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REVIEW ON PLANT: CHROZOPHORA ROTTLERI

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Abstract:

Chrozophora rottlerin belongs to the family of Euphorbiaceae, which is also termed to as Suryavati. The plant grows wild in central Java, Malesia, Andaman Islands, Thailand, Myanmar, and India. From January to April, C. rottleri, an upright herb with silvery hairs; the stem has a narrow tap root and a naked lower portion. The leaves have three lobes and are rugose, thick, and alternate. The plants are monoecious, bearing flowers in sessile axillary raceme and staminate flowers in the higher position. The presence of alkaloids, tannins, flavonoids, steroids, phenols, saponins, quinines, glycosides, aminoacids, and carbohydrates was identified by the qualitative analysis of secondary metabolites. The results showed that every species (Chrozophora rottleri) examined had a negative reaction to the steroid test, indicating the plants' value as food and fodder. The plant frequently grows at the edges of the paddy field; plant shows luxuriant growth in moderate level of watering. The plant Chrozophora rottlerin shows the various pharmacological activity such as anti-fungal, anthelminthic, anti-inflammatory, anti-bacterial activity.

Key words: *Euphorbiaceae, Glycosides, Flavonoids, larvicidal , ovicidal activity.*

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INTRODUCTION:

Euphorbiaceae is a spurge family which is the vast family of flowering plants that includes about 7,500 species spread across 300 genera. While most spurges are herbs, some are shrubs or trees, particularly in tropical regions. Chrozophora is a large genus which is part of the Euphorbiaceae family. It contains species that have various biological activities, such as C. oblongifolia, which has antimicrobial activity and antioxidant activity, and C. hierosolymitana, which has antifungal and antiyeast activities. C. rottlerin is used traditionally to treat variety of diseases by native medical practitioners and tribes. In Sudan, the whole plant or powdered stems are applied to wounds to promote healing. In Ethiopia, an infusion of the seeds and leaves is consumed as a laxative. The fruits yield a purplish blue dye, which is used to dye mats in Eat Africa.

Succlent and nonsucclent plants, ranging in size from shrubs and herbs to trees and cacti, are categorized under the Euphorbiaceae family. A lot of them have a milky fluid that is quite poisonous, especially to animals with cold blood. Typically, the fruits are three-celled capsules, with one seed within each cell. In certain species, these seeds can provide vesicating, irritating, and poisonous seed oils. (Hawas; 2007) The genera of spurge, or Euphorbia, with over 1600 species, and croton, with roughly 700 species, are largest in the spurge family. Various natural species are used under the same medication name in every traditional frame work, and this is one of the major problems encountered. The major phytochemical of C. rottleri include alkaloids, carbohydrate, glycosides, steroids, tannins, and apigenin 7-o-b-d-[6-(3,4-dihydroxybenzoyl)]. C. rottleri is acrid, poisonous, emetic, catharatic, drastic corrosive and traditionally used for the purpose of treating various type of diseases.

They are reffered to as debatable pharmaceuticals because they are further assured to have comparable restorative viability and are used as medication is crucial if one is used using natural medications. Pharmacognostical approaches, by choosing normalization of minute and phytochemical techniques, focus on aiding in the identification of certified plants used in such circumstances. The goal of the present investigation was to investigate the Pharmacognostic properties and physicochemical evaluation of Chrozophora rottleri's foundation and aeronautical parts. Hydroalcoholic, methanolic, ethyl acetate and hexane extracts of C. rottleri were found to possess concentration dependent scavenging activity on DPPH radical, and superoxide generated by photoreduction of Methanolic, riboflavin extract of C. rottleri showed the maximum inhibition of Gram positive and Gram negative bacteria

Plant Profile:

Synonyms: The Synonyms of Chrozophora rottleri are Chrozophora plicata var. rottleri Geiseler Mull.Arg

Species name (as per the IPNI): Chrozophora rottleri (Geiseler) A. JUSS. ex Spreng.

Vernacular or local names:

→ Chrozophora rottleri has different vernacular names based on different languages in India.

In Sanskrit names such as: Suryavarta. Konkani: Survarli. In Urdu: Chotaki hunkatath. Telugu: Linga mirapa, erra miriyamu, guruguchettu. Names in Kannada: lingamenasu, gurugu. In Tamil it is called as Purapirakkai. In Hindi there are different names such as: Sonballi, subali, dekha chowkdi, gubra, khakaguddi. Marathi: Suryavarti and in Bengali: Khudi ojra.

Botanical source:

(Keerthana P, 2020) Chrozophora rottleri is related to the family Euphorbiaceae which is locally known as Suryavarti (Prema R et al., 2023).

Family: Euphorbiaceae (also called as castor family).

Geographical source:

(Sambhavy et al., 2018) The plant mainly available in the tropics, in which majority of species located in the region of Indo-Malayan and tropical America. A variety of species available in tropical Africa, but not as abundant as these two other tropical regions (Gibbs R D, 1974). Many species of Euphorbia present in non-tropical areas like the Mediterranean Basin (Paul E et al., 2014), the Middle East, Southern USA, South Africa, India (Rev Fr Jean, 1986) and Asia.

Habitat and Ecology:

(Forster Welson P C V, 1999) The plant is locally grown in the areas of wet places, such as waste areas, along and in stream beds, and along roads. The soil suitable for growth is clay (mud), sand. Alt: should be 10-200 m. The flowering and fruiting are at December-September, but perhaps it may be whole year through. It grows in warmer climate and temperate regions (Grin database, 2006).

Taxonomical classification:
(Sambhavy et al., 2018), (Sathish R et al., 2022).

Kingdom	**Plantae**
Clade	Angiosperm, Eudicots, Rosid
Order	Malpighilales
Family	Euphorbiaceae
Sub family	Acalyphoideae
Tribe	Chrozophoreae
Sub tribe	Chrozophorinae
Genus	Chrozophora neck
Species	Chrozophora rottleri

The study of Euphorbiaceae Family:
Another title for them that is commonly used in English is the family Spurge, Euphorbias, which is the name of the type genus of the family. Most spurges are plants, such as Euphorbia paralias, but some are shrubs or trees, especially in the tropics, such as Hevea brasiliensis. Due to convergent evolution, Euphorbia canariensis, is one of the succulent plants that resembles cacti. There is a global distribution within this family. With the exception of Antarctica, all continents in the Euphorbiaceae family include a large number of species that thrive in nontropical climtes; nonetheless, the largest diversity of species is found in the tropics.

Stipules are present on the leaves, when they are compound, they are always palmate and never pinnate. In other situations, stipules in succulent plants can be absent or limited to hairs, glands, or spines. As one could expect from a large family of the size, the flower's structure shows a lot of vaccine.

Botanical description:
(Webster G L, 2014) The plant is 40-60 cm tall. A Cross-section of the root with thickness of 6-7 mm and 6-8 reduced layers with pliable, rectangular-shaped cells that appear crushed from the outside. With bigger vessels pointing outward, the xylem and vascular components are rounded. The diagram shows a single layer of epidermis composed of microscopic cubical cells, as well as a cross-section of the stem that is 5 to 6 mm thick. In the cortex, collenchymatous cells are organised in 8-9 layers following epidermis. The main stem consists of 50 cm length and is pubescent. Petiole; straight, 2 mm long stipules. Leaf-opposed, 1-4 cm long inflorescence.

- Male blooms: Have 1 mm long pedicels, 3 mm long, lanceolate, stellate-pubescent sepals, 3 mm long pink petals, elliptic-elongated, and lepidote-free sepals, 15 stamens connected with a 4 mm tall section and 1 mm long anthers.

- Feminine flowers: The pedicels of the natural product are around 5 mm long and have a maximum extension of 1.5 cm. The petals are either tiny or non-existent of 1.5-2 mm long, straight, lanceolate, and thickly stellate-pubescent ovary.

Chemical constituents:
(Prema R et al., 2023) The oil obtained from the seeds of chrozophora rottleri was reported to be rich in linoleate and the leaves and root include chromone and xanthone glycosides. The entire plant contained the tannins (Madane A N et al., 2013). Alkaloids, carbohydrates, glycosides, tannins, steroids, flavonoids, and saponins (Maharaj S, 2013) were all found in the chloroform extract of C. rottleri, according to another study.

The weed C. rottleri has detrimental allelopathic effects on the germination and growth of rice seedlings, according to Maharaj and Prabhakaran (2013) and Mothana et al., (2011). The coumarin, Scopoletin, the alkaloid ricinine (Abdel-sattar, 1985), flavonoids, xanthones, and chromones are isolated from different species of Chrozophora rottleri.
The major phytochemical constituents of C. rottleri include:

1. Apigenin 7-o-methylether
2. Apigenin 7-o-beta-D-glucopyranoside
3. 5,7-dihydroxy 4\-methoxyflavanone

Qualitative and Quantitative phytochemical screening of Chrozophora rottleri:
(Mallikarjuna Rao T et al.;) The presence of several phytochemical elements, including steroids, terpenoids, flavonoids, alkaloids, glycosides, phenols, tannins, and carbohydrates, was discovered through qualitative phytochemical screening of the C. rottleri extracts. For the oils, quinines, saponins, amino acids, and quinines, the extracts produced negative results.

The C. rottleri extract's quantified phenolic concentrations ranged from 10.41±0.62 to 41.36±0.54(mg/gm). Compared to the other extracts, the methanol extract had a higher phenolic content of 41.36±0.54(mg/gm), while the alkaloid content ranged from 13.4±0.18 to 39.62±0.48(mg/gm). Compared to the other extracts, the methanolic extract had a higher alkaloid concentration (39.62±0.48 mg/gm).

Chemical tests:
(Harbone J B, 1983)
Tests for alkaloids:
These are test performed for presence of alkaloids

- Mayer's test
- Wagner's test

Tests for carbohydrates:
These are few tests performed for carbohydrates

- Molisch's test
- Fehling's test
- Benedict's test

Tests for anthraquinone:

- It is main test performed to know presence of anthraquinone-Glycosides borntrager's test.

Tests for flavonoids:

- Lead acetate test is performed to know presence of flavonoids.

Plant cultivation:
(Reddy C S et al., 1998) Male and female flowers of the monoecious plant Chrozophora rottleri coexist in the same inflorescence. The raceme inflorescence that develops in the terminal branches' leaf axiles. There are female flowers below and male flowers above in this raceme. In the morning, both sexes of the flower open at the same time and reward with nectar and pollen.

Certain plants can pollinate one another and from within when the female flowers are present. Beetles migrate between male and female flowers, causing both xenogamous and geitono pollination, while files, wasps, and bees are sporadic and do not visit female flowers, making them non-pollinators. The only ones that were regular and in large numbers when feasting on these blossoms were the beetles in chrozophora rottleri, a species that related to beetle pollination in Chrozophora rottleri are explained and examined in the context of various

It's a little herb that grows well in fields of crops. Aniline blue washings of pollinators were done to assess how well they were able to collect pollen. The collected stigmas were stained, viewed under a microscope, and the rate of pollen deposition was estimated. The plant can bloom for almost a year without interference, provided it is left alone. In Chrozophora rottleri, the ovules are bitegmic, hemianantropous, and crassinucellate.

The endosperm is classified as nuclear. The heart-shaped stage of the embryo is when the centripetal wall begins to form, and eventually the entire embryo is filled with cellular endosperm. According to this study, beetle pollination is connected to the phylogenetically advanced Euphorbiaceae family, which includes Chrozophora rottleri.

Morphology:
(From eflora of Thailand)

- Leaves, stems, and fruits of Chrozophora species have been used in food and traditional used in food and traditional pharmaceuticals.
- Inflorescence of chrozophora species can be a cyme or a solitary flower.
- Flowers of Chrozophora species can be bisexual or unisexual, bracte-ate, actinomorphic, and usually perigynous.

Preparation of plant extract:
(Narmada T et al.,) The leaves of those plants have been thoroughly cleaned under running water from the tap, then dried for two hours at room temperature and then for eight hours at 60^0c in an oven. The dehydrated plant fabric was ground into a fine powder in a grinder, sealed in an airtight bottle, categorised, and kept in a somewhat dark place.

Maceration:

(Mostafa M E et al.;) By using this procedure, the leaves of the corresponding flowers were extracted. When the pattern's solubility was tested in several solvents, the leaf powder became freely soluble in the ethanol, methanol, and ethyl acetate. 20 grams of dry changed powder being macerated one by one in a test tube containing 250 ml of ethanol, methanol, and ethyl acetate. For the purpose of extraction, the flasks were covered with aluminium foil and left in the dark for 72 hours. After filtering these extracts, the filtrate evaporated and became dry on a heating plate.

Extraction:

The extraction of plant with methanol shows the greatest inhibition in Gram positive and Gram-negative microbes (Dipankar et al., 2011).

Therapeutic Uses:

(Manal et al., 2014) The Chrozophora rottleri is traditionally used for the treatment of various diseases.

- ✓ The fruit juice is given to treat cough and cold in Nepal (khare, 2007).
- ✓ The leaves of Chrozophora rottleri will work as depurative agent and very useful in treatment of various skin diseases.
- ✓ The experimental study done by Suparna and Tapaswi (1999) they reported that, Chrozophora rottleri's leaf extracts exhibit higher inhibition of radial, shoot, root elongation than stem.
- ✓ The leaf is used as purifying agent and seed is used as laxative (Singh et al., 2010).
- ✓ Priyanka et al reported that, the aqueous extract of leaves of the C. rottleri has anti-helminthic property against Pheritima posthuma.
- ✓ C. rottleri seeds are used as cathartic (Manandhar et al., 2000) such as Ghodtapde and consist of purgative properties (Sasinath, 2007).
- ✓ Chrozophora rottleri has been used traditionally for treatment of Pyrexia.
- ✓ The plant extracts consist of anti-bacterial, anti-fungal, anti-inflammatory, anti-oxidant activities

Note: The mean and standard deviation values of the biometric measurements were calculated according to Rummel (1970).

Pharmacological and Therapeutic activities of Chrozophora rottleri:

Antifungal Activity:

According to Shrivastava D K et al., two phytopathogens, Alternaria Solani and Rhizoctonia solani, were investigated in vitro against Chrozophora rottleri, Galings Parviflora, and Phyllanthus niruri. Leaf extracts were made using their distinct solvents: methanol, ethanol, and hot water. At a concentration of 10%, extracts from Ageratum conozoides and Chrozophora rottleri totally (100%) inhibited the mycelial growth of A. solani, which was equivalent to the corresponding fungicide at 100 ppm. The toxicity of the other four species were found to be consistent with Ageratum conozoides' greater phytotoxic activity, while extracts from this plant demonstrated inferior phytotoxic action. The most effective extracts for inhibiting the infections' mycelial growth were those prepared in ethanol. Phyllanthus niruri>Chrozophora rottleri>galingsoga parviflora>blumea eriantha.

Anti-oxidant Activity:

T. Narmada et al. The assessment of Chrozophora rottleri's repressing limit revealed that the IC50 value of the bacterium against these free revolutionaries was significantly greater ($p<0.001$) than the established criteria, indicating a reduced degree of cell reinforcement movement. We concluded that Chrozophora rottleri doesn't have a significant capacity for reinforcement movement against regularly experienced free revolutionaries in human pathology, according to the current review. Compared to the combination of phytoconstituents found in Chrozophora rottleri, the individual phytoconstituents may exhibit a better fixation potential for cell reinforcement. The screening for phytoconstituents will provide a foundation for the research on medication disclosure.

Anthelmintic Activity:

(Patil P et al., 2010) The anthelmintic properties of aqueous extracts of Cissus quadrangularis, Eclipta alba, Chrozophora rottleri, and Luffa acutangular flowers were examined against Pheritima posthuman (Indian Earth worm) by Patil P et al. The period at which the worms were paralyzed and died was measured in a bioassay including varying concentrations (25, 50, and 100 mg/ml) of the aqueous extracts of each plant.10 mg/ml of piperazine citrate was utilized as the typical reference medication. The flowers of Luffa acutangula showed the best anthelmintic activity in both criteria, however, all three plants' aqueous extracts showed significant anthelmintic activity against Pheritima posthuman.

Anti-Bacterial Activity:

(Patel J R et al., 2017) Anti-bacterial inhibition Patel, J. R., et al., The bacterialaction of C. rottleri, oxalis corniculata, Parthenium hysterophorus, and Solanum xanthocarpum leaf concentrate was assessed in-vitro against a variety of clinical disconnects using the agar well distribution method. Two solvents were employed to extract combinations from fresh leaves: methanol and chloroform. The leaf's ability to withstand microbes is not entirely assured by the calculation of the zone of restriction. The findings led to the conclusion that both methanol and chloroform separates are useful in preventing the onset of clinical detached. The outcomes demonstrated that the removal of chloroform has less capacity to combat bacteria than methanol extraction.

Anti-Inflammatory Activity:

Mallikarjuna Rao T. et al., The maximal paw edema reaction that happened over the course of six hours in

the medication-concentrate treated collection was compared to the vehicle-viewed pack as a control to assess the drug's effects. The pack I standard rodents were treated with Drug vehicle as 1% Sodium CMC and filled in and as would be typical control. The additional friendly occurrences, and each dosage was administered orally based on the weight of the critters, it uses different extracted at different components levels to cure. Whereas the group II mice received an indomethacin treatment of 1.3× 10-5 moles/kg.wt. When the rate of rise in paw thickness was plotted against time (Hour) to test this model, the maximal paw edema reaction that was not fully established. The outcomes showed how difficult it was to distinguish between changes in the model, the maximal paw edema reaction that was influenced during the six was not fully established. The rate at which paw edema thickness advances can still be found by using formula.

Larvicidal activity:

Sumithira S et. al., The crude leaf concentrations of C.rottleri were tested for their larvicidal properties against hatchlings of Culex quinquefasciatus, Andes aegypti, and Anopheles stephensi using five different solvents: methanol, chloroform, benzene, ethyl acetic Acid derivatives, and hexane. The mortality of the larvae was observed 24 hours after treatment. Methanol was the solvent with the highest viability out of the five. Against hatchlings of Culex quinquefasciatus, Andes aegypti, and Anopheles stephensi, C.rottleri's lethal fixation (LC50) upsides were 142.90, 133.96, and 122.85 ppm, respectively. The controls showed no mortality against three vector mosquitoes, the C.rottleri methanol concentrations demonstrated strong larvicidal activity.

Ovicidal activity:

Su and Mulla's (1998) significantly modified approach was used to measure ovicidal activity. Cx. Quinquefasciatus, An.stephensi, and Ae. Aegypti egg rafts were gathered from Vector Control Laboratory, Annamalai University, India. Various extracts of leaf were diluted in the suitable solvent in order to reach different concentrations between 50 and 300 ppm. One hundred mosquito eggs from these species were treated to various leaf extract concentrations. Following treatment and a microscope count, each concentration's eggs were moved separately to distilled water containers for hatchling evaluation. Every experiment was carried out six times with a suitable control. The following formula was used to determine the hatch rates 48 hours after treatment.

% egg hatchability= number of hatched larvae×100 number of eggs/egg raft.

Repellent activity:

The world Health Organization's (2009) methodology was used in the repellent study. One hundred female Cx.quinquefasciatus, Ae. Aegypti, and An. Stephensi mosquitoes that were three days old and blood-starved were housed in a 45 cm×30 cm×45 cm net cage. On the day of the assay, the volunteer did not come into touch with lotions, perfumes, or soaps that were scented. The volunteer's arms had rubber gloves covering the remaining portion of their flesh, leaving only 25 cm of the dorsal side visible. Regular doses of crude extract were administered separately to the forearm's exposed region. Ethanol was only the control. The target mosquitoes's ability to bite at night or during the day determines the test timing.

CONCLUSION:

Even though many plants have been investigated for their specific therapeutic qualities, more study has not been done to the point of clinical trails because the majority of studies are without Industrial collaborations and autonomous. The majority of earlier research has not documented the cytotoxicity of either the crude extracts or the purified fraction of the plant extracts, which is one of its drawbacks. Chrozophora plants have been used traditionally to treat mouth ulcers, skin burns, diarrhoea, jaundice, joint pain and swelling, abdominal pain, migraine, menstrual issues, and wounds. Furthermore, scientific proof for the logical use of these plants in food as well as the prevention and treatment of infectious and oxidative stress-related diseases was provided by the screening and research for phytochemical and pharmacological studies of the plants. It discovered that it had been subjected with numerous studies as antibacterial, anti-inflammatory, and antioxidant properties.

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