient times. Traditional medicinal plants have been used for centuries to treat various ailments, and their importance in modern medicine cannot be revealed. In recent years, there has been a growing interest in exploring traditional medicinal plants for their phytochemicals composition and pharmacological activities, with the aim of discovering new therapeutic agents. *Madhuca indica* belong to family Sapotaceae is a tree native to India, Sri Lanka, Nepal, and Myanmar. It is also known as the Mahula gachha (Odia), Mahua (Hindi), Butter tree (English), llupa, Poonam (Malayalam), Mahwa, maul (Bengali), Madhuda (Gujurati), Ippa (Telugu), tuppe (Kannada). It is a large deciduous tree, usually grows up to a height of 15-20m in Height. Bark is thick dark coloured cracked from outside, inner bark is red colour, secretes milky latex, formed rounded crown and multiple branches. It posses semi evergreen foliage leaves. Leaves are oblong shaped and leathery in texture; the tree produces fragrant yellowish creamy flowers that bloom in Clusters from March to April. It produces fleshy berries which have 1-4 seeds that ripen in May - June.

Madhuca indica is a multipurpose tree; every part of the plant is used for different purposes. The flowers, fruits and leaves are edible. Flowers and fruits are used as vegetable. The flowers can be eaten as raw or dried fried and eaten. The flowers are fermented to produce alcohol. The flowers play a significant role in life of tribal people, provide food and incentive. The leaves are used as cattle feed particularly for feeding goat. The seeds yield 35 to 50% oil. The oil is edible and best for hair. *Madhuca indica* produces best fuel wood when it is dry.

Madhuca indica has been used in traditional medicine for various purposes, including the treatment of Dental pain, fever, rheumatism, and respiratory disorders. Despite its traditional use, the phytochemicals composition and pharmacological activities of *Madhuca indica* remain poorly understood. Previous studies have reported the presence of various bioactive compounds, including flavonoids, alkaloids, and phenolic compounds, but further research is needed to fully elucidate the plant's phytochemicals profile.

Materials and methods
The barks of *Madhuca indica* was collected from the Bhima Bhoi College campus, Rairakhol of district Sambalpur, Odisha, India. Latitude:.21.07627^0, longitude: 84.35523^0 in December 2024. Authors have identified the plant specimen. Bark (Figure 1) extracts of Aqueous, ethanol and Acetone were prepared and ten different bioactive compounds were detected using standard methods (Marndi *et al*).

Fig 1: Raw bark material of *Madhuca indica*

Qualitative Phytochemicals Test
Detection of ten secondary metabolites were conducted using standard methods (Lal *et al*. 2024).

Test for saponin
About 1 ml of the bark extract was taken and added with 1 ml of distilled water. After addition shaked it well and observed the persistent froth formation confirmed the presence of saponin.

Test for tannin
About 1 ml of the bark extract was taken. Added 3-5 drops of 10% lead acetate solution into it. The gelatinous precipitate formation confirmed the presence of tannin.

Test for flavonoids
About 1 ml of the bark extract was taken. Added 2 ml of 2% NaOH solution and 3 to 4 drops of dilute HCL. The colour initially turned to an intense yellow colour with NaOH solution and later became colourless. This change in colours confirmed the presence of flavonoids.

Test for terpenoids
About 1 ml of the filtrate was added with 6 drops of chloroform and place it in the water bath for few minutes. Then 6 drops of concentrated H_2SO_4 were added. The reddish-brown interface confirmed the positive result for the presence of terpenoids.

Test for phenolic compounds
About 1 ml of the filtrate was taken. Few drops of 5% Ferric chloride solution were added. The dark bluish black provides the positive result of the test for phenolic groups.

Test for reducing sugars
About 1 ml of the bark extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept it in water bath for some time. The presence of red orange precipitate confirmed the presence of reducing sugar.

Test for steroids
About 1 ml of the bark extract was taken. 1 ml of chloroform and 1 ml of concentrated sulphuric acid was added into it. The appearance of upper red and lower yellow with green fluorescence provide the presence of steroids.

Test for alkaloids
About 1 ml of the bark extract was taken and added 3 to 4 drops of Dragendroff's reagent. The formation of reddish-brown precipitate confirmed the presence of alkaloids.

Test for carbonyl compounds
About 1 ml of the bark extract was taken and added 3 to 4 drops of 2,4- Dinitrophenylhydrazine (DNPH) reagent. The formation of yellow crystal confirmed the presence of carbonyl compounds.

Test for Amino acids
3ml of extract is added with 3 drops of 5% ninhydrin solution and heated in water bath for 10 min. The presence of amino acids is shown by appearance of purple or blue colour.

Results and Discussion
The phytochemicals analysis of *Madhuca indica* bark presented in Table 1 reveals the presence of various bioactive compounds and secondary metabolites in three different types of extracts. The aqueous, acetone and ethanol extracts all contain tannins, Terpenoids, flavonoids & alkaloids. However, steroids & Carbonyl Compounds are present in the acetone and aqueous extracts, while phenolic compounds and reducing sugar are only found in the acetone & ethanol extracts. These findings suggest that *Madhuca indica* bark is a rich source of phytochemicals with potential medicinal applications. The presence of tannins, flavonoids, phenolic compounds, reducing sugars, steroids, and alkaloids suggests that the bark may possess anticancer, antimicrobial, anti mutagenic, antioxidant, anti-diabetic, anti-inflammatory, and antifungal properties. These potential medicinal uses are supported by references to previous studies, indicating that *Madhuca indica* bark may be a valuable resource for the development of new medicines.

Table 1: Qualitative phytochemicals analysis of *Madhuca indica* bark using three different extracts

Bioactive compounds	Extracts		
	Aqueous	Acetone	Ethanol
Saponin	-	-	-
Tannin	+	+	+
Flavonoids	+	+	+
Terpenoids	+	+	+
Phenolic compounds	-	+	+
Reducing sugars	-	+	+
Steroids	+	+	-
Alkaloids	+	+	+
Carbonyl compounds	+	+	-
Amino Acids	-	-	-

(+: Present; -: Absent)

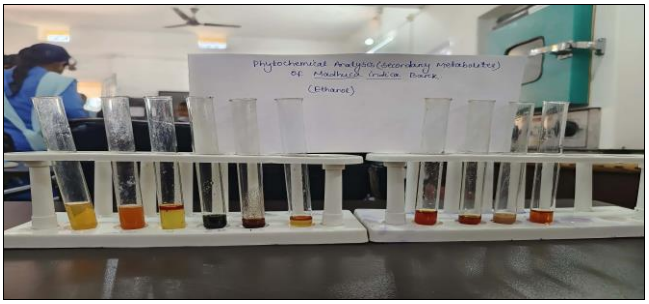

Fig 2: Phytochemical analysis of *Madhuca indica* bark using Aqueous extract

Fig 3: Phytochemical analysis of *Madhuka indica* bark using Ethanolic extract

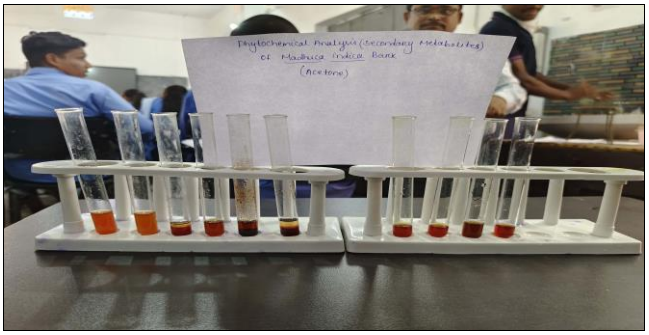

Fig 4: Phytochemical analysis of *Madhuca indica* bark using acetone extract

Conclusion

The present study provides evidence of the phytochemicals profile of *Madhuca indica* bark, supporting its traditional use in medicine. The presence of various bioactive compounds, including tannins, saponins, flavonoids, and phenolic compounds contribute to the pharmacological properties. The present studies also suggest that *Madhuca indica* bark may be a valuable resource for the development of new therapeutic agents in future. Further research is needed for its applications in medicine.

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References

1. Gujjeti RP, Estari M. Phytochemicals analysis and TLC profile of *Madhuca indica* inner bark plant extract. Int J Sci Eng Res,2013:4(10):1507-1510.
2. Das V, Roy RC, Hansdah B. Ethno medicinal and biological activities of tropical mahua (Madhuca species) a comprehensive review. Ann Trop Res,2022:44(2):67-88.
3. Tambe SS, Deore S, Ahire PP, Kadam VB. Biochemical evaluation of medicinal plants of Marathwada region Maharashtra. Int J Pharm Res Bio Sci,2013:1(4):185-194.
4. Kadam VB, Mali MV, Medhane VJ, Gikward VB. Biochemical evaluation of three medicinal taxa of Genus Sesbania in Maharashtra. J Drug Deliv Ther,2013:3(5):41-43.
5. Kadam VB, Salve SB, Deore SV, Gikward VB. Determination of soluble extractives of some medicinal plants of Genus Terminalia of Marathwada region in Maharashtra. Int J Res Pharm Life Sci,2015:4(1):75-80.
6. Patel PK, Prajapati NK, Dubey BK. *Madhuca indica* review of its medicinal property. Int J Pharm Sci Res,2012:3(5):942-950.
7. Indu S, Annika D. Cytotoxic and antioxidant potential of *Madhuca indica* flowers. J Pharm Pharm Sci,2014:3(6):2108-2114.
8. Pratheepa T, Vijitha P, Piratheekumar R. Effectiveness of *Madhuca longifolia* root bark powder for wound healing activity in Wistar albino rats. Eur J Biomed Pharm Sci,2018:5(01):93-99.
9. Meena J, Meena D. Medicinal and commercial potential of *Madhuca indica*: A review. Int J Med Health Res,2016:2(12):23-26.
10. Eswaraiah C, Elumalai A, Rahman H. Isolation of phytochemical constituents from stem barks of *Madhuca latifolia*. Int J Pharm Appl Sci,2011:1(1):43-60.
11. Agarwal B, Rathore S, Krishnan R, Jaiswal A, Panda A, Hegde L, Kumar S. A checklist on wild nutraceutical tuberous plants of India. Indian For,2023:149(5):587-590.
12. Patel M, Naik SN. Flowers of *Madhuca indica* JF Gmel: Present status and future perspectives. Indian J Nat Prod Resour,2010:1(4):438-443.
13. Bhattacharjee P, Bhattacharyya D. Characterization of the aqueous extract of the root of *Aristolochia indica*: Evaluation of its traditional use as an antidote for snake bites. J Ethnopharmacol,2013:145(1):220-226.
14. Sikarwar RL, Kumar V. Ethnoveterinary knowledge and practices prevalent among the tribals of central India. J Nat Rem,2005:5(3):147-452.
15. Devi RS, Satapathy KB, Kumar S. Validation of tribal claims for formulation of future drugs through evaluation of ethno-pharmacological values of *Ludwigia adscendens*. Med Plants,2023:15(4):691-697.
16. Kumar S, Mahanti P, Rath SK, Patra JK. Qualitative phytochemical analysis and antibacterial activity of *Dioscorea alata* L.: A nutraceutical tuber crop of rural Odisha. J Altern Med Res,2017:3(1):122-122.
17. Sunita M, Sarojini P. *Madhuca longifolia* (Sapotaceae): A review of its traditional uses and nutritional properties. Int J Hum Soc Sci Invention,2013:2(05):30-36.
18. Dubey NK, Kumar R, Tripathi P. Global promotion of herbal medicine: India's opportunity. Curr Sci,2004:86(1):37-41.
19. Das BK. Identification of abiotic and biotic factors causing deterioration during storage and development of storage techniques for Mahua flowers. Agric Conspectus Sci,2010:75:119-125.
20. Chandra D. Analgesic effect of aqueous and alcohol extract of *Madhuca longifolia*. Indian J Pharmacol,2001:33:108-111.
21. Kumar S, Parida AK, Jena PK. Ethno-medico-biology of Ban Aalu (Dioscorea species): A neglected tuber crop of Odisha, India. Int J Pharm Life Sci,2013:4(12):313-315.
22. Mosses AN, Ishaku S, Bolarin JA. Preliminary phytochemical screening of stem bark of Frankincense plant. Int J Sci Adv Innov Res,2019:4(2):1-7.
23. Kumar S, Tripathy PK, Jena PK. Study of wild edible plants among tribal groups of Simlipal Biosphere Reserve Forest, Odisha, India: with special reference to Dioscorea species. Int J Biol Technol,2012:3(1):11-19.
24. Kumar SN, Mishra S, Kumar S. Documentation of indigenous traditional knowledge (ITK) on commonly available plants in Koira Range, Bonai Forest Division, Sundargarh, Odisha, India. Asian Plant Res J,2021:8(4):83-95.
25. Mohanty M, Choudhury R, Kumar S, Maggirwar R. Phytochemical screening and antibacterial activity of *Dioscorea bulbifera* L. fruits. Plant Arch,2021:21(9):862-866.
26. Swain J, Kumar S, Antunes LLC, Biswal AK, Jena PK. *Amorphophallus paeoniifolius* (Araceae): A nutraceutical for food disorders, novel bacterial & viral infections. Carpathian J Food Sci Technol,2022:14(1):118-136.
27. Sakarkar DM, Deshmukh VN. Ethnopharmacological review of traditional medicinal plants for anti-cancer activity. Int J Pharm Tech Res,2011:3:298-308.
28. Srirangam P, Annsmpelli AK. Anti-hyperglycemic and antioxidant activity of ethanolic extract of *Madhuca indica* bark. Int J Pharm Sci Rev Res,2010:5:89-94.
29. Chakma CS. Pharmacological screening of isolated compound from *Madhuca longifolia* seeds give significant analgesic effect. Int Res J Pharm,2011:2(8):43-45.
30. Singh A, Singh IS. Chemical evaluation of Mahua seeds. Food Chem,1991:40:221-228.