

Chapter 10

Exploring the phytoconstituents of flowers *Eragrostis unioloides* (Retz.) Nees ex Steud., through TLC profiling & phytochemical screening

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ABSTRACT

Eragrostis unioloides, a grass species, has been traditionally used for various purposes. To explore its potential medicinal properties, a phytochemical screening and thin-layer chromatography (TLC) analysis were conducted. The results revealed the presence of tannins, saponins, reducing sugars, and alkaloids in different extracts. The TLC analysis showed distinct R_f values for various compounds in different mobile phases. This study lays the groundwork for future research into the medicinal properties of *E. unioloides* and its potential applications in traditional medicine. The findings highlight the importance of screening grass species for bioactive compounds, which could lead to the discovery of new medicines.

Keywords: Bioactive compounds, grass, therapeutic agents

INTRODUCTION

Grasses are one of the most diverse and widespread groups of plants, with many species being used in traditional medicine for various purposes (Gebashe *et al.*, 2020). Despite their importance, grasses remain an underexplored source of

bioactive compounds (Gono *et al.*, 2022). Recent studies have highlighted the potential of grasses as a source of novel medicines, with many species showing promising pharmacological activities (Zeng *et al.*, 2018; Mukarram *et al.*, 2021; Kiełtyka-Dadasiewicz *et al.*, 2024). *Eragrostis unioloides*, a species of grass, has been traditionally used in various cultures for its medicinal properties (Saxena and Brahman, 1996; Siddabathula and Prasanna, 2023; Panda and Panda, 2012). However, there is limited scientific evidence to support its use, and further research is needed to explore its potential as a source of bioactive compounds (Nayak *et al.*, 2024). This study aims to investigate the phytochemical composition of *E. unioloides* flowers and to identify potential bioactive compounds that may be responsible for its medicinal properties (Aldughaylibi *et al.*, 2022). The search for bioactive compounds in grasses is an important area of research, as it may lead to the discovery of new medicines and provide insights into the pharmacological activities of these compounds (Dincheva *et al.*, 2023). This study will contribute to our understanding of the phytochemical composition of *E. unioloides* and its potential applications in traditional medicine (Sinha *et al.*, 2023).

METHODOLOGY

The flowers of *E. unioloides* were collected from the Athagarh division of Cuttack district in Odisha, India (Figure 3). The plant species was identified by the authors (Figure 1-2). The Soxhlet extraction for phytochemical analysis was carried out and nine secondary metabolites were detected using standard methods (Devi *et al.*, 2023; Marndi *et al.*, 2024; Mety *et al.*, 2024).

Test for tannin: 1 ml of flower extract was taken in a test tube, and 3-5 drops of 10% lead acetate solution were added to it. The gelatinous precipitate formation confirmed the presence of tannin.

Test for saponin: About 1 ml of distilled water was added to 1 ml of the flower extract and shaken well. The formation of persistent froth was observed, confirming the presence of saponin.



Figure 1: Flowers of *E. uniolooides* from Odisha state, India



Figure 2: Flowers of *E. unioides* from Himachal Pradesh, India



Figure 3: Collected flowers of *E. unioides* for experimental work

Test for flavonoids: About 1 ml of the flower extract was taken. 2 ml of NaOH solution and 3-5 drops of dilute HCl were added to it. The colour initially turned to an intense yellow colour with NaOH solution and later became colourless, which confirmed the presence of flavonoids.

Test for terpenoids: To 1 ml of the flower extract, 5-6 drops of chloroform were added. Then, 4-6 drops of concentrated sulphuric acid were added to it. The reddish-brown interface confirmed the presence of terpenoids.

Test for phenols: About 1 ml of the flower extract was taken. A few drops of 5% ferric chloride solution were added. The dark bluish-black appearance confirmed the presence of phenolic compounds.

Test for reducing sugars: About 1 ml of the flower extract was taken. Two drops of Fehling's solution A, followed by Fehling's solution B, were added and kept in the water bath for a few minutes. The presence of red-orange precipitate confirmed the presence of reducing sugars.

Test for steroids: To 1 ml of the flower extract, 1 ml of chloroform followed by 1 ml of concentrated sulphuric acid were added. The appearance of upper red and lower yellow color with green fluorescence provides the presence of steroids.

Test for alkaloids: About 1 ml of the flower extract was taken. 3-4 drops of Dragendroff's reagent were added to it. The formation of a reddish-brown precipitate confirmed the presence of alkaloids.

Test for carbonyl compounds: About 1 ml of flower extract was taken, and 3-4 drops of 2,4- Dinitrophenylhydrazine (DNPH) reagent was added. The formation of yellow crystals confirmed the presence of carbonyl compounds.

TLC (Thin-layer chromatography) analysis

TLC plates were prepared on 6 cm glass slides using silica gel powder. Slides were washed with clinical laboratory detergent and dried. Clean and dried slides were wiped with ethyl acetate for removing surface adherents. 3 g of silica was taken in 20 ml of distilled water, and slurry was prepared by constant stirring and was finally poured over the slides and slides were left undisturbed till the drying of the silica layer. Then, the slides were activated at 50° C for 15-20 minutes before running the TLC. Methanol: chloroform (1:1), ethyl acetate: chloroform (1:9), and ethyl acetate: distilled water: acetic acid (8:1:1) were used as mobile phases. Then spots were marked, the RF (Retention Factor) values were recorded and visualized under the UV chamber (Kumar and Jena, 2014; Mishra and Bhatnagar, 2024).

RESULTS AND DISCUSSION

The phytochemical screening of *E. unioides* flowers revealed the presence of various bioactive compounds, including tannins, saponins, reducing sugars, and

alkaloids (Figures 4-6, Table 1). The presence of these compounds suggests that the plant may have potential medicinal properties. The TLC analysis showed distinct Rf values for various compounds in different mobile phases, indicating the presence of a range of bioactive compounds with different polarities. The results suggest that *E. unioides* may have potential applications in traditional medicine, particularly in the treatment of diseases where these compounds have shown efficacy. The presence of tannins and saponins in the plant suggests that it may have antimicrobial and anti-inflammatory properties, while the presence of alkaloids may indicate potential analgesic and anti-inflammatory activities. The reducing sugars detected in the plant may also contribute to its medicinal properties.

TLC Results and Polarity of Mobile Phases: The TLC analysis of *E. unioides* flowers was conducted using different mobile phases with varying polarities (Figure 7, Table 2). The results are as follows:

1. **Chloroform: Methanol (1:1):** This mobile phase has a moderate polarity. The Rf values of 0.28 and 0.46 for the acetone extract suggest that the compounds present in the extract have moderate polarity, allowing them to move up the plate but not too far. The Rf value of 0.93 for the hydro-ethanolic extract suggests that the compounds present in this extract are relatively non-polar.
2. **Ethyl acetate: Chloroform (1:9):** This mobile phase has a relatively low polarity. The Rf values of 0.79 and 0.87 for the acetone extract suggest that the compounds present in the extract are relatively non-polar, allowing them to move up the plate. The Rf value of 0.91 for the hydro-ethanolic extract suggests that the compounds present in this extract are also non-polar.
3. **Ethyl acetate: Distilled water: Acetic acid (8:1:1):** This mobile phase has a relatively high polarity. The Rf values of 0.93 and 0.96 for the acetone extract suggest that the compounds present in the extract are relatively polar, allowing them to move up the plate. The Rf values of 0.75 and 0.83 for the

hydro-ethanolic extract suggest that the compounds present in this extract are also polar but to a lesser extent.

Overall, the results of the present study provide a foundation for further research into the medicinal properties of *E. unioloides* and its potential applications. Further studies are needed to isolate and characterize the bioactive compounds present in the plant and to evaluate their pharmacological activities.

Table 1: Qualitative phytochemical screening of *Eragrostis unioloides* flowers using different extracts

Bioactive compounds	Extracts		
	n-Hexane	Ethanol	Aqueous
Tannin	Not detected	Detected	Detected
Saponin	Detected	Not detected	Detected
Flavonoids	Not detected	Not detected	Not detected
Terpenoids	Not detected	Not detected	Not detected
Phenols	Not detected	Not detected	Not detected
Reducing sugar	Not detected	Detected	Detected
Steroids	Not detected	Not detected	Not detected
Alkaloids	Not detected	Detected	Detected
Carbonyl compounds	Not detected	Not detected	Not detected

Table 2: TLC analysis of *Eragrostis unioloides* flowers using different mobile phases

Mobile phases	Extracts	Rf values of spots	
		S ₁	S ₂
Chloroform: Methanol (1:1)	Acetone	0.28	0.46
	hydroethanolic	0.93	Nil
	Acetone	0.79	0.87

Ethyl acetate: chloroform (1:9)	Hydroethanolic	0.91	Nil
Ethyl acetate: Water: Acetic acid (8:1:1)	Acetone	0.93	0.96
	Hydroethanolic	0.75	0.83

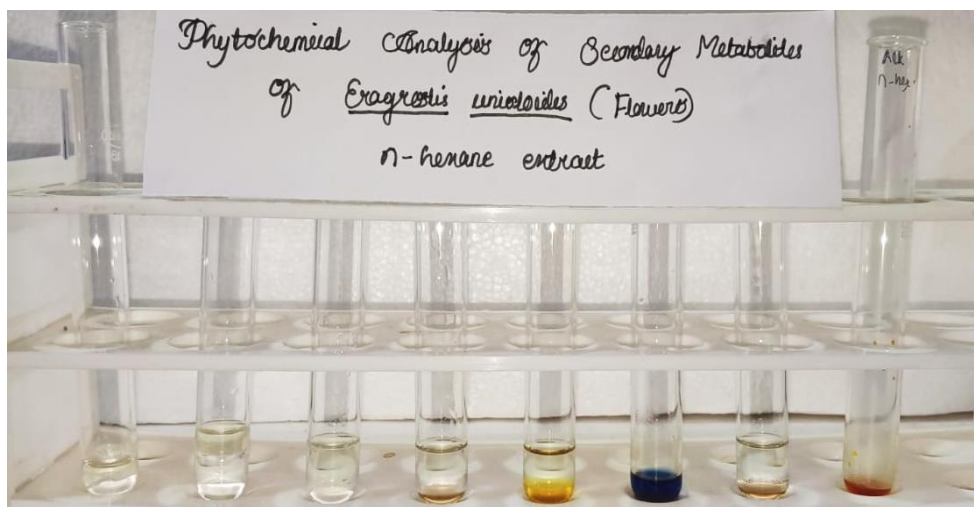


Figure 4: Detection of secondary metabolites of *E. unioides* flowers using n-hexane extract

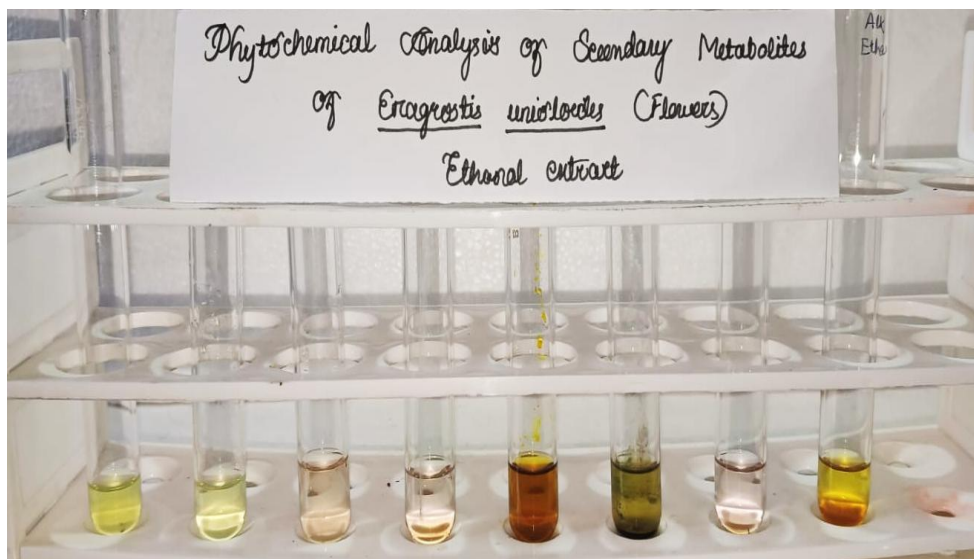


Figure 5: Detection of secondary metabolites of *E. unioides* flowers using ethanol extract

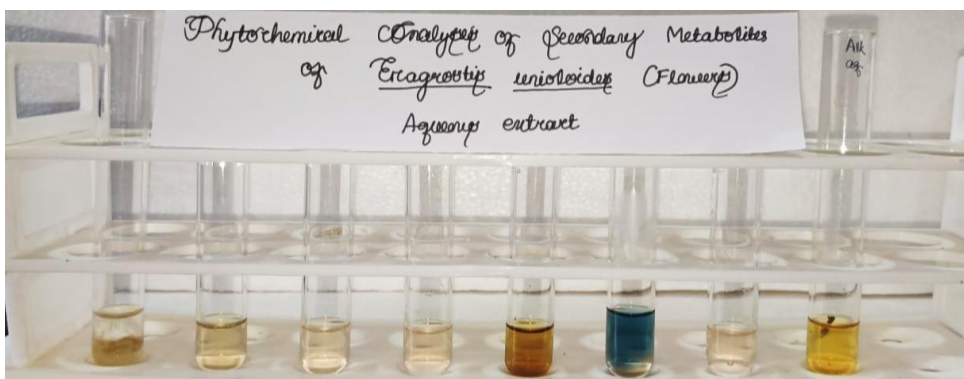


Figure 6: Detection of secondary metabolites of *E. unioloides* flowers using aqueous extract

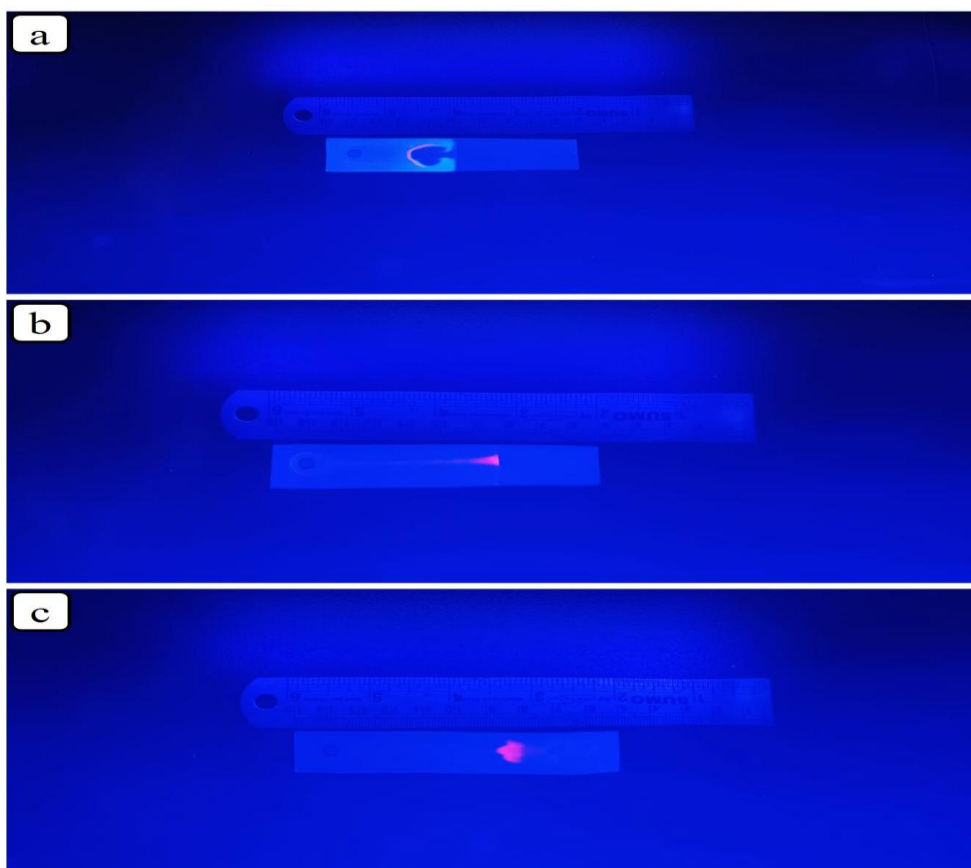


Figure 7: Spots on TLC plates under UV light of *E. unioloides* acetone extracts using mobile phases; a) (Chloroform: methanol), b) (Ethyl acetate: chloroform) and c) (Ethyl acetate: water: acetic acid)

During the literature survey, it was noticed that there are fewer or no reports available on the *E. unioloides* flower, but researchers have documented the medicinal values and bioactive compounds of grass species. Sujatha *et al.*, (2022) reported the high cytotoxicity activity of ethyl acetate extracts of *E. amabilis* and *E. pilosa*. Jabeen *et al.*, (2023) reported the phytochemical and allelopathic potential of invasive grass species.

CONCLUSION

The phytochemical screening and TLC analysis of *Eragrostis unioloides* flowers revealed the presence of various bioactive compounds, including tannins, saponins, reducing sugars, and alkaloids. These findings suggest that *E. unioloides* may have potential medicinal properties, warranting further research into its pharmacological activities and potential applications. The study highlights the importance of screening grass species for bioactive compounds, which could lead to the discovery of new medicines.

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