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Review Article: Phytochemical Screening and Potential Biological Activities of Lahuna Plants (*Chromolaena odorata* L.)

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ABSTRACT

Chromolaena odorata L., locally known as the Lahuna plant, is a tropical plant with great potential in traditional medicine. This study uses a qualitative approach method that critically examines the results of previous studies on the phytochemical content and potential biological activity of the *Chromolaena odorata L. plant. This review* article discusses the results of phytochemical screening and the potential biological activity of various secondary metabolite compounds contained in the plant, such as flavonoids, alkaloids, saponins, tannins, and terpenoids. Various studies have shown that *C. odorata* has broad pharmacological activities, including antibacterial, anti-inflammatory, antioxidant, and wound-healing agents. With its abundant bioactive content, this plant has great potential to be developed as a source of natural medicine. However, its clinical use still requires further scientific validation through toxicity tests, pharmacodynamics, and clinical trials. This article aims to provide a scientific basis for the potential of *C. odorata* in the field of phytopharmaceuticals and encourage further research for its development.

Keywords: *Chromolaena odorata, Phytochemistry, Secondary Metabolites, Biological Activity*

I. INTRODUCTION

Indonesia, as one of the mega biodiversity countries, has abundant biological wealth, including medicinal plants. One of the plants that are widely found and has the potential as a source of active ingredients is *Chromolaena odorata* L., better known by its local name Wiki with many local names such as Minjangan grass, Kirinyuh, white grass, devil's weed, Siamese weed [1] and lahuna [2]. This plant is often considered a weed because of its aggressive growth, but various studies have shown that *C. odorata* contains bioactive compounds that can be used for treatment, Bulukumba people often use it as a wound medicine [3].

Phytochemistry is an approach to identifying natural chemical compounds contained in plants. Phytochemical screening aims to explore secondary metabolite compounds such as flavonoids, alkaloids, tannins, saponins, and terpenoids that often play a role in biological activity. Some parts of this plant are widely used to treat skin infections, burns, and wounds, and have anticancer, antidiabetic, antihepatotoxic, anti-inflammatory, antimicrobial, and

antioxidant properties [4]. The final findings of the phytochemical test are expected to indicate the presence of new compounds that have pharmacological activity so that they can encourage the development of new drugs with antibacterial, antiviral, and other therapeutic effects [5].

Potential biological activity, several previous studies have revealed that *C. odorata* has the ability as an antibacterial agent [6] and antioxidant [7] [8]. However, further studies are needed to explore other biological potentials, as well as to ensure the effectiveness and safety of using this plant extract in medicine. Therefore, this study aims to conduct phytochemical screening and test the potential biological activity of *C. odorata*, in order to provide a scientific basis for the development of plant-based medicinal materials.

Thus, understanding medicinal plants plays a crucial role in traditional medicine systems in various regions of the world. Currently, modern research is increasingly re-exploring the potential of plants as a primary source in the development of medical therapy [9]. This research is expected to contribute to the development of the use of local plants that have so far received little attention, thus supporting biodiversity conservation and innovation in the fields of health and pharmacy.

This study aims to comprehensively review the research results related to phytochemical screening and potential biological activity. *Chromolaena odorata L.* has been published, in order to provide a comprehensive picture of the prospects for its use as a candidate for phytopharmaceutical raw materials. This study is also expected to provide scientific contributions in the field of pharmacy and health sciences based on local wisdom.

II. METHODS

This review article is compiled with a **qualitative approach** that critically examines the results of previous studies on the phytochemical content and potential biological activity of the *Chromolaena odorata L. plant*. The data collection process was carried out by searching for relevant literature from various scientific sources published between 2020 and 2025. The preparation of the article began with **the Selection of Literature Sources:** Namely Google Scholar, PubMed, ScienceDirect, and Scopus. **Article Selection:** Selected articles must meet the inclusion criteria, namely research involving laboratory tests or field research related to biological activity and phytochemical screening of *Chromolaena odorata*. **Data Analysis and Synthesis:** After selection, the data obtained from the selected literature was analyzed and synthesized to obtain an overview of the phytochemical compounds contained in *Chromolaena odorata L.* and how these compounds provide certain pharmacological effects. The analysis was carried out by classifying biological activity based on the type of phytochemical compound (flavonoids, alkaloids, tannins, saponins, and terpenoids), and assessing its therapeutic potential in various health conditions. **Article Compilation:** The collected data is arranged in a systematic narrative form, highlighting the main findings of each study. Each subtopic related to phytochemical content and biological activity is presented with reference to the latest research findings to provide a clear picture of the pharmacological potential of *Chromolaena odorata L*. **Evaluation of the Quality of Literature Sources:** Each literature source used is evaluated for quality based on the credibility of the journal, year of publication, and validity of the data presented. Only literature that meets scientific quality standards is included in this review.

III. RESULTS AND DISCUSSION

Chromolaena odorata L., locally known as the lahuna plant, is one of the tropical shrubs that have a long history in traditional medicine in various countries, including Indonesia. Its utilization has been passed down from generation to generation by the community, especially to treat wounds, infections, and inflammation [2], encouraging many modern researchers to study the content of active compounds and their pharmacological potential scientifically. Phytochemical screening of this plant shows that its extract contains various important bioactive compounds such as flavonoids, tannins, saponins, terpenoids, alkaloids, and steroids [6]. These compounds play a major role in providing beneficial biological effects, such as antioxidant, antibacterial, anti-inflammatory, and even anticancer potential activities.

Specifically, the antibacterial activity of *C. odorata extract* has been shown to inhibit the growth of various pathogenic bacteria, both gram-positive and gram-negative [10], through a mechanism thought to involve disruption of the microbial cell membrane. In addition, the flavonoid and phenolic content contributes to the antioxidant capacity of this plant [7], which functions to neutralize free radicals and protect cells from oxidative stress. The wound-healing effect is also supported by the presence of saponins and tannins, which accelerate the process of tissue regeneration and blood clotting. Purwaeni's research states that there is a significant blood clotting effect tested *in vitro* using the *Lee-White method* [11]. Furthermore, several studies have shown the cytotoxic potential of this plant extract against cancer cells, although further mechanism studies and validation through clinical trials are still needed.

Ethnopharmacologically, the existence of *C. odorata* as a medicinal plant in traditional medicine practice adds to its importance in the development of natural medicinal ingredients [12]. In addition, pharmacological studies report that *Chromolaena odorata* has been shown to have anti-inflammatory activity through the mechanism of inhibition of NO, NF-κβ, p38 MAPK, IL-1β, TNF-α, as well as suppressing leukocyte cell migration and reducing edema. In addition, *Chromolaena odorata* also shows analgesic activity by significantly reducing the number of stomach wriggles and pain perception in mice [13] . Scientific validation of this traditional use opens up opportunities for the development of phytopharmaceuticals or even modern drugs derived from biological sources. However, further research is still needed, especially regarding long-term toxicity, dose standardization, and *in vivo* and clinical testing to ensure its safety and effectiveness in human use. Pure isolation of active compounds, thorough toxicology studies, and development of stable dosage formulations are important directions for further research.

Thus, *Chromolaena odorata* has promising prospects as a source of bioactive materials for the development of new therapeutic agents, especially in the treatment of infections, inflammation, and degenerative diseases. However, its clinical use must be based on a comprehensive scientific approach to ensure the safety and effectiveness of its use. Several studies have revealed the active compounds contained in *Chromolaena odorata* along with their biological activities as shown in Table 1.

No.	Active Compounds	Bioactivity	Library
1.	Phenols, flavonoids, tannins, alkaloids and saponins	Antimicrobial against *Candida albicans* and *Pseudomonas aeruginosa*	[14]
2.	Alkaloids, flavonoids, tannins, saponins, anthraquinones, glycosides and terpenoids	Wound medicine in gel form	[15]
3.	Flavonoids, Phenols, alkaloids, steroids, saponins and tannins.	Antibacterial against *Staphylococcus epidermidis*	[16]

4.	Flavonoids, tannins and saponins	Antibacterial *Salmonella typhi* and *Staphylococcus aureus*	[17]
5.	Phenols, triterpenoids, flavonoids and alkaloids	The soap preparation has antifungal activity against *Candida albicans fungus.*	[18]
6.	Alkaloid	*Schizophyllum commune* antifungal	[19]
7.	Phenols, flavonoids, tannins, saponins, and anthraquinones	Biotoxic	[20]
8.	Flavonoids and phenols	Anti-inflammatory and antiviral for oral mucosal diseases such as aphthous stomatitis	[21]
9.	Tannins, flavonoids, saponins, and alkaloids	Anti-bacterial *Staphyloccocus aureus (SA) ,Bacillus subtilis (BS), Staphylococcus typhimurium*	[22]
10.	Alkaloids, saponins, flavonoids, phenols and tannins.	Cream preparation for healing cuts	[23]

Based on the results of the literature review, *Chromolaena odorata L.* or Lahuna plants show significant phytochemical potential, especially due to the content of secondary metabolite compounds such as flavonoids, tannins, terpenoids, steroids, and saponins. These compounds contribute to various biological activities, including antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities. Therefore, this plant has promising prospects as a source of natural ingredients for the development of traditional and modern medicines. However, further in-depth research is needed, especially toxicity tests and clinical trials, to ensure its safety and effectiveness in pharmacological applications.

IV. CONCLUSION

Lahuna plants (*Chromolaena odorata L.*) have diverse phytochemical content, such as flavonoids, alkaloids, tannins, saponins, and terpenoids, which play an important role in supporting various biological activities. The results of phytochemical screening from various studies show that these compounds provide significant pharmacological effects, including antibacterial, anti-inflammatory, antioxidant, and accelerated wound healing. This potential makes *C. odorata* a promising candidate in the development of natural ingredient-based drugs. However, its clinical use still requires further study, especially through more comprehensive toxicology, formulation, and clinical trial research to ensure its safety and effectiveness scientifically.

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