Chapter 2

Phytochemical analysis of *Limnophila repens* (Benth.) Benth. (Plantaginaceae): a wetland plant

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Abstract: *Limnophila repens*, a traditionally used medicinal wetland plant, was subjected to qualitative phytochemical analysis using n-hexane, ethanol, and distilled water. The results revealed the presence of various bioactive compounds, including tannins, saponins, flavonoids, terpenoids, phenolic compounds, reducing sugars, and alkaloids. The ethanol and aqueous extracts showed a broader range of bioactive compounds compared to the n-hexane extract. This study provides valuable insights into the secondary metabolites of *L. repens*, which may contribute to formulate new therapeutic agents.

Keywords: Bioactive compounds; medicinal plants; wetlands

INTRODUCTION

Wetlands are vital ecosystems that provide numerous ecological, economic, and social benefits (Mazzotta et al., 2019). They support a wide range of plant and animal species, maintain water quality, and regulate water cycles (Devi et al., 2024a). Wetlands also play a crucial role in human well-being, providing food,

fiber, and medicines, as well as recreational and tourism opportunities (Devi et al., 2024b). Among the wetland plants, *Limnophila repens* (Benth.) Benth., an aquatic plant species has medicinal uses (Gunji and Seru, 2020). Despite its importance, *L. repens* remains understudied, and its secondary metabolites are not well documented. This study aims to investigate the phytochemical constituents of *L. repens* and provide a scientific basis for its traditional therapeutic uses. The findings of this study will contribute to the conservation and sustainable use of *L. repens* and highlight the importance of wetland ecosystems in supporting human well-being.



Figure 1: Whole plant of *Limnophila repens*

MATERIALS AND METHODS

Whole plants of *L. repens* was collected from Cuttack, Odisha. The plant species was identified by the authors using published literature (Kumar *et al.*, 2022; Figure

1). The Soxhlet extraction method was adopted using three solvents for phytochemical analysis (Devi et al., 2023; Marndi et al., 2024; Jena et al., 2024).

RESULTS AND DISCUSSION

The phytochemical analysis of the whole plant of *L. repens* revealed the presence of various bioactive compounds in the n-hexane, ethanol, and aqueous extracts (Table 1). The n-hexane extract showed the presence of tannins, terpenoids, reducing sugars, and alkaloids. The ethanol extract contained tannins, saponins, flavonoids, phenolic compounds, reducing sugars, and alkaloids. The aqueous extract revealed the presence of tannins, saponins, flavonoids, phenolic compounds, reducing sugars, and alkaloids (Table 1).

Table 1: Phytochemical analysis of the whole plant of *Limnophila repens* using different extracts

Bioactive compounds	n-Hexane	Ethanol	Aqueous
Tannin	+ve	+ve	+ve
Saponin	-ve	-ve	+ve
Flavonoids	-ve	+ve	+ve
Terpenoids	+ve	-ve	-ve
Phenolic compounds	-ve	+ve	+ve
Reducing sugar	+ve	+ve	+ve
Steroids	-ve	-ve	-ve
Alkaloids	+ve	+ve	+ve
Carbonyl compounds	-ve	-ve	-ve

(+ve: Present; -ve: Absent)

The results indicate that the ethanol and aqueous extracts have a broader range of bioactive compounds compared to the n-hexane extract. The phytochemical analysis of *L. repens* revealed a diverse range of bioactive compounds, including tannins, saponins, flavonoids, terpenoids, phenolic compounds, reducing sugars, and alkaloids.



Figure 2: Phytochemical analysis of the whole plant of *L. repens* using n-hexane extract

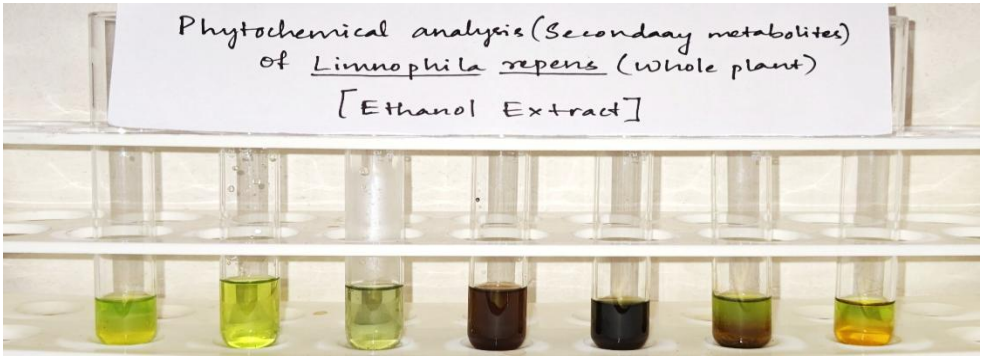


Figure 3: Phytochemical analysis of the whole plant of *L. repens* using ethanol extract

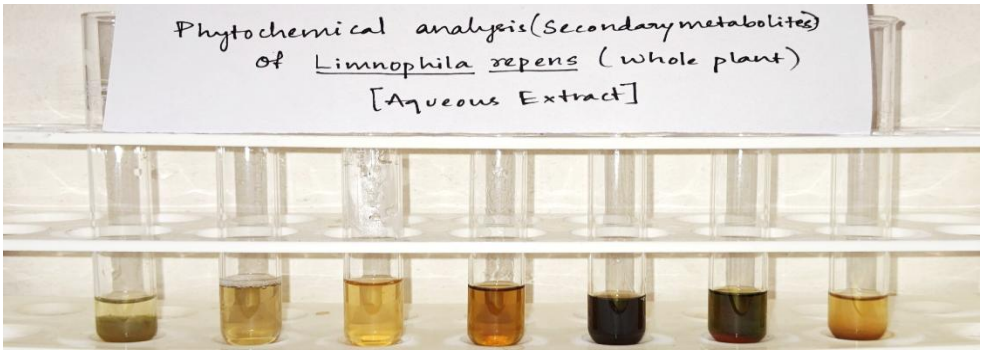


Figure 4: Phytochemical analysis of the whole plant of *L. repens* using aqueous extract

The presence of these compounds may contribute to the medicinal uses of *L. repens* (Kumar et al., 2013; Aradhana et al., 2022). The ethanol and aqueous extracts showed a broader range of bioactive compounds compared to the n-hexane extract. This suggests that polar solvents like ethanol and water may be more effective in extracting bioactive compounds from *L. repens* (Figures 2-4).

CONCLUSION

The phytochemical analysis of *L. repens* revealed a diverse range of bioactive compounds, including tannins, saponins, flavonoids, terpenoids, phenolic compounds, reducing sugars, and alkaloids. The presence of these compounds may contribute to the traditional medicinal uses of *L. repens*. This study provides a scientific basis for the traditional medicinal uses of *L. repens* and highlights its potential as a source of natural products with pharmacological activities. Further studies are needed to fully explore the medicinal properties of *L. repens*.

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