***Review Article***

# A comprehensive review on – *Acalypha indica* L.


## ABSTRACT

*Acalypha indica* is an herbaceous annual which belonging to the family euphorbiaceae. It is commonly called as kuppaimeni. In this plant mostly found in the backyards of houses and waste places throughout the India. This herb has wide range of therapeutic purposes and have nutritional properties. In this plant widely used for treat various diseases like antibacterial, antifungal, acaricidal effects and also. This review article provides comprehensive information on the phytochemistry and pharmacological aspects of species.



***KEYWORDS:***: *Medicinal plants, Acalypha indica, phytochemistry and pharmacological aspects .*


## 1. INTRODUCTION

*Acalypha indica* Linn., is a weed plant which contain important medicinal values for human health remedies. It can be found commonly in India, Srilanka, Thailand and Pakistan.(1) It can grow up-to 0.6m to 0.75m.(2) It is commonly known as Indian copper leaf. The plant is rich in secondary metabolites such as terpenoids, tannins, alkaloids, flavonoids.(3) The plants root, leaf, flower and stem parts possess antibacterial, antifungal properties and to use to treat various diseases and disorders.(4) This present review focuses on pharmacognostical and pharmacological properties of the plant *Acalypha indica* Linn.

## 2. PLANT PROFILE

**Scientific name**: *Acalypha indica* Linn.

**Fig .1 *Acalypha indica* Linn.**

**Fig .2 *Acalypha indica* flowers**

### 3.0 TAXONOMICAL CLASSIFICATION

| | |
|---|---|
| Kingdom: | Plantae |
| Superdivision: | Embryophyta |
| Division: | Tracheophyta |
| Subdivision: | Spermatophytina |
| Class: | Magnoliopsida |
| Superorder: | Rosanae |
| Order: | Malpighiales |
| Family: | Euphorbiaceae |
| Genus: | *Acalypha* |
| Species: | *A. Indica* |

### 4.0 Vernacular names

| | |
|---|---|
| Begali: | Muktajhuri steva-basanta |
| Hindi: | Kuppikhoksli, kuppu, khokali . |
| Kannada: | Kuppigida |
| Malayalam: | Kuppameni |
| Sanskrit: | Haritamanjari |
| Tamil: | Kuppivaeni , kuppaimeni . |
| Telugu: | Kuppichettu, harita-manjiri, kuppinta, muripindi |

### 5.0 DISTRIBUTION

*Acalypha indica* grows naturally in wet conditions, temperate and tropical areas along the equator cross continental of Asia, Africa, Europe, South and North America and Australia.[(5)] The Indian people have the most documented records of plant utilization for their traditional medicines.[(6)] It is also found in the Arabia Gulf region.[(7)] The plant shows high level of distribution in the regions of African regions such as Ethiopia, Sudan, DR Congo, South Africa, Somalia, Kenya and Zambia. [(8)]

### 6.0 HABITAT

The plant mostly grows in moist and shaded places.[(9)]

### 7.0 BOTANICAL DESCRIPTION

*Acalypha indica* is a traditional medicinal plant, well known by old generations in many countries like Asia and Africa.[(5)] The plant is mostly found in wet, tropical and backyards of houses. It grows as weed, bushes alongside roads and other areas.[(6)] Many international manuscripts on *Acalypha indica* has been published in Indian journals because this plants has a close connection with Siddha, Ayurveda medicinal practices followed by old generation of people.[(7)]

### 7.1 Leaves

The leaves have acute or sub obtuse crenate – serrate, glabrous thin and base cuneate. Their petiole is usually longer than the blade, slender and stipulate minute.[13] The leaves of *Acalypha indica* are simple and arranged spirally 0.02 – 12cm petiole long.

### 7.2 Flower

Flowers are elongated, auxiliary spikes and clusters near to spikes. The female flower is white in colour and surrounded by a shortly pedunculate large leafy dentate cuneiform with many nerves bract a shortly pedunculate large leafy dentate cuneiform with many nerves bract that is approximately 6 to 8mm in diameter. Flowers are unisexual, sessile and petals absent; male flowers with 4-lobed, minute, granular dotted, greenish calyx and stamens 8; female flowers with 3 triangular-ovate, ciliate sepals, ovary superior, 3-celled, slightly 3-lobed, styles 3, fused at base and fringed.[14]

### 7.3 Fruits

The fruits of the *Acalypha indica* are small and hairy. Capsule is bristly, 1mm broad.[15]

### 7.4 Seeds

The seeds are minute, ovoid in shape and pale brown in colour. In the early stages of seed formation, its colour changes from greenish white into a completely brownish or grey colour depending on its maturity[16]

The inflorescences are in axillary, solitary or paired spike reaching up to 6 –10cm

## 8.0 TRADITIONAL USES OF *ACALYPHA INDICA* LINN.

### 8.1 leaves

Leaves are used as antibacterial, wound healing and decoction of leaves is used for dysentery. Leaf infusion is also taken as purgative. The leaves in decoction and in powder form are used as laxative. Paste of leaves is applied in burning lesions.[17]

### 8.2 Roots

Roots are used for treatment of fever, intestinal worms, diabetes and stomach ache. Roots are used as abortifacient, cathartic, demulcent and anti-inflammatory.[18]

### 8.3 Seeds

Seeds are used to treat diarrhoea, asthma and bronchitis and it is a natural diuretic agent,[19]

#### 9.0 COMMON USES

It has also been reported to be useful in treating pneumoniae, asthma, rheumatism and several other ailments. The plant is commonly used as dyeing agent.[20] The plant is also used as expectorant, antivenom, wound healing, antioxidant, diuretic and treatment of infertility, Inflammation, bacterial infections and cancer.[21]

## 10.0 PHYTOCHEMICAL STUDY

The constituents present in plant play a vital role in the identification of crude drug.[22] *Acalypha indica* has a wide variety of nutrients such carbohydrates, proteins, vitamins and lipids. The plant has a high content of iron, followed by copper, nickel, zinc and chromium.[23]

### 10.1 Leaves

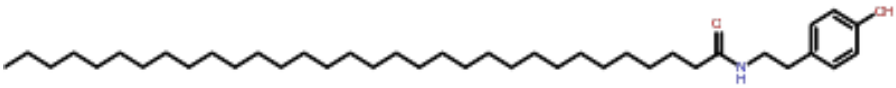
The leaves possess acaindinin, aurantiamide,[24] corilagin, ferulic acid, triacetonamine and resin.

### 10.2 Whole plant

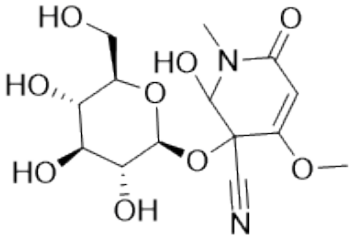
The plant contains acalyphamide, acetonylgeraniin, caffeic acid, cysteine, gallic acid and tectoquinone.[25]

### 10.3 Root

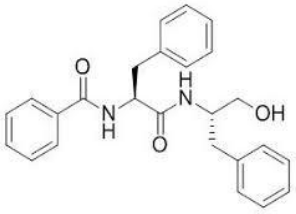
The roots have stigmasterol, syringic acid and 3,3' Methylene bis (4-hydroxyl coumarin). The plant shows a cyanogenetic glucoside, kaempferol, triacetoneamine, a base and acalyphin, an alkaloid. It also contains acalyphamide, 2- methylanthraquinone, amides, $\gamma$-sitosterol, beta-sitosterol, tri-o-methyl ellagic acid, stigmasterol, beta-sitosterol glucoside, quinine, tannin, resin, n-octacosanol, and essential oils.[26]



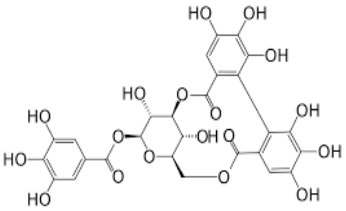
**Acalyphamide**



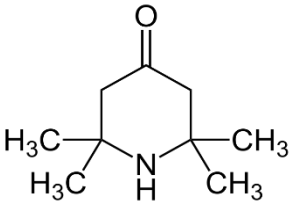
**Acalyphin**



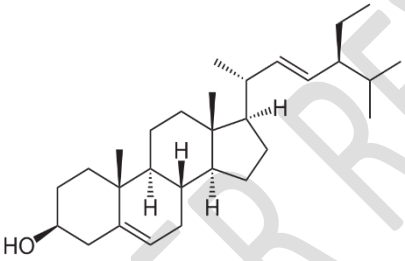
**Aurantiamide**



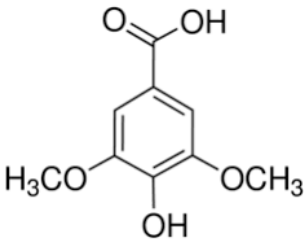
**Corilagin**



**Triacetonamine**



**Stigmasterol**



**Syringic acid**

**Fig. 3 Phytoconstituents of *Acalypha indica***

## 11.0 PHARMACOLOGICAL ACTIVITY

### 11.1 Anti-venom activity

The anti-venom derived from *Acalypha indica* methanolic extract is used to treat *Daboia russelli* venom[27] by increasing the life span up to 100% at 500mg/kg dose. Benzene, petroleum ether, chloroform and acetone extracts of *Acalypha indica* also increased the life span by 35%, 47%, 47% and 77%, respectively against similar snake venoms.[28] The mechanism of action for the antivenom potency of the extracts is found to be antioxidant.[29]

### 11.2 Post coital Infertility activity

The post coital infertility activity has been tested by four solvents in female albino rats. The petroleum ether extract and ethanol extract were found to be most effective in causing significant anti – implantation activity. Both the extract of Acalypha indica at 600mg/kg body weight showed estrogenic activity. Histological studies of the uterus were carried out to confirm this estrogenic potential of the plant.[30]

### 11.3 Haemolysis

The haemolytic(acute intravascular effect) potential of *Acalypha indica* was evaluated after broth ingestion of the plant in patients. The patients were observed to have lack in glucose 6- phosphate dehydrogenase.[31]

### 11.4 Wound healing activity

The *Acalypha indica* leaves were used to treat variety of skin problems. The ethanolic extract of *Acalypha indica* was used to evaluate the wound healing activity in rats using excision and incision models in rats. The extract showed less wound healing property.[32]

**11.5 Anthelmintic activity**

Anthelmintic potential of the methanolic and water extracts of *Acalypha indica* were investigated for their anthelmintic potential against *Pheretima posthuma* The extracts were evaluated at 100mg/ml. Both the extracts found to possess significant anthelmintic properties.[33]

**11.6 Anti-fungal activity**

Hexane, petroleum ether, chloroform, ethyl acetate, methanol and water extracts of *Acalypha indica* was evaluated for its antifungal activity against *Aspergillus flavus, Aspergillus niger Candida albicans, Candida glabrata, Candida tropicalis and Penicillium chrysogenum*. The phenolic compounds and flavonoidal derivatives of *Acalypha indica* were believed to be the source for antifungal properties. [34 &35]

**11.7 Anti-inflammatory activity**

The anti-inflammatory properties of ethanolic extract of *Acalypha indica* was proved using rats. The study was carried out using phenylbutazone as the standard drug. The anti-inflammatory potential of the plant was evaluated by carageen induced paw edema and measurement of percentage inhibition of albumin proteinase and denaturation. Both the assays showed 85% of inhibition, exhibiting no protein denaturation. Protein denaturation is one of the indicators for inflammation property. *Acalypha indica* plant extract stabilize the membrane by inhibiting hypotonicity induced lysis of an erythrocyte membrane analogous to a lysosomal membrane.[36&37]

**11.8 Hepatoprotective activity**

The hepatoprotective activity of methanolic extract of aerial parts of *Acalypha indica* was investigated at 300mg/kg in wistar albino rats of either sex. Hepatotoxicity was induced using thioacetamide. After 48 h of hepatotoxicant administration, the extract showed hepatoprotective activity by lowering the glutamic oxaloacetic transaminase (GOT), glutamic pyruvic transaminase (GPT), alkaline phosphatase (ALKP) levels. The results were comparable to the standard drug silymarin.[38]

**11.9 Anti-ulcer activity**

The phytoconstituents present in methanolic extract of *Acalypha indica* has the potency of inhibiting ulcer. The anti-ulcer activity was evaluated using pylorus ligation and swim stress models in swiss albino rats. *A. indica* extracts were evaluated at doses of 50 and 100 mg/kg. Famotidine at 10 mg/kg per body weight is used as the standard drug. The extract at 100 mg/kg reduced the volume of gastric juice by 67.14%, total acidity 59.29%, free acidity 53.24% and 37.18% of ulcer index. The *Acalypha indica* extract showed anti-ulcerogenic potency and the results were comparable to the standard drug.[39]

**11.10 Analgesic activity**

Analgesic properties of *Acalypha indica* was evaluated by *in vivo* studies. Writhing reflex assay was used to determine the analgesic activity of the *Acalypha indica* hexane extract.[40] Acetic acid was used to induce the pain in mice. Acetic acid involves two phases, first it will release serotonin and histamine and second phase will involve prostaglandins in the inflammatory exudates in plant extract. The study was evaluated 100 mg/kg and 200 mg/kg and aminopyrine was used as a positive control. The results were measured by counting the writhing induced within 20 minutes, immediately after the administration of the test drugs. The hexane extract produced up to 61.1% and 67.2% of writhing inhibition, respectively for the two doses. The analgesic effect produced the extract was comparable to the standard drug 79.9%. The hexane extract disrupted the first phase of inflammation formation by inhibiting the release of serotonin and histamine.[41]

**11.11 Psoriasis**

Psoriasis is a chronic inflammatory skin disorder characterized by rapid proliferation of keratinocytes and incomplete keratinization. The present study, shows antipsoriatic effect of aqueous extract of *Acalypha indica*. A431 and B16-F10 cell lines were used as *in vitro* models. The *in vitro* study suggested that the leaf extract of *Acalypha indica* is capable of serving as anti-psoriasis agent.[42]

## 12.0 CONCLUSION

*A. indica* is a common annual shrub freely grown in Indian gardens. It is wide spread all over the world. This comprehensive review enlights the information on *Acalypha indica* for phytochemical content and pharmacological properties. The plant is a potential source of carbohydrates, proteins, vitamins, lipids, polyphenols, tannins etc., and used for the treatment of cancer, inflammation, helminthiasis, microbes, diabetes, hyperlipidemic, obesity, venom poisoning and wounds. The present review shows the pharmacological study of the *Acalypha indica* and various phytochemical compounds responsible for it which have been reported.

**NOTE:**

The study highlights the efficacy of "Ayurved" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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