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## Review on pharmacological and biological properties of *Acalypha fruticosa* Forssk

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### ABSTRACT

In recent times the years of conventional medicine as an alternate source for the ailment of human health and improvement of microbial resistance to the available antibiotics have recently reaffirmed the need for medicinal plants to test the antimicrobial activity. *Acalypha fruticosa* is one such plant that is widely known as “Chinnichedi” and shrub belonging to the Euphorbiaceae family is “Birch leaved Acalypha. The leaves and roots are used for treat skin diseases, wounds, stomach problems and poisonous bites. In view of this the present study was investigated to review the Phytochemistry, Pharmacological activity, medicinal properties and biological properties of *Acalypha fruticosa*.

**Keywords:** Medicinal, Pharmacological, Phytochemistry, *Acalypha fruticosa*

### 1. INTRODUCTION

The herbal medicines are considered to be more accurate and cost effective than any other system of medicinal practice. Furthermore, and preparation of higher plants for the care of infectious and non-infectious diseases is an ancient tradition and the only approach possible in the past. Plants that makeup an active part of the environment have been found to be beneficial human as both food and medication sources (Akpomie et al., 2011). For the preservation of human health, plants have become a reliable source of natural resources. The best source for accessing a number of medicines will be medicinal plants according to the world health organization. Around 80% of individuals from developing countries use traditional medicine, which has medicinal plants derived from compounds (Ellof et al., 1998).

Among the large number of medicinal plants, many species of *Acalypha* are have different phytochemical compounds with medicinal properties (Sofawora, 1982 Duraipandian, et al., 2006; and Mothana et al., 2008). The fourth largest genus of the Euphorbiaceae family is *Acalypha*. Its consists of 450 species, primarily in the tropical regions of Africa, America and Asia, in the form of ever green shrubs, trees and annuals (Seebaluk et al., 2015). In ancient Ayurvedic medicine the plant *Acalypha fruticosa* is known as “Chinnichedi”. Most recently this scientifically reported for several medicinal properties. The leaves are reported to antimicrobial activity, larvicidal and anti-snake venom activity.

The aerial parts of the plants reported to hypoglycaemic activity. The stem part of this species is used by native people to heal wounds in animals and also used to treat toothache and used as fuel wood (Malathi at al., 2019). The healing properties of all aspects of the plants are known to be used in the treatment of dyspepsia, skin complaints, jaundice, cholera, sexually transmitted infections, digestive problems antipyretics and even an antidote (Anandakumar et al., 2009).

Many pharmacological trials have its anti-epileptic, antioxidant, antibacterial, anti-inflammatory, anti-tumor, wound healing and cytotoxic effects. A qualitative phytochemical analysis of this various extracts from the aerial parts of *Acalypha fruticosa* shows the existence of triterpenoids, steroids, saponins, tannins, phenols, flavonoids, alkaloids, anthraquinones and sugar.

The quantitative estimation of these Phyto-constituents revealed that, as opposed to alkaloids, tannins, phenols, steroids and flavonoids were found in high concentration (Gopalakrishan et al., 2010). In view of this purpose, the pharmacological and biological properties of this medicinal plant should be investigated in this plant.

### 1. 1. Systematic classification of the plant:

#### A. Scientific classification

1. Kingdom: Plantae
2. Divison: Angiosperm
3. Class: Dicotyledons
4. Order: Malpighiales
5. Family: Euphorbiaceae
6. Genus: *Acalypha*
7. Species: *fruticosa*

#### B. Common name

1. English: Brich leave acalypha
2. Kannada: Chinco mara
3. Tamil: Seethaathazhai
4. Telungu: Chinnaaku
5. Irula: Seenai chedi
6. Malayalam: Perim-munja

### 1. 2. Morphology and distribution

The plant of *Acalypha fruticosa* is an erect, shrub and woody. its 3.5m in height with yellow resinous glands on the lower surface, erect profusely branched shrubs, leaves 2.5×1.3 cm, ovate, base truncate or sub cordate, margin crenate-serrate, apex acuminate, hairy on both sides, aromatic, glandular below, glands orange, petiole to 3 cm long, spikes shorts, auxiliary, solitary androgynous to 2 cm long, female flowers bellow, sessile bracts reniform, margin denate, ovary to 0.5 mm across, style many, capsules triobed, tip tapering hairy on both sides, bracts-kidney shaped, flowering July-august.

The plant appeared to be present in Southern western Ghats (Gamble, 1958). It also occurs in South Africa, tropical Arabia, Southern India, Sri Lanka and Myanmar.



**Figure 1.** *Acalypha fruticosa* Forssk

### 1. 3. Medicinal properties

The plants root and leaves are used as an expectorant against asthma and pneumonia, as an emetic and anthelmintic. As an antimicrobial activity, various extracts of plant material have been proven. In the treatment of pneumonia, asthma, rheumatism and many other diseases it has been started to be useful (Hiremath et al., 1993).

### 1. 4. Phutochemistru of *Acalypha fruticosa*

**Table 1.** Phytochemical present in *Acalypha fruticosa* (Goplakrishnan et al., 2010)

Extracts					
Sl.No.	Phytochemicals	Petroleum ether	Chloroform	Ethanol	Water
1	Triterpenoids	Negative	Negative	Positive	Positive
2	Steroids	Negative	Negative	Positive	Positive
3	Flavonoids	Negative	Negative	Positive	Positive
4	Phenols	Negative	Negative	Positive	Positive
5	Saponins	Positive	Positive	Positive	Positive

6	Anthraquinones	Negative	Negative	Negative	Positive
7	Alkaloids	Negative	Positive	Positive	Negative
8	Tannins	Negative	Negative	Positive	Positive
9	Sugars	Positive	Positive	Negative	Positive

## 2. ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY

The alcoholic extracts were tested for their effect against the growth of pathogenic bacteria and fungi by disc diffusion method. Invitro studies of antibacterial activity of *A. fruticosa* was examined for the chemical extracts of stem part of this species *A. fruticosa* against *Micrococous* sp., *Lactobacillus* sp., *Bacillus subtilis*, *B. thuringinesis* and gram negative strains *Pseudomonas aeruginosa*, *P. stutzeri*, *E. coli*, *Klebsiella pneumonia*, *Servatia* sp and *Moraxetta* (Thambiraj and Paulsamy, 2011). The presence of antibacterial and antifungal activity in the shade dried extracts acetone, chloroform, aqueous extracts of *A. fruticosa* was obtained tested human pathogenic organism. The extract was tested against bacterial pathogens such as *K. pneumoniae* and *S. pneumonia*. Fungal pathogens such as *Candida albicans* and *Trichophyton rubrum* (Malathi et al., 2019).

## 3. INVITRO PROPAGATION

Invitro propagation of *A. fruticosa* was used to shoot tip, leaf, node and internodes. The explant was inoculated successfully under aseptic conditions and the cultures at  $25 \pm 2$  °C with a relative humidity (65-70%). The explant of *A. fruticosa* was evaluated for efficacy to neutralize various culture of nodal culture, callus culture, regeneration of root and hardening (John et al., 2007).

## 4. ANTIOXIDANT ACTIVITY

For this study, the aerial portion of the antioxidant and anticancer feature of the *Acalypha fruticosa* methanol extracts used for six different fractions were selected. These fractions were reported to have solubilizing ability in many tests for several of the existing secondary metabolites. Shaza Al-Massarani et al., 2019 reported used of MCF-7 (breast carcinoma), HCT-116 (colon carcinoma), HepG-2 (hepatocellular carcinoma) and non- cancerous (MRC-5) cell lines for DPPH radical scavenging activities and cel lines.

## 5. CYTOTOXICITY

The cytotoxicity activity of the sample was calculated by a panel of four human cancer cell lines (SK-MEL, KB, BT-549, SK-OV-3) and two non-cancerous kidney cell lines (LLC-PK1 and VERO) as described (Al-Taweel et al., 2015). The American type culture collection

provided all cell lines (ATCC, Rockville, MD). Before adding the test sample and incubation for another 48 hours, cells at a density of 25000 cells/well were grown to confluence. The vitality of the cells was determined using the neutral red assay, as described by Borenfreund et al., 1990.

## **6. ANTILARVICIDAL ACTIVITY**

A laboratory colony of larvae *C. quinquefasciatus* larvae have been used for larvicidal activity. Twenty fourth-instar larvae were kept in 500 ml glass beaker containing 249 ml of dechlorinated water and the desired concentration of *A. fruticosa* leaf extracts in 1ml of acetone with tween 20 (1%) (Pavunraj et al., 2016). The treated and control larval instars were fed different diets until they pupated. Up until pupation, larval mortality was found. Each treatment was replicated five times with ten larvae per replication (total n = 50). The mortality rate of larvae was determined as a percentage. Abbott WS (1925).

## **7. ANTI-SNAKE VENOM**

Anti-snake venom activity of *Acalypha fruticosa* plant leaves extract was evaluated against *Echis carinatus* snake venom. The venom extracts of Indian scaled viper were dissolved in a phosphate buffer (pH 7.4) and centrifuged for 10 minutes at 3000 rpm and supernatant was used for the experiments. The ethanolic extracts evaluated for this effectiveness to various action of the venom like acute toxicity, liver function and renal function. It is used for biochemical markers like aspartate aminotransferase (AST), alanine aminotransferase (ALT),  $\alpha$ -glutamyl transferase and lactate dehydrogenase (LDH) was evaluated (Malathi et al., 2019).

## **8. ANTIFEEDENT ACTIVITY**

The antifeedant activity of *A. fruticosa* crude extracts against *P. xylostella* larvae after 24 h of therapy. Chloroform extract reported significantly high antifeedant activity to four concentrations among the three solvents extract 25.8%, 42.8%, 78.3% and 92.8% activities were recorded statistically significant  $P \leq 0.05\%$ . (Lingathurai et al., 2010). Bhendi fruit discs for *E. vittella* and brinjal fruit discs for *L. orbonalis* were used to test the Antifeedant activity. Bhendi fruit discs (100 mm thick) with seeds and brinjal discs (10 mm thick) were dipped in crude extracts at concentrations of 0.625 percent, 1.25 percent, 2.5 percent, and 5 percent for about 10 minutes, then shade dried. Fruit discs were weighed and provided for *E. vittella* and *L. orbonalis*. For each treatment and control for both pests, a set of ten discs were placed separately in Petri dishes, Pavunraj manikam et al., (2015).

## **9. HYPOGLYCAEMIC ACTIVITY**

Hypoglycemic activity of *A. fruticosa* was prepared with the extracts petroleum ether, chloroform, ethyl acetate and n-butanol. Rabbits with an average weight of 1000g and Swiss

Wistar albino with an average weight of 25g were used for the acute toxicity study in the hypoglycaemic activity study. All rabbits were treated orally with a single dose (600 mg/kg). Further studied are isolation and structural elucidation of the active components of the plant extract (Amina El-Shaibany et al., 2015).

## 10. ANTIPILEPTIC ACTIVITY

Chloroform extract of *A. fruticosa* aerial part at doses 30,100 and 300 mg/kg were studied for antiepileptic activity in Swiss albino mice with brain disorder. The protective effect of *A. fruticosa* extract was compared with standard drug. Various processes used for acute toxicity, INH induced convulsions in mice and PTZ induced convulsions in mice (Sumalatha and Sreedevi. 2014). Epilepsy is a term used to describe a set of chronic neurological illnesses marked by sporadic convulsive seizures, sensory disturbances, aberrant behavior, and loss of consciousness or any or all of these symptoms as a result of a brain injury, Cerebral neuron malfunction or aberrant discharge (Jerome E., 1997).

## 11. OTHER PHARMACOLOGICAL AND BIOLOGICAL PROPERTIES:

*Acalypha fruticosa* is known to possess anti-inflammatory (Gupta et al., 2003), antidiarrhoeal, antiviral (Ma et al., 2002; Park et al., 2014), neuroprotective (Yoon et al., 2003), anticancer (Mothana et al., 2007), wound healing (Saroja et al., 2007), antiplasmodial (Alshawsh et al., 2007), antitumor (Sivakumar et al., 2010) hepatoprotective (Rajeswari et al., 2013), anthelmintic (Raj et al., 2012) etc.

## 12. USES OF ACALYPHA FRUTICOSA

*A. fruticosa* leaves are used to treat poisonous snake bites, epilepsy, fever, malaria and eye infections. To relieve digestive issues and swelling of the body, a leaf infusion is used. Leaf maceration is used for eye infections and its decoction is consumed to cure of epilepsy in Tanzania (Gopalakrishnan et al., 2010). In order to relieve coughing and chest problems, leaf sap used as nasal drops and leaf paste is applied to scabies and sores. Stem soil in water is added to wounds of animals (Schmelzer et al., 2007).

## 13. CONCLUSION

*Acalypha fruticosa* is a potential plant with several remedial concepts and economic ideals. It is used for the care of different illnesses by folklore and traditional practitioners. Nevertheless, *Acalypha fruticosa* has numerous medical uses and it is still important to standardize the biological study of this plant to investigate therapeutic principles with the aid of different methods to clarify the biological and pharmacological aspects of this herb.

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