

Chapter 10

Ecological, phytochemical and antioxidant potential of *Rottboellia cochinchinensis* (Lour.) Clayton

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ABSTRACT

Grasses play a vital role in ecosystems by stabilizing soil, preventing erosion, and providing forage for herbivores. *Rottboellia cochinchinensis*, an attractive perennial grass, contributes significantly to these functions while supporting biodiversity and habitat regeneration. Beyond its ecological importance, it has traditional medicinal uses attributed to bioactive compounds. Present study evaluated its secondary metabolites and antioxidant activity. Results revealed that non-polar extracts showed no detectable compounds, whereas ethanol and aqueous extracts contained tannins, saponins, flavonoids, phenols, and reducing sugars, with the aqueous extract being richest. Antioxidant analysis revealed multiple radical-scavenging spots across different solvent systems, indicating diverse antioxidant constituents. These results support its traditional medicinal use, ecological and pharmacological significance.

Keywords: Bioactive compounds, traditional medicine, fodder grass, wildlife management

INTRODUCTION

Rottboellia cochinchinensis (Figure 1) is an annual upland grass of the Poaceae family known as the Itchgrass, that often go unnoticed along tropical and subtropical landscapes, yet it quietly anchors ecosystems in

remarkable ways (Bundit et al., 2022). Its dense network of roots and rhizomes binds soil, prevents erosion, and stabilizes degraded lands, while its persistent ground cover enhances the resilience of grasslands and forest edges against both natural and human-induced disturbances (Fadun et al., 2017). While it has been documented to have a low palatability among wildlife (Behera et al., 2025), it supports local biodiversity and maintains ecosystem productivity. In disturbed habitats, this hardy grass can be found in plenty while in row crops, pastures and roadsides, it gets competitive (Allawan, 2021). Beyond its ecological contributions, *R. cochinchinensis* harbors hidden pharmacological treasures. Traditional knowledge highlights its medicinal potential (Guevara and Garcia, 2018), which indicates towards the presence of bioactive compounds in its various parts that can imply towards its potential antioxidant, anti-inflammatory, and antimicrobial effects. Exploration of these properties can validate it as a promising candidate for natural product exploration, yet surprisingly little scientific work has systematically investigated its phytochemistry and therapeutic potential while largely, it is regarded as a weed due to its allelopathic potential (Bundit et al., 2022). This study aims to bridge that gap by exploring the phytochemical profile and antioxidant activity of *R. cochinchinensis* using qualitative screening and Thin Layer Chromatography (TLC)-based 2, 2-Diphenyl-1-picrylhydrazyl (DPPH) assay. By unraveling its bioactive constituents and radical-scavenging potential, the research provides a scientific foundation for its traditional medicinal uses, while highlighting the ecological and pharmacological significance of this resilient, yet often overlooked, grass.

METHODOLOGY

Whole plants of *Rottboellia cochinchinensis* were collected from Puri district, Odisha, India (Figure 1). The plant species was identified using published literature (Behera et al., 2025). Soxhlet method extraction (n-Hexane, Ethanol and Aqueous) was carried out for further experimental works (Jena et al., 2025). Qualitative phytochemical analysis for detection of secondary metabolites and Thin Layer Chromatography (TLC) based antioxidant analysis was done using standard methods (Kumar et al., 2013; Jena et al., 2025; Roy and Devi, 2025).



Figure 1: Plant parts of *Rottboellia cochinchinensis*

RESULTS AND DISCUSSION

The phytochemical screening of *Rottboellia cochinchinensis* showed that solvent polarity plays a key role in extracting metabolites (Table 1; Figure 2–4). The non-polar extracts did not contain any detectable bioactive compounds. In contrast, polar solvents effectively extracted secondary metabolites. The ethanol extract contained tannins, saponins, phenols, and reducing sugars, while the aqueous extract was richer, showing tannins,

saponins, flavonoids, phenols, and reducing sugars (Table 1, Figure 2-4). The antioxidant activity of the aqueous extract was tested using TLC combined with DPPH assay. Multiple radical-scavenging spots were observed across different solvent systems (Table 2). The ethyl acetate: methanol: water system showed spots at R_f 0.65 and 0.793, the chloroform: ethyl acetate: formic acid system produced spots at R_f 0.278, 0.360, and 0.983, and the n-hexane: petroleum ether: ethanol system exhibited a streak ranging from 0.25 to 0.85 (Figure 5). These results indicate that *R. cochinchinensis* contains diverse antioxidant compounds, mainly polar in nature, which can scavenge free radicals effectively.

Table 1: Qualitative phytochemical analysis of *R. cochinchinensis*

Polarity	Extract	Detected secondary metabolites
Non-Polar  Polar	n-Hexane	All tested bioactive compounds are not detected.
	Ethanol	Tannin, Saponin, Phenol and Reducing sugars
	Aqueous	Tannin, Saponin, Flavonoids, Phenol and Reducing sugars

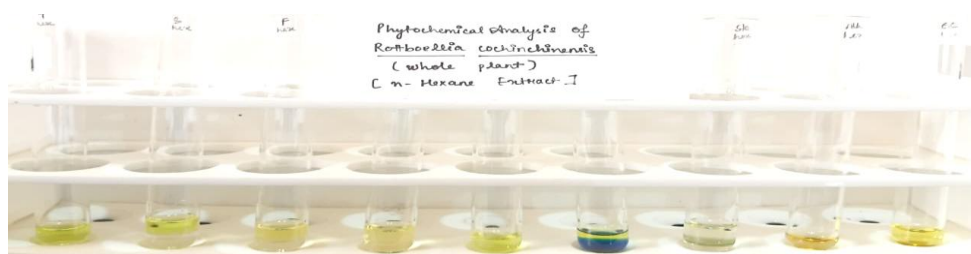


Figure 2: Phytochemical analysis of *R. cochinchinensis* using n-hexane extract

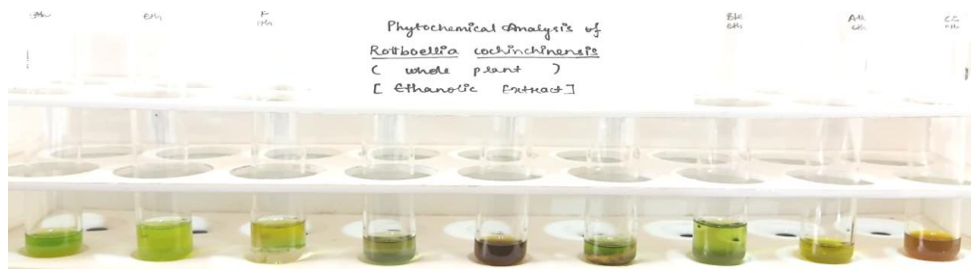


Figure 3: Phytochemical analysis of *R. cochinchinensis* using ethanolic extract

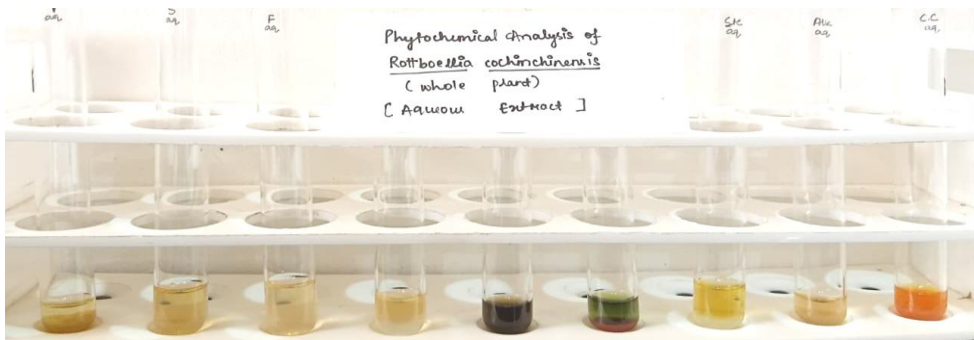


Figure 4: Phytochemical analysis of *R. cochinchinensis* using aqueous extract

Table 2: TLC-based DPPH analysis of whole plant extract of *R. cochinchinensis* using different mobile phases

	Mobile Phases	Rf value of Spots			
		S1	S2	S3	Streak
Aqueous	Ethyl acetate: Methanol: Water (40:5.4:4)	0.65	0.793	-	-
	Chloroform: Ethyl acetate: Formic acid (5: 4: 1)	0.278	0.360	0.983	
	n-Hexane: Petroleum ether: Ethanol (10: 10: 80)	-	-	-	0.25 – 0.85

(Rf: Retention factor)

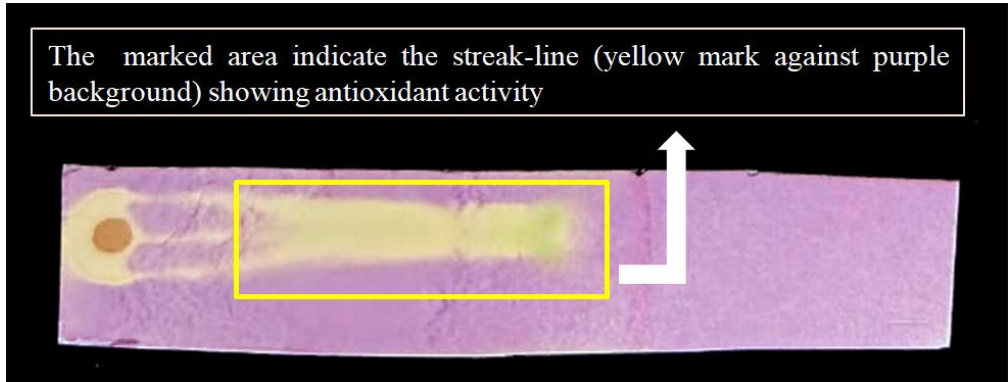


Figure 5: TLC based DPPH analysis using (n-Hexane: Petroleum ether: Ethanol)

Traditional medicinal values of *R. cochinchinensis* have been documented by various scientific surveys. Its leaves have been reviewed to have purgative functions and leaves along with roots and stems to be edible in nature (Fadun et al., 2017). The plant has also been surveyed to be ingested as infusion by Matigsalug Tribe of Philippines in treatment of vomiting (Guevara and Garcia, 2018).

CONCLUSION

Present study highlights *Rottboellia cochinchinensis* as more than a mere grass but a reservoir of bioactive potential. Rich in polar metabolites such as tannins, saponins, flavonoids, phenols, and reducing sugars, the species exhibited notable antioxidant capacity. These findings validate its traditional medicinal use and suggest promise for development of natural drugs. Beyond pharmacological value, it also plays an ecological role in soil stabilization, biodiversity support, and forage provision. Future explorations aimed at isolating and characterizing its active compounds may uncover new possibilities for both human health and environmental resilience.

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