CALYTROPIS GIGANTEA- A PROSPECTIVE HERB IN COSMETICS

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***Abstract*: Cosmetic products have a huge impact on the people. the cosmetic ingredients are prevailing day by day and hence there is a need to bring about natural ingredients as many as possible, since our nature is the hidden treasure of various herbs so almost every herb possess a medicinal as well as cosmetic property in it. It is necessary to study them well in order to gain the boon of such naturally occurring agents. One of such shrub is *Calytropis gigantea* also called as "rui", "aak", and "madar" plant. It possess various phytochemical characteristics such as alkaloids, flavonoids, etc and pharmacological actions that could be incorporated into the cosmetic products. This would be useful not only to the cosmetic industry but also would be replacing the impact of synthetic ingredients on the surroundings. This article deals with the study of Ayurvedic, medicinal and pharmacological properties of calytropis and its prospective use in the field of cosmetics.**

***Keywords*: *Calytropis gigantea*n, rui, aak, madar, alkaloids, flavonoids, photochemical characteristics, pharmacological actions.**

I. INTRODUCTION:

In India, the plant *Calytropis gigantea* is common in the compounds of temples. From the beginning of civilization, human beings have worshiped plants and such plants are conserved as a genetic resource and used as food, fodder, fibre, and fertilizer, and fuel, febrifuge and in every other way. There are numerous herbs with medicinal and cosmetic properties, *Calytropis gigantea* is one of them. *Calytropis gigantea* commonly known as "rui", "aak", "madar" plant, belongs to the family *Asclepiadaceae* and is a shrub that grows almost at any conditions and possesses many properties. In ancient Ayurvedic medicine the plant *Calytropis gigantea* is known as "Sweta Arka" and *Calytropis gigantea* as "Raktha Arka".[1]Both of them are often similar in their botanical aspects and also have similar pharmacological effects. It is called commonly as milky weed. It is a big shrub; which looks like a small tree, sports clusters of waxy flowers that are either white or lavender in colour. Each flower consists of five pointed petals and a small, elegant "crown" rising from the center, which holds the stamens. Calotropis is drought resistant; salt tolerant to a relatively high degree, grows wild up to 900 meters throughout the country [1, 2]and prefers sandy soils with mean annual rainfall: 300-400 mm. It has a preference for and is often dominant in areas of abandoned cultivation especially disturbed sandy soils and low rainfall. It is assumed to be an indicator of over cultivation. The calytropis is a follicle and when dry, seed dispersal is by wind. The seeds with a parachute of hairs are a delight for small children, who like to blow it and watch it float in the air.
The cheif features includes: [3,4, 1, 2,]
The plant grows very well in variety of soils and different environmental conditions it does not require cultivation practices. It is one of the few plants not consumed by grazing animals.
It thrives on poor soils particularly where overgrazing has removed competition from native grasses.
Sometimes this plant is the only survivor in some areas where nothing else grows. It is drought tolerant and the pioneer vegetation in dessert soil. Presence of latex extensively branched root system and thick leaves with waxy coverage are the xerophytic adaptations. Hence, it is distributed in tropical and subtropical area of the world and throughout India.
In the description Of Plant In Unani System Of Medicine Dioscorides (78A.D.) has mentioned *Calytropis gigantea* in his noteworthy book "Kitabul– Hashaish".[5] It is thorny tree with broad leaf and at the site of flowers and stem it oozes milk which is called as "sukr" which is also obtained from different parts of plant. The wood is fragile, delicate and leaves are soft. In some part of the world the milk is used in leather cleaning. [6] In "Makhzan-al-Advia.

There are three varieties of Madar :

a) White flowers, large leaves, and much milky juice. It is found near towns and the habitations of man;
b) Smaller with small leaves, the flowers are white externally lilac within.
c) Smaller plant, with pale yellowish green flowers.[7]

Figure I *CALYTROPIS GIGANTEA*

II. SCIENTIFIC CLASSIFICATION: [8, 9, 1]

TABLE 1: CLASSIFICATION OF *CALYTROPIS GIGANTEA*

KINGDOM	Plantae
ORDER	Gentianales
FAMILY	Asclepiadaceae
SUBFAMILY	Asclepiadoideae
GENUS	Calotropis
SPECIES	Gigantea

III. GEOGRAPHICAL DISTRIBUTION: [1.]

The seeds freely float in the air and natural regeneration is very common. Vegetative propagation through stem and root cuttings is very useful in large scale multiplication of the superior genotypes. Calotropis has been cultivated in South America and on the Caribbean Islands for the production of fibres at a spacing of 1-1.5m.When cultivated annual yields of up to 500kg/ha are expected. A single harvest per season is preferable to a double or triple harvest; a single harvest would result in a net saving of energy input both on the form and in the processing plant. It is well suited for intensive energy farming in arid or semi-arid regions where frost is not a limiting factor.

IV. SYNONYMS:

TABLE 2: VERNACULAR NAMES OF *CALYTROPIS GIGANTEA* [1].

India	✓ Sanskrit- Arka, Ganarupa, Mandara, Vasuka, Svetapushpa, Sadapushpa, Alarka, Pratapass. ✓ Hindi- Aak.Madar. ✓ Kannada-Ekka. ✓ Tamil& Malyalam- Erukka. ✓ Telegu- Jilledi Puvvu
Malaysia	Remiga,Remhega,Kemengu
English	Crown Flower, Giant Indian Milkweed.
Indonesia	Bidhuri(Sundanese, Madurese), Sidaguri(Javanese), Rubik (Aceh)
Phillipines	Kapal-Kapal (Tagalog)
Laos	Kok May, Dok Kap, Dok Hak
Thailand	Po Thuean, Paan Thuean (Northern), Rak
Vietnam	B[Oot]Ng B[Oot]Ng L[As]Hen, Nam T[It] B[At]
French	Faux, Arbre De Soie, Mercure Vegetal,

V. BOTANICAL DESCRIPTION

Macroscopic description. [10, 11, 12]

It is a large shrub growing to 4 m (13 ft) tall. It has clusters of waxy flowers that are either white or lavender in colour. Each flower consists of five pointed petals and a small "crown" rising from the center which holds the stamens. The aestivation found in calytropis is valvate i.e. sepals or petals in a whorl just touch one another at the margin, without overlapping. The plant has oval, light green leaves and milky stem.

Shrub or a small tree up to 2.5 m (max.6m) height.

1. Root: Simple, branched, woody at base and covered with a fissured; corky bark; branches somewhat succulent and densely white tomentose; early glabrescent. All parts of the plant exude white latex when cut or broken.
2. Leaves: Opposite-decussate, simple, sub sessile, extipulate; blade-oblong obovate to broadly obovate, 5-30X2.5-15.5 cm, apex abruptly and shortly acuminate to apiculate, base cordate, margins entire, succulent, white tomentose when young, later glabrescent and glacouse.
3. Flowers: Bracteate, complete, bisexual, actinomorphic, pentamerous, hypogynous, pedicellate, pedicel 1-3 cm long.
4. Floral Characteristics: Inflorescence: A dense, multiflowered, umbellate, pedicled

a. Androecium: Stamens five, gynandrous, anther dithecous, coherent.
b. Gynoecium: Bicarpellary, apocarpous, styles are united at their apex, peltate stigma with five lateral stigmatic surfaces. Anthers adnate to the stigma forming a gynostegium.
c. Calytropis: A simple, fleshy, inflated, subglobose to obliquely ovoid follicle up to 10 cm or more in diameter.
d. Seeds: Many, small, flat, obovate, 6x5 mm, compressed with silky white pappus, 3 cm or more long.
e. Cymes, arising from the nodes and appearing axillary or terminal.
f. Calyx: Sepal 5, Polysepalous, 5 lobed, shortly united at the base, glabrescent, quincuncial aestivation.
g. Corolla: Petals five, gamopetalous, five lobed, twisted aestivation.

Microscopic features

The transverse section of the root shows the presence of cork as the outermost layer, regularly arranged with 15-20 layers of rectangular cells without any intercellular space. The cells in the cortex region consist of abundant number of starch grains. These cells were consists of irregularly shaped parenchymatic cells and contains laticiferous tubes and rosette of calcium oxalate. [11] Transverse section through midrib of leaves shows an upper and lower single layered epidermis externally covered with thick striated cuticle and few epidermal cells on both surface of leaf elongated to form uniseriate 2-3 celled trichomes. Xylem consists of mostly vessels and tracheid. [13].

VI. PHYTOCHEMISTRY

In phytochemical 'Phyto' is the Greek word for plants. There are varieties of phytochemicals that could be helpful for human body in different ways. Phytochemical are non-nutritive plant chemicals that have various curative properties. Plant chemical are considered under three main biogenetic classes – a) terpenoids, b) alkaloids and related nitrogen compounds and c) phenolic. The general properties and uses of active constituent present in different plants these constituent are found in *Calytropis gigantea* and therefore can also be used in various cosmetic formulation to enhance its effect.

Phytochemical constituents in the various parts of calytropis are noted below.

Table 4: Phytochemicals present in different part of the *Calytropis gigantea*

Stem Bark	Giganteol, α and β calotropeol, β-amyrin.[14].
Root	Calotropnaphthalene [naphthalenederivative], calotropisesquiterpenol, calotropisesterterpenol [terpene derivatives], calotropbenzofuranone [aromatic product] and sucrose.[15]
Seed Oil extracted from seeds	Contains palmitic, oleic, linoleic and linolenic acid. The unsaponifiable fraction contains phytosterol, stigmasterol , melissyl alcohol and laurane.[16]
Flower	Ester of α-and β-calotropeols.[16]
Leaves	Sapogenins, holarrhetine; cyanidin-3-rhamnoglucoside; taraxasterol isovalerate. mudarine and three glycosides calotropin uscharin, calotoxin along with phenol.[10]
Latex	Water and water soluble substance (86-95.5%) and caoutchouc (0.6-1.9%). The coagulam consist of caoutchouc (5.1-18.6), resin (73.6-87.8) and insoluble matter (4.5-13.8%).[17] α- and β-calotropeols (also in latex); latex-protease, calotropains FI & FII, flower β-amyrin, stigmasterol.[18]. Two new Triterpine ester-3'-methyl butanoates of α-amyrin and Ψ taraxasterol–isolated from latex.[19].
Root Bark	Root bark contains β-amyrin, two isomeric crystalline alcohols, giganteol and isogiganteol.[14]

The presence of many phytochemical constituents in various parts of *Calytropis gigantea* especially in the leaves has been traced. Usharin, gigantin, calcium oxalate, alpha and beta-calotropeol, beta-amyrin., fatty acids (both saturated and unsaturated), hydrocarbons, acetates and the benzoates, a mixture of tetracyclic triterpene compounds, terols, giganteol and giganteol are also found to be present, (Murti PBR and Seshadri TR) [20, 21, 22] Cardenolide calotropin,[23]α-amyrin, β-amyrin, taraxasterol, β-sitosterol, α-amyrin methylbutazone, βamyrin methylbutazone, α-amyrin acetate, β-amyrin acetate, taraxasteryl acetate, lupeol acetate B, gigantursenyl acetate A, gigantursenyl acetate B (Habib RM, Nikkon F and Rahaman, Sen S, Sahu NP and Mahato SB) [24, 25] flavonol glycoside, akundarol, uscharidin, calotropin, frugoside, calotroposides A to G[26] are responsible for many of its activities. The following cardenolides are also described in the literature: calactin, calotoxin, calotropagenin, proceroside, syriogenine, uscharidin, uscharin, uzarigenin and voruscharin.(Brischweiler F, St6ckel K and Reichstein T; CalotropisGlykoside, vermutliche Teilstruktur , Singh B and Rastogi RP, Lardon A, Stockel K and Reichste) [27, 28, 29] Other compounds found are benzoylisolineolon and benzoyllineolone.(Chandler RF, Coombe RG and Watson TR).[30.]Flavonoids, (Crout DHG, Curtis RF

and Hassall; CH). [31] Triterpenoids, Pal G and Sinha NK [32]. alkaloids, steroids, glycosides, saponins, terpenes, enzymes, alcohol, resin, fatty acids and esters of calotropeols Seiber (JN, Nelson CJ and Lee SM)[33], volatile long chain fatty acids, glycosides and proteases (Kitagawa I, Ru-Song Z, Jony DP, Nam IB, Yasuyuki T, Mayasuki Y and Hirotaka S)[34] have been isolated from the various parts of the plant *Calytropis gigantea*. The laticifer fluid of Calotropis. (Cleverson DT, Jefferson EF, Soares oilveiva L, Maria Raguel A and Miranda nivea Maria R) [35] found to have strong proteolytic activity, having the enzyme cysteine proteinase and aspartic proteinase. Due to the presence of these components, the plants are resistant to phytopathogens and insects mainly in leaves where the latex circulates abundantly. The milky latex of the plant is rich in lupeol, calotropin, calotoxin, and uscharidin, the latex protein.

Phytochemically the plant has been investigated for cardenolides from the latex and leaves, [33] triterpenoids, {(Saber, A. H. & Maharan, G.H.), (Saxena, V.K. & Saxena, Y.P)}. [36, 37] anthocyanins from flowers (Tiwari, K.P. & Minocha, P.K) [38] and hydrocarbons. (Carruthers, I.B. & Grifiths, D.J.)[39] A systematic study on fresh and undried flowers has resulted in the isolation of pentacyclic triterpene that calotropenyl acetate (urs-19(29)-en-3β-yl acetate) (A), Procesterol (B) (steroidal hydroxyl ketone). (Khan, A.Q., Ahmed, Z. & Malik, A.) [40]

Sharma and Sharma et al., screened the major phytochemicals viz. alkaloids, carbohydrates, glycosides, phenolic compounds/ tannins, proteins and amino acids, flavonoids, saponins, sterols, acid compounds, resins in flower, bud, root of Calotropis. (Engels G. Marsh mallow. Herbal Gram.)[41].

Phytochemical components in *Calytropis gigantea* (Sharma P and Sharma JD) [42] The root bark contains α-amyrin, β-amyrin, taraxasterol and its ψ-isomer taraxasteryl isovalerate, taraxasteryl acetate, gigantin, giganteol, isogiganteol, β-sitosterol and wax.

TABLE 3: RESULTS OF VARIOUS TESTS PERFORMED ON THE PARTS OF *C.GIGANTEA* [42]

Sl. No.	Class of Compounds	Plant Part			Tests performed
		Flower	Bud	Root	
1.	Alkaloids	+	+	+	Dragendorff's test, Mayers test
2.	Carbohydrates	+	+	+	Molish test, Fehling test
3.	Glycosides	+	+	+	Keller killiani test
4.	Phenolic compounds/tannins	+	+	+	Ferric chloride test
5.	Proteins and amino acids	+	+	+	Xantho protein test
6.	Flavanoids	+	+	+	Ammonia test
7.	Saponins	+	+	+	With water With Na_2CO_3
8.	Sterols	+	+	+	Liebermann-Burchard test, Salkowski reaction, Hesse'sreaction
9.	Acid compounds	+	+	+	With Na_2CO_3, With litmus paper
10.	Resins	+	+	+	With double distilled water, With acetone and conc. HCl
11.	Peroxides	-	-	-	Potassium Iodide test
12.	Polyuronoids	-	-	-	Haemotoxylin test

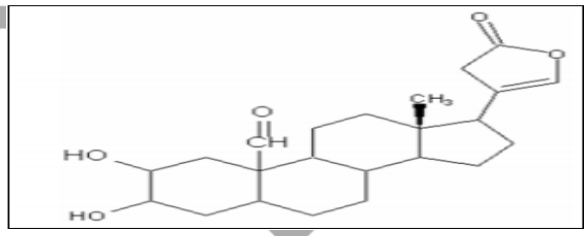


Figure II. CALOTROPOGININ

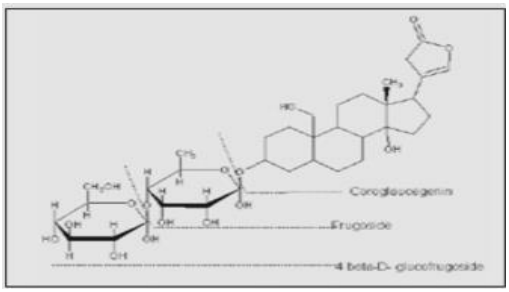


Figure III (a) Coroglaucegenin (b) Frugoside (c) 4beta-D-glucofrugoside

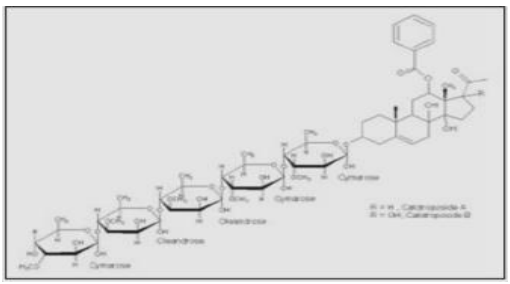
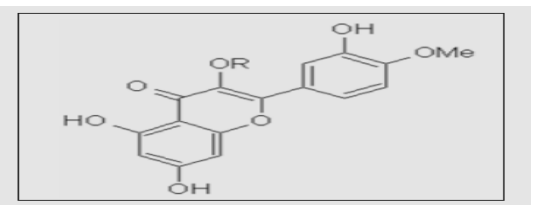


Figure IV (a) Clotroposide A (b) Calotroposide

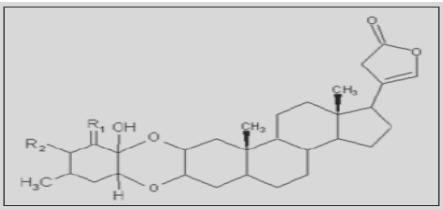
Root parts also contain cardiac glycosides, seven oxypregnane-oligoglycosides, calotroposides A-G. Latex: akundarin, 0.45% uscharin, 0.15% calactin, 0.15% calotoxin also consists α βcalotropeol, β-amyrin. Latex also consists of glutathione and proteoclstic enzyme. [43] In 1980, Pal and Sinha had isolated, crystallized and studied the properties of Calotropins D1 and D2 from *C.gigantea*.

The new oxypregnane-oligoglycosides named Calotropis A and B have been isolated from the root of *C. gigantea*n (Havagiray R, United State Department of Agriculture).



Structure No.	Nomenclature	R
11	Isorhamnetin -3-O-rutinoside	Glu-ORha O Gal
12	Isorhamnetin 3-O-glucoside	Glucose
13	Isorhamnetin rhamnoglucoside	Glucose-O-Rhamnose

Figure 4



Structure No.	Nomenclature	R_1	R_2
2	Calotropin	α- OH, β- H	H
3	Uscharin	S- CH_2 N-CH_3	H
4	Calotoxin	γ-H, γ-OH	H
5	Calactin	α- H, β- OH	H

Figure V

Table A: Represents the active constituents in the plant *Calytropis gigantea*.[44]

Table 1: Phytochemical Analysis of *Calotropis gigantea* extracts from Root.

S.N	Constituents	Soxhlet Extractions of Root Samples to *C. gigantea*				
		n-Hexane Extract	Benzene Extract	Acetone Extract	Ethanolic Extract	Aqueous Extract
1	Alkaloids	–	+2	+3	+4	+5
2	Glycosides	–	+	+5	–	+5
3	Tannins	–	–	+	+2	+2
4	Saponins,	+	+2	+5	+5	+3
5	Flavonoids	–	+	–	+3	+3
6	Terpenoids	–	–	–	–	–

[(+) means present, (+2 or +3) means Prominent, (+5) means highly prominent and (-) means absent]

Table 2 Phytochemical Analysis of *Calotropis gigantea* extracts from Latex.

S.N	Constituents	Soxhlet Extractions of Latex Samples to *C. gigantea*				
		n-Hexane Extract	Benzene Extract	Acetone Extract	Ethanolic Extract	Aqueous Extract
1	Alkaloids	–	–	+2	+	–
2	Glycosides	–	–	+3	+	–
3	Tannins	–	–	+4	+3	–
4	Saponins,	+	+3	+5	+2	+3
5	Flavonoids	–	–	+5	+3	–
6	Terpenoids	–	–	+3	+2	–

[(+) means present, (+2 or +3) means Prominent, (+5) means highly prominent and (-) means absent]

The chemical and spectral studies identified as C-6, C-24 diepimer of stigmast-4en-6β-ol-3-one. [40] *Calotropis gigantea* contain proceragenin an antibacterial cardenolides. (Akhtar, N. & Malik, A.)[45] Leaves of *Calotropis gigantea Calotropis gigantea* leaves contained principally calotropagenin (C), calactin (D), calotoxin, calotropin, taraxasteryl acetate, β-sitosterol (E), α-amyrins (F), and β amyrins (G). Leaves also contain organic carbonate and stigmasterol (H)[46] The chemical screening of its latex revealed that this plant contain cardinolides such as calotropin, calotoxin, uscharin, uscharidin, voruscharin.[33] Root also contain n-Dotriacont-6-ene, glyceryl mono-oleolyl-2-phosphate, methyl myrisate, methyl behenate, glceryl-1, 2- dieapriate-3-phosphate.

TRADITIONAL USES

Whole plant was used to treat common diseases such as fever, rheumatism, indigestion, cold, and eczema, diarrhoea, for the treatment of boils and for the treatment of jaundice. The root was used for the treatment of eczema, leprosy, elephantiasis, asthma, cough, rheumatism and diarrhoea. In case of diarrhoea it changed the faecal matter into a semisolid mass within the first day of treatment. The stem was used for the treatment of skin diseases, intestinal worms, and leprosy and cure leucoderma. [47, 48]

PHARMACOLOGICAL ACTIONS AND THERAPEUTIC USES IN UNANI SYSTEM OF MEDICINE

In Unani literature the root of *Calytropis gigantea* has been described to possess numerous pharmacological actions viz. Qabiz (Astringent),[49] Muqawwi (Tonic), Qate wa Mukhrije Balgham (Expectorant), Moarrique (Diaphoretic), Qatile deedan (Anthelmintic),[50] Muhallil (Anti inflammatory), Musakkin (Sedative), Mundamile qurooh (wound healer), Tiryaq (anti dote) and Hazim (Digestive). On the basis of these actions milk weed is used therapeutically in a variety of ailments. Najmul Ghani (1902 AD) has reported that root bark is very effective in treatment of diarrhoea, dysentery, cholera and epileptic attack. Decoction of root bark is used in the treatment of amenorrhoea, to relieve toothache, in treatment of fever. Root bark and Kanji is used in treating elephantiasis.[51] Flowers are digestive, anti flatulence and work as appetizer. Flower buds are effective in asthma, with black pepper and rock salt useful in digestive disturbances and stomach ache. Leaves after crushing when applied externally cleanse wound and stop recurrence.[51, 52] Leaves along with the milk and Daru Hald (Berberis aristata) are used to treat fistula in ano. If leaves are burnt with salt in closed container and the ash which obtained after incineration is useful in ascites and splenomegaly. Leaves are effective for decreasing inflammation, relieving pain when tied externally on joints. [52] The various part of the plant are used as an ingredient in many of Unani formulations such as Johar Madar, Habbe Madar, Roghane Madar, Sufoofe Madar, Habbe Gule Akh etc.[53]

ETHNOPHARMACOLOGICAL REPORTS

All parts of the plant are used in the treatment of bronchitis and asthma. Milky juice is used as purgative (gastrointestinal irritant). [54]Roots are used in the management of lupus, tuberculosis leprosy and syphilitic ulceration. [54] Leaf-juice is used to relieve external swellings. In Java, roots are used to treat scabies.[3] Preparation of roots and leaves in the form of powders, balms, enemas and ghee or clarified butter used to resolve abdominal tumours.[55]Powdered root with milk is used for ear trouble and boils. [55] The root bark and especially the inspissated juice are used as powerful alterative and purgatives. [56]. The root bark is used in treatment of certain cutaneous affections, such as leprosy and secondary syphilis and to treat the elephantiasis.[57] It is also useful in scorpion bite, [58] in treatment of earache, body ache, mumps, headache, joints pain, swellings, tooth decay, ring worm and cuts. It is also used to expel worms in infants. [59]. Powdered root bark gives relief in diarrhoea and dysentery.[54, 60]It is very effective in cough.[61].They were also supposed to be popular with the Hawaii queen Liliuokalani, who considered them as symbol of royalty and wore them strung into leis (garland).

VII. PHARMACOLOGY ACTIVITIES

Antioxidant:

Antioxidant play important role by prevent the formation of reactive oxygen species by reducing hydro peroxides and scavenging free radicals. Antioxidant activity may be due to compound such as flavonoids, iso-flavones, flavones, vitamin C, and E and beta carotene. In phenolic antioxidant activity due to their redox potential which allow them to act as hydrogen donors, singlet oxygen quenchers, and metal chelators. Methanol extract of *Calytropis gigantea* was found to possess highest antioxidant potential in comparison to other extracts. Methanol extract of *C. gigantea* showed the maximum antibacterial activity against the tested bacterial strains. FTIR analysis of plants extracts indicates the presence of phenolic compounds, alkanes, carboxylic acids, aldehydes, aliphatic and aromatic amines, allene, sulfoxides, phenyl ester nitrocompounds and imines. GC-MS analysis of C. procera aqueous extract showed the presence of R-limonene, mannosamine, tridecane, 1-bromo-, 2-propenoic acid, tridecyl ester, pentatriacontane and 1-hexacosene as major phytochemicals. *C. gigantea* methanol extract indicated the presence of hentriacontane, eicosane, 3,3-dimethylnonadecane, pentacosane, 1-hexacosene, pentatriacontane and clocortolone as major phytochemicals(Elakkiya LP and Prasanna G.).[62] The different fractions of methanolic extract of leaf of *Calotropis gigantea* was tested for antioxidant activity using 1,1-Diphenyl-2-picryl hydrazyl radicals by Yogi et al (2011). The extracts of *Calotropis gigantea* exhibited that fraction F3 of chromatographic elutes of methanolic extract having IC50 82 ± 5.23 mg/ml showed potent antioxidant activity comparable to standard ascorbic acid (IC50 69.13 ± 4.08mg/ml).This study suggests that leaves of *Calotropis gigantea* have bioactive compounds for a new antioxidant drug development greater capacity to scavenge DPPH radicals whereas leaf extract showed moderate free radical scavenging activity. (Roy, S., Kumar, V.L. & Sehgal, R.),(Murti Y, Yogi B, Pathak D.)[63,64]

Antibacterial activity:

Calytropis gigantea is an ordinary wasteland weed and identified for different medicinal properties. The aspire of the present study was to screen leaves of *Calytropis gigantea* for the antimicrobial activity beside clinical isolates of bacteria. Anti-Candida activity of the *C. gigantea* leave extracts was reported against clinical isolates of *C. albicans, C. tropicalis, C. krusei and C. parapsilosis.* Aqueous extract of *Calytropis gigantea* showed high inhibitory activity followed by methanol extract, where as ethanol and petroleum ether extracts showed low activity.[65] The aqueous extract of the *C. gigantea* was studied for its antagonistic action against *Staphylococcus aureus, Escherichia coli, Bacillus cereus, Pseudomonas aeruginosa, Micrococcus luteus and Klebsiella pneumoniae*. In vitro antimicrobial action was performed by well diffusion method [66] The extract showed considerable effect on the tested organisms. The extract showed maximum zone of inhibition beside *E. coli*(Gaurav Kumar et al. 2010)

Antimicrobial activity:

Antimicrobial activity of different solvent extract of *Calytropis gigantea* showed that the aqueous, ethanolic and acetonic extracts of Root of *C. gigantea* impart sufficient inhibitory actions against the test microbe ranging from 10 mm to 16 mm diameter inhibitory zones. And out of the hexane and benzene extracts only limited inhibition was observe in benzene extract against the *E. coli* only. The ethanolic and aqueous extracts of latex of *C. gigantea* impart sufficient inhibitory actions against the test microbe ranging from 10 mm to 18 mm diameter inhibitory zones. The aqueous extract of latex has maximum zone of inhibition against the *Staphylococcus aureus* the common Gram positive pathogenic microorganism and this is the maximum inhibitory potential out of the all extracts viz. root and latex. But the acetonic, hexane and benzene extracts of latex has no inhibition against any organism.[67]

Anti-inflammatory activity:

The anti-inflammatory property of the *Calytropis gigantea* was studied on carrageenin and formalin induced rat paw edema model by Kumar et al (1994). A single dose of the aqueous suspension of the dried latex was effective to a significant level against the acute inflammatory response.(Kumar, V.L. & Basu, N.)[68, 69]

Analgesic activity:

Analgesic activity of dry latex (DL) of *Calytropis gigantea* was evaluated by Kumar et al (2000). A single oral dose of DL ranging from 165 to 830 mg/kg produced a significant dose dependent analgesic effect against acetic acid induced writhing. (Kumar, V.L. & Basu, N.)[70] The hydroalcoholic (50:50) extract of the aerial part of Calotropis gigantea was studied for its analgesic properties. Analgesic activity was evaluated by using Hot-plate test in mice, Tail-flick latent period in rats and Acetic acid-induced writhing response in mice. Hydroalcoholic extract of Calotropis gigantea produced a significant increase in the latency to response of mice to hot plate thermal stimulation dose dependently.[71]

Insecticidal activity:
The residual film toxicity, fumigant toxicity and repellent effect of methanol extract of root bark of *Calytropis gigantea* and its chloroform and petroleum ether soluble fractions were evaluated against several stages of larvae and adult of Tribolium castaneum. In residual film toxicity, methanol extract and its chloroform and petroleum ether fractions showed insecticidal activity. Methanol extract showed lowest LD50 values against several inster of larvae and adult which indicates highest toxicity or insecticidal activity. The order of toxicity on T. castaneum was methanol extract>petroleum ether fraction>chloroform fraction. No fumigant toxicity of test samples was found. In the treated filter paper repellency test, methanol extracts and also its chloroform and petroleum ether soluble fractions were repellent to Tribolium castaneum in mild to moderate range. (Alam MA, Habib MR, Nikkon F, Khalequzzaman M, Karim MR)[72]

Antifungal property:
The presence of pharmacologically active phytochemicals in the ethanolic extract of *C. gigantea* may provide a justification for the observed antifungal activity against dermatophytic fungi, i.e. *Candida albicans*, *Tricophyton rubrum*, *T. mentagrophytes*. Phytochemical constituents such as flavonoids, alkaloids, tannins and other aromatic compounds are secondary metabolites of plants that serve as defence mechanisms against predation by many microorganisms, insects and herbivores. (Khan A, Ahmad A, Manzoor N, Khan LA),(Pfaller MA, Diekema DJ)[73, 74.]

Wound healing activity:
Calytropis gigantea latex showed wound healing activity in albino rats using excision and incision wound models. Latex treated animal exhibited 83.42% reduction in wound area when compared to controls which was 76.22%. The framycetin sulphate cream 1% w/w was used as standard. The extract treated wounds were found to epithelize faster as compared to controls. Significant ($p<0.001$) increase in granuloma breaking strength was observed.(Nalwaya N, Pokharna G, Deb L, Jain NK) [75]
In another study in streptozotocin sit was discovered that *Calytropis gigantea* promotes diabetic wound healing by stimulating collagen synthesis and enhancing histological processes central to normal wound healing.[76]
it was concluded that *Calytropis gigantea* accelerated wound healing in rats and thus chains its traditional use (Deshmukh PT, et al. 2009).[77] In the homeopathic system of medicine, it is reported to be useful in the elephantiasis, lupus and chronic rheumatism. The ethanolic (50%) extract of root exhibited anti cancer activity (Jagtab V.A).[78]The plant was also mention in Ayurveda and Unani for the management of asthma and for a lot of other diseases. The inheritance of the utilization of plant as the source of medicine plays an essential component of the health care system in India. (Bent S, 2004).[79]

Other uses includes
Asthma, Abortifacient, Analgesic And Antinociceptive Activity, Antifertility And Emmenagogue,[80]
Anti-Inflammatory Activity, Anthelmintic Activity,[81] Anti Cancer Activity, Anti Dote For Scorpion Stings And Insect Bites, Anti Tumor Activity,[82] Anti-Diarrheal And Anti Dyssentry Activities, Antimicrobial Activity,[83] Antiviral Activity, Anxiety And Pain CNS Activity,[84] Cold, Expectorant, Cytostatic Activity,[85] Cytotoxic Activity,[86] Dyspepsia, Eczema,[87] Elephantiasis (Of The Legs And Scrotum),[88] Epilepsy, Expectorant,[89] Fever, Fibrinolytic Activities,[90] Free Radical Scavenging Activity, Healing The Ulcers And Blotches, (Goat) Motility Of Mature Haemonchus Contortus Of Goat Origin, Indigestion, Kesarayer Disease, Leprosy, Liver Injuries As Well As On Oxidative Stress, Hepatoprotective,[91] Mental Disorders, Molluscicidal Activity, Whole Plant, Migrine, Nasal Ulcer,[92] Laxative, Rheumatoid Arthritis,[93] Bronchial Asthma, Diabetes Mellitus, Nervous Disorders, Piles, Pregnancy Interceptive Activity, Purgative, Removing Anemia, Rheumatism, Ringworm Of The Scalp[94], Secondary Syphilis, Gonorrhea, Ascites, Helminthiasis, And Jaundice,[95] Skin Diseases, Spleen Disorder, Swelling And Inflammation In Sprain TB And Leprosy, Uterus Stimulant, Vermicidal Activity(Vertenery), Camel Diseases Treatment, Worms, Wounds And Ulcers, Arrow Poison, Latex, Biocidal Activity Latex, Biogas And Substitute For Petroleum Products, [96]Whole Plan, Brewing And To Curdle Milk The Bark And Latex, Cleansing Water Leaves And Its Saps, Energy Plantation,[97] Whole Plan, Fibers Bark, And The Silky Hairs From Its Seeds, Fodder Young Pods, Senescing Leaves And Flowers, Fungicidal, Insecticidal Properties, Pest Repellent Twigs And Leaves, Etc.[100]

SIDE EFFECT OF *C. GIGANTEA*
Toxicity if taken orally a therapeutic large dose causes nausea, vomiting and diarrhoea. Prolonged higher doses cause headache, burning micturition.[54] diarrhea. (Jagtab V.A, United State Department of Agriculture).
And weakens the intestine.[101]in pregnant women it may lead to abortion, injurious to liver and lungs.[102, 103]

Conclusion:
The inheritance of the utilization of plant as the source of medicine plays an essential component of the health care system in India and thus the heritage must be given a proper exposure wherever possible. The *Calytropis gigantea* has a long history as a medicinal plant with diverse therapeutic uses. It has been traditionally claimed for a large number of pharmacological actions, Ayurvedic uses, documented for medicinal uses in ayurveda and Unani. Scientific studies conducted have verified many of the traditional uses of this plant. The various properties desired are available in the natural forms. The present review highlights on the future of calytropis in various cosmetic formulations. The phytochemistry of *Calytropis gigantea* has been investigated revealing that it contains alkaloids, glycosides, terpenes, terpenoids, benzoids, tannins, phenols, etc. Which gives various properties such as antioxidant, antibacterial, antifungal, analgesic, etc? With proper toxicological studies and research work it could be used in various cosmetic preparation especially in foot preparation and other cosmoceuticals preparations like foot sprays, pain relievers, foot creams, antifungal creams etc. And further in these bioactive complex phytochemicals can be used for the development of various agents

that can be used for various purposes for human welfare upon further extensive & systematic studies its properties can be given more exposure using them various innovative herbal and natural cosmetics formulations.

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