



# International Journal of Pharmaceutics and Drug Analysis

Available at [www.ijpda.com](http://www.ijpda.com)

ISSN: 2348:8948

## Pharmacological and phytochemical evaluation of *Chromolaena odorata*

Shilpa V<sup>1</sup>, Rupesh Kumar M<sup>1\*</sup>, Harshitha H S<sup>1</sup>, Chinthana H B<sup>1</sup>, B Ramesh<sup>2</sup>.

<sup>1</sup> Department of Pharmacology, Sri Adichunchanagiri College of Pharmacy, Sri Adichunchanagiri College of Pharmacy, Adichunchanagiri University, B. G Nagara, Mandya-571448, India

<sup>2</sup> Department of Pharmaceutical Chemistry, Sri Adichunchanagiri College of Pharmacy, Adichunchanagiri University, B. G Nagara, Mandya-571448, India

Article History:	Abstract
<p>Received on: 05-04-2020 Accepted on: 18-06-2020 Published on : 21-06-2020</p>	<p><i>Chromolaena odorata</i> belongs to the asteraceae family and it is a perennial shrub that in America's origin, but now it's common in Oceania, Africa and Asia, it has become a serious weed. <i>C. odorata</i> is a tropical and subtropical species of flowering shrub in the family of sunflower. The several parts of the plant have been used to treat wound, hepatotoxicity, analgesic, antidiabetic and various diseases. The common name of <i>Chromolaena odorata</i> is Siam weeds. In traditional usage leaf paste of <i>C. odorata</i> is applied to affected place to heal wounds. The plant is a rapidly growing shrub, multi-stemmed shrub 2.5 m tall in open areas, hairy, glandular and leaf gives off a pungent, aromatic odour when the plant leaves are crushed. The phytochemical constituents essential oil, flavonoids, tannins, monoterpenes, quercetin and alkaloids are determined in the various extraction to give good results in various pharmacological activities. <i>C. odorata</i> is used nowadays worldwide in traditional usage. The various extracts of <i>Chromolaena odorata</i> of leaves, stem, flower, fruit, and aerial parts show good activity against wound, anti-inflammatory, anticancer, antidiabetic and antifungal activity.</p> <p><b>Key words:</b> <i>Chromolaena odorata</i>, wound healing and antioxidant property.</p>
<p><b>Corresponding Author</b> Rupesh Kumar M E mail: <a href="mailto:manirupeshkumar@yahoo.in">manirupeshkumar@yahoo.in</a> Contact: +91-7348828206</p>	

This article is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License. Copyright © 2020 Author(s) retain the copyright of this article.



### Introduction

King and Robinson Asteraceae (L) *Chromolaena odorata* (L) A fast-growing perennial and invasive herb, commonly called as Siam weed, is native to South and Central America. The tropical areas have been added to Africa, Asia and other areas of the globe [1]. Its common names include "Awolowo", "Independence weed", Siam weed, trifid weed, bitter bush or jack in the bush. Although, native to South and Central America it has spread throughout the tropics, Nigeria includes [2]. The ointment eupolian is a formulation prepared from the *C. odorata* leaves aqueous extract (formerly *Eupatorium odoratum*) has been licensed for clinical use in Vietnam. Medicinal use of fresh leaves and decoction have been used throughout Vietnam for many years as well as in

other tropical countries for the treatment of leech bite, soft tissue wounds, skin infection and burn wounds [3].

The plant has been used in antimalarial treatment. Other pharmacological properties of *C. odorata* include activities against typhoid fever, cataract, diabetes and bacterial infection [4]. The medicinal qualities of many of these plants are unable to in the light of oral cultures and traditions, be overemphasized. Folklore of the far past, which has continued to be eulogized these plants' medicinal qualities and their extracts. Siam weed, whose medicinal principles have been very different, is one of these medicinal plants. Eclipsed by the reputation it acquired as very obnoxious "Grass" due to its unprecedented capacity to penetrate new weeds fields [5].

**Plant profile****Kingdom:** plantae**Order :**asterales**Family :** asteraceae**Genus:** *chromolaena***Species:** *c. odorata* .**Chemical constituents**

The leaves of *C. odorata* also contain allelochemicals with high concentration isolated from a plant. A study in Vietnam proved that the aqueous extract of the leaf contained flavonoids (sakuranetin, salvigenin, tamarixetin, kaempferide, isosakuranetin, betulenol, 2-5-7-3 tetra-o-methyl quercetagenin, odoratin, two chalcones and its alcoholic compound), essential oils ( $\beta$ -eubeden, bornyl acetate and geyren), saponin triterpenoids, tannins, organic acids and numerous trace substances. Several chemical analyses of *C. odorata* L. have been undertaken that have identified constituents including monoterpenes, flavonoids, triterpenes, alkaloids and sesquiterpenes hydrocarbons. The leaves of this plant have been found to be a rich source of flavonoids including quercetin, sinensetin and padmatin [6].

**Traditional uses**

In traditional medicine, the leaf decoction is used as a cough remedy and as an ingredient with guava leaves and lemon grass for the treatment of malaria. Other traditional and medicinal uses include astringent, anti-diarrheal, antihypertensive, antispasmodic, anti-inflammatory, tonic, antipyretic, diuretic and heart tonic. The fresh leaves and extract of *C. odorata* are a traditional herbal treatment in some countries for burns, skin infection and soft tissue wounds. A formulation prepared from the aqueous extract of the leaves has been licensed for clinical use in Vietnam [7].

From review literature regarding the traditional uses, phytochemical properties of *C. odorata* are anti-bacterial, anticancer, anticonvulsant, antidiabetic, anti-fungal, antioxidant, and antiparasitic, hemostatic and hepatoprotective activities [8].

**Table 01: Various pharmacological activity of *chromolaena odorata***

SL NO	PLANT PART USED	TYPE OF EXTRACTION	PHARMACOLOGICAL ACTIVITY	REFERENCE
01.	Leaves	Aqueous and Methanolic	Antioxidant	Afolabi c. et al., (2007) [9].
02.	Aerial part	Aqueous	Anti inflammatory	Owoyele VB et al.,(2005) [10].
03.	Aerial part	Aqueous	Antibacterial and anti-malarial	Pisutthanan N et al., (2005) [11].
04.	leaves	Ethanol	Anti-fungal	O. N. Irobi (1992) [12].
05.	leaves	Methanol	Anti inflammatory	Tran thi honghanh et al., (2011) [13].
06.	Whole plant	n-hexane, dichloromethane, ethyl acetate, nbutanol and water	Antipyretic, anti-inflammatory and analgesic	Bamidele Victor Owoyele et al.,(2013) [14].
07.	Leaves, stem and root	Water, ethanol, methanol and hexane	Antimicrobial	Srisuda Hanphakphoom et al., (2016) [15].
08.	leaves	Methanol, ethyl ether	Antimicrobial	Odutayo F et al., (2017) [16].
09.	leaves	Water	Wound healing	Ayyanar et al., (2009) [17].
10.	Whole plant	Aqueous and ethanol	cytotoxic	Nurjannah et al., (2006) [18].
11.	leaves	Ethanol	Cancer cell	Kouamé PB et al., (2013) [19].
12.	leaves	Aqueous , ethanol and methanol	Wound healing,	Anyasor GN et al.,(2011) [20].
13	Leaves	Chloroform	Anti-oxidant	Rao KS et al.,(2010) [21].

14.	leaves	Alcohol and water	hemostatic	Pandith H et al., (2012) [22].
15.	leaves	Aqueous	Anti-inflammatory and analgesic	Elion Itou RD et al.,(2017) [23].
16.	leaves	Methanol and aqueous	Anti-inflammatory, antipyretic and antispasmodic	Taiwo OB et al., (2000) [24].
17.	leaves	Hydroethanolic	Acute toxicity and sub chronic toxicity	Ogbonnia SO et al.,(2010) [25].
18.	leaves	Ethanol	Anti diabetic and ant cataract	Onkaramurthy M et al.,(2013) [26].
19.	leaves	N hexane, dichloromethane, ethyl acetate, methanol and water	antioxidant	Putri DA et al., (2019) [27].
20.	Leaves	N hexane, dichloromethane and methanol	Anti spasmodial	Ezenyi IC et al., (2014) [28].
21.	Leaves	Ethanol	antidiabetic	Yusuf H, Yusni et al., (2020) [29].
22.	leaves	Aqueous	Anti cholesterolemic	Ikewuchi JC et al.,(2011) [30].
23.	Whole plant	Ethanol, methanol, petroleum ether, dichloromethane and distilled water	Antimicrobial, cytotoxicity and mutagenicity	Omokhua AG (2017) [31].
24.	leaves	Ethanol	antimicrobial	Suriyavathana M et al., (2012) [32].
25.	leaves	Ethanol	antibiotic	Irobi ON et al.,(1997) [33].

## Conclusion

*C. odorata* exhibits its wound healing and antioxidant property using multiple mechanisms. From the survey of literature reviews, these mechanisms can be summarized as follows: *C. odorata* extract contains many active compounds and antioxidant that enhance wound healing property, analgesic, anti-inflammatory, antibiotic and antipyretic. Some of the recent studies have proved its medicinal value as mentioned in the article. Efforts should be made to exploit the biological property of this abundant herb. The example of this shrub indicates the importance to consider and evaluate the abundantly occurring weed species on this planet as potential sources of medicine. Abovementioned information on the species was gathered by the different databases.

## References

1. Akinmoladun AC, Ibukun EO, Dan-Ologe IA. Phytochemical constituents and antioxidant properties of extracts from the leaves of *Chromolaena odorata*. Scientific research and essays. 2007 Jun 30; 2(6):191-4.
2. Ngozi IM, Jude IC, Catherine IC. Chemical profile of *Chromolaena odorata* L.(King and Robinson) leaves. Pakistan Journal of Nutrition. 2009; 8(5):521-4.
3. Thang PT, Teik LS, Yung CS. Anti-oxidant effects of the extracts from the leaves of *Chromolaena odorata* on human dermal fibroblasts and epidermal keratinocytes against hydrogen peroxide and hypoxanthine-xanthine oxidase induced damage. Burns. 2001 Jun 1; 27(4):319-27.
4. Afolayan FI, Adegbolagun OM, Irungu B, Kangethe L, Orwa J, Anumudu CI. Antimalarial actions of *Lawsonia inermis*, *Tithonia diversifolia* and *Chromolaena odorata* in combination. Journal of ethnopharmacology. 2016 Sep 15;191:188-94.
5. Aro SO, Osho IB, Aletor VA, Tewe OO. *Chromolaena odorata* in livestock nutrition. Journal of Medicinal Plants Research. 2009 Dec 31; 3(13):1253-7.
6. Vijayaraghavan K, Rajkumar J, Bukhari SN, Al-Sayed B, Seyed MA. *Chromolaena odorata*: A neglected weed with a wide spectrum of pharmacological activities. Molecular medicine reports. 2017 Mar 1; 15(3):1007-16.

7. Vaisakh MN, Pandey A. The invasive weed with healing properties: A review on *Chromolaena odorata*. International journal of Pharmaceutical sciences and research. 2012 Jan 1; 3(1):80.
8. Sirinthipaporn A, Jiraungkoorskul W. Wound healing property review of siam weed, *Chromolaena odorata*. Pharmacognosy reviews. 2017 Jan;11(21):35.
9. Akinmoladun AC, Ibukun EO, Dan-Ologe IA. Phytochemical constituents and antioxidant properties of extracts from the leaves of *Chromolaena odorata*. Scientific research and essays. 2007 Jun 30; 2(6):191-4.
10. Owoyele VB, Adediji JO and Soladoye AO: Anti-inflammatory activity of aqueous leaf extract of *Chromolaena odorata*. Inflammopharmacol. 13:479–484. 2005.
11. Pisutthanan N, Liawruangrath S, Bremner J and Liawruangrath B: Chemical constituents and biological activities of *Chromolaena odorata*. J Sci Fac Chiang Mai Univ. 32:139–148. 2005.
12. Irobi ON. Activities of *Chromolaena odorata* (Compositae) leaf extract against *Pseudomonas aeruginosa* and *Streptococcus faecalis*. Journal of Ethnopharmacology. 1992 Aug 1;37(1):81-3.
13. Hanh TT, Hang DT, Van Minh C and Dat NT: Anti-inflammatory effects of fatty acids isolated from *Chromolaena odorata*. Asian Pac J Trop Med. 4:760–763. 2011.
14. Owoyele BV, Oguntoye SO, Dare K, Ogunbiyi BA, Aruboula EA, Soladoye AO. Analgesic, anti-inflammatory and antipyretic activities from flavonoid fractions of *Chromolaena odorata*. Journal of Medicinal Plants Research. 2013 Sep 28;2(9):219-25.
15. Thophon SH, Waranusantigul P, Kangwanrangsan N, Krajangsang S. Antimicrobial activity of *Chromolaena odorata* extracts against bacterial human skin infections. Modern Applied Science. 2016;10(2).
16. Odutayo F, Ezeamagu C, Kabiawu T, Aina D, Mensah-Agyei G. Phytochemical screening and antimicrobial activity of *Chromolaena odorata* leaf extract against selected microorganisms. Journal of Advances in Medical and Pharmaceutical Sciences. 2017 Jun 7:1-9.
17. Ayyanar M, Ignacimuthu S. Herbal medicines for wound healing among tribal people in Southern India: Ethnobotanical and Scientific evidences. Int J Appl Res Nat Prod 2009; 2:29-42.
18. Jannah MH, Mahmood AA, Sidik K, Salmah I. Cytoprotective effects of honey in combination with aqueous and ethanol extracts from *Chromolaena odorata* L (*Eupatorium odoratum*) in rats. Jummec 2006; 9:8.
19. Kouamé PB, Jacques C, Bedi G, Silvestre V, Loquet D, Barillé-Nion S, Robins RJ, Tea I. Phytochemicals isolated from leaves of *Chromolaena odorata*: impact on viability and clonogenicity of cancer cell lines. Phytotherapy Research. 2013 Jun;27(6):835-40.
20. Anyasor GN, Aina DA, Olushola M, Aniyikawe AF. Phytochemical constituents, proximate analysis, antioxidants, anti-bacterial and wound healing properties of leaf extracts of *Chromolaena odorata*. Ann Biol Res 2011;2:441-51.
21. Rao KS, Chaudhury PK, Pradhan A. Evaluation of anti-oxidant activities and total phenolic content of *Chromolaena odorata*. Food and chemical toxicology. 2010 Feb 1;48(2):729-32.
22. Pandith H, Thongpraditchote S, Wongkrajang Y, Gritsanapan W. In vivo and in vitro hemostatic activity of *Chromolaena odorata* leaf extract. Pharmaceutical biology. 2012 Sep 1;50(9):1073-7.
23. Elion Itou RD, Etou Ossibi AW, Epa C, Nsonde & Ntandou GF, Bokia CB, Ouamba JM, Abena AA. Anti-inflammatory and analgesic effects of leaves of *Chromolaena odorata* L.(King and Robinson). African Journal of Pharmacy and pharmacology. 2017 May 8;11(17):217-23.
24. Taiwo OB, Olajide OA, Soyannwo OO, Makinde JM. Anti-inflammatory, antipyretic and antispasmodic properties of *Chromolaena odorata*. Pharmaceutical Biology. 2000 Jan 1;38(5):367-70.
25. Ogbonnia SO, Mbaka GO, Anyika EN, Osegbo OM, Igbokwe NH. Evaluation of acute toxicity in mice and subchronic toxicity of hydroethanolic extract of *Chromolaena odorata* (L.) King and Robinson (Fam. Asteraceae) in rats. Agriculture and Biology Journal of North America. 2010;1(5):859-65.
26. Onkaramurthy M, Veerapur VP, Thippeswamy BS, Reddy TM, Rayappa H, Badami S. Anti-diabetic and anti-cataract effects of *Chromolaena odorata* Linn., in streptozotocin-induced diabetic rats. Journal of ethnopharmacology. 2013 Jan 9;145(1):363-72.
27. Putri DA, Fatmawati S. A New Flavanone as a Potent Antioxidant Isolated from *Chromolaena odorata* L. Leaves. Evidence-Based Complementary and Alternative Medicine. 2019 Jun 18;2019.
28. Ezenyi IC, Salawu OA, Kulkarni R, Emeje M. Antiplasmodial activity-aided isolation and identification of quercetin-4'-methyl ether in *Chromolaena odorata* leaf fraction with high activity against chloroquine-resistant *Plasmodium falciparum*. Parasitology Research. 2014 Dec 1;113(12):4415-22.
29. Yusuf H, Yusni Y, Meutia F, Fahrhani M. Pharmacological Evaluation of Antidiabetic Activity of *Chromolaena Odorata* Leaves Extract

- in Streptozotocin-Induced Rats 2020; 11 (10) : 772-778 .
30. Ikewuchi JC, Ikewuchi CC. Anti-cholesterolemic effect of aqueous extract of the leaves of *Chromolaena odorata* (L) King and Robinson (Asteraceae): Potential for the reduction of cardiovascular risk. *The Pacific Journal of Science and Technology*. 2011;12(2):385-91.
  31. Omokhua AG, McGaw LJ, Chukwujekwu JC, Finnie JF, Van Staden J. A comparison of the antimicrobial activity and in vitro toxicity of a medicinally useful biotype of invasive *Chromolaena odorata* (Asteraceae) with a biotype not used in traditional medicine. *South African Journal of Botany*. 2017 Jan 1;108:200-8.
  32. Suriyavathana M, Parameswari G, Shiyan SP. Biochemical and antimicrobial study of *Boerhavia erecta* and *Chromolaena odorata* (L.) King & Robinson. *International Journal of Pharmaceutical Sciences and Research*. 2012 Feb 1;3(2):465.
  33. Irobi ON. Antibiotic properties of ethanol extract of *Chromolaena odorata* (Asteriaceae). *International journal of pharmacognosy*. 1997 Jan 1;35(2):111-5.