IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Systematic Review On *Calotropis Procera* (Aiton) Dryand: Chemistry And Pharmacology

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Abstract:

The Asclepiadaceae family includes *Calotropis Procera*, (Aiton) R.Br., a plant which grows wild. Native of Indo-China, North Africa, and Southern Asia, *Calotropis Procera* serves as a blooming plant. Due to the latex material the plant produces, they are frequently referred to as milkweeds. In various parts of the world, species of *Calotropis Procera* are considered as common weeds. In every Indian home, the plant is a vital component of traditional herbal treatments. This plant contains variety of biologically active chemical elements in different portions of the plant, such as tannins, sugars, alkaloids, saponins, flavonoids, phenols, cardenolides, and steroids. Anti-inflammatory, analgesics antidote, antibacterial, anthelmintic, antipyretic, cancer prevention, antiangiogenic, gastroprotective, kidney protective, liver-protective, antioxidant, antidiarrheal, improved healing of wounds, anticonvulsant, anti-diabetic, immune function, smooth muscle relaxant, etc. are just a few of the numerous pharmacological effects it exhibited. The primary aim of this overview is to furnish preliminary data regarding the chemical constitution and pharmacological properties of species *Calotropis Procera*.

Key words: *Calotropis Procera*, pharmacology, chemical constituents.

Introduction:

Herb: Herbs are tiny plants with tiny roots and delicate, silky, green stalks.

E.g. Rice, coriander, grass.

Herbal formulation: "A herbal formulation is a form of dosage that contains one or more herbs, or processed herb(s), in an amount specified to offer particular nutritional, cosmetic, and/or other benefits intended for use in diagnosing, treating, mitigating, or curing human or animal disease, as well as changing the physiology or structure of the affected person or animal".

A variety of herbal preparations are available, including tincture forms, the extracts, expressed beverages, essential oils and processed exudates.

- **Classification of Herbal Formulations:**

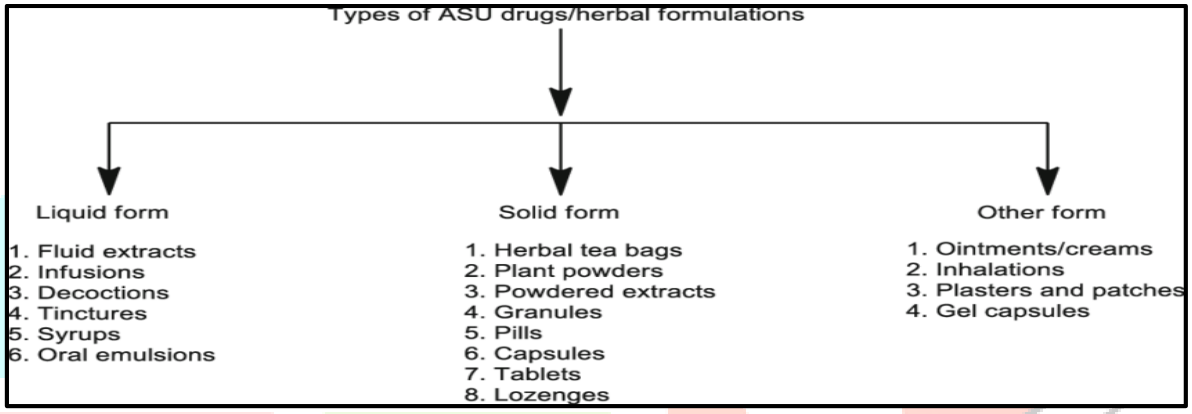
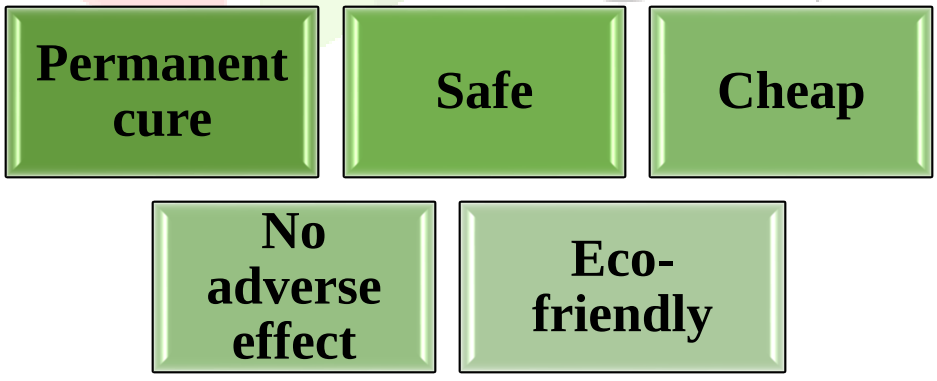


Fig. No. 1: Classification of Herbal Formulations

- **Ideal properties of Herbal formulations:**



***Calotropis procera*:**

Southern Asia, northwestern Africa, and Indo-China are the native habitats of the flowering plant species *Calotropis procera*, which belongs to the Apocynaceae family.

Due to the latex that the plant produces, they are frequently referred to as milkweeds. In several regions of the world, species of *Calotropis* are regarded as common weeds. Some civilizations in mainland

Southeast Asia use the aromatic blooms to make floral tassels, or bunches of flowers. These plants' fibers are referred to as madar or mader. Most *Calotropis* species are found in abandoned agricultural land [1].

Taxonomical Classification:

Kingdom:	• Plantae – plantes, Planta, Vegetal, plants
Subkingdom:	• Viridiplantae – green plants
Division:	• Tracheophyta – vascular plants, tracheophytes
Subdivision:	• Spermatophytina – spermatophytes, seed plants,
Class:	• Magnoliopsida
Order:	• Gentianales
Family:	• Apocynaceae – dogbane, apocyns
Genus:	• Calotropis R. Br.
Species:	• Calotropis procera (Aiton) W.T. Aiton

Fig. No. 2: ***Calotropis Procera (Aiton) Dryand***

Phytochemical Constituents: -

Numerous different types of chemicals, including alkaloid compounds, the triterpenoids, resins, enzymes that break down proteins, steroid, sterols, saponins, tannins, cardiac glycosides, and terpenes, etc., have been identified through the phytochemical investigations of *Calotropis procera*. Plant components can determine how phytochemicals are dispersed [2].

Table No. 1: Phytochemical Constituents of *Calotropis Procera*

Parts of plant	Phytochemical constituents
Flowers	1) calotropin (protease) 2) 3-proteinase, calotoxin 3) queretin-3-ratinoside 4) calactin 5) glucosamine 6) D-arabinose 7) L-rhamnose 8) A-calotropeol 9) 3-epimoretenol 10) Uscharidin 11) Uzarigenin 12) Voruscharin
Leaves	1) ß-sitosterol 2) cardenolides 3) a-amyrin, a-amyrin acetate 4) urosolic acid 5) calotropin 6) calotropagenin.
Bark	1) Quercetin-3-rutinoside 2) norditerpenyl esters 3) pentacyclic triterpenoids 4) calorotropterpenyl ester
Latex	1) calotropin 2) calotoxin (0.15%) 3) calactin (0.15%) 4) uscharin (0.45%) 5) trypsin

Flowers: -

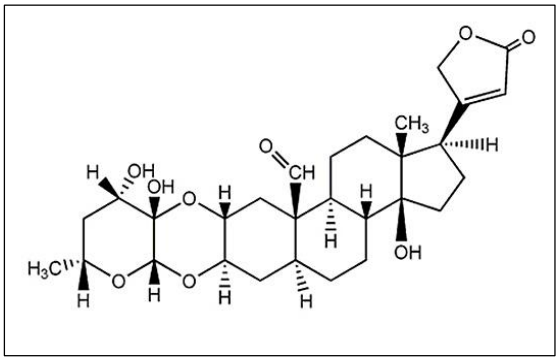


Fig. No. 3: Calactin

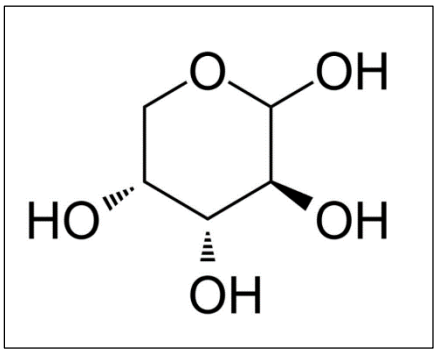


Fig. No. 4: D-arabinose

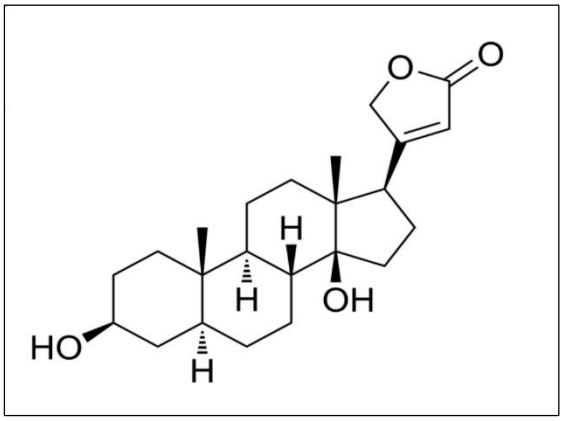


Fig. No. 5: Uzarigenin

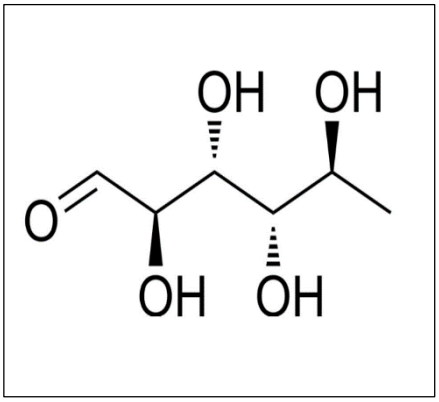


Fig. No. 6: L-rhamnose

Leaves: -

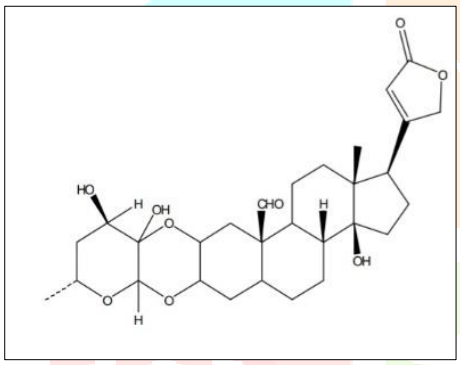


Fig. No. 7: Calotropin

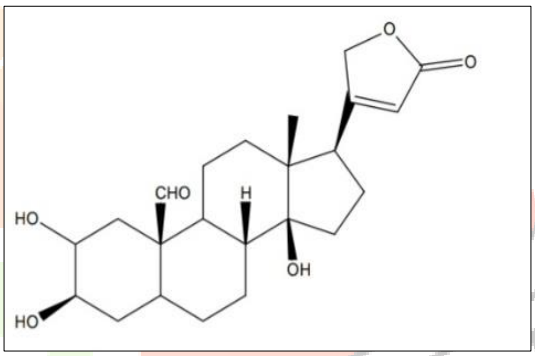


Fig. No. 8: Calotropagenin

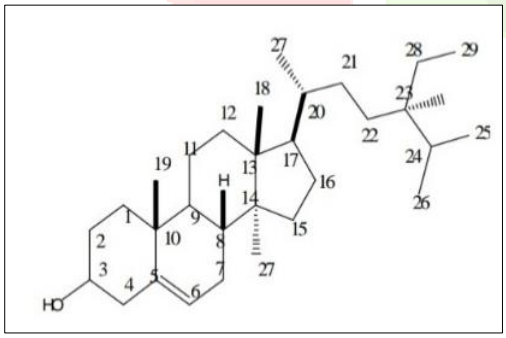


Fig. No. 9: ß-sitosterol

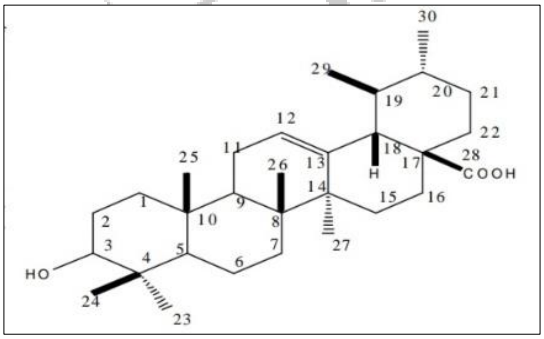


Fig. No. 10: Urosolic

Bark: -

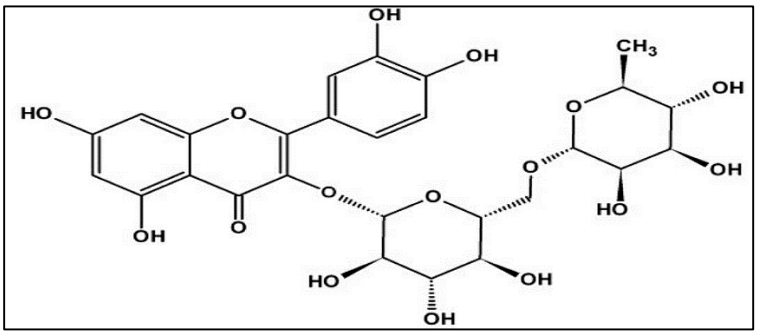


Fig. No. 11: Quercetin-3-rutinoside

Latex: -

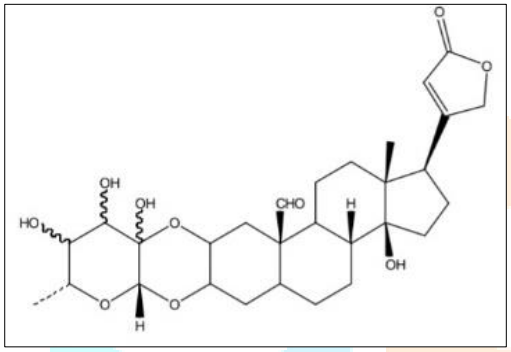


Fig. No. 12: Calotoxin

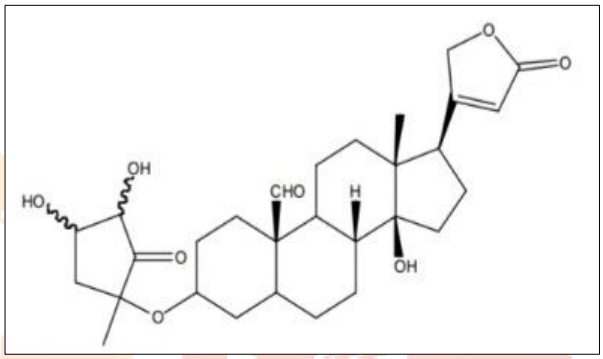


Fig. No. 13: Calactin

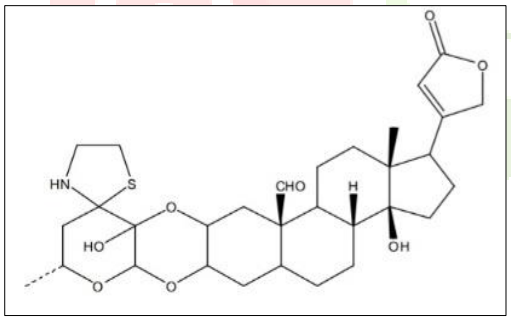


Fig. No. 14: Voruscharine

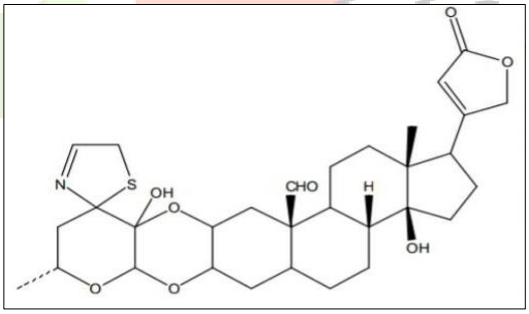


Fig. No. 15: Uscharin

Pharmacological profile of *Calotropis procera*: -

Calotropis Procera, as previously mentioned, is a tiny shrub or plant with a variety of pharmaceutical uses. The pharmacological properties of *Calotropis procera* include analgesic, anti-inflammatory, antitumor, anthelmintic, antioxidant, hepatoprotective, antidiarrheal, anticonvulsant, and antimicrobial properties. Additionally, the plant is used in toxicological studies, antinociceptive, antimalarial, and oestrogenic functions [3].

1. **Anthelmintic Activity:**

   Adult earthworms were used to test the anthelmintic activity of *Calotropis procera's* crude latex. Dried latex extracts, both fresh and aqueous, showed dose-dependent inhibitions of spontaneously movement (paralyzing) and elicited reactions to pin prick. At greater concentrations (100 mg/ml of dry latex aqueous extract and 100% fresh latex), the results were similar to those of 3% piperazine. However, in contrast to piperazine, which caused the paralysis to be reversible and the worms to fully recover within six hours, latex-treated worms did not show any final recovery. The findings indicate that latex has wormicidal activity and could be helpful as an anthelmintic [4].

2. **Anti-inflammatory Activity:**

   Rat paw oedema models generated with formalin and carrageenin were used to examine the anti-inflammatory properties regarding *Calotropis procera's* latex. Dried latex's aqueous suspension was very beneficial with just one dose in contrast to the initial inflammatory reaction [5].

3. **Anti- diarrhoeal Activity:**

   The anti-diarrheal activity of dried crude latex from *C. procera* an active inflammation reducing substance, have been studied. Only one oral dosage of Latex (500 milligram per kilogram), similar the drug atropine or phenylbutazone (PBZ), resulted in a considerable reducing the frequencies or severeness of diarrhoea, and protected 80 percentage of rat administered castor oil against diarrhoea. We also assessed its impact on intestinal transit, castor oil-induce colonic fluid aggregation (enterpoling), or total electrolytes in intestinal fluid in order to comprehend the mechanism behind its anti-diarrhoeal effects. Colonic transit decreased (27–37%) in DL animals referred to standard and castor oil-induced animals. In contrast to Benzeneacetic acid, DL dramatically reduced enterpooling that was caused by castor oil. When compared to rats given with castor oil, it did not, however, change the concentration of electrolytes in the intestinal fluid [6].

4. **Amidolytic Activity:**

   Dried latex of *C. procera*, stable form containing cysteine protease (procerain) is homogenously isolated. Procerain with extremely persistent cysteine protease activity and amidolytic activity. The ideal range for azoalbumin hydrolysis by these enzymes is pH 7-9 with temperature 55–60°C. Casein, azoalbumin, and azocasein were naturally denatured by high specific activity by the enzyme hydrolyses [7].

5. **Antinociceptive Effect:**

Using various experimental models of nociception, the antinociceptive effect of these proteins was investigated in mice using *Calotropis procera* latex. Male mice were given various doses of latex protein intraperitoneally, and the mice demonstrated an antinociceptive activity in a dosage-dependent mode when compare with controls within total assessment. This led to conclusion that the protein originated via *calotropis procera* latex, with antinociceptive activity [8].

6. **Analgesic Effect:**

To assess *calotropis procera* latex's analgesic properties the Dried latex administered orally once had a strong, dosage dependent analgesic activity against writings caused by ethanoic acid. Impact regarding aspirin was less noticeable than that of dry latex. In mice, the oral dosage of latex had no harmful effects [9].

7. **Anti-ulcerative colitis Activity:**

Several extraction techniques, including total alcoholic extract and polar and non-polar extracts of the *C. procera's* plant, was used to assess the anti-ulcerative colitis activity. used dose-dependent colitis to study possible effects for anti-ulcerative colitis for five days straight following acetic acid-induced colitis within rats. Because dosage of 200 milligram per kilogram of polar extracts provides 63.8% and 400 mg/kg creates 78.4% protection, respectively, compared to a typical dose of 54.9% protection produced by prednisolone, polar extracts were more effective than the medicine. Total alcoholic extract is secure in dose up to 4000 milligram per kilogram with nor any negative adverse effect [10].

8. **Antibacterial Effect:**

Customers want natural antibacterial agents that prevent the growth of bacteria. These agents were created by extracting the flowers of *C. Procera* and using ethyl acetate, hexane, butanol, and aqua in an agar well diffusion approach against a variety of pathogens. *Salmonella typhi*, *Micrococcus luteus, methicillin-resistant S. aureus*, and *E. coli* are pathogenic organisms used in this investigation. Growth inhibition against every pathogen under study was demonstrated by the percentage soluble in hexane. However, the ethyl acetate-soluble fraction inhibits the growth of *M. Luteus, MRSA*, and *E. Coli*. When it comes to aqua and butanol extract, they exclusively prevent *M. Luteus* from growing. According to the findings of this investigation, *C. promethea* flower extract is utilized as an antibacterial agent against infections [11].

9. **Antioxidant Activity:**

In vitro experiments revealed that the root extract of *Calotropis procera* included flavonoids and phenolics, as well as antioxidant and membrane-protective qualities. The protective effectiveness of the liver's (71%) or kidney (65%) tissues against peroxidative damage was considerably higher

than that of the brain (60%) or kidney (65%). This study showed how well extract of roots of *C. Procera* inhibits oxidative damage brought on by metal and radical ions [12].

10. Antifungal Activity:

Calotropis procera stem extract's antifungal activity against *Trichophyton gypsum* and *Epidermophyton flocosum* was observed using agar diffusion techniques. At 4.0 mg/ml, the extract exhibits activity on both species; the MIC values was 0.5 along with 0.9 milligram per millilitre, and MFC values was 2 along with 4 milligram per millilitre, resp. According to research findings, the stem bark of *Calotropis procera* may be a viable therapy option for species-related tinea [13].

Conclusion

One of the plants that is widely dispersed throughout the world's geographical area is *Calotropis Procera.* The information gathered above about the chemical structure and pharmacological use of *Calotropis procera* worldwide corresponds with what is currently known. The applications of this plant point to its significance for both humans and animals. Because the literature has shown us that plants are forgotten with time, we will continue to preserve their conservation for the different medical uses of that plant. To learn more about its phytochemistry and pharmacological action, numerous scientists have worked on this. There are many phytoconstituents in the plant. Although there are many synthetic chemicals accessible, their usage is restricted because of their negative effects on human health and environmental damage.

In the process of identifying a plant source that yields a safe, effective, and eco-friendly agent, *C. procera* is one that shows promise. The study's findings are consistent with a more comprehensive classification of the plant *Calotropis Procera's* numerous medicinal applications in daily life. Different parts of this plant can be utilized to treat a number of conditions, including pyrexia, edema, joint discomfort, leprosy, diarrhea, jaundice, etc.

This is crucial for the pharmaceutical industry and will open up new avenues for study in the future. Additionally, everyone under study should be made well aware of the benefits of this plant that humans are unaware of in order to take advantage of them for their everyday well-being. In conclusion, research on *Calotropis Procera* indicates that this plant has enormous biological potential, which is why it is important to be aware of these.

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