Chapter 7

Medicinal and nutraceutical values of *Eragrostis ciliaris* (L.) R.Br.: a wild grass of India

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ABSTRACT

Eragrostis ciliaris, a wild grass commonly found along roadsides has paleotropical distribution. Present study evaluated its medicinal and nutraceutical values through phytochemical screening and antioxidant activity. Results revealed that ethanol and aqueous extracts showed tannins, saponins, flavonoids, and reducing sugars. Antioxidant activity revealed diverse radical-scavenging compounds with varying Rf values. The findings highlight *E. ciliaris* as both an ecologically valuable fodder species and a source of natural antioxidants. However, research on its phytochemistry and pharmacological properties remains limited, warranting further studies to explore its therapeutic applications and ecological significance in India.

Keywords: Antioxidant potential, fodder species, secondary metabolites

INTRODUCTION

Grasses form the green foundation of terrestrial ecosystems, covering nearly one-third of Earth's land surface (Stevens, 2018). They stabilize soil with dense fibrous roots, prevent erosion, and enhance water infiltration, thus maintaining watershed health. As primary producers, grasses convert

sunlight into biomass that sustains vast herbivore populations and, in turn, higher trophic levels (Kazama et al., 2021). Their rapid growth and adaptability make them crucial in restoring degraded lands and maintaining ecosystem resilience under climate stress (Ojija, 2024). Grasses also sequester significant carbon below ground, mitigating greenhouse gas buildup. In open landscapes they regulate nutrient cycling and microclimates (Bai and Cotrufo, 2022). *Eragrostis ciliaris* is a widely distributed paleotropical grass (Poaceae), occurring across the Old-World tropics and subtropics and often naturalized in disturbed habitats such as roadsides, degraded pastures, and seasonally dry plains. It is an annual to short-lived perennial adapted to semi-arid and seasonally dry tropical biomes (POWO, 2025). While it is a commonly occurring grass, the palatability is still considered mild both as a wildlife and livestock fodder (Behera et al., 2025). The family Poaceae, one of the largest and most ecologically significant plant families, encompasses a vast diversity of grass species that contribute not only to global primary productivity but also to human and animal well-being. Beyond their ecological and economic importance, many grasses are now recognized for their phytochemical richness and medicinal potential (Gebashe et al, 2020; Singh and Patel, 2024). In this context, *Eragrostis ciliaris* (Figure 1), a small yet resilient grass species, represents an underexplored member of Poaceae deserving scientific attention. Present study was therefore carried out to profile its phytoconstituents and antioxidant activity that can provide the base for future researches based on plant-based drug development and quality control.

METHODOLOGY

Plant parts of *Eragrostis ciliaris* were collected from Khordha district, Odisha, India, and identified by the authors based on published literature (Behera et al., 2025). After thorough washing with running tap water to remove dust, the plant material was cut into small pieces. Soxhlet extraction was then performed using n-hexane, ethanol, and aqueous solvents (Jena et al., 2025). The extracts underwent qualitative phytochemical analysis to detect secondary metabolites and TLC (Thin Layer Chromatography) based

antioxidant analysis following standard methods (Kumar et al., 2013; Pattnaik and Bhatnagar, 2023; Jena et al., 2025).

RESULTS AND DISCUSSION

The qualitative phytochemical screening of *Eragrostis ciliaris* revealed that the distribution of secondary metabolites varied with solvent polarity (Table 1). The non-polar n-hexane extract showed no detectable bioactive compounds, indicating a limited presence of lipophilic metabolites. In contrast, ethanolic and aqueous extract displayed a richer phytochemical composition, with tannins, saponins, and reducing sugars identified in both, while flavonoids were exclusive to the aqueous extract. The presence of flavonoids and tannins suggests potential antioxidant and anti-inflammatory activities, as these compounds are known to act as free radical scavengers and metal ion chelators. The TLC-based DPPH (2,2-diphenyl-1-picrylhydrazyl) assay of aqueous extract was performed to confirm the antioxidant potential of *E. ciliaris* (Table 2). Notably, (Ethyl acetate: Methanol: Water) and (Chloroform: Ethyl acetate: Formic acid) systems produced two spots at Rf (0.666, 0.95) and (0.241, 0.983) respectively. While, Rf 0.793 along with a streak (0.238 – 0.507) was observed in the n-hexane: petroleum ether: ethanol system (Figure 2). These observations highlighted the presence of multiple antioxidant-active components in *E. ciliaris* implying the its potential radical-scavenging activity due to presence of diverse array of secondary metabolites which can again help in protection against cell damage and oxidative stress.

Table 1: Qualitative phytochemical analysis of *E. ciliaris*

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

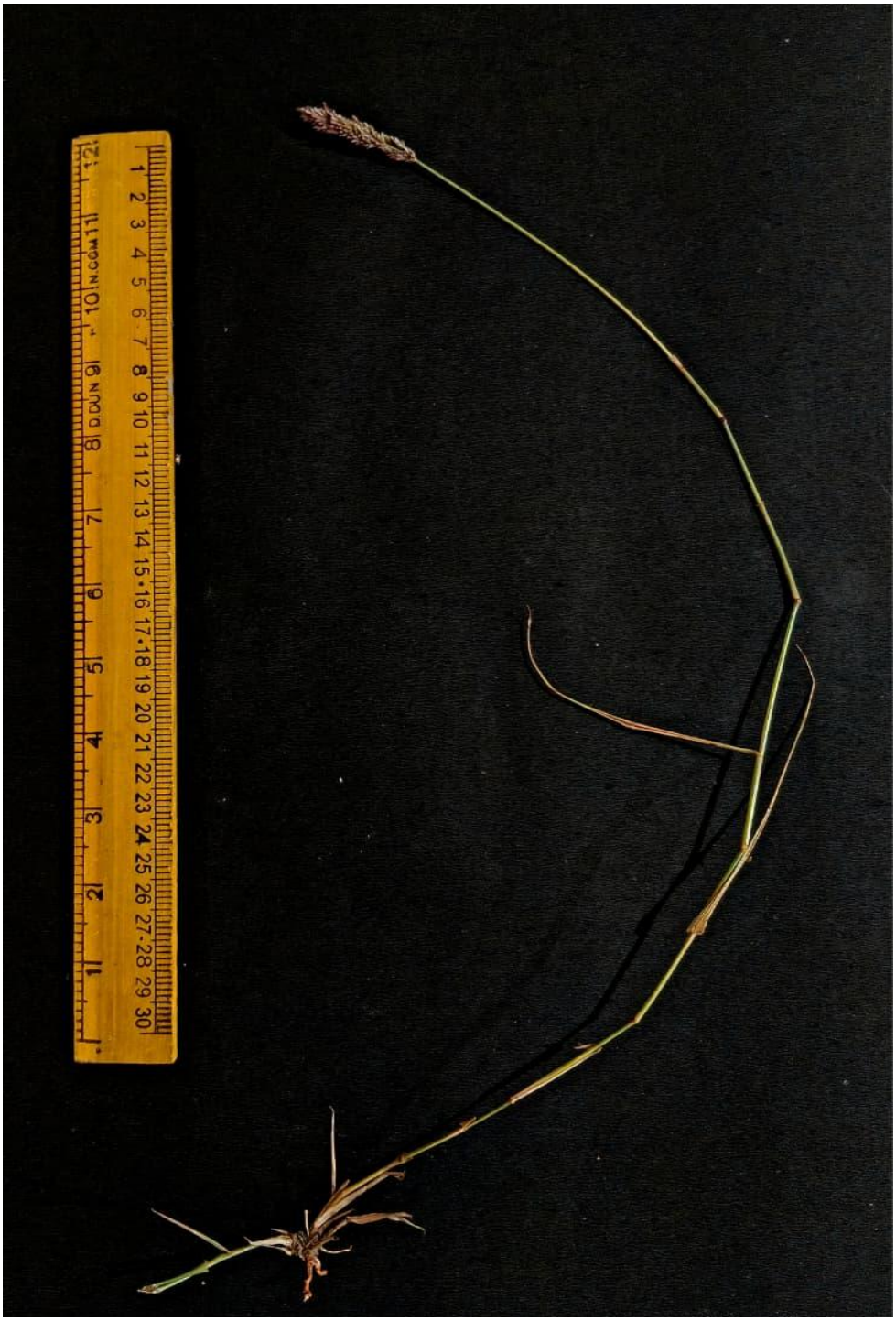

Figure 1: Whole plant of *Eragrostis ciliaris*

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

	Mobile Phases	Rf value of Spots		
		S1	S2	Streak
Aqueous	Ethyl acetate: Methanol: Water (40:5.4:4)	0.666	0.95	-
	Chloroform: Ethyl acetate: Formic acid (5: 4: 1)	0.241	0.983	-
	n-Hexane: Petroleum ether: Ethanol (10: 10: 80)	0.793	-	0.238 – 0.507

(Rf: Retention factor)

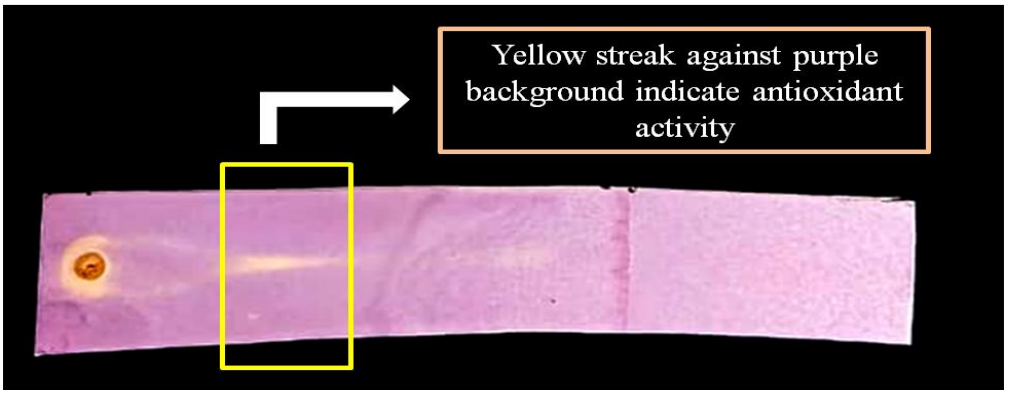

Figure 2: TLC-DPPH assay showing streaking in *E. ciliaris*

CONCLUSION

Current study revealed that *Eragrostis ciliaris* contains a diverse array of polar phytochemicals, with the aqueous extract emerging as the richest source of bioactive metabolites such as tannins, saponins, flavonoids, and reducing sugars. The TLC-DPPH assay further substantiated the plant's antioxidant potential, as different solvent systems exhibited distinct Rf values and streaking patterns, indicating the presence of multiple radical-scavenging compounds. These results suggest that the aqueous extract of *E. ciliaris* possesses significant antioxidant activity and may serve as a promising candidate for the development of natural therapeutics and plant-

based formulations. However, research on this grass species remains limited. Comprehensive studies exploring its phytochemical and pharmacological profiles are essential to fully elucidate its bioactive potential, while future investigations may also shed light on its ecological significance, forage value, and practical applications in sustainable resource management.

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