

Chapter 9

Phytochemical screening and TLC analysis of flowers of *Acanthus ilicifolius* L. (Acanthaceae)

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Abstract: Mangrove plants are mostly unexplored in the aspects of secondary metabolites screening. Flowers of *Acanthus ilicifolius* was selected for phytochemical screening and Thin-layer chromatography (TLC) profiling using hydroethanolic extract. Phytochemical analysis revealed the presence of tannins, saponins, flavonoids, phenolic compounds, reducing sugars, and alkaloids. TLC analysis showed different spots in different mobile phases. The findings suggest that *A. ilicifolius* flowers possess diverse phytochemicals with potential therapeutic applications.

Keywords: Bioactive compounds, mangroves, coastal

INTRODUCTION

Evaluation of medicinal uses of a plant species depends on their available bioactive compounds (Dincheva et al., 2023). In current scenario, where whole world facing different types of health problems and drug failures (Sun et al., 2022). In this aspect, there is a need to screen unexplored and special group of plants and mangroves are quite suitable (Ghizelini et al., 2012). Therefore, flowers of *Acanthus ilicifolius*, a mangrove associated shrub was selected for present study (Hossain et al., 2025;

Figure 1). The plant parts of *A. ilicifolius* is used to treat many health problems (Singh and Aeri, 2013; Hossain et al., 2025).



Figure 1: Flowers of *A. ilicifolius*

Despite its traditional use, there is limited scientific evidence on the bioactive compounds and potential therapeutic applications of flowers of *A. ilicifolius*. Hence, present study aims to investigate the phytochemical profile and chromatographic characteristics of *A. ilicifolius* flowers using hydroethanolic extract, providing insights into its potential medicinal properties and applications.

METHODOLOGY

The flowers of *A. ilicifolius* were collected from the nearby areas of Rajnagar, Kendrapara district of Odisha, India (Figure 2). The plant species was identified by the authors. The Soxhlet extraction method was adopted using hydroethanolic solvent for phytochemical analysis. Detection of nine secondary metabolites were conducted using standard methods (Kumar et al., 2013a; Devi et al., 2023; Marndi et al., 2024; Jena et al., 2024).



Figure 2: Collection of flowers of *A. ilicifolius* for experimental work

TLC plates were prepared on 6 cm glass slides using silica gel powder (SILICA GEL G, CAS 112926-00-8, Spectrochem Pvt. Ltd.). Slides were washed with clinical laboratory detergent and dried. Clean and dried slides were wiped with ethyl

acetate for removing surface adherents. 3 g of silica was taken in 20 ml of distilled water and slurry was prepared by constantly stirring, and finally was poured over the slides and slides were left undisturbed till the drying of silica layer (Kumar et al., 2013b). Then the slides were activated at 50°C for 15-20 minutes before running the TLC. Methanol: chloroform (50%), ethyl acetate: chloroform (1:9) and ethyl acetate: water: acetic acid (8:1:1) were used as mobile phases. Then spots were marked, recorded the RF (Retention Factor) values and visualized under UV chamber (Kumar and Jena, 2014).

RESULTS AND DISCUSSION

The phytochemical analysis of *A. ilicifolius* flowers using hydroethanolic extract revealed the presence of various bioactive compounds (Table 1; Figure 3). The results showed positive tests for tannins, saponins, flavonoids, phenolic compounds, reducing sugars, and alkaloids. These compounds are known for their diverse biological activities, including antioxidant, anti-inflammatory, and antimicrobial properties.

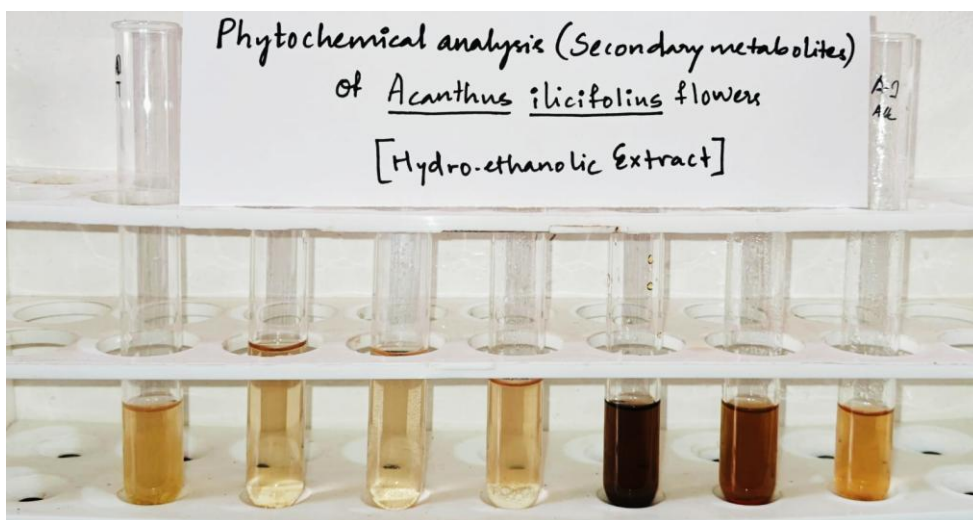


Figure 3: Phytochemical analysis of the flowers of *A. ilicifolius* using hydroethanolic extract
The TLC profiling of the hydroethanolic extract using different mobile phases showed distinct Rf values, indicating the presence of various phytochemicals (Table

2). The results suggest that the plant contains a complex mixture of compounds, which may contribute to its medicinal properties. The presence of tannins, flavonoids, and phenolic compounds in *A. ilicifolius* flowers is consistent with previous studies on mangrove plants, which have reported similar phytochemical profiles. These compounds are known for their antioxidant and anti-inflammatory activities, which may contribute to the plant's traditional use in treating various ailments. The TLC profiling results indicate that the hydroethanolic extract contains multiple compounds with different polarities, which may be responsible for the plant's medicinal properties.

Table 1: Phytochemical analysis of flowers of *Acanthus ilicifolius* using hydroethanolic extract

Bioactive compounds	Hydroethanolic extract
Tannin	+ve
Saponin	+ve
Flavonoids	+ve
Terpenoids	-ve
Phenolic compounds	+ve
Reducing sugar	+ve
Steroids	-ve
Alkaloids	+ve
Carbonyl compounds	-ve

(+ve: Present; -ve: Absent)

Table 2: TLC analysis of flowers of *Acanthus ilicifolius* using hydroethanolic extract

Mobile phase	Extracts	Rf value of spots		
		S ₁	S ₂	S ₃
Chloroform: methanol (1:1)	Hydroethanolic	0.7	-	-
Ethyl acetate: chloroform (1:9)	Hydroethanolic	0.95	-	-

Ethyl acetate: distilled water: acetic acid (8:1:1)	Hydroethanolic	0.68	0.88	0.95
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Conclusion

This study demonstrates the presence of diverse phytochemicals in *A. ilicifolius* flowers, including tannins, saponins, flavonoids, phenolic compounds, reducing sugars, and alkaloids. The TLC profiling reveals a complex mixture of compounds with different polarities. These findings provide a foundation for further research on the medicinal properties and potential applications of *A. ilicifolius*. Future studies can focus on isolating and characterizing individual compounds, evaluating their biological activities, and exploring their therapeutic potential.

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