

CHAPTER 3

Scientific validation of tribal claims on *Chromolaena odorata*: an invasive weed

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Abstract: *Chromolaena odorata* is an invasive weed spreading at a breakneck pace. Now, it has also reached the interiors of the forest, where it was impossible to find earlier. These invasive weeds suppress the growth of the native flora wherever it grows, but the plant also has some healing properties. Therefore, it could be used commercially in the pharmaceutical industries for preparing drug formulations from *C. odorata* due to the presence of wound healing potential, anti-inflammatory, cytotoxic, and antipyretic properties. Keeping this in mind, phytochemical screening of *C. odorata* leaves was done in 3 different extracts (aqueous, ethanol, and methanol) to document the bioactive compound present in the plant. The results revealed the presence of tannins, saponins, phenolic compounds, reducing sugars, and alkaloids, which supports the presence of pharmacological potential in the plant.

Keywords: Invasive weed, Asteraceae, native flora, ecological balance

Introduction

Weed management is important for ecological balance, a healthy environment, and maintaining the diversity of local flora and fauna. Due to various natural and man-made factors, they are spreading everywhere, even inside forests, suppressing local flora growth. Therefore, local medicinal plants and other species are going to be lost. In this scenario, researchers have to search for options to use the available weeds for commercial purposes, so that their population will be maintained and all the natural processes will be balanced (Ganguly et al., 2022). *Chromolaena odorata*, a shrub of the Asteraceae family is a serious weed in India. It is an erect shrub with terete stems. Leaves are petiolate, deltoid-ovate, coarsely toothed, acuminate, pubescent on both sides, base cuneate (Figure 1). Heads bluish, cylindrical, in

dense terminal corymbs. Involucre 4-5-seriate, outer involucre bracts ovate, shorter, inner linear, acute, whitish with 3 distinct green lines on each. Corolla tubular campanulate, 5-lobed (Figure 2). The flowering and fruiting period is from October to December (Saxena and Brahmam, 1995). Keeping the sustainable management of *C. odorata* in mind, an attempt has been made to make it a source of phytochemical screening, and qualitative analysis of bioactive metabolites was carried out to draw attention to this aspect.



Figure 1: Leaves of *Chromolaena odorata*

Methodology

The leaves of *C. odorata* were collected from CDA 13 of Cuttack, Odisha, India in August 2024 (Figures 3 & 4). The plant species was identified by the senior author. The Soxhlet method of extraction was adopted using different solvents for phytochemical analysis. The phytochemical analysis of the *C. odorata* leaves was conducted to detect secondary metabolites using standard methods (Bhat et al., 2024; Behera et al., 2024; Saradar et al., 2024; Kumar et al., 2013; Devi et al., 2023; Marndi et al., 2024).



Figure 2: Flowers of *Chromolaena odorata*

Results and discussion

The qualitative phytochemical screening revealed that tannins, saponins, phenolic compounds, and reducing sugars were present in the aqueous, ethanolic, and methanolic extracts of *C. odorata* leaves. Alkaloids were present in the ethanolic extract of *C. odorata* leaves (Table 1). Many researchers have worked on the leaves of *C. odorata* and found the presence of bioactive compounds like flavonoids, saponins, alkaloids, tannins, etc (Usunobun and Efosa, 2016; Magar et al., 2023; Vijayaraghavan, 2018; Sirinthipaporn and Jiraungkoorskul, 2017). The presence of tannins indicates its healing activity against inflammation or burns (Agidew, 2022). The presence of alkaloids in the ethanolic extract of *C. odorata* leaves indicates its pharmacological potential as an anesthetics, cardioprotective, and anti-inflammatory agent (Heinrich et al., 2021).



Figure 3: Collection of leaves of *Chromolaena odorata*

Table 1: Phytochemical screening of secondary metabolites using different extracts of *C. odorata* leaves

Bioactive compounds	Aqueous	Ethanol	Methanol
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: positive; -ve: negative)



Figure 4: Collected leaves of *Chromolaena odorata* for phytochemical analysis

Conclusion

The present study on *C. odorata* leaves revealed the presence of pharmacological potential in the plant. The phytochemical screening for secondary metabolites indicated the presence of tannins, saponins, phenolic compounds, reducing sugars, and alkaloids in 3 different extracts (aqueous, ethanol, and methanol). The finding suggested that the leaves of *C. odorata* can be used in the pharmacology field commercially for their anti-inflammatory property, anesthetic potential, cardioprotective activities, etc.

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