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Phytochemical Screening and Analysis of Bioactive Compounds in *Calotropis Gigantea* Leaves Extract

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Abstract: *Calotropis gigantea, commonly known as the giant milkweed, is a medicinal plant widely used in traditional healing systems across Asia and Africa. This review summarizes current knowledge on its botanical characteristics, traditional uses, chemical composition, and reported biological activities. Different parts of the plant—including the leaves, flowers, roots, and latex—have long been used to treat fever, inflammation, pain, skin diseases, digestive problems, and wounds. Phytochemical studies show that C. gigantea contains a diverse range of bioactive compounds, such as cardenolides, flavonoids, alkaloids, terpenoids, and phenolic compounds. These natural chemicals contribute to the plant's broad pharmacological potential. Modern review has reported that extracts of C. gigantea exhibit anti-inflammatory, antimicrobial, antioxidant, analgesic, anticancer, antidiabetic, and wound-healing effects. These activities are linked to mechanisms including reduction of oxidative stress, inhibition of inflammatory mediators, and induction of cell death in cancer cells.*

Keywords: Calotropis gigantean, Milkweed, Antioxidant, Anti-inflammatory, Pharmacological activity, Phytochemicals etc.

I. INTRODUCTION

Calotropis is a type of plant that comes in several varieties. One of them, *Calotropis gigantea*, is a wild plant that grows plenty in Africa and Asia. People often call it "crown flower", "giant milkweed", or "swallow wort". In India, it's commonly known as "Madar" in Hindi. (1) We can find it growing in unused lands, and it's easy to spot because of its bulky, oval-shaped fronds and purple flowers that don't have a strong scent. When you break or cut its leaves or stem, a milky white, bitter juice comes out. (2)

C.gigantea, a plant used in indigenous medicine, offers various health pros. The root cortex is specifically used for dysentery, acting as a purgative and alterative; it also has diaphoretic and emetic characteristics. Scientific studies confirm the plant's antipyretic, analgesic, anticonvulsant, anxiolytic, sedative, hepatoprotective, wound-healing, antidiabetic, larvicidal, anti-inflammatory and anti-diarrhoeal characteristics, making it a valuable resource for indigenous medicine. (3)

Sections of *Calotropis gigantea* are utilized as medication in the local system of herbal medicine. Correspondingly, this plant achieved significance in recent years as a prospective insecticidal origin opposed to harmful insects. (4) This plant extract was potent in regulating larvae and sap-sucking insects that damage multiple crops. Giant milkweed plants hold natural chemicals that are harmful to insects. These chemicals include cardenolides (like calotropin), cardiac glycosides and flavonoids, which can efficiently dominate a spectrum of insect pests. (5)

There is a lot of research showing the medicinal uses and economic value of C. procera. But only a few studies have examined how this plant grows, how it behaves in nature, and how it manages to survive in hot, dry, and semi-dry

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areas. (6) The plant kingdom includes all types of plants such as mosses, ferns, and flowering plants. With more than 250,000 species, it is the second-largest kingdom in biology. The Asclepiadaceae family is quite large, containing about 175–180 genera and around 2,200 species, mostly found in tropical and subtropical regions. Calotropis is one of the plants in this family, and it has two main species: *Calotropis procera* and *Calotropis gigantea*. (7,8,9,10)

II. PLANT PROFILE

Scientific classification: (11)

- **Kingdom:** Plantae
- **Clade:** Tracheophytes (Vascular plants)
- **Clade:** Angiosperms (Flowering plants)
- **Clade:** Eudicots
- **Clade:** Asterids
- **Order:** Gentianales
- **Family:** Apocynaceae
- **Genus:** *Calotropis*
- **Species:** *C.gigantea*

Binomial name: *Calotropis gigantea (L.) Dryand*

Synonyms: (12)

- *Asclepias gigantea L.*
- *Calotropis gigantea (L.) Dryand.*
- *Madorius giganteus (L.) Kuntze.*
- *Periploca cochinchinensis Lour.*

English Indian Names:(13)

- Giant Milkweed
- Crown Flower
- Giant Calotrope
- Giant Swallow-wort
- Mudar

III. PLANT DESCRIPTION:

Root: The roots are simply branched and have a thick woody base with fissured corky bark; when cut or broken, the roots release a milky sap. (14)

Leaves: The oval-shaped leaves grow in pairs on opposite sides of the stem or are egg-shaped, 5-30 cm long and 25-155 cm broad. Young leaves are covered with soft white hair but become smooth as they mature. (15)

Flowers: The flowers are full of significance; they have both male and female parts. They are rearranged in clusters at the end of limbs or where blades meet the trunk; every blossom has five petals. (16)

Fruit and Seeds: The fruit is a swollen egg-shaped pod up to 10 cm in diameter; it contains many small flat seeds with silky white tufts of long hair and 25-155 cm broad young leaves that are covered with soft white hair but become smooth as they mature flowers. (17)

Androecium (male part): There are five stamens, which are fused with the female part (gynandrous). The anthers have two chambers.

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Gynoecium (female part): The flower has two separate carpels (bicarpellary, apocarpous). The styles join at the top, forming a peltate stigma with five parallel stigmatic surfaces. (18,19)

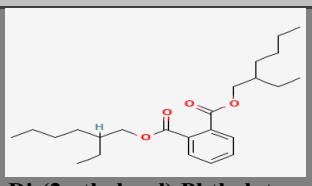
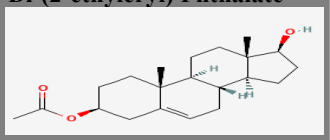
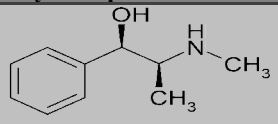
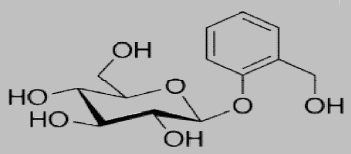
(a)

(b)

Fig (a) and (b): Image of C. gigantea

Geographical Distribution:- Calotropis gigantea is native to Asia and Southest Asia.

Phytochemistry of various parts of Calotropis gigantea:

SI. No.	Plant Part	Chemical constituents	Structure	Pharmacological activity	Reference
1	Flower	Di-(2-ethyleryl) Phthalate Anhydrosophorsdiol-3-acetate	 Di-(2-ethyleryl) Phthalate  Anhydrosophorsdiol-3-acetate	As anti- rabic, Treatment of cold, As digestive, Treatment of mental disorder	21
2	Leaves	Alkaloids Mudarine Glycoside	 Alkaloid  Glycoside	Treatment of stomach pain, As vermicide	

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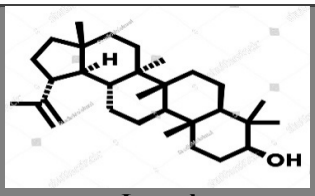
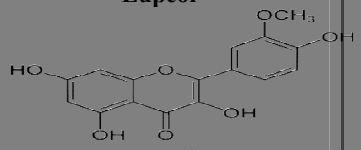
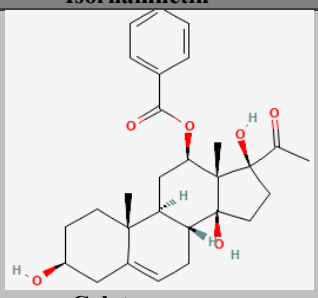
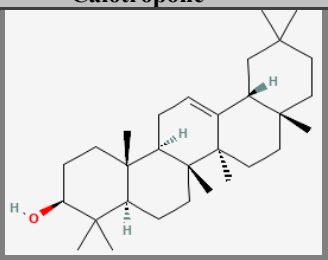
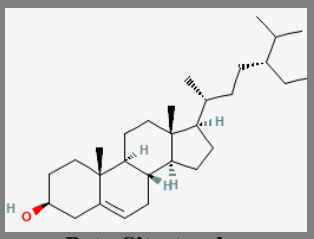
3	Areal parts	Lupeol Isorhamnetin γ-Taraxasterol	 Lupeol  Isorhamnetin	Treatment of congestion and asthma	
4	Roots	Asclepin Calotropone Gofruside	 Calotropone	Strong anti-inflammatory property, As analgesic , Anti asthmatic	
5	Root bark	β-Amyrin β-Sitosterol β-Sitosterolacetate β-Amyrin acetate	 Beta-Amyrin  Beta-Sitosterol	Anti diarrheal, Antitumor, Bronchodilators	

Table 1. Various Chemical Constituent isolated from *C.gigantea*

Phytochemical screening of *Calotropis gigantea* leaves:

1. Collection and Preparation of Plant Material

Materials

- Fresh leaves of *Calotropis gigantea.*
- Distilled water.
- Ethanol or methanol.

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- Soxhlet apparatus or maceration setup. (22)

Procedure

1. Collect leaves and wash thoroughly.
2. Shade-dry for 7–10 days.
3. Pulverize into coarse powder.
4. Extract using ethanol/methanol in a Soxhlet apparatus for 6 to 8 hours.

(a)

(b)

5. Filter out the extract.
6. Concentrate the extract using a rotary evaporator.
7. Store at 4°C until use. (23)

Standard Phytochemical Tests (24)

Sr.No.	Phytochemical	Test	Observation
1	Alkaloids	Mayer's test	Cream precipitate
2	Flavonoids	Shinoda test	Pink/red colour
3	Tannins	Ferric chloride test	Blue-black coloration
4	Glycosides	Keller-Killiani test	Brown ring
5	Terpenoids	Salkowski test	Reddish-brown interface
6	Phenols	Ferric chloride test	Dark green colour

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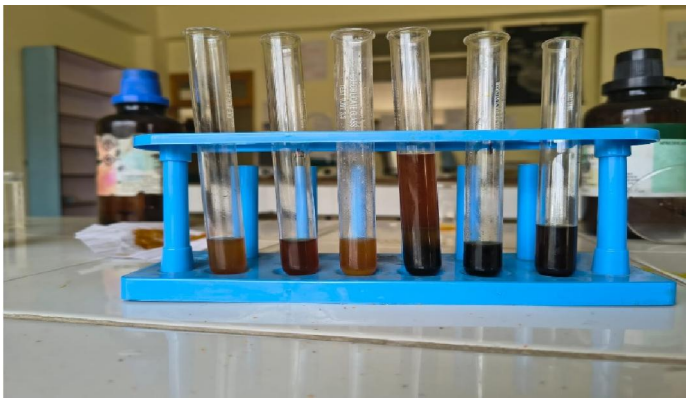
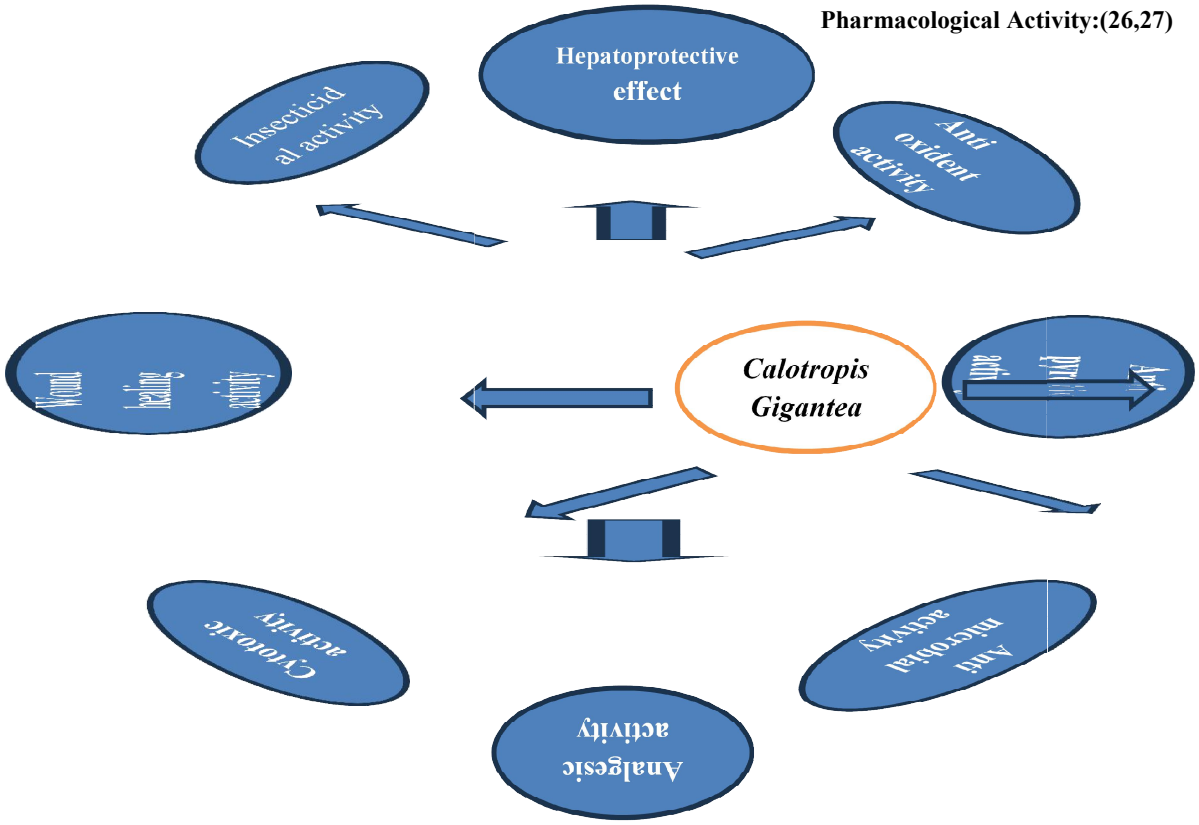


(b)

Fig (a) and (b): Phytochemical screening

Pharmacological Activity:(26,27)



IV. PHARMACOLOGICAL STUDIES: (28-31)

1. Anti-diarrheal Activity

A hydroalcoholic extract (50:50) prepared from the aerial parts of *Calotropis gigantea* was tested in rats with castor-oil–induced diarrhea. Researchers measured how far charcoal travelled through the intestine to check the speed of digestion. They also studied the amount and weight of intestinal fluids produced after castor oil using the enteropooling method. The extract helped reduce diarrhea by slowing down intestinal movement and decreasing fluid accumulation.

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2. Antipyretic (Fever-reducing) Activity

In traditional Indian medicine, the roots of *Calotropis gigantea* are used to treat problems like leprosy, eczema, syphilis, elephantiasis, ulcers, and cough. In experiments, fever was induced in rats and rabbits using yeast and a TAB (Typhoid) vaccine. When the animals were given the root extract at doses of 200 and 400 mg/kg through injection, their body temperature dropped significantly, showing strong antipyretic effects.

3. CNS (Central Nervous System) Activity

Alcoholic extracts from the peeled roots were orally given to rats at 250 and 500 mg/kg to study their effects on the central nervous system. The extract showed strong pain-relieving activity, as seen in the hot-plate and acetic acid-induced writhing tests. It also showed anticonvulsant effects by delaying seizures caused by pentylenetetrazole. Additionally, the rats spent more time in the open arms of the elevated plus maze, indicating anti-anxiety activity.

4. Analgesic (Pain-relieving) Activity

The alcoholic extract of *Calotropis gigantea* flowers was tested in mice using both chemical and heat-based pain models. At doses of 250 and 500 mg/kg, the extract reduced the number of writhing responses by 20.97% and 43%, respectively. In the hot-plate test, the time before the mice licked their paws increased, confirming the pain-relieving effect. The strongest activity was noted around 90 minutes after giving the extract.

5. Anti-inflammatory Activity

Different extracts of the plant were tested in several inflammation models, including carrageenan- and kaolin-induced paw swelling for acute inflammation, and cotton-pellet granuloma and adjuvant-induced arthritis for chronic inflammation. The extracts also showed antipyretic effects in yeast-induced fever and pain-relieving activity in phenylquinone-induced writhing in mice. The alkaloid fraction showed the strongest early anti-inflammatory response, with peak activity observed after 2 hours.

6. Hepatoprotective Activity

The methanolic leaf extract of *Calotropis gigantea* demonstrated strong liver-protecting effects in rats with CCl_4-induced liver damage. The effect improved in a dose-dependent manner.

V. CONCLUSION

Calotropis gigantea leaves possess several important phytochemicals such as flavonoids, alkaloids, tannins, saponins, glycosides, and phenolic compounds that contribute to their medicinal value. Preliminary phytochemical screening confirms the presence of these bioactive constituents, which are known for their antioxidant and anti-inflammatory properties. The hepatoprotective activity of the leaf extract may be attributed to its ability to reduce oxidative stress and protect liver cells from toxic damage. Experimental studies indicate that the extract helps normalize liver enzyme levels and improves liver function. Therefore, Calotropis gigantea leaves have significant potential as a natural hepatoprotective agent.

REFERENCES

1. Kanchan T, Atreya A. Calotropis gigantea. Wilderness & Environmental Medicine. 2016 Jun;27(2):350-1.
2. Habib MR. Evaluation of antitumour activity of Calotropis gigantea L. root bark against Ehrlich ascites carcinoma in Swiss albino mice. Asian Pacific journal of tropical medicine. 2011 Oct 1;4(10):786-90.
3. Nguyen KD, Dang PH, Nguyen HX, Nguyen MT, Awale S, Nguyen NT. Phytochemical and cytotoxic studies on the leaves of Calotropis gigantea. Bioorganic & Medicinal Chemistry Letters. 2017 Jul 1;27(13):2902-6.
4. Saratha V, Subramanian SP. Evaluation of antifungal activity of Calotropis gigantea latex extract: An in vitro study. International Journal of Pharmaceutical sciences and research. 2010;1(9):88-96.

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5. Prabhu S, Priyadharshini P, Veeravel R. Effect of aqueous extracts of different plant parts of milkweed plant (Calotropis gigantea R. Br.) against ovicidal activity on Helicoverpa armigera (Hubner). International Journal of Advanced Life Sciences. 2012Feb;2:39-44.
6. Kaur A, Batish DR, Kaur S, Chauhan BS. An overview of the characteristics and potential of Calotropis procera from botanical, ecological, and economic perspectives. Frontiers in Plant Science. 2021 Jun17;12:690806.
7. Timilsina H, Modi B, Basnyat R. Phytochemical, antimicrobial and ethnobotanical study of Calotropis gigantea. Journal of Health and Allied Sciences. 2020;10(2):23-7.
8. Verma VN. The chemical study of Calotropis. International Letters of Chemistry, Physics and Astronomy 2014;1:74-90.
9. Jain SC, Sharma R, Jain R, Sharma RA. Antimicrobial activity of Calotropis procera.
10. Amini MH. Important insights from the antimicrobial activity of Calotropis procera. Arabian Journal of Chemistry. 2021 Apr 28.
11. Kumar PS, Suresh E, Kalavathy S. Review on a potential herb Calotropis gigantea (L.) R. Br. Scholars Academic Journal of Pharmacy. 2013 Oct 2;2(2):135-43.
12. Mandal S. Calotropis gigantea: a brief study on phytochemical and pharmacological profile. Asian Journal of Pharmaceutical Research. 2023;13(1):34-40.
13. Amutha A, Jeyalalitha T, Kohila M. Calotropis gigantea a review paper. Int J Recent Sci Res. 2018;9(10):29386-90.
14. Singh N, Gupta P, Patel AV, Pathak AK. Calotropis gigantea: A Review on its phytochemical & pharmacological profile. Int. J. of Pharmacognosy. 2014;1:1-8.
15. Divya N, Singh BA. A Review on Brief Study of Calotropis gigantea Linn. Journal of Drug Delivery & Therapeutics. 2021 Sep 1;11(5):224-8.
16. Sarkar S, Chakraverty R, Ghosh A. Calotropis Gigantea Linn.-a complete busket of Indian traditional medicine. Int. J. Pharm. Res. Sci. 2014 May 21;2(1):7-17.
17. VA J, Usman MR, Salunkhe PS, Gagrani MB. Anti-inflammatory Activity of Calotropis gigantea Linn. Leaves Extract on In-vitro Models. IJCP Rev Res. 2010;1(2):1-5.
18. Divya N, Singh BA. A Review on Brief Study of Calotropis gigantea Linn. Journal of Drug Delivery & Therapeutics. 2021 Sep 1;11(5):224-8.
19. Gharge VG, Ghadge DM, Shelar PA, Yadav AV. Importance of Pharmacognostic study of medicinal plants Calotropis gigantea (Linn.): A review. Int J Pharmacognosy. 2017;4(11):363-71.
20. Zaman HU, Khan RA. Surface Modified Calotropis Gigantea Fiber Reinforced Polypropylene Composites. International Journal of Advanced Science and Engineering. 2022;9(1):2477-87.
21. Friedel MH. Unwelcome guests: a selective history of weed introductions to arid and semi-arid Australia. Australian journal of botany. 2020 Jun 18;68(2):75-99.
22. Rani R, Sharma D, Chaturvedi M, Yadav JP. Phytochemical analysis, antibacterial and antioxidant activity of Calotropis procera and Calotropis gigantea. The natural products journal. 2019 Mar 1;9(1):47-60.
23. Patel HV, Patel JD, Patel B. Comparative efficacy of phytochemical analysis and antioxidant activity of methanolic extract of Calotropis gigantea and Calotropis procera. Int J Life Sci Biotechnol Pharm Res. 2014;5(2):107-13.
24. Singh S, Singh S, Mishra RM, Shrivastava MP. Preliminary phytochemical screening of Calotropis gigantea leaf. International Journal of Scientific and Research Publications. 2014 Feb;4(2):1-3.
25. Usmani SH, Kushwaha PO. Hepatoprotective activity of extracts of leaves of Calotropis gigantea. Asian Journal of Pharmaceutical and Clinical Research. 2010;3(3):195-6.
26. Chitme HR, Chandra R, Kaushik S. Studies on anti-diarrhoeal activity of Calotropis gigantea R. Br. in experimental animals. J Pharm Pharm Sci. 2004 Feb 25;7(1):70-5.

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27. Kumar D, Kumar S. Calotropis gigantea (L.) Dryand-A review update. Indian Journal of Research in Pharmacy and Biotechnology. 2015 May 1;3(3):218.
28. Mishra P, Yadav KS, Shrivastava P. An updated Review on Phytochemistry, Pharmacological activity and Medicinal uses of Calotropis gigantea R. Br. Research Journal of Pharmacognosy and Phytochemistry. 2017;9(2):135-8.
29. Kumar G, Karthik L, Rao KV. A review on pharmacological and phytochemical profile of Calotropis gigantea Linn. Pharmacologyonline. 2011;1:1-8.
30. Joseph B, George J, Jeevitha MV, Sisssy Charles. Pharmacological and Biological overview on Calotropis gigantea. A Comprehensive Review. Int. Res J Pharm. App Sci. 2013; 3(5):219-223.
31. Blair TS. A Practitioner's Handbook of Materia Medica and Therapeutics based upon established physiological actions and the indications in small doses. 1907: 215-228