Chapter 5

Qualitative phytochemical analysis of *Artabotrys hexapetalus* (L. f.) Bhandari fruits: a medicinal tree of India

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Abstract

Three extracts are used to carry out a qualitative phytochemical analysis on the fruits of *Artabotrys hexapetalus*, and the findings are presented. The findings revealed that three extracts exhibited a variety of bioactive compounds, including tannin, saponin, flavonoids, reducing sugar, and alkaloids. The bioactive chemicals that were present exhibited their future potential in pharmacology.

Keywords: Bioactive compounds, pharmacological values, *Artabotrys hexapetalus*

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Introduction

Medicinal fruits are the key species in several herbal formulations and traditional therapeutic practices. They are used to treat several health problems. Rural and tribal traditional health practitioners use them for various purposes. They are also food for many faunal species, including birds, and provide ecological services to the environment. In this aspect, the declination of indigenous traditional practices leaves many plants unexplored for the scientific community. Therefore, there is a need to explore the phytochemistry of unexplored medicinal fruits for future pharmacological drug development. Hence, keeping this in mind, an attempt has been made to evaluate the medicinal properties through qualitative phytochemical analysis of the fruits of *Artabotrys hexapetalus* (Figures 2-4). It belongs to the family Annonaceae. Extracts of *A. hexapetalus* have long been used in Asian folk medicine to treat various symptoms and diseases, including fevers, microbial infections, ulcers, hepatic disorders, and other health problems (Bailly and Henichart, 2022). The present study highlights the bioactive compounds available in the fruits of *A. hexapetalus*.

Methodology

Collection of fruits and preparation of extracts

The fruits of *A. hexapetalus* were collected from Khordha district of Odisha in April 2024 (Figure 1). The plant was identified by the senior author. The Soxhlet method of extraction using three solvents (aqueous, methanol and ethanol) was carried out for phytochemical analysis (Hebbar *et al.,* 2024). Detection of nine secondary metabolites was carried out using standard methods (Mahendru *et al.,* 2024; Chandra *et al.,* 2024). An herbarium specimen is deposited to the Herbarium unit, Biodiversity and Conservation Lab, APRF, Odisha (Figure 5).

Qualitative phytochemical analysis

Test for tannin

One ml of the filtrate of fruit extract was taken, added three drops of 0.1% of lead acetate solution. The creamy gelatinous precipitate provides the positive result for the presence of tannins (Devi *et al.,* 2023).

Test for saponin

One ml of the filtrate of fruit extract was mixed with 1 ml of distilled water, then shaked it vigorously. The persistent froth formation after shaking provide the evidence for the presence of saponin.

Test for flavonoids

One ml of the filtrate of fruit extract was taken and added 2 ml of 2% NaOH solution and 3 drops of dilute HCL. The colour initially turned to an intense yellow colour with NaOH solution and later become colourless. This change in colour confirmed the presence of flavonoids.

Test for terpenoids

Two ml of the filtrate of fruit extract was added with 6 drops of chloroform and placed 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

One ml of the filtrate of fruit extract was taken. Few drops of 5% Ferric chloride solution were added. The bluish black colour provides the positive result of phenolic compounds.

Test for reducing sugars

One ml of the fruit 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 few minutes. The presence of red orange precipitate confirmed the positive result of the test for reducing sugar.

Test for steroids

One ml of the filtrate of fruit extract was taken. One 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 positive result of the test for steroids.

Test for alkaloids

One ml of the filtrate of fruit extract was taken and added 3-4 drops of Dragendroff's reagent. The formation of reddish-brown precipitate confirmed the presence of alkaloids.



Figure 1: Collection of fruits of *A. hexapetalus*



Figure 2: Fruits of *A. hexapetalus*



Figure 3: Leaves of *A. hexapetalus*



Figure 4: Flower of *A. hexapetalus*

Results and discussion

Qualitative analysis of phytochemicals of *A. hexapetalus* fruits showed the presence of tannin, saponin, flavonoids, reducing sugar and alkaloids (Table 1; Figures 6-8). The detected compounds showed its pharmacological potentials (Singh *et al.,* 2022; Swain *et al.,* 2020) and fruits can be used as antimicrobial agents and for other health problems (Kumar *et al.,* 2013; Kumar *et al.,* 2017; Kumar *et al.,* 2024).

Table 1: Phytochemical analysis of different extracts of *A. hexapetalus* fruits

Bioactive compounds	Aqueous	Methanol	Ethanol
Tannin	+ve	+ve	+ve
Saponin	+ve	+ve	+ve
Flavonoids	+ve	+ve	+ve
Terpenoids	-ve	-ve	-ve
Phenolic compounds	-ve	-ve	-ve
Reducing sugar	+ve	+ve	+ve
Steroids	-ve	-ve	-ve
Alkaloids	+ve	+ve	+ve

(+ve: positive; -ve: negative)

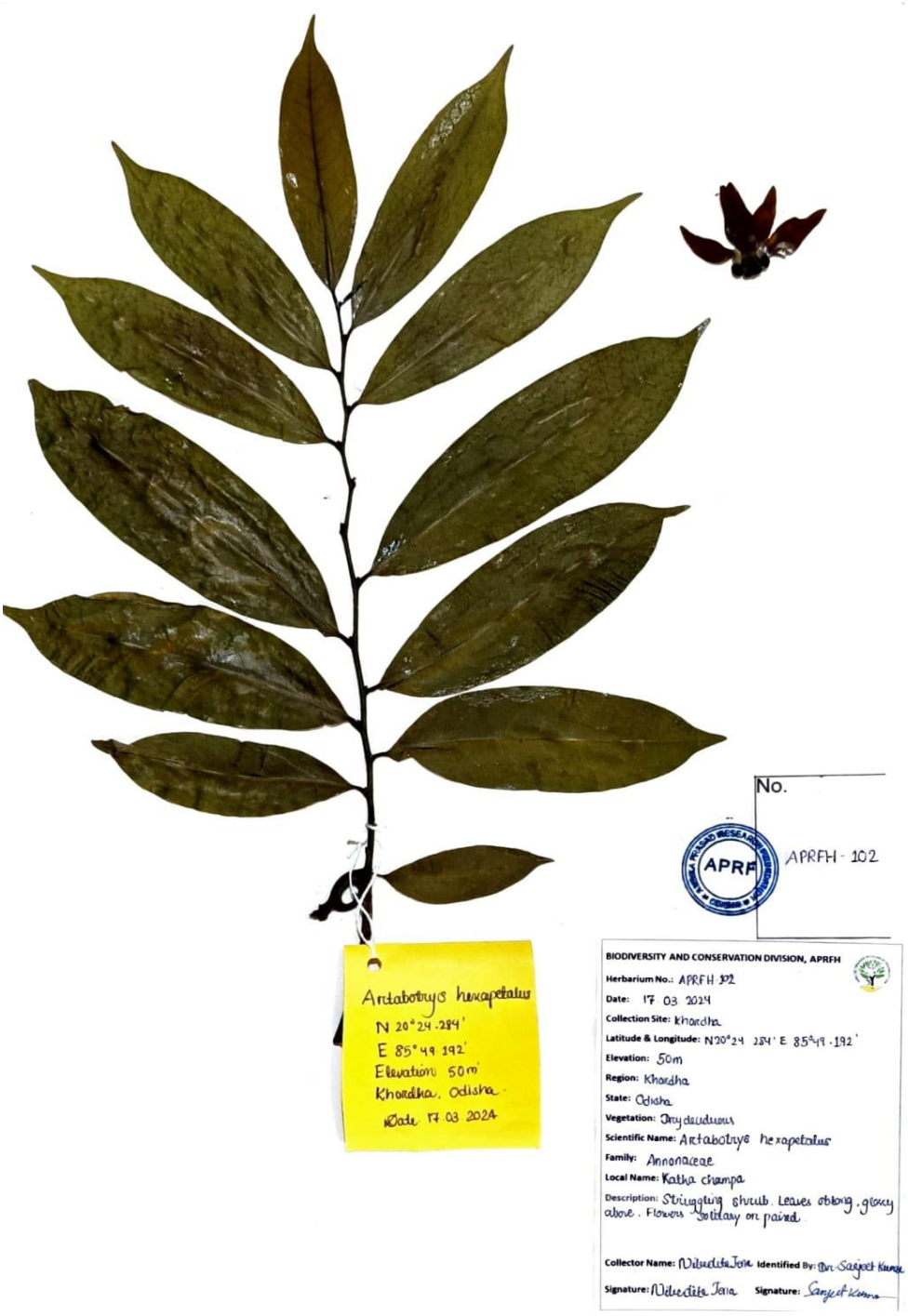


Figure 5: Herbarium specimen of *A. hexapetalus*

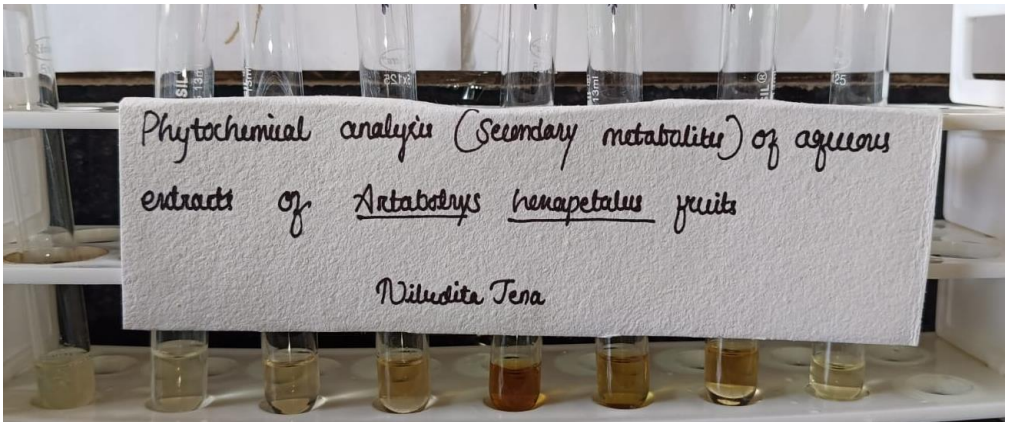


Figure 6: Screening of bioactive compounds of aqueous extract of *A. hexapetalus* fruits

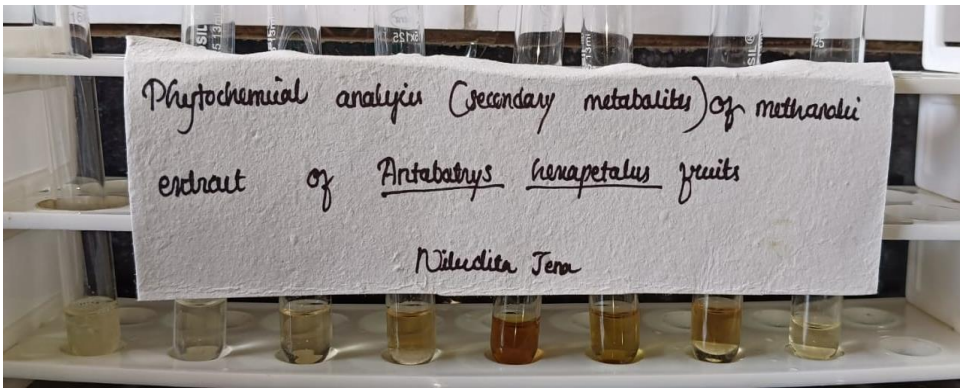


Figure 7: Screening of bioactive compounds of methanolic extract of *A. hexapetalus* fruits

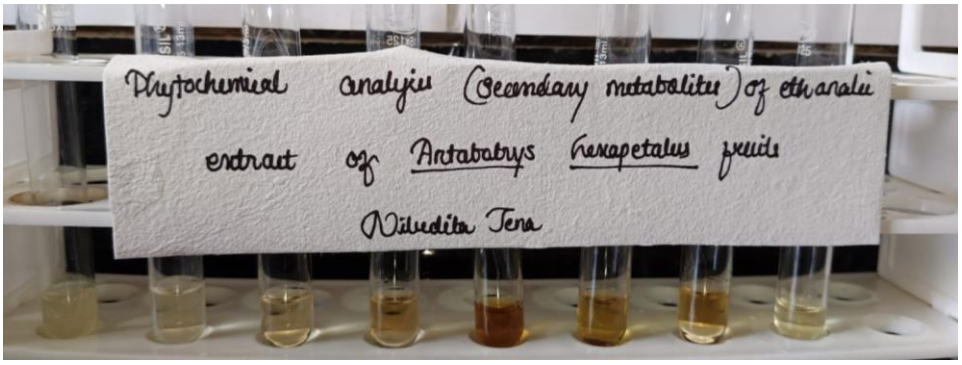


Figure 8: Phytochemical analysis of ethanolic extract of *A. hexapetalus* fruits

It is also reported in Chinese folk medicine and fruits are used to treat malaria which can be validated through bioassay (Li and Yu, 1998). Leaves have antioxidant, analgesic and antipyretic activities (Rahman *et al.,* 2023) whereas the petroleum ether extract of *A. hexapetalus* displayed potent antileishmanial activity (Bajaj *et al.,* 2018).

Conclusion

Given that the biologically active substances detected in three extracts of *A. hexapetalus* fruits showed prospective for pharmacological development, the study suggests that ethnomedicinal usage and the isolation of novel antimicrobial agents be investigated for future drug development.

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