



# An Updated Review on the Anticancer Activities of *Cecropia pachystachya* Trécul: Recent Advances and Future Perspectives

Sohail Ahmad Jan\* and Muhammad Asad Anwar

Department of Bioinformatics and Biosciences, Capital University of Science and Technology, Islamabad, Pakistan



## Abstract

Cancer remains a major global health challenge, necessitating the development of novel and safe therapeutic agents. Medicinal plants are recognized as valuable sources of bioactive molecules with anticancer potential. *Cecropia pachystachya* Trécul (Urticaceae), a species traditionally used in South American medicine, has recently garnered attention for its cytotoxic and antitumor properties. This review highlights cancer-related findings published primarily over the last five years, focusing on cytotoxic effects, anticancer mechanisms, active phytoconstituents, experimental cancer models, and future research directions. Recent studies indicate that *C. pachystachya* exhibits anticancer activity against lung cancer, prostate cancer, and glioma. However, a lack of comprehensive mechanistic studies, clinical trials, and pharmacokinetic data represent significant gaps in current knowledge. This review underscores the potential of *C. pachystachya* as a source of anticancer compounds and identifies essential avenues for future research using advanced molecular and clinical investigation.

**Keywords:** *Cecropia pachystachya*; Anticancer; Cytotoxicity; Glioma; Prostate Cancer; Natural Products

## Introduction

The genus *Cecropia* has about 61 species belonging to the family Urticaceae, of which 20 occur in Brazil, mostly in the Amazon [1]. The genus *Cecropia* contains medicinally important species commonly used to treat coughs, asthma, bronchitis, high blood pressure, inflammation, and heart disease, and can also be used as a diuretic [2]. In addition, this genus has key compounds such as triterpenes, terpenoids, sesquiterpene lactones, flavonoids, phenolic compounds, and flavonoid glycosides, showing strong antioxidant, anti-inflammatory, antimicrobial, and cytotoxic activity properties [3, 4]. The ethanolic and hydroethanolic extracts of *C. pachystachya* induce fibroblast proliferation and show significant antioxidant and anti-inflammatory activity [5-7]. Apoptosis in human polymorphonuclear cells was induced by the potential and dichloromethane extract, as well as pomolic acid isolated from its leaves [8]. The cytotoxic activity of *C. pachystachya* has been described by Aragao et al., [9]. Plants are rich in secondary metabolites having ability to affect cancer cell proliferation and survival pathways [10-15]. No comprehensive updated literature is available on the anticancer activities of this important plant species. Therefore, in this review, we highlighted the cancer-related studies associated with *C. pachystachya* Trécul. The data were retrieved from major scientific databases including PubMed, Web of Science, Scopus, ScienceDirect, and Google Scholar. Studies published mainly between 2020 and 2026 were considered. The anticancer activities of this important medicinal plant species are summarized in Figure 1 and discussed in detail below.

A 2026 study by Rochetti et al., [16] demonstrated that *C. pachystachya* extract exhibits selective anticancer activity against human lung cancer cells by inducing apoptosis while maintaining low toxicity toward normal cells. The presence of chlorogenic acid and orientin likely contributes to these cytotoxic effects, positioning *C. pachystachya* as a promising natural source for future anticancer drug development. Other research has similarly reported that *C. pachystachya* possesses significant anticancer potential by inhibiting cancer cell growth and inducing cellular dysfunction. One important study investigated a triterpene-enriched fraction obtained from *C. pachystachya* leaves against human prostate cancer cells, particularly the hormone-independent PC3 cell line. The fraction showed concentration-dependent cytotoxic activity and significantly reduced cancer cell viability. The anticancer effect was associated with alterations in mitochondrial function, reduction of mitochondrial membrane potential, and disturbance of cellular processes required for cancer cell

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### \*Correspondence:

Sohail Ahmad Jan, Department of  
Bioinformatics and Biosciences, Capital  
University of Science and Technology,  
Islamabad, Pakistan,  
E-mail: [sjan.parc@gmail.com](mailto:sjan.parc@gmail.com)

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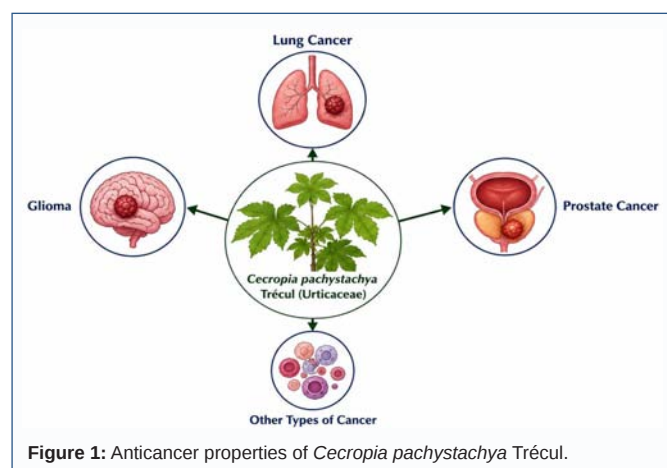
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survival. The study suggested that triterpene components present in the plant extract may contribute significantly to its selective toxicity against prostate cancer cells [17]. Another study further evaluated the antitumor potential of *C. pachystachya* leaf extract using glioblastoma models. The leaf extract showed inhibitory effects on glioblastoma cell lines, including C6 and U87 cells, by reducing cell viability and suppressing tumor-associated growth. In an experimental animal glioma model, treatment with the plant extract resulted in a significant reduction in tumor development and improvement of pathological parameters. The observed antitumor effects were associated with modulation of oxidative balance and biological pathways involved in tumor progression. This research offers significant evidence for *C. pachystachya*'s utility in developing treatments for aggressive brain cancers [18].

## Conclusion and Future Prospects

*Cecropia pachystachya* Trécul is a promising medicinal plant showing emerging potential in cancer treatment. Recent research indicates that its extracts and bioactive fractions can inhibit cancer cell proliferation and suppress tumor growth, notably in models of glioblastoma and prostate cancer. These anticancer properties are likely linked to its phytochemical profile which may modulate mitochondrial function, apoptosis, oxidative stress, and key oncogenic signaling pathways. Nevertheless, current evidence is preliminary; extensive molecular, pharmacological, and clinical studies are essential to validate its viability as a therapeutic agent. Future investigations should prioritize the purification and structural characterization of the plant's most potent anticancer compounds. Advanced approaches including metabolomics, molecular docking, transcriptomic analysis, and proteomic studies may help identify therapeutic targets and mechanisms of action. Combination studies involving *C. pachystachya* extracts or isolated compounds with existing anticancer drugs may provide valuable information regarding synergistic effects and reduction of drug resistance.

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