

Chapter 6

Qualitative Phytochemical analysis, TLC and Antibacterial activity of leaves of *Oplismenus burmanni* (Retz.) P. Beauv.

Rachna Devi¹, Sanjeet Kumar^{2*}, Vivek Kumar³, Sohan Lal⁴ and B. Jyotirmayee⁵

¹Department of Zoology, The ICFAI University, Himachal Pradesh, India

²Ambika Prasad Research Foundation, Odisha, India

³Department of Botany, Chaudhary Charan Singh University, Meerut, Uttar Pradesh, India

⁴School of Studies in Botany, Shaheed Mahendra Karma Vishwavidhyalaya, Bastar, Jagdalpur, Chhattisgarh, India

⁵Centurion University of Technology and Management, Bhubaneswar, Odisha, India

*Email-Id: sanjeet.biotech@gmail.com

ABSTRACT

Present study highlighted the bioactive compounds, antimicrobial potential, and chromatographic profile of the hydroethanolic leaf extract of *Oplismenus burmanni*. It is a grass species and lot of grasses are unexplored in these aspects. Qualitative screening revealed the presence of tannins, saponins, reducing sugars, and alkaloids. Antimicrobial testing against *Escherichia coli* showed complete inhibition at all tested concentrations. Thin Layer Chromatography (TLC) analysis under different solvent systems exhibited multiple distinct spots with R_f values ranging from 0.114 to 0.957. These findings suggest that *O. burmanni* contains bioactive constituents with promising antibacterial potential and could serve as a basis for further phytochemical and pharmacological investigations.

Keywords: Antibacterial activity, Qualitative screening, Phytochemical.

INTRODUCTION

Creeping grass species that grows abundantly in moist and shaded habitats, often carpeting the forest floor and plays an important role in soil stabilization and ground cover (Halli et al., 2022). Although commonly overlooked as a wild grass, *Oplismenus burmanni* has been traditionally valued in folk medicine for its soothing and healing properties. In several local systems of medicine in Asia and Africa, plants of the genus *Oplismenus* have been used in the treatment of wounds, skin irritations, and minor infections, highlighting their potential as natural remedies (Satpathy et al., 2019). In recent years, attention has shifted towards lesser-known grasses as alternative sources of pharmacologically active compounds and as a food resource within ecosystems, particularly in the context of rising antibiotic resistance and a source of nourishment for various organisms (Woo et al., 2023; Manjula et al., 2023).

Exploring the phytochemical composition and antimicrobial potential of *O. burmanni* can provide new insights into its medicinal relevance. By combining existing traditional knowledge with phytochemical screening, antimicrobial assays, and chromatographic profiling, this study aims to uncover the therapeutic promise of *O. burmanni* and contribute to the growing search for plant-based bioactive agents.

METHODOLOGY

Leaves of *Oplismenus burmanni* were collected from nearby Mahanadi areas of Cuttack district, Odisha, India (Figure 1). The plant species was identified by Dr. Sanjeet Kumar. Leaves were thoroughly washed under running tap water to remove dust. Further, they were cut into small pieces and macerated with the help of mortar and pestle by using hydroethanolic solvent to obtain extract for further experimental analysis. Qualitative phytochemical analysis, antibacterial activity against *Escherichia coli* and Chromatographic analysis was carried out using standard methods (Jena et al., 2025; Kumar et al., 2017; Naik et al., 2022; Kumar et al. 2013).



Figure 1: Collected leaves of *Oplismenus burmanni*

RESULTS AND DISCUSSION

The qualitative phytochemical screening for the detection of nine secondary metabolites in hydroethanolic leaf extract of *Oplismenus burmanni* confirmed the selective presence of some bioactive compounds *i.e.* Tannin, Saponin, Alkaloid and Reducing sugars (Table 1; Figure 2). The hydroethanolic leaf extract of *O. burmanni* exhibited strong antibacterial activity against *E. coli*, as no bacterial growth (NG) was observed in any of the tested concentrations (100, 50, 25, and 12.5 mg/mL). This indicates that the extract was effective in completely inhibiting the growth of *E. coli* even at the lowest concentration, showing the Minimum Inhibitory Concentration (MIC) at 12.5 mg/mL (Table 2; Figure 3). The negative control (nutrient broth) showed no growth, confirming sterility, while the positive control (microbial broth without extract) showed growth, confirming bacterial viability. The TLC analysis of the hydroethanolic leaf extract of *O. burmanni* using different mobile phases

revealed variations in compound separation efficiency (Table 3; Figure 4). The methanol: chloroform (1:1) system showed the most distinct separation, with four visible spots (R_f 0.642 to 0.957). The ethyl acetate: water: acetic acid (8:1:1) phase produced three moderates to high R_f spots (0.670, 0.731, 0.829). In contrast, the ethyl acetate: chloroform (1:9) system produced two lower R_f values except one spot at 0.957.

Table 1: Qualitative phytochemical analysis of leaves of *Oplismenus burmanni* using hydroethanolic extract

Bioactive compounds	Hydroethanolic extract
Tannin	Present
Saponin	Present
Flavonoids	Absent
Terpenoids	Absent
Phenolic compounds	Absent
Reducing sugars	Present
Steroids	Absent
Alkaloids	Present
Carbonyl compounds	Absent

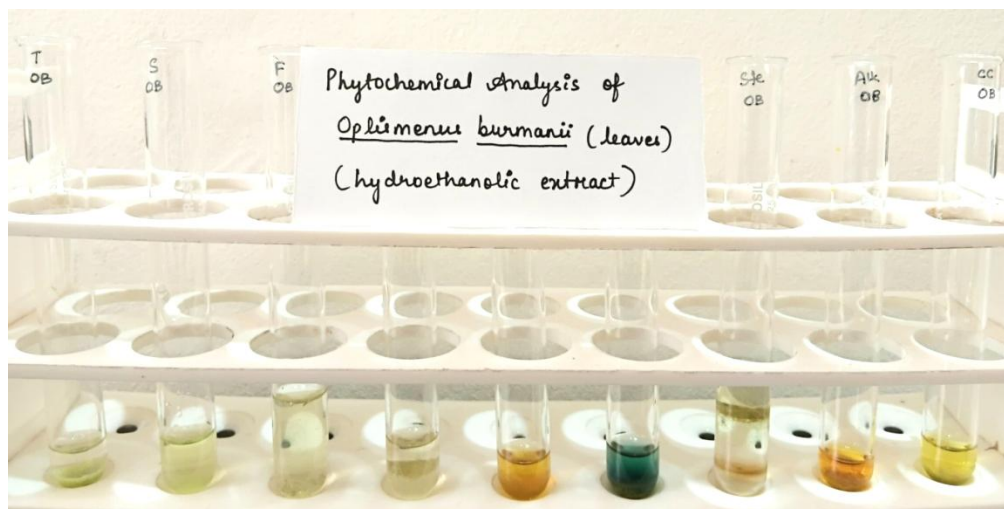


Figure 2: Detection of secondary metabolites

Table 2: Estimation of Minimum Inhibition Concentration (MIC) of hydroethanolic leaf extract of *Oplismenus burmanni* against *E.coli*

Extract	Concentration (mg/mL)				MIC (mg/mL)
	100	50	25	12.5	
<i>Oplismenus burmanni</i>	NG	NG	NG	NG	12.5
Nutrient broth	NG	NG	NG	NG	-
Microbial broth	G	G	G	G	-

(G: Growth of bacteria; NG: No growth)

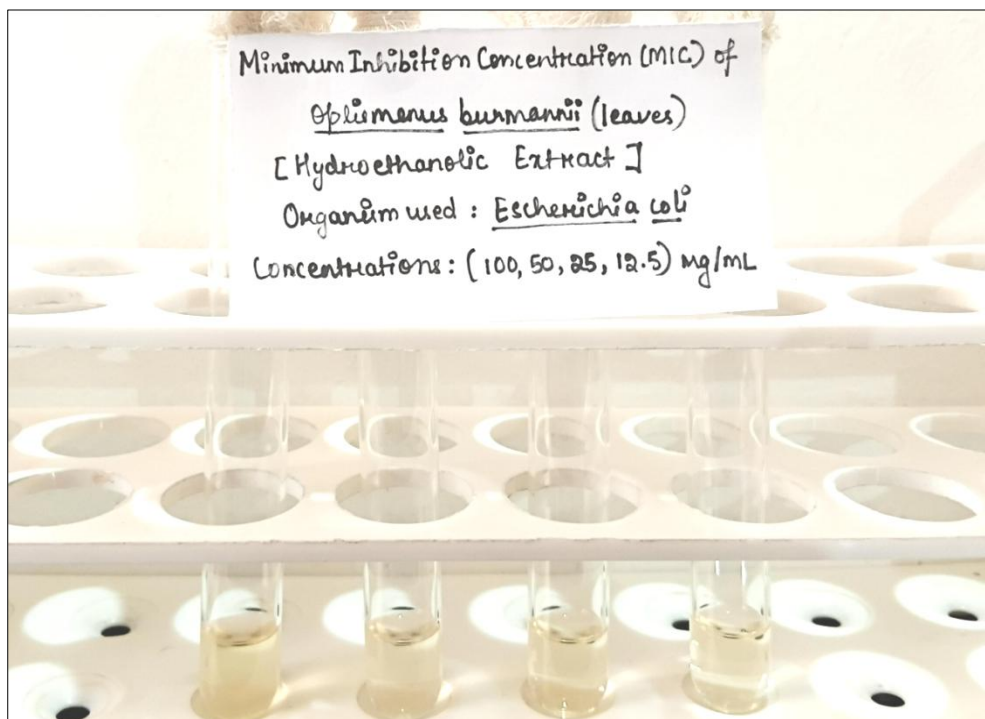


Figure 3: Estimation of Minimum Inhibition Concentration (MIC) against *E. coli*

Table 3: TLC analysis hydroethanolic leaf extract of *Oplismenus burmanni* using different mobile phases

	Mobile Phases	Rf value of Spots			
		S1	S2	S3	S4
Hydroethanolic	Methanol: Chloroform (1:1)	0.642	0.885	0.9	0.957
	Ethyl acetate: Water: Acetic acid (8:1:1)	0.670	0.731	0.829	-
	Ethyl acetate: Chloroform (1:9)	0.114	0.271	0.957	-

(Rf: Retention factor)

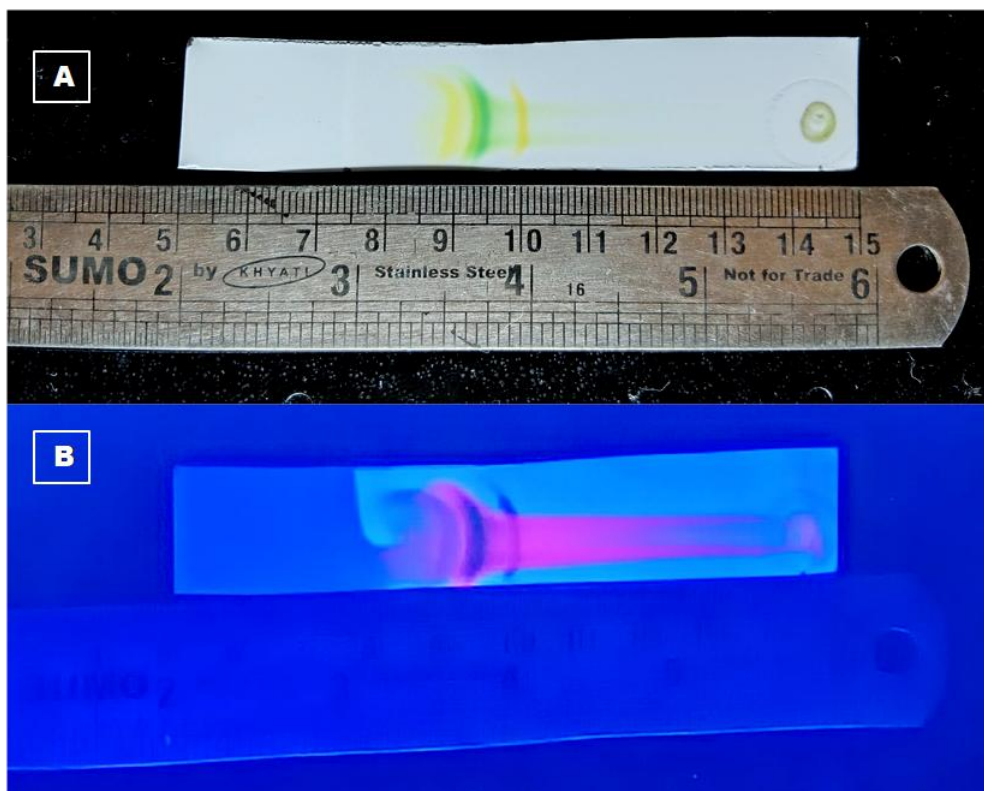


Figure 4: TLC analysis using (Methanol: Chloroform) mobile phase A) Without UV light B) Under UV light

Verma et al. (2015) reported isolation of sterol glycosides and included antibacterial screening of methanol extracts, indicating potential antimicrobial properties of *Oplismenus burmannii*. Again, Verma et al. (2015) isolated key glycolipids from *O. burmannii* and validated a reverse-phase HPLC method, confirming presence of bioactive metabolites. Satpathy et al. (2019) reported that *O. burmannii* is used in the treatment of galactogauge and used during pregnancy. Kumar, Mishra, and Sahu (2024) reported *O. burmannii* as a traditionally used medicinal grass, commonly applied for treating fever, wounds, and skin infections by tribal communities. The plant is reported to contain phenols, tannins, and saponins, suggesting antioxidant and antimicrobial potential.

CONCLUSION

The current study of hydroethanolic leaf extract of *Oplismenus burmannii* was found to contain secondary metabolites including tannins, saponins, reducing sugars, and alkaloids, which are traditionally associated with antimicrobial and therapeutic activities. The extract demonstrated significant antibacterial activity against *E. coli*, with a MIC of 12.5 mg/mL, highlighting its potency compared to other studied species. TLC profiling further confirmed the presence of diverse phytoconstituents, supporting its role as a potential source of natural antibacterial agents. However, the absence of major classes such as flavonoids, terpenoids, and phenolics in the preliminary screening suggests that its activity may rely on a narrower range of compounds. But future studies focusing on bioactive compound extraction, structural characterization, and broader antimicrobial screening are necessary to fully explore its pharmacological relevance.

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