Chapter 2

Phytochemical analysis and antioxidant activity of *Ottochloa nodosa* (Poaceae)

Alok Ranjan Sahu[1], Brajesh Kumar Sahu[2], Jogdand SK[3], Gajender Singh[4], Sanjeet Kumar[5] and Debangshu Agrahari[6*]

[1]Department of Botany, Vikash Degree College, Bargarh, Odisha, India

[2]Department of Botany, P.M. College of Excellence, Government College Vidisha, Madhya Pradesh, India

[3]Department of Botany, Mrs. K. S. K. College, Beed, Maharashtra, India

[4]Department of Pharmacognosy, Central Ayurveda Research Institute, Gwalior Road, Jhansi, Uttar Pradesh, India

[5]Ambika Prasad Research Foundation, Odisha, India

[6]Department of Dravyaguna Vijnana, Jeevak Ayurved Medical College and Hospital Research Centre, Chandauli, Uttar Pradesh, India

*Email-Id: debangshu111@gmail.com

ABSTRACT

Ottochloa nodosa, a lesser-known member of the Poaceae family, was evaluated for its phytochemical constituents and antioxidant potential. Qualitative phytochemical screening of whole plant extracts (n-hexane, ethanol, and aqueous) revealed the presence of tannins, saponins, reducing sugars, and phenolic compounds, while flavonoids, terpenoids, steroids, and alkaloids were absent. Thin Layer Chromatography-based 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) analysis confirmed antioxidant activity, with distinct retention spots and streaks observed across solvent systems, indicating the presence of compounds with radical scavenging activity. These findings highlight the potential of *O. nodosa* as a reservoir of natural bioactive compounds, warranting further exploration for pharmacological and ecological applications.

Keywords: Antioxidant potential, conservation, grass, qualitative phytochemical screening

INTRODUCTION

Grasses, belonging to the family Poaceae, are ecologically and economically important due to their role in soil stabilization, erosion control, and as a sustainable fodder resource for both wildlife and livestock (Fatima et al., 2018; Behera et al., 2025). Beyond their ecological value, grasses have also been recognized as reservoirs of bioactive compounds (Verhulst et al., 2023) with antimicrobial, antioxidant, anti-inflammatory, anti-diabetic, and various therapeutic properties, making them increasingly relevant in natural product research (Gebashe et al., 2020). *Ottochloa nodosa* (Figure 1) is a perennial grass species widely distributed in moist and disturbed habitats. Although primarily studied as a groundcover species with soil-stabilizing properties, it is widely recognized as a weed. Hence, little attention has been given to its phytochemistry or potential pharmacological significance. Different bioactive compounds are often present in grasses those play an important role in plant defense mechanisms and have demonstrated medicinal value in traditional systems (Damor et al., 2025). Oxidative stress has been reported to be associated with several neurological diseases like Parkinson's and Alzheimer's disease (Pizzino et al., 2017) and considering the global demand for novel plant-based antioxidants to address oxidative stress-related disorders, exploring underutilized and abundantly present grasses like *O. nodosa* becomes highly relevant. It stands as one of those quiet grasses that thrive in the background of ecosystems, yet its scientific story is still largely unwritten. In the era of growing interest in natural product research, its silence in literature is striking, an untapped thread waiting to be woven into pharmacological and ecological narratives. The scarcity of focused studies not only leaves its medicinal promise in obscurity but also overlooks its contribution to soil resilience and biodiversity. The present study aims to investigate the phytochemical composition of *O. nodosa* and assess its antioxidant activity using TLC-based DPPH analysis. Such baseline information may contribute towards positioning this overlooked grass as an ecologically viable source of natural compounds for pharmacological and nutraceutical applications.



Figure 1: Collected sample of *Ottochloa nodosa*

METHODOLOGY

Whole plants of *Ottochloa nodosa* were collected from nearby Mahanadi areas of Cuttack district, Odisha, India. The plant species was identified by the author. Whole plant was thoroughly washed under running tap water to remove dust. They were cut into small pieces and using 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 carried out using standard methods (Jena et al., 2025; Kumar et al., 2013, Pattnaik and Bhatnagar, 2023).

RESULTS AND DISCUSSION

Qualitative analysis of the whole plant using different solvent extracts revealed the presence of several bioactive compounds (Table 1; Figure 2-4). Tannins, saponins, and reducing sugars were consistently detected in ethanol and aqueous extracts. Phenolic compounds were found in ethanol and aqueous extracts, while no bioactive compounds were detected in the n-hexane extract. Other secondary metabolites, including flavonoids, terpenoids, steroids, carbonyl compounds and alkaloids, were absent in all extracts. These results indicate that *O. nodosa* contains a selective range of phytochemicals, dominated by tannins, saponins, reducing sugars, and certain phenolics. The TLC-based DPPH assay of the aqueous extract confirmed antioxidant activity across different solvent systems (Table 2). In the ethyl acetate: methanol: distilled water (40:5.4:4) system, active bands appeared at Rf values of 0.384 and 0.476. The chloroform: ethyl acetate: formic acid (5:4:1) system produced a strong antioxidant spot at Rf 0.904 and a streak between 0 to 0.761, suggesting the presence of a broad spectrum of radical scavenging compounds. In the n-hexane: petroleum ether: ethanol (1:1:8) system, an antioxidant spot at Rf 0.5 and a streak extending from 0.5 to 0.766 were observed. These findings demonstrated the presence of multiple antioxidant constituents of varying polarity in *O. nodosa*.

Table 1: Qualitative phytochemical analysis of *O. nodosa*

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

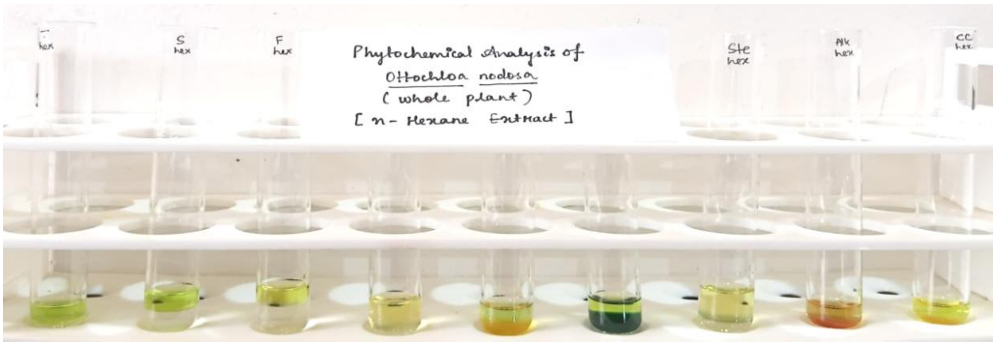


Figure 2: Phytochemical analysis of *O. nodosa* using n-hexane extract

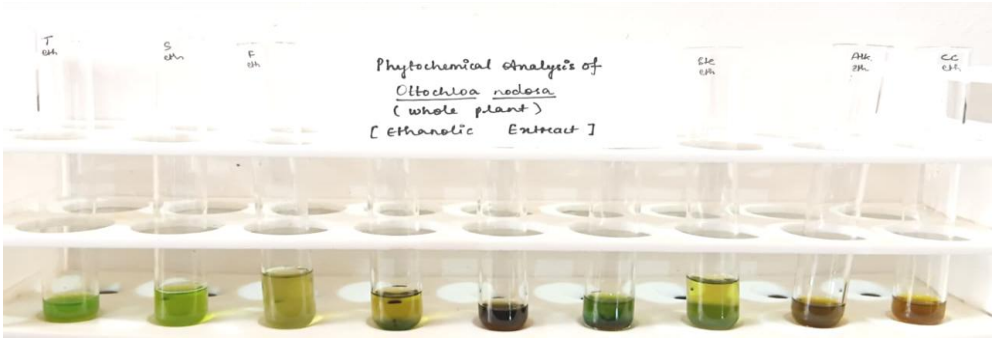


Figure 3: Phytochemical analysis of *O.nodosa* using ethanolic extract

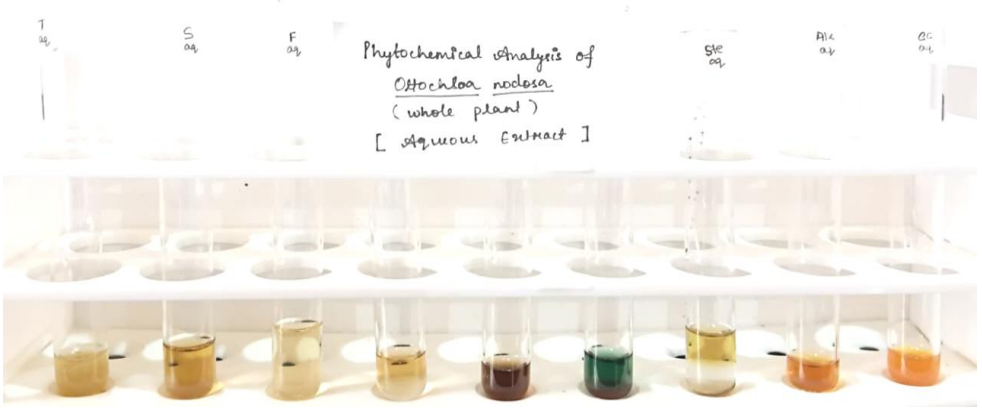


Figure 4: Phytochemical analysis of *O.nodosa* using aqueous extract

Table 2: TLC-based DPPH analysis of *O.nodosa*

	Mobile Phases	Rf value of Spots			
		S1	S2	S3	Streak
Aqueous	Ethyl acetate: Methanol: Water (40:5.4:4)	0.384	0.476	-	-
	Chloroform: Ethyl acetate: Formic acid (5: 4: 1)	0.904	-	-	0 to 0.761
	n-Hexane: Petroleum ether: Ethanol (1: 1: 8)	0.5	-	-	0.5 to 0.766

(Rf: Retention factor)

Other researchers have also studied different aspects of *Ottochloa nodosa*. A study conducted on freeze-dried whole plant extracts of *O. nodosa* (Latib et al., 2022) showed presence of secondary metabolites like saponin, tannin, flavonoid and alkaloid during phytochemical screening. While, the GC-MS analysis of crude extract detected nine active components (Gokul and Thomas, 2023) *i.e.* 9,12-octadecadienoate acid (Z, Z)-, 6-octadecanoic acid, methyl, 9,12-heptadecadienoate, trans-13-octadecanoic acid, 9,17-octadecadienal, cisvaccenic acid, butyl 9,12-octadecadienoate, octadecanoic acid, and oleic acid. Also using morphological traits and Beeli's digital formula (3111.4223), *Meliola panici* was identified which is an obligate

biotrophic fungi frequently reported on grasses of the Poaceae family. Gokul and Thomas, 2023 presented the first report of *M. panici* occurring on *O. nodosa*. This documentation contributed towards host-pathogen interactions and highlighted the ecological relevance of fungal associates in grasses. Research on *O. nodosa* remains sparse, leaving much of its biological and pharmacological potential unexplored. This lack of focused investigation creates a clear research gap, which, if addressed, could reveal novel and deeper insights into its bioactive profile and ecological contributions.

CONCLUSION

This study established *Ottochloa nodosa* as a promising source of natural antioxidants, with screening of key phytochemicals such as tannins, saponins, and phenolic compounds contributing to its bioactivity. Its dual ecological role as a soil stabilizer and fodder grass, along with its bioactive potential, reinforces its significance as an ecologically viable and pharmacologically relevant species. Future studies focusing on isolation, characterization, and biological evaluation of its active constituents could expand its utility in natural product research and sustainable medicine.

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