



REVIEW OF PHARMACOLOGICAL ACTIVITIES OF CHROZOPHORA ROTTLEI

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ABSTRACT

Chrozophora rotteri is a strong plant, which is found in Africa, India, Pakistan, Australia, Myanmar, and Central Asia. *Chrozophora plicata* in Indian vegetations is known as *Chrozophora rotteri*. The plant has a spot with the Euphorbiaceae family. The plant is erect with silvery hairs, stem, and leaf parts are uncovered and bristly. The season for starting to develop is February to August. It appears in the month of February, and flowering is in June and July and it completely disappears in the late August. The plant frequently grows at the edges of the paddy field, plant shows luxuriant growth in moderate level of watering. The plant has an extremely huge number of chemical constituents and different pharmacological properties. The plant contains chemical synthetics like Alkaloids, sugar, glycosides, tannins, steroids, flavonoids, saponins, quercetin 3-o-rutinoside, acacetin 7- orutinoside, and apigenin 7-o-b-d-[6-(3,4- dihydroxybenzoyl)] -glucopyranoside. Leaf and basic pieces of *C. rotteri* were rich in xanthone glycosides and chromone glycoside. Oil dispensed from seeds was rich in lineolate and the whole plant contains tannins. Leaves and root powder is given in the treatment of cold, cough, and wound recuperating. The plant *Chrozophora rotteri* shows antimicrobial, anti-oxidant, antinecrotic, antihelminthic properties.

Keywords: Euphorbiaceae, *Chrozophora rotteri*, Glycosides, anti inflammatory, antimicrobial, antioxidant.

1. INTRODUCTION

Chrozophora rotteri belongs to the Euphorbiaceae family that contains 300 genera and 5000-7500 species, family is addressed by seven genera. The natural action of the *Chrozophora* plants got expanded thoughtfulness regarding finding new lead compounds for the treatment of different ailments¹. It contains monoecious or under bushes. The genus is widespread across Europe, Africa, and Asia. It is an annually grows in common waste lands, erect herb with silvery hairs, occurs naturally throughout India².

In every conventional framework, different natural species are utilized under a similar medication name and this is one of the serious issues experienced. Further these are guaranteed to force's comparative restorative viability and utilized by the doctors as a similar medication thus they are named as disputable medications. To keep away from natural medications, it is critical to really try towards normalization of the plant material to be utilized as medication. In such cases pharmacognostical concentrates on help in recognizing certified plants utilized, by selecting normalization of minutely and phytochemical strategies. The current work was attempted to study the pharmacognostic qualities and physicochemical assessment of aeronautical parts and foundation of *Chrozophora rotteri*. The Plant List incorporates 58 logical plant names of species for the sort genus *Chrozophora*. In this nine are acknowledged species names. The different types of species present with the genus *Chrozophora* such as *Chrozophora brocchiana*, *C. gangetica*, *C. mujunkumi*, *C. oblongifolia*, *C. plicata*, *C. rotteri*, *C. sabulosa*, *C. tinctoria*³.

Chrozophora rotteri is a medicinal plant which is also known as *Chrozophora plicata* var. *rotteri* (Geiseler) or *Croton rotteri* Geiseler. It is commonly known as Suryavarti in Sanskrit. It is an herbal plant contains different pharmacological activities. In Sudan, stem powder is utilized in mending of wounds and treatment of Jaundice in India, In Nepal the leafy foods of the plant utilized in treatment of cold and cough. Leaf powder is utilized in the treatment of Skin like sun burn and sunstroke. Leaves are used to treat Leucoderma. It is utilized in Ayurvedic like Emetic, Cathartic, Purgatives, and Depurative. Concentrate of leaf has hostile to helminthic property against *Pheritima posthuma* (Indian Earth worm) and phytotoxic action on Rice, wheat and mustard. Seeds are utilized as Laxatives and Purgatives. The Extraction of plant with methanol shows the greatest inhibition in Gram positive and Gram negative microbes⁵.

Stems	Wound healing.
Whole plants	Jaundice and to purify blood.
Leaves	Anti-helminthic activity.
Fruits	Cough and Cold.

TAXANOMICAL CLASSIFICATION

Kingdom	Plantae
Clade	Angiosperm, Eudicots, Rosids.
Order	Malpighiales.
Family	Euphorbiaceae.
Subfamily	Acalyphoideae.
Tribe	Chrozophoreae.
Subtribe	Chrozophorinae.
Genus	Chrozophora Neck.
Species	<i>Chrozophora rottleri</i>

PLANT PROFILE

The entire plant is 40 - 60 cm tall. A cross-segment of the root around 6 to 7 mm distance across of thickness shows outside with 6 to 8 minimized layers with springy and rectangular formed cells in a compacted way. Xylem and Vessel component are round in shape, bigger vessels are inwarded and little vessels towards the external district. A cross-segment of the stem around 5 to 6 mm distance across of thickness shows round in diagram with a single layer of epidermis comprising of little cubical cells. Following the epidermis, 8 to 9 layers of collenchymatous cells are organized in the cortex⁵.

The plants are yearly spices, prostrate or climbing; principle stem up to 50 cm long, stellate-pubescent or now and again scabrid. Leaves substitute, 2-5 x 1-4 cm, petiole 1-4 cm long, thickly stellate-pubescent; stipules 2 mm long, straight. Inflorescence 1-5 cm long, leaf-went against.

Male blossoms: pedicels 1 mm long; sepals c. 3 mm long, lanceolate, stellate-pubescent; petals pink, 3 mm long, elliptic-elongated, lepidote without; stamens 15, joined into 4 mm tall section; anthers 1 mm long.

Female blossoms: pedicels c. 5 mm long, stretching out up to 1.5 cm or more in the natural product; sepals 1.5-2 mm long, straight lanceolate, stellate-pubescent; petals minute or missing. Ovary is thickly stellate-pubescent; styles 1-1.5 mm long, bifid nearly from the base, stellate-pubescent without, thickly papillose inside, 3-lobed, stellate-pubescent; seeds 3-3.5 x 2-2.5 mm⁶.



Figure2: leaf and stem part of *Chrozophora rottleri*

PLANT CULTIVATION:

Chrozophora rottleri is a monoecious species with male and female flowers occurring in the same inflorescence. The raceme inflorescence which arises in the leaf axiles of the terminal branches. This raceme bears male flowers above and female flowers below. Both flower sexes open at a time during morning hours and offer pollen and nectar as floral rewards. The female flowers are compatible to pollen from within and between specific plants.

The flies, wasps, and bees are sporadic, do not visit female flowers, and hence are not pollinators and the beetles moves between male and female flowers and effects geitono and xeno-gamous pollination. Of these only beetles were numerous and consistent in their feeding acivity on these flowers. The beetle pollination in *Chrozophora rottleri* which belongs to an advanced family Euphorbiaceae, and interesting reports since it is a characteristic of early angiosperms.

In the present study monoecy associated with beetle pollination in *Chrozophora rottleri* is described and discussed in the light of different reports on beetle pollination. It is a small herb growing in good number in agricultural fields. Flowering phenology, floral arrangements, morphology and structural features of floral parts were carefully examined. The washings of pollinators in aniline blue were made to evaluate their pollen pick-up efficiency. Stigmas collected were stained and examined under microscope for pollen deposition rate and calculated. The plant survives for more than a year flowering although if undisturbed. The male flowers contain 15 stamens arranged in two tiers, the lower tier with 10 and upper with 5. The ovary in female flowers are naked and its maturity is indicated by the partitioning of stigma into three lobes. The ovules in *Chrozophora rottleri* are crassinucellate, bitegmic and hemianatropous. The endosperm is of the Nuclear type. Centripetal wall formation occurs at the heart-shaped stage of the embryo, and ultimately cellular endosperm occupies the entire embryo.

The studies of pollination suggest that this beetle pollination system is characteristic of early angiosperms. In the present study beetle pollination is associated with phylogenetically advanced family, Euphorbiaceae to which *Chrozophora rottleri* belongs. *Chrozophora rottleri* shows negative response to the steroid test indicates useful of the plant for food and fodder. It is evidence from result shows that presence of phenol indicates the medicinal usefulness of these plants⁷.

PHYTOCHEMICAL CONSTITUENTS

The major phytochemicals present in *C. rottleri* include

1. Apigenin 7-o-beta-D-glucopyranoside (Fig.1)
2. 5,7,4'-trihydroxyflavone(apigenin) (Fig.2)
3. 5,7,4'-trihydroxyflavanone(naringenin) (Fig.3)
4. 5,7-dihydroxy 4'-methoxyflavanone (Fig.4)
5. Apigenin 7-o-methylether (Fig.5)

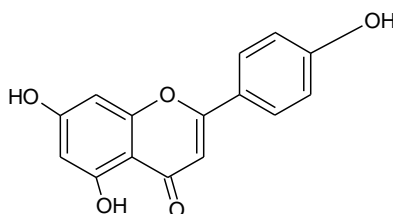


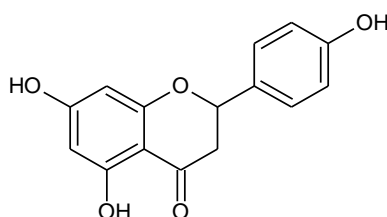
Fig.1: Apigenin 7-o-beta-D-glucopyranoside

molecular formula = $C_{21}H_{20}O_{10}$, pale yellow needles (MeOH), Melting point = 251-253⁰C.

Uses: It exhibits significant anti-proliferative and antioxidant activity, there is a significant anti-proliferative activity against B16F10 melanoma cells after 24 and 48 h of incubation.

CONFIRMATORY TEST

Name of Reagents	Observance
Alkalis	yellow colour
Ferric chloride	olive green
Mg-HCl	magenta red
Alcoholic NaBH ₄ and HCl	Pink
Under UV and UV/NH ₃	Purple to yellow

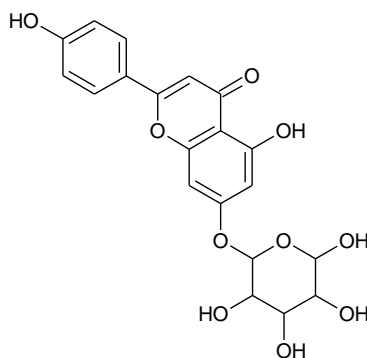
**Fig.2: 5, 7, 4'-trihydroxyflavone (apigenin)**

Molecular formula = C₁₅H₁₀O₅, Melting point = 348- 350°C.

Uses: It is a natural flavonoid, possesses a broad spectrum of biological properties, including anti-oxidative, anti-inflammatory, anticancer, and neuro-protective effects.

CONFIRMATORY TEST

Name of Reagents	Observance
Alkalis	yellow colour
Ferric chloride	olive green
Mg-HCl	deep red
Under UV and UV/NH ₃	Purple

**Fig.3: 5,7,4'-trihydroxyflavanone(naringenin)**

Molecular formula = C₁₅H₁₂O₅, Melting point = 245-248°C.

Uses: It is a naturally occurring flavonoid reported to possess several biological activities, including antioxidant, anti-inflammatory and antitumor activities.

CONFIRMATORY TEST

Name of Reagents	Observance
Alkalis	yellow colour
Ferric chloride	olive green
Mg-HCl	magenta red
Alcoholic NaBH ₄ and HCl	Pink
Under UV and UV/NH ₃	Purple to yellow

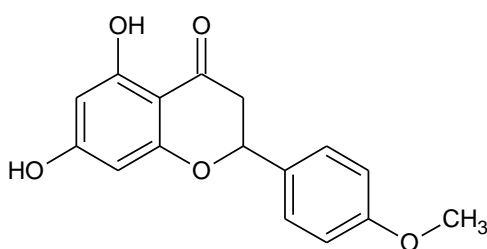


Fig.4: 5,7-dihydroxy 4'-methoxyflavanone

Molecular formula=C₁₆H₁₄O₅, Yellow needles (MeOH), Melting point= 248-250°C.

Uses: Naringenin is an antioxidant flavonoid. It has anti-inflammatory and antitumor properties.

CONFIRMATORY TEST

Name of Reagents	Observance
Alkalis	yellow colour
Ferric chloride	olive green
Mg-HCl	magenta red
Alcoholic NaBH ₄ and HCl	Pink
Under UV and UV/NH ₃	dull violet to yellow

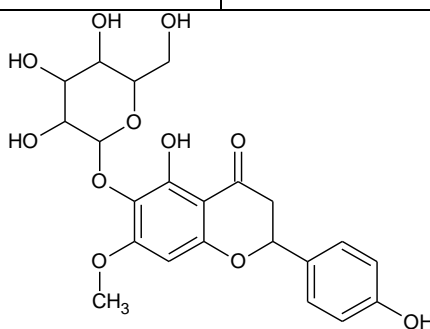


Fig.5: Apigenin 7-o-methylether

Molecular formula = C₁₆H₁₂O₅, Melting point = 324-327°C.

Uses: It is a flavonoid compound with antimutagenic, antiplasmodial, antiperoxidant, anti-inflammatory and anticancer effects.

CONFIRMATORY TEST

Name of Reagents	Observance
Alkalis	yellow colour
Ferric chloride	olive green
Mg-HCl	deep red
Under UV and UV/NH ₃	Purple

These are the compounds having different activities isolated from the *Chrozophora rotleri*⁸.

2. PHARMACOLOGICAL ACTIVITY OF CHROZOPHORA ROTTLERI**ANTI-OXIDANT ACTIVITY:**

Narmadaa T et.al., The repressing limit of *Chrozophora rotleri* when it was assessed it shows IC₅₀ worth of *Chrozophora rotleri* against these free revolutionaries were viewed as a lot higher ($p < 0.001$) than the guidelines utilized, demonstrating that they have less cell reinforcement movement. In view of the information, we reasoned that *Chrozophora rotleri* doesn't show huge cell reinforcement potential under in-vitro conditions. The current review didn't show any proof of in-vitro cell reinforcement movement against normally experienced free revolutionaries in human pathology. The individual phyto-constituents of *Chrozophora rotleri* may show cell reinforcement capacity in higher fixation than the combination of phyto-constituents present in *Chrozophora rotleri*. The phyto-constituents screening will frame a base for the medication disclosure research⁹.

ANTI-INFLAMMATORY ACTIVITY:

Mallikarjuna Rao T et.al., The medication impacts were assessed by separating the maximal paw edema reaction during 6 hrs in the medication as concentrate treated collecting with that of the vehicle saw pack as control. The pack I customary rodents treated with Drug vehicle (1% Sodium CMC) and filled in as would be ordinary control and Group II rodents were treated with Indomethacin 1.3x10⁻⁵ moles/kg.wt. The extra friendly events were treated with the picked plant eliminated at various part levels every one of the dosages was facilitated orally as indicated by the bodyweight of the creatures. To assess this model, the rate augmentation in paw thickness was plotted against the time (Hour) and the maximal paw edema reaction affected during the 6 was not totally settled. The outcomes showed the restriction of the model in isolating that the time course changes in the paw size were associated with carrageenan began rodent paw edema. The paw edema was continually stretched out for 4 h and displayed at the zenith of edema at the fourth hour. At the fifth and sixth hours, the edema was progressively diminished. The rate advancement in paw edema thickness still hanging out thereby utilizing the going with the recipe¹⁰.

ANTI-BACTERIAL ACTIVITY:

Patel J R et.al., The antibacterial movement of leaf concentrate of *C. rotleri*, *Oxalis corniculata*, *Parthenium hysterophorus* and *solanum xanthocarpum* were assessed in-vitro against some clinical disconnects by agar well distribution technique. Two solvents chloroform and methanol were utilized for extraction of mixtures from new leaves. Antimicrobial capability of leaf not entirely set in stone by the estimating of zone of restriction. It was closed from the outcomes that both chloroform and methanol separates have viable in restraining the growth of clinical detaches. Result uncovered that methanol extraction have more antibacterial potential than chloroform remove¹¹.

LARVICIDAL ACTIVITY:

Sumithira S et.al., The larvicidal activity of the crude leaf concentrates of *C. rotleri* with five unique solvents like methanol, Chloroform, benzene, Ethyl acetic acid derivation, and Hexane was tried against the hatchlings of *Culex quinquefasciatus*, *Aedes aegypti* and *Anopheles stephensi*. The larval mortality was seen after 24 h of treatment. Among the five solvents the greatest viability was seen in methanol. The deadly fixation (LC₅₀) upsides of *C. rotleri* against hatchlings of *Culex quinquefasciatus*, *Aedes Aegypti* and *Anopheles stephensi* were 142.90, 133.96, and 122.85 ppm separately. No mortality was seen in controls. The methanol concentrate of *C. rotleri* showed great larvicidal movement against three vector mosquitoes¹².

ANTI-HELMINTIC ACTIVITY:

Patil P et.al., Aqueous extracts of leaves of *Cissus quadrangularis*, *Eclipta alba*, *Chrozophora rotleri* and flowers of *Luffa acutangula* were investigated for anthelmintic property against *Pheritima posthuma* (Indian Earth worm). Different concentrations (25, 50 and 100 mg/ml) of each plants aqueous extracts were studied in a bioassay, which involved the determination of time of paralysis and time of death of the worms. Piperazine citrate (10 mg/ml) was used as a standard reference drug. All the aqueous extracts of the three plants exhibited significantly anthelmintic activity against *Pheritima Posthuma*, but flowers of *Luffa Acutangula* demonstrated the best anthelmintic activity in both the parameters¹³.

ANTI-FUNGAL ACTIVITY:

Shrivastava D K et.al., *Chrozophora rotleri*, *Galingsoga parviflora* and *Phyllanthus niruri* were evaluated in vitro against two phyto-pathogens viz. *Alternaria solani* and *Rhizoctonia solani*. Leaf extracts were prepared in three solvents i.e. Ethenol, Methanol and Hot water. Extracts of *Ageratum*

conozoides and *Chrozophora rottleri*, showed complete (100%) mycellial inhibition of *A. solani* as well as *R. solani* at 10 % concentration which was comparable with respective fungicide at 100 ppm. Extracts prepared in ethanol was most effective in arresting the mycellial growth of the pathogens whereas, superior phytotoxic activity was observed in *Ageratum conozoides* extracts and other four plants' toxicity was found in corresponding manner

chrozophora rottleri > galingsoga parviflora > blumea eriantha > phyllanthus niruri¹⁴.

3. CONCLUSION

According to the world health organization (WHO) about 80% of world population depends on the natural product for their health and minimal side effect. The review of *Chrozophora rottleri* was done by the literatures survey of various research articles, it was found that there has been many activities done on the particular plants such as Antioxidant, Anti-inflammatory and Antibacterial activity, where as the other species of *Chrozophora* have different activities such as Antiproliferative, Antimicrobial, Antinecrotic, Antimalarial etc., It's playing a significant role in anti-oxidant activity. This plant is having edible uses along with it. The further more studies also required with *Chrozophora rottleri* to reveal many activities of this plant, only few activities had done on it.

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