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Review Article

A Review on Brief Study of *Calotropis gigantea* Linn.

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Abstract

Calotropis gigantea Linn is a popular restorative herb commonly known as milk weed & has been utilized in Indian system of medication. In this review, the systematic position, introduction about the plant, morphological study, phytochemistry and the economical values of the *Calotropis gigantea* are discussed. It has oval, light green leaves and smooth stem. The plant is growing in a wide range of soils and natural conditions, requiring no cultivation practices. Various pharmacological activities reported like antioxidant activity, anti-malarial activity, antimicrobial activity, cytotoxic activity, antipyretic activity, anti-asthmatic activity, anti-inflammatory activity, analgesic activity, insecticidal activity, wound healing activity & anti-diarrheal activity.

Keywords: *Calotropis gigantea* Linn., Pharmacological studies.

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INTRODUCTION

The plants have remedial properties or apply valuable pharmacological effects on the animal body are generally designated as “Medicinal Plants”. It has now been set up that the plants which normally synthesis and collect some optional metabolites, similar to alkaloids, glycosides, tannins, volatiles oils and contain minerals and nutrients, have restorative properties.[1]

In antiquated ayurvedic medication the plant *Calotropis gigantea* is known as "Sweta Arka" and *Caotropis procera* as "Raktha Arka".[2] Here we study about *Calotropis Gigantea. Calotropis gigantea* Linn is flowering plants belong to *Asclepidaceae* family. It is also known as Akada, Aak, Mandar, Aakh etc[3].

Calotropis gigantea is a common weed in arid lands and is known as giant milkweed. This plant is native to India, Bangladesh, Burma, China, Indonesia, Malaysia, Pakistan, the Philippines, Thailand and Sri Lanka. The plant has oval, light green leaves, a milky stem, and clusters of waxy flowers in either white or lavender. *C. gigantea* is frequently available in India and is used for several medicinal purposes in the traditional medical system. Recently *C. gigantea* has been scientifically reported for several medicinal properties. The flowers have been reported to possess analgesic activity and antimicrobial activity and cytotoxicity. Leaves and aerial parts of the plant have been reported for antidiarrheal activity, anti-candida activity and antibacterial activity, and antioxidant activity. The roots have been reported to have antipyretic activity, cytotoxic activity, antimicrobial activity, insecticidal activity, wound healing activity and CNS activity and load-blocking properties. Plant latex has been reported to have laxative properties, procoagulant activity, wound healing activity, and antimicrobial activity. Stem has been reported to possess hepatotoxic effects. The current review focuses on a general outline of the medicinal and biomolecular properties of *C. gigantea* and its future prospects for further scientific research to develop effective therapeutic compounds.[4]

Figure 1: *Calotropis gigantean*

TAXANOMY[5]

Table 1: Taxonomical classification of *Calotropis gigantea* Linn.

Kingdom	Plantae
Order	Gentianales
Family	Apocynaceae
Subfamily	Asclepiadaceae
Genus	*Calotropis*
Species	*C.gigantea*

VERNACULAR NAMES[6]

Table 2: Vernacular names of *Calotropis gigantea* Linn.

Common names	Giant Milkweed, Crown Flower, Swallow Wort.
Hindi	Safed aak, Aak, Alarkh, Madar, Sveta Arka, Akanda, Bara Akand.
Gujarati	Aakando
English	Crown flower, giant Indian milkweed. Bowstring hemp, crownplant, madarMalaysia: Remiga, rembega, kemengu
Indonesia	Bidhuri (Sundanese, Madurese), sidaguri (Javanese), rubik (Aceh).
Philippines	Kapal-kapal (Tagalog).
Thailand	Po thuean, paan thuean (northern), rak(central)
French	Faux arbre de soie, mercure vegetal

DISTRIBUTION

Calotropis gigantea Linn has a place with the family Asclepiadaceae with 180 genera and 2,200 species conveyed fundamentally in tropical and subtropical districts of the world. The plant shows its original presence in the Afro-Asiatic monsoon regions from where it spread to Northwest Africa (Mauritania and Senegal), through the Arabian Peninsula, and grows most commonly in the sub-Himalayan regions, and from the Deccan to Kanyakumari, Bangladesh, Burma and Pakistan. It also shows the presence of flowers in subtropical America, the Mascarene Islands and the drier parts of Australia. Its natural cultivation occurs from sea level up to 1300 m in semi-arid conditions where the annual rainfall varies between 150 and 1000 mm. The plant grows in sandy, over-drained soils and abandoned land and can withstand a wide range of soil texture and environmental climatic changes. It tolerates soil salinity, drought, heat and seaside salt spray well. It is a highly adaptable plant that can withstand an annual rainfall of 2,000 mm and is established very quickly in open habitats with little competition. It exhibits excellent adaptability to biological structures and grows along degraded roadsides, lake edges, and in native pastures and pastures that have been subjected to overgrazing. When damaged, they easily develop suckers from the roots that quickly regenerate and form adventitious shoots.[7]

MORPHOLOGY[8]

Root: Simple, branched, woody at the base and covered with a fissured; corky bark; branches somewhat delicious and thickly white tomentose; early glabrescent. All parts of the plant exude white latex when cut or broken.

Leaves: Opposite-decussate, straightforward, subsessile, exstipulate; edge oval obovate to comprehensively obovate, 5-30X 2.5-15.5 cm, apex abruptly and shortly acuminate to apiculate, base cordate, edges whole, delicious, white tomentose when young, later glabrescent and glacouse.

Fruit: A basic, plump, swelled, subglobose to sideways ovoid follicle up to 10 cm or more in diameter.

Seeds: Many, small, flat, obovate, 6 × 5 mm, compacted with silky white pappus, 3 cm or more long.

Flowers: Bracteate, complete, sexually unbiased, actionmorphic, pentamerous, hypogynous, pedicellate, pedicel 1-3 cm long.

Calyx: Sepal 5, Polysepalous, 5 lobed, in a matter of seconds joined at the base, glabrescent, quincuncial aestivation Androecium: Stamens five, gynandrous, anther dithecous, sound.

Inflorescence: A thick, multi-bloomed, umbellate, peduncled cymes, emerging from the hubs and seeming axillary or terminal.

Gynoecium: Gynoecium: Bicarpellary, apocarpous, styles are joined at their peak, peltate disgrace with five parallel stigmatic surfaces. Anthers are adnate to the shame of framing a gynostegium.

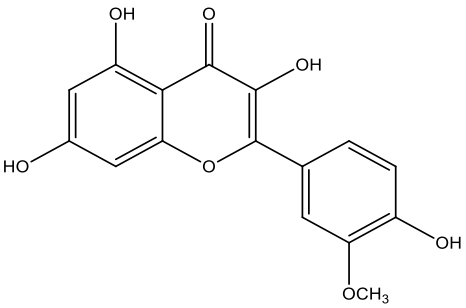
CHEMICAL CONSTITUENTS

Various chemical constituents isolated from *Calotropis* gigantea Linn.[9]

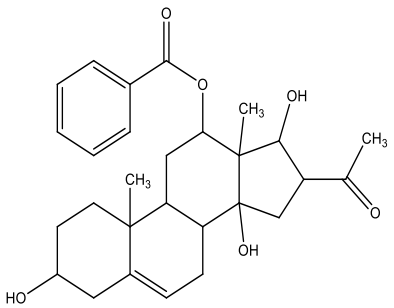
Table 3: Various chemical constituents isolated from *C. gigantea* Linn

Class of Chemical Constituent	Name of Chemical Constituent	Plant Part Used	Extract Taken
Triterpenoids	Di-(2-ethylhexyl) Phthalate	Flowers	Ethyl acetate extract
	Anhydrosophoradiol-3-acetate		
	Lupeol	Aerial parts	Latex
	α –Taraxerol	Root bark	Ethyl acetate extract
Triterpene esters	γ-Taraxasterol	Aerial parts	Hexane and methanol soluble extract
	Lupenyl-1-acetate	Root bark	Petroleum ether extract
Flavonol	Isorhamnetin	Aerial parts	Methanol extract

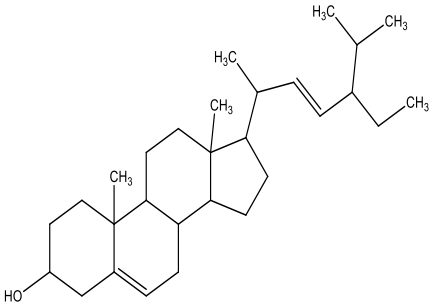
Cardiac glycosides	Calotropone	Roots	Ethanol extract
	Gofruside		
Steroids	Stigmasterol	Root bark	Methanol extract
	β-Sitosterol		
	β–Sitosterolacetate		Ethyl acetate extract
Resin	β-Amyrin	Root bark	95 % Alcohol extract
	β-Amyrin acetate		
Fatty acids	Isovaleric acid	Root bark	95 % Alcohol extract
Miscellaneous	Asclepin	Roots	Latex



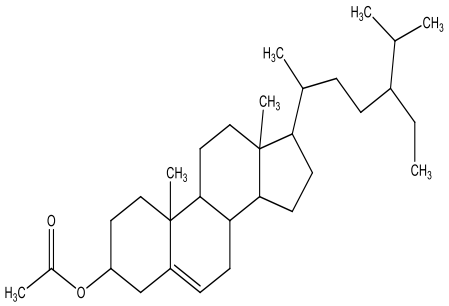
Isorhamnetin



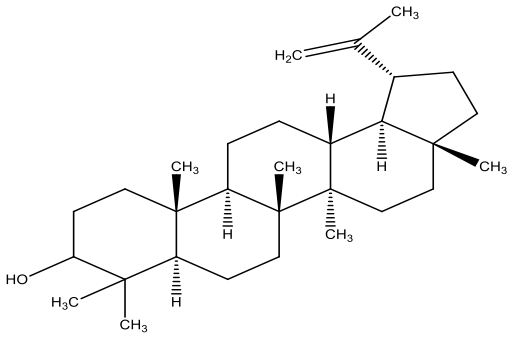
Calotropone



Stigmasterol



β-Sitosterol acetate



Lupeol

Chemical structures of various chemical constituents isolated from *C. gigantea*

THERAPEUTIC USES

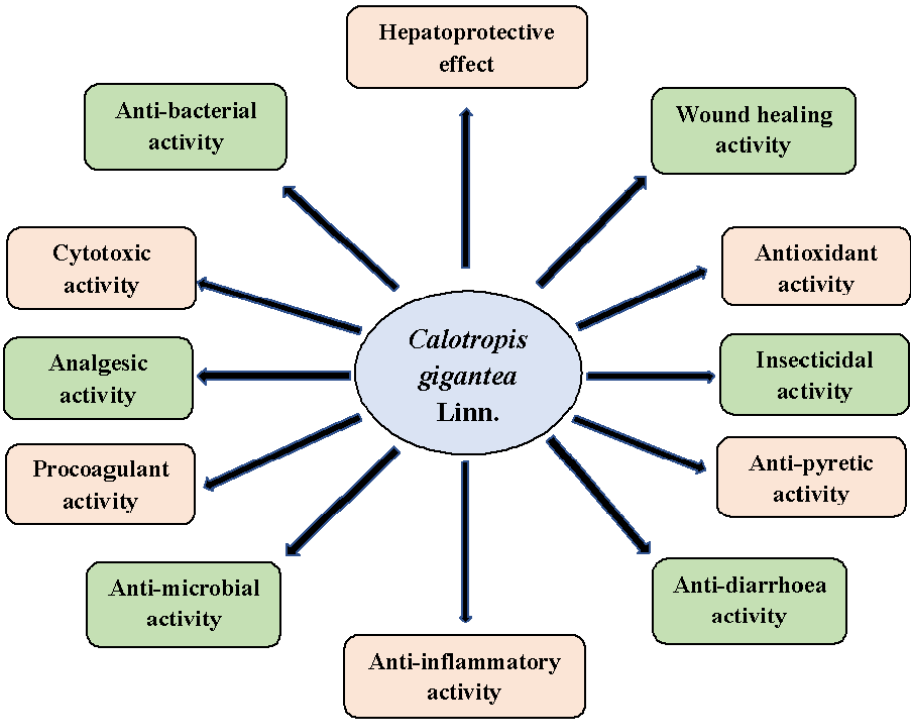


Figure 2: Medicinal properties of *C. gigantea* Linn.[10]

PHARMACOLOGICAL STUDIES

Antioxidant Activity

Mushir Ansari *et al.* was studied the *in vitro* antioxidant activity of *Calotropis gigantea* root extract by 2, 2-diphenyl-1-picrylhydrazyl and fluorescence recovery after photobleaching assay. In both the method, extract possesses high antioxidant activity when compared with standard ascorbic acid due to presence of high content of various phytochemicals.[11]

Anti-Malarial Activity

Shripad M. Bairagi *et al.* was studied the mosquito repellent activity of *Calotropis gigantea* flower extract was studied. The distinctive extract of the plant was utilized for the investigation against the multi day blood starved female *Culex quinquefasciatus mosquito*. The alcoholic extract showed high mosquito repellent action against the female *Culex quinquefasciatus mosquito* as compared to the petroleum ether and chloroform extract. The dose dependent mosquito repellent activity of the extract was found.[12]

Antiasthmatic Activity

S. Sarkar *et al.* was studied anti asthmatic activity of *Calotropis gigantea* in ova albumin (OVA) induced asthma. The impact of *Calotropis gigantea* at 100, 200, 400 mg/kg, on various body cells, catalysts and histopathological changes were noticed. Along these lines, plant concentrate might help for treating asthma.[7]

Antipyretic Activity

Namrata Singh *et al.* was studied that root extract of *Calotropis gigantea* has expected antipyretic action against both yeast-induced and TAB vaccine-induced fever, showing the chance of creating *Calotropis gigantea* as a less expensive and intense antipyretic agent.[13]

Antimicrobial Activity

Madhu Prakash Srivastav *et al.* was studied that the antimicrobial activity of aqueous, methanolic and ethanolic extract of leaves and flower of *Calotropis gigantea* Linn shows potent antimicrobial activity against Staphylococcus aureus.[14]

Cytotoxic Activity

S. Rajashekara *et al.* was studied that synthesized Zinc oxide nanoparticles from aerial (leaf) parts of *Calotropis gigantea* Linn showed a cytotoxic effect against MDAMB-231 cell lines. So, plant extract also shows cytotoxic effect.[15]

Anti-Inflammatory Activity

V. A. Jagtap *et al.* was examined that ethanolic extract of leaves of *Calotropis gigantea* Linn. on *in-vitro* models shows significant anti-inflammatory activity.[16]

Analgesic Activity

A.K. Pathak *et al.* was studied the analgesic activity of alcoholic extract of *Calotropis gigantea* Linn. in acetic acid induced writhing test & hot plate technique in mice. In both the technique, extract has high analgesic activity.[17]

Insecticidal Activity

M. Rezaul Karim *et al.* was read for methanolic extract of root bark of *Calotropis gigantea* Linn. furthermore, its chloroform and petroleum ether soluble portions against several instar of larvae and adult of *Tribolium castaneum*. The methanol extracts and furthermore, its chloroform and petroleum ether soluble portions were repellent to *Tribolium castaneum* in mild to moderate range.[18]

Wound Healing Activity

Narendra Nalwaya *et al.* was examined for wound healing activity of latex of *Calotropis gigantea* Linn. in albino rats by using extraction and entry point wound model and the latex showed the significant wound healing activity.[19]

Anti-Diarrheal Activity

Havagiray R. Chitme *et al.* was studied for anti-diarrheal effect of hydroalcoholic (50:50) extract of aerial part of *Calotropis gigantea* Linn against castor oil induced diarrhoea model in rodents. The examination implies the anti-diarrheal effect of extract.[20]

CONCLUSION

Calotropis gigantea Linn is a plant with 180 genera and 2,200 species distributed for the most part in tropical and subtropical regions of the world. The plant is growing in in a wide range of soils and natural conditions, requiring no cultivation practices.

The plant *Calotropis gigantea* is a traditional therapeutic plant having large numbers of phytochemical values with the antioxidant, anti-malarial, anti-asthmatic, antimicrobial, cytotoxic, antipyretic activity, anti-inflammatory activity, analgesic activity, insecticidal activity, wound healing activity & anti-diarrheal activity.

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