Chapter 3

Qualitative phytochemical analysis of flowers of *Cassia fistula* L.

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Abstract

Qualitative phytochemical analysis of *Cassia fistula* flowers is carried out using three extracts, and the results are presented here. The results revealed that extracts showed diverse secondary metabolites, which could be responsible for their pharmacological potential. It draws attention to the need for advanced experimental work for future drug development.

Keywords: Bioactive compounds, pharmacological values, Fabaceae

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Introduction

Flowers are the symbol of beauty, recreation, pride, and love. They are used for various purposes in our life and environments. They used to worship our deities as well as part of foods and medicines (Kumar *et al.,* 2012a). People of rural and tribal communities used to collect the flowers from wild and use them as food and medicines.

In this aspect, authors observed a flower having lot of ecological services and other parts of the plant is used to treat many health problems. The plant is *Cassia fistula*. It belongs to the family Fabaceae and has lot of

ethnomedicinal uses. Many authors have reported the medicinal uses of *C. fistula* but less reports on flowers are available (Kumar *et al.,* 2012b). Keeping this in view, an attempt has been made to document the bioactive compounds presence in the flowers of *C. fistula*.

Methodology

Collection of flowers and preparation of extracts

The flowers of *C. fistula* were collected (Figure 1) from the roadsides of Mahanadi River area, Cuttack district, Odisha in May 2024 (N 20° 28.59°; E 85° 49.29"; 38 m). 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 (Kumar *et al.,* 2013; Devi *et al.,* 2023).

Detection of nine secondary metabolites were carried out using standard methods (Mohanty *et al.,* 2021; Sharma *et al.,* 2024). A herbarium specimen was submitted to the herbarium unit, Ambika Prasad Research Foundation, India (Figure 2).

Qualitative phytochemical analysis

Test for tannin

1 ml of the filtrate of flower (Figure 3) 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 (Kumar *et al.,* 2024).

Test for saponin

1 ml of the filtrate of flower 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 (Kumar *et al.,* 2017).

Test for flavonoids

1 ml of the filtrate of flower 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 (Swain *et al.,* 2020).



Figure 1: Collection of *C. fistula* flowers for experimental work

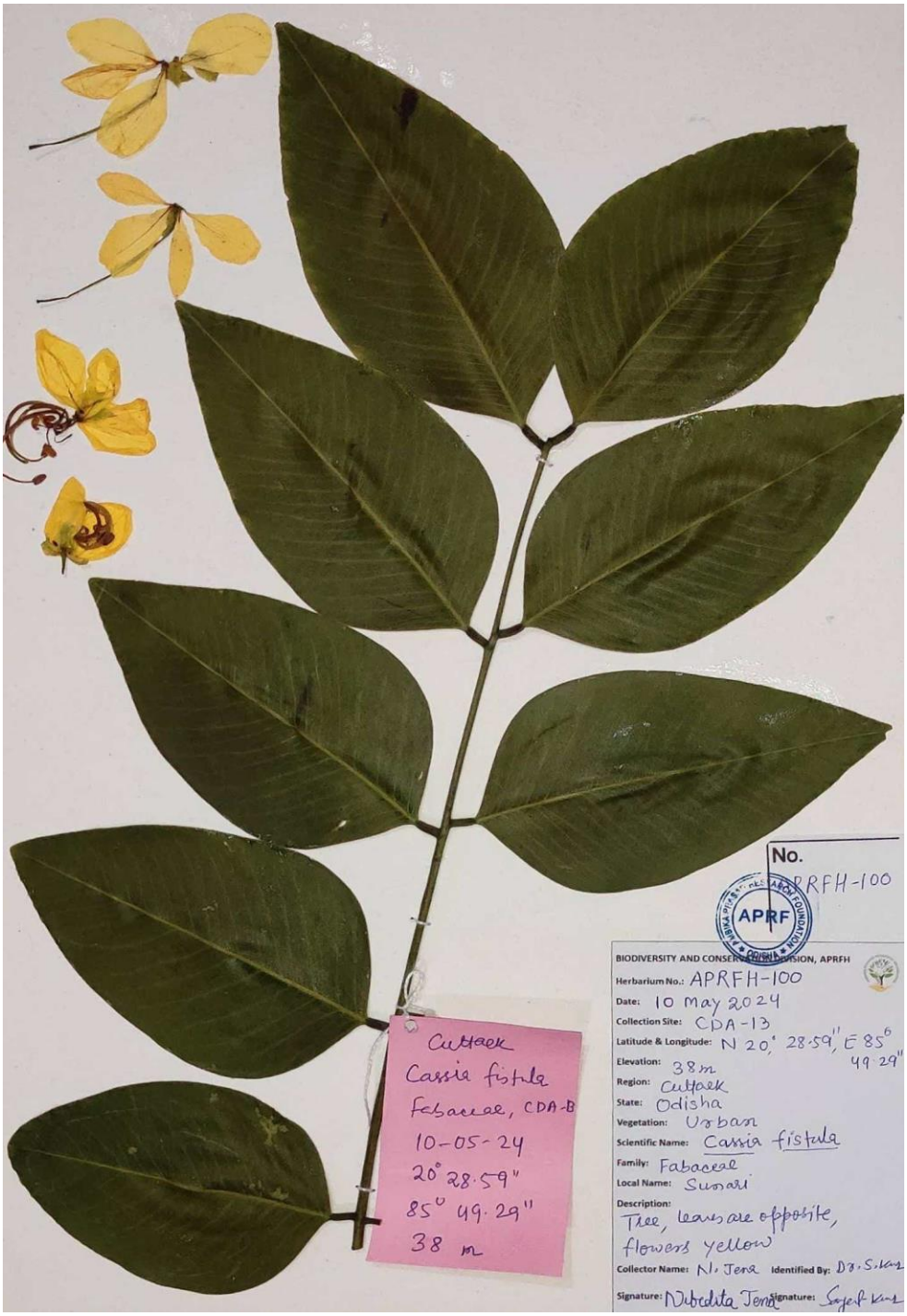


Figure 2: Herbarium specimen of *Cassia fistula*



Figure 3: Flower petals of *C. fistula*

Test for terpenoids

2 ml of the filtrate of flower 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 (Singh *et al.,* 2022).

Test for phenolic compounds

1 ml of the filtrate of flower 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

1 ml of the flower extract was taken and 2 drops f 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

1 ml of the filtrate of flower 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 positive result of the test for steroids.

Test for alkaloids

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

Test for carbonyl compounds

1 ml of the filtrate of flower extract was taken and added 3 to 4 drops of 2,4- Dinitrophenylhydrazine reagent. The formation of yellow crystal confirmed the presence of carbonyl compounds.

Results and discussion

The qualitative phytochemical investigation revealed that the flowers of *C. fistula* showed the presence of bioactive compounds including tannin, saponin, terpenoids and reducing sugar in different extracts (aqueous, methanol and ethanol). It was noticed that ethanolic extract of flowers showed highest number of secondary metabolites followed by methanol and aqueous extracts (Table 1; Figures 4-6).

Table 1: Phytochemical analysis of different extracts of *C. fistula* flowers

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
Carbonyl compounds	-ve	-ve	-ve

(-ve: negative; +ve: positive)

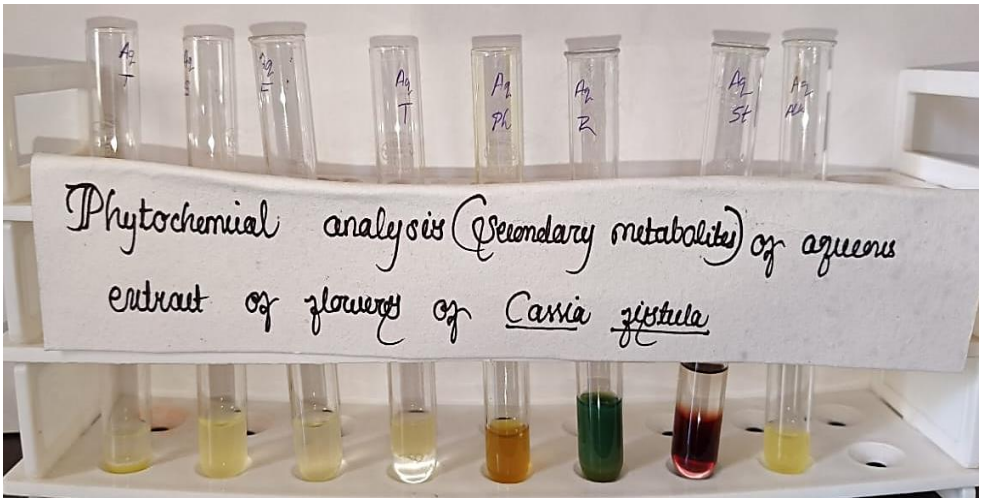


Figure 4: Screening of bioactive compounds of aqueous extract of *C. fistula* flowers



Figure 5: Detection of secondary metabolites of methanolic extract of *C. fistula* flowers

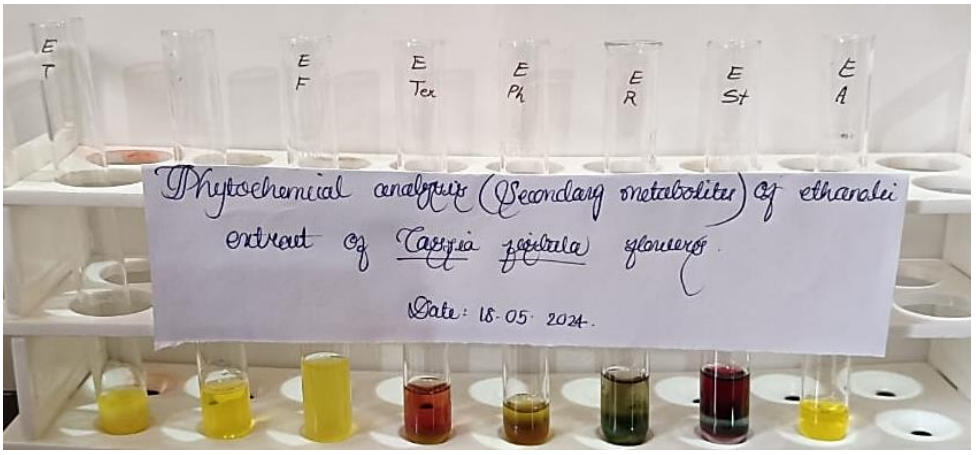


Figure 6: Phytochemical screening of ethanolic extract of *C. fistula* flowers

Conclusion

The bioactive compounds detected in three extracts of *C. fistula* flowers showed pharmacological potential, and the study also recommends that there is a need to explore ethnomedicinal uses and pharmacological potentials.

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