Chapter 4

Phytochemical profiling and antimicrobial evaluation of *Dactyloctenium aegyptium* (L.) Willd.: a nutritive fodder grass with therapeutic potential

Sanjeet Kumar

Biodiversity and Conservation Lab., Ambika Prasad Research Foundation, Odisha, India
Email-Id: sanjeetaprf@gmail.com

Abstract: Present study investigated the phytochemical analysis and antimicrobial potential of *Dactyloctenium aegyptium*, an underutilized fodder grass. Qualitative phytochemical screening of n-hexane, ethanolic, and aqueous extracts revealed the presence of saponins and reducing sugars, with tannins detected only in ethanolic extract. The hydroethanolic extract exhibited growth inhibition of *Escherichia coli* at a minimum inhibitory concentration (MIC) of 100 mg/mL, suggesting moderate antibacterial potential. These findings highlight the dual importance of *D. aegyptium* as a sustainable fodder resource and a promising source of bioactive compounds for future therapeutic development.

Keywords: Fodder grass, pharmacology, secondary metabolites

Introduction

Dactyloctenium aegyptium (L.) Willd., commonly known as crowfoot grass or Egyptian grass, is a widely distributed in India (Behera et al., 2025). Traditionally used as a pasture grass, it plays a crucial role in sustaining livestock in marginal ecosystems where other fodder sources may be scarce (Shaheen et al., 2020). Its palatability makes it valuable in supporting ruminant health and improving forage diversity. Recent ethnobotanical surveys suggest that many fodder grasses also possess medicinal attributes, including antimicrobial, antioxidant, and anti-inflammatory activities (Mishra et al., 2022; Sinha et al., 2023). The exploration of these dual-purpose species is important, as they contribute both to ecosystem functioning and rural livelihoods. However, *D. aegyptium* remains poorly studied in terms of its phytochemical composition and bioactivity. Present study aims to bridge this gap by performing a qualitative phytochemical screening of whole-plant extracts of *D. aegyptium* and assessing its antibacterial potential against *E. coli*.



Figure 1: Collected whole-plant sample of *Dactyloctenium aegyptium* (L.) Willd.

These findings will contribute to both grassland ecology and pharmacognosy by providing evidence of its bioactive constituents.

Methodology

D. aegyptium was collected from Aathgarh Forest Division, Cuttack, Odisha, India (Figure 1). The grass species was identified by author followed by published literature (Behera et al., 2025). Whole plant was thoroughly washed under running tap water to remove dust. Further, they were cut into small pieces and air dried. Extraction was made using Soxhlet extraction (Jena et al., 2025). Phytochemical screening was carried out using standard method (Jena et al., 2025). Antibacterial activity was done against *Escherichia coli* (Jena et al., 2025).

Results and discussion

The qualitative analysis (Table 1; Figure 2-4) showed that saponins were consistently present across all solvent extracts, indicating their abundance and potential contribution to immunomodulatory and antimicrobial activity. Reducing sugars were detected in both n-hexane and ethanolic extracts, suggesting a moderate carbohydrate presence, which could provide additional nutritive value as fodder. Tannins were observed only in ethanolic extract, which may impart mild astringent properties and potential antimicrobial effects. No steroids, alkaloids, phenolic compounds, flavonoids, or terpenoids were detected, indicating a relatively simple phytochemical profile compared to medicinally dominant grasses. The hydroethanolic extract demonstrated visible inhibition of *E. coli* growth at an MIC of 100 mg/mL (Table 2). Although this indicates a moderate antibacterial effect, the extract's efficacy supports its traditional relevance as a safe fodder option with potential therapeutic benefits. The results are consistent with reports that saponin-rich grasses exert antibacterial activity through membrane disruption mechanisms (Figure 5). Further fractionation and identification of active principles may enhance potency and applicability in livestock health management.

Table 1: Qualitative phytochemical analysis of *Dactyloctenium aegyptium*

Bioactive compounds	n-Hexane	Ethanol	Aqueous
Tannin	Absent	Present	Absent
Saponin	Present	Present	Present
Flavonoids	Absent	Absent	Absent
Terpenoids	Absent	Absent	Absent

Phenolic compounds	Absent	Absent	Absent
Reducing sugars	Present	Present	Absent
Steroids	Absent	Absent	Absent
Alkaloids	Absent	Absent	Absent
Carbonyl compounds	Absent	Absent	Absent

Table 2: Estimation of Minimum Inhibition Concentration against *E. coli*

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

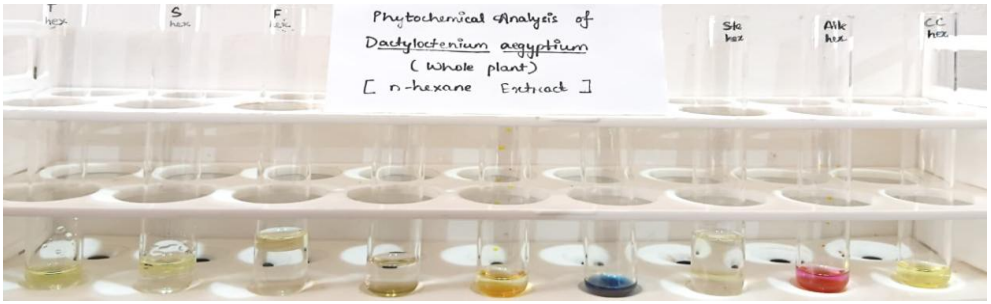


Figure 2: Phytochemical analysis of *Dactyloctenium aegyptium* using n-hexane extract

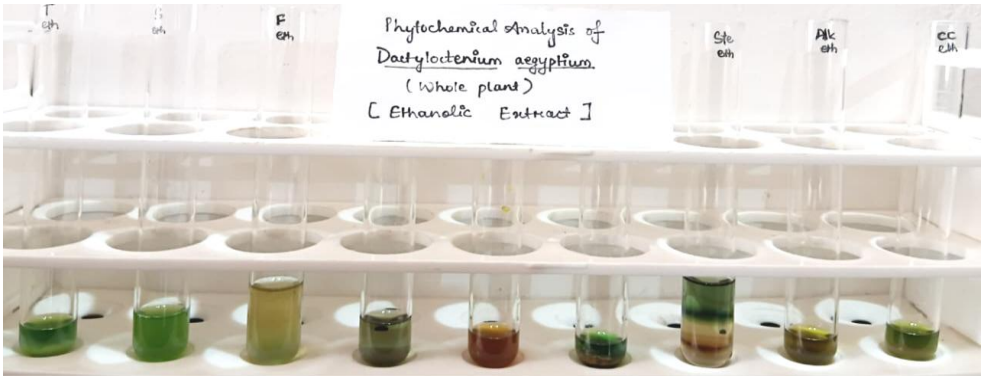


Figure 3: Phytochemical analysis of *Dactyloctenium aegyptium* using ethanolic extract

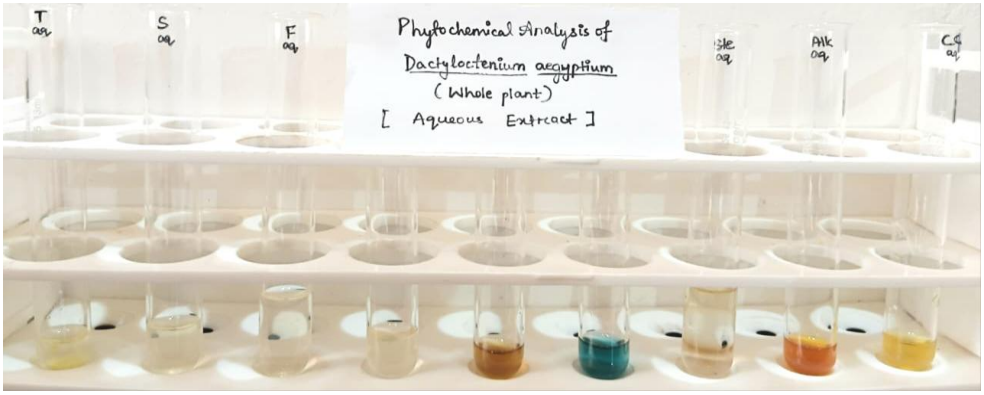


Figure 4: Phytochemical analysis of *Dactyloctenium aegyptium* using aqueous extract

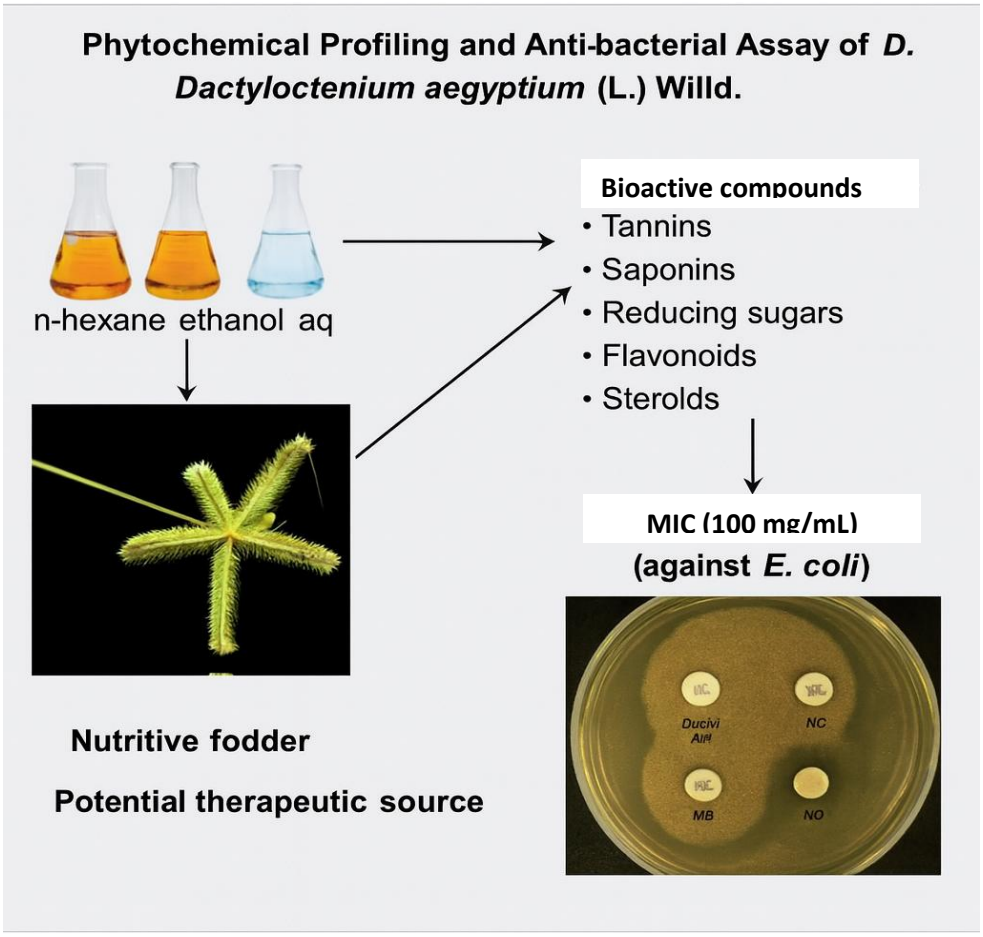


Figure 5: Significance of present study

Conclusion

Present study confirms the presence of bioactive constituents, particularly saponins and tannins, in *Dactyloctenium aegyptium* and demonstrates its moderate antibacterial potential. Beyond its role as a nutritive fodder grass, *D. aegyptium* represents a valuable candidate for future phytopharmacological investigations, especially in developing natural antimicrobial agents for sustainable livestock health and possible human therapeutic applications. It can also be utilized for grassland development in wildlife management initiatives.

References

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