Chapter 10

Phytochemical profiling and antimicrobial evaluation of *Eriochloa procera* (Poaceae)

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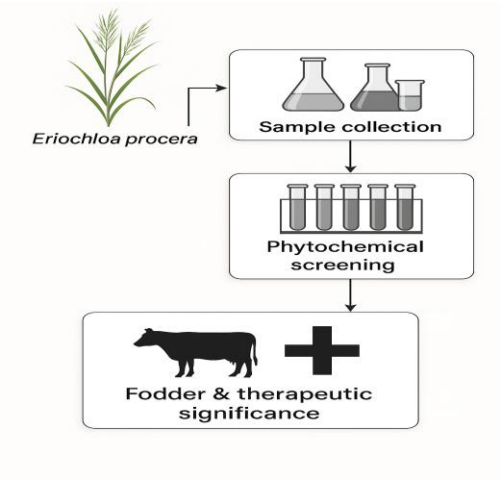
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Abstract: *Eriochloa procera*, a lesser-known wild fodder grass, was subjected to qualitative phytochemical screening and minimum inhibitory concentration (MIC) analysis against *Escherichia coli*. Both ethanolic and aqueous extracts were found to contain tannins, saponins, phenolic compounds, reducing sugars, and alkaloids, while flavonoids were detected only in aqueous extracts. MIC assay demonstrated significant inhibition at a concentration of 12.5 mg/mL, with a MIC value of 25 mg/mL. These findings suggest that *Eriochloa procera* has potential as a natural antimicrobial agent for sustainable ethnoveterinary applications.

Keywords: Phytochemicals, MIC assay, fodder grass, antimicrobial potential, ethnoveterinary medicine



Graphical abstract

Introduction

Grasses play a vital role in maintaining the health of grassland ecosystems, supporting livestock productivity, and contributing to rural livelihoods (Jiang et al., 2022; Rousset et al., 2024; Tuo et al., 2024; Behera et al., 2025). They are also the major food of wildlife and important component of ecological balance and wildlife management (Messmer et al., 2024). Despite their potential to nutritional and therapeutic benefits to both herbivores and human communities, wild grasses are often underutilized. One such species is *Eriochloa procera* (Retz.) C. E. Hubb., a perennial grass species commonly found in moist areas and along paddy field bunds (Behera et al., 2025). This grass is an important component of natural pastures and serves as a food source for grazing herbivores; however, its phytochemical and pharmacological properties remain poorly documented. With the rising concern over antimicrobial resistance and the need for natural alternatives, investigating the bioactive potential of wild fodder grasses has become a priority. This study aims to profile the phytochemical constituents of *E. procera* and assess its antibacterial efficacy against *E. coli*, thereby highlighting its significance for ethnoveterinary applications and grassland management.

Materials and methods

Sample collection: *Eriochloa procera* was collected from selected grassland patches in Cuttack, Odisha, India (Figure 1) and was authenticated using a regional reference book on grasses (Behera et al., 2025).

Phytochemical screening: Successive extractions were performed using n-hexane, ethanol, and distilled water. Standard protocols were followed for detecting the presence of tannins, saponins, flavonoids, terpenoids, phenolics, reducing sugars, steroids, alkaloids, and carbonyl compounds (Jena et al., 2025).

Antimicrobial assay: The hydroethanolic extract was tested for minimum inhibitory concentration (MIC) assay against *E. coli* using serial dilution techniques (Jena et al., 2025). Growth inhibition was assessed visually and compared with control samples, which included both nutrient broth and microbial broth.

Results and discussion

Qualitative screening of bioactive compounds showed a diverse range of secondary metabolites in both ethanolic and aqueous extracts (Table 1). Tannins, saponins, phenolic compounds, and reducing sugars were consistently identified, while alkaloids were exclusively found in the ethanolic extract.



Figure 1: Collected sample of *Eriochloa procera*

The presence of flavonoids was restricted to the aqueous extract, indicating they may be key contributors to its bioactivity. These phytoconstituents are known for their antimicrobial, antioxidant, and wound-healing properties (Farahmandfar et al., 2019), which support the ethnomedicinal use of this grass by local communities. MIC results demonstrated growth inhibition of *E. coli* at 25 mg/mL. The growth in microbial broth served as a positive control, validating the assay. This result confirmed that hydroethanolic extracts of *E. procera* possess bacteriostatic activity against gram-negative pathogens. These findings are comparable to other reported fodder grasses with antimicrobial properties, highlighting *E. procera* as a potential candidate for the development of a natural antimicrobial formulation.

Table 1: Qualitative phytochemical analysis of *Eriochloa procera*

Bioactive compounds	n-hexane	Ethanol	Aqueous
Tannin	Absent	Present	Present
Saponin	Absent	Present	Present
Flavonoids	Absent	Absent	Present
Terpenoids	Absent	Absent	Absent
Phenolic compounds	Absent	Present	Present
Reducing sugars	Absent	Present	Present
Steroids	Absent	Absent	Absent
Alkaloids	Absent	Present	Absent
Carbonyl compounds	Absent	Absent	Absent

Table 2: Estimation of MIC *Eriochloa procera* against *E. coli*

Extract	Concentration (mg/mL)				MIC (mg/mL)
	100	50	25	12.5	
Eriochloa procera	NG	NG	NG	G	25
Nutrient broth	NG	NG	NG	G	-
Microbial broth	G	G	G	G	-

(NG = No Growth; G = Growth observed)

Conclusion

The study presents a detailed and comprehensive report on the phytochemical and antimicrobial properties of *Eriochloa procera*, a grass species with emerging therapeutic potential. It highlights that the plant is notably rich in secondary metabolites such as tannins, saponins, phenolics, and flavonoids, as well as its ability to inhibit the growth of *E. coli*, a common pathogenic bacterium associated with gastrointestinal infections in both humans and animals. These bioactive compounds are well known for their pharmacological relevance. This underscores its potential for use in ethnoveterinary medicines and therapeutic applications, especially in rural and resource-limited settings. The application of this plant species as a plant-based therapeutic for livestock disease management will help in reducing their dependency on synthetic antibiotics. Furthermore, this study highlights the importance of future research that should emphasize bioassay-guided fractionation, isolation of bioactive compounds, and in vivo validation to support its integration into sustainable livestock healthcare and grassland conservation strategies. Moreover, promoting the conservation and cultivation of this grass species would help in maintaining ecological sustainability and grassland biodiversity. This will help in achieving broader goals of environmental conservation and sustainable agriculture. This study provides a strong foundation for further studies on *Eriochloa procera* for the development of veterinary medicine and ecosystem management.

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