

CALOTROPIS GIGANTEA: A PHYTOCHEMICAL POTENTIAL**Siddharth Deshpande^{1*}, Kalpita Deshpande² and Ekta Tomar³**

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ABSTRACT

Calotropis gigantea Linn is a well known medicinal herb commonly known as milk weed and has been used in Indian system of medicine. Hence, plant based formulations may serve as an alternative source towards development of new drugs. The plant is known for antioxidant, hepatoprotective, analgesic, inflammatory, antidiarrhoeal, antitumor, antihelmintic, anticonvulsant, antimicrobial, flatulence, astringent, tonic, expectorant, oestrogenic, antinociceptive, antimalarial, appetizer, anti emetic, diaphoretic, anti inflammatory, sedative, wound healer, antidote and digestive properties. In this manuscript research literature searched through Pub med, Medline, Google scholar, and Science Direct till 2017.

KEYWORDS: Calotropis gigantea Linn; Milk weed; Phytochemistry; Therapeutic potential.

INTRODUCTION

Calotropis gigantea Linn is flowering plants in apocynaceae family, first described in 1810. It is native to southern Asia and North Africa.^[1] This large shrub, which looks like a small tree, sports clusters of waxy flowers that are either white or lavender in color. Each flower consists of five pointed petals and a small, elegant "crown" rising from the center, which holds the stamens. The plant has oval, light green leaves and milky stem. The dry fruit is a follicle, seed dispersal is by wind flow. The seed with a parachute of hairs is a delight for small children, who like to blow it and watch it float in the air. Calotropis procera Linn is milky

latex, an erect, tall, large, multi branched and perennial shrubs that grow to a height of 5.4 m. Bark is soft and corky, branches stout, terete with fine appressed cottony pubescence (especially on young). Leaves are sub-sessile, opposite, decussate, broadly ovate-oblong, elliptic or obovate, acute, thick, glaucous, green, covered with fine cottony pubescent hair on young but glabrous later and base cordate. The flowers are in umbellate-cymes and covered with densely matted woolly hairs on young, Calyx glabrous, ovate and acute. Corolla glabrous, lobes erect, ovate, acute, coronal scales 5 - 6, latterly compressed and equally of exceeding the staminal column. Follicles are sub-globose or ellipsoid or ovoid. Seeds are broadly ovate, acute, flattened, minutely covered with densely matted woolly hairs, brown colored and silky coma is 3.2 cm long.^[2]



Calotropis procera Linn have been widely used in the Sudanese, Unani, Arabic and Indian traditional medicinal system for the treatment of various diseases namely leprosy, ulcers, piles and diseases of the spleen, liver and abdomen.^[3] The latex is used as a drug in abortion^[4], pain killer and antiparasitic^[5], dysentery, antisiphilitic, antirheumatic, antifungal, diaphoretic and for the treatment of leprosy and bronchial asthma.^[6,7]

Taxonomy and Description of *Calotropis Gigabytes*

Plant Taxonomy			
Kingdom	Plantae	Subfamily	Asclepiadoideae
Unranked	Angiosperms, Eudicots, Asterids	Tribe	Asclepiadeae
Order	Gentianales	Sub tribe	Asclepiadinae
Family	Asclepiadaceae	Genus	<i>Calotropis</i> R.Br.
Names in vernacular language			
English	Sodom apple, kapok tree, bush	Hindi	Aak, madar, akavana
Sanskrit	Arka, alaraka, asfota, vikirana	Punjabi	Ak
Telgu	Jilledu, mandaram	Bengali	Akanad
Marathi	Rui	Malayalam	Neela ekku
Ayurvedic properties			
Rasa	Katu, tikta	Guna	Laghu, ruksha, tikshan
Virya	Ushan	Vipak	Katu

Calotropis gigantea and *C. procera* are the two most common species in the genus. *Calotropis gigantea* grows to a height of 8 to 10 ft (2.4 to 3.0 m) while *C. procera* grows to about 3 to 6 ft (0.91 to 1.83 m). The leaves are sessile and sub-sessile, opposite, ovate, cordate at the base. The flowers are about 1.5 to 2 in (3.8 to 5.1 cm) in size, with umbellate lateral cymes and are colored white to pink and are fragrant in case of *C. procera* while the flowers of *C. gigantea* are without any fragrance and are white to purple colored, but in rare cases are also light green-yellow or white.^[8-10]

DISTRIBUTION

Calotropis procera belongs to the family Asclepiadaceae with 180 genera and 2200 species distributed mainly in the tropical and subtropical regions of the world. Plant shows its indigenous presence in Afro-Asian monsoonal regions from where it has spread to northwestern Africa (Mauritania, Senegal), through Arabian Peninsula, commonly grow most abundantly in Sub Himalayan tracts, Deccan to Kanyakumari, Bangladesh, Burma and Pakistan.^[7] It also shows floral presence in subtropical America, Mascarene Islands and drier parts of Australia. Its natural plantation occurs from sea level up to 1300 m in semi-arid conditions where annual rainfall noted between 150 and 1000 mm. Plant grows in sandy and excessively drained soils, derelict lands and can withstand a wide range of soil texture and ecoclimatic changes. It is a good tolerant of soil salinity, draught, heat and of beachfront salt spray. It is a highly adapting plant, which can withstand 2000-mm annual precipitation and established very fast in open habitat with little competition. It shows excellent adaptability to biological structures and grows along degraded roadsides, lagoon edges and in overgrazed native pastures and rangelands.^[11] When damaged, it readily develops suckers from the roots that rapidly regenerate and form adventitious shoots.^[7] The plant is also known by other common names such as Akund, apple of sodom, auricula tree, giant milkweed, madar, mudar, roostertree, rubber bush, rubberbush, small crownflower, sodom's milkweed, sodom apple, swallowwort, aak, akada, rui, thora thora. *Calotropis procera* Linn., also known as Alarka, Surya, Suuryaahvya, Vikirna, Vasuka, Tapan, Tuulaphala, Kshirparna, Arkaparna, Aasphota Aakh, Madaar or Ashar in India.^[12]

Phytochemicals of *Calotropis Gigantea*

Different parts of *Calotropis gigantea* is shown to have abundant phytochemicals as mentioned in below;

Stem Bark: Giganteol, α and β calotropeol, β -amyrin.^[13]

Root: Calotropnaphthalene [naphthalene derivative], calotropisesquiterpenol, calotropisesterterpenol [terpene derivatives], calotropbenzofuranone [aromatic product] and sucros.^[14]

Seed Oil extracted from seeds contains palmitic, oleic, linoleic and linolenic acid. The unsaponifiable fraction contains phytosterol, stigmasterol, melissyl alcohol and laurane.^[15]

Flower: Ester of α - and β -calotropeols.^[15]

Leaves: Sapogenins, holarrhetine; cyanidin-3-rhamnoglucoside; taraxasterol isovalerate. mudarine and three glycosides calotropin uscharin, calotoxin along with phenol.^[16]

Latex: Water and water soluble substance (86-95.5%) and caoutchouc (0.6-1.9%). The coagulam consist of caoutchouc, resin and insoluble matter (4.5-13.8%).^[17] α - and β -calotropeols (also in latex); latex-protease, calotropains FI & FII, flower β -amyryn, stigmasterol.^[18] Calotoxin, uscharin, and calactin.^[19] Two new Triterpine ester-3'-methyl butanoates of α -amyryn and taraxasterol isolated from latex.^[20]

Root Bark: Root bark contains β -amyryn, two isomeric crystalline alcohols, giganteol and isogiganteol.^[21]

Ethnopharmacology of *Calotropis Gigantea*

Anticancer activity

Treatment with anhydrosophoradiol-3-acetate (A3A) isolated from the flower of *Calotropis gigantea* decreased the viable tumor cells in mice. Results of this study conclude that *in vivo*, the A3A was effective in inhibiting the tumor growth.^[22]

Antiasthmatic activity *Calotropis gigantea* showed anti asthmatic activity in ova albumin (OVA) induced asthma. The effect of *Calotropis gigantea* at 100, 200, 400 mg/kg, on different body cells, enzymes and histopathological changes were observed. So plant extract may help for treating asthma.^[19]

Ovicidal activity Different parts viz. leaves, stem, flower, roots and whole plant of *Calotropis gigantea* tested for ovicidal activity on *Helicoverpa armigera*. Thus milkweed plant possesses ovicidal activity and could be used for the management of *Helicoverpa armigera*.^[23]

Hair growing activity *Calotropis gigantea* with *Hibiscus rosa sinensis* (HRSF), and polyherbal formulation (HCF) in combination of both the plants were aimed for revealing effect on hair growth initiation.^[24]

Antibacterial activity Well plate method was employed on leaf extract of *Calotropis gigantea* against certain Gram positive (*B. subtilis*, *M. luteus*, *S. aureus*) and Gram negative (*K. pneumoniae*, *P. vulgar* and *E. coli*) bacteria.^[25-29]

Anti-inflammatory activity The anti-inflammatory activity of *Calotropis gigantea* was proved against albumin denaturation technique. The Percentage inhibition of denaturation produced by test drug was comparable with that produced by Ibuprofen (85.71%) which indicates that test drug possesses significant anti-inflammatory activity.^[30]

Insecticidal activity The residual film toxicity, fumigant toxicity and repellent effect of methanol extract of root bark of *Calotropis gigantea* and its chloroform and petroleum ether soluble fractions were evaluated against several stages of larvae.^[31]

Hepatoprotective activity Acetaminophen induced hepatotoxicity models were used to evaluate hepatoprotective activity of leaf extracts of *Calotropis gigantea* in various solvents showed very significant reduction in SGPT level whereas, methanolic extract and Silymarin showed very significant reduction in SGOT level.^[32]

Analgesic activity The alcoholic extract of the flowers of *Calotropis gigantea* was administered orally for its analgesic activity in mice. The analgesic effect was observed after 30 min of dose administration which reached its maximum after 90 min.^[33]

Anti viral activity A new lignan glycoside isolated from the latex of *Calotropis gigantea* evaluated for *in vitro* inhibitory activities against a panel of human and avian influenza viruses. It showed inhibitory effect against human influenza viruses also in both subtypes A and B.^[34]

CONCLUSION

The various parts of *Calotropis gigantea* Linn. Plant viz. root, root bark, leaves, flower, milk are used as a medicine for various diseases. The present review presented the morphological description, therapeutic uses, ethno pharmacological reports and all the pharmacological

studies conducted on the plant along with its phytochemistry. So it is concluded that the relevance of plant in traditional medicine is of substantial importance.

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