

**ETHANOBOTONICAL AND BIOLOGICAL ACTIVITIES OF *ACALYPHA INDICA* LINN:
A REVIEW**

Charan C. S.*, Abhishek K. and K. Hanumanthachar Joshi

Sarada Vilas College of Pharmacy, Krishnamurthy Puram, Mysuru.

*Corresponding Author: Charan C. S.

Sarada Vilas College of Pharmacy, Krishnamurthy Puram, Mysuru.

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ABSTRACT

Acalypha indica is a traditional medicinal plant that has been used for centuries in many parts of the world. It is known for its various pharmacological activities and is used to treat a wide range of ailments. In recent years, there has been a growing interest in this plant due to its diverse pharmacological properties and its potential as a source of new drugs. This review article provides a comprehensive overview of the traditional uses, phytochemistry, and pharmacological activities of *Acalypha indica*. The article presents an extensive literature review of published research on this plant, covering its traditional uses and modern scientific studies. The review covers the various chemical constituents present in different parts of the plant and their pharmacological activities, including antioxidant, anti-inflammatory, antimicrobial, immunomodulatory, antidiabetic, and anticancer effects. The mechanisms underlying these actions are also discussed, as are the potential applications of *Acalypha indica* in drug development. The review highlights the potential of *Acalypha indica* as a valuable source of natural products and bioactive compounds with diverse pharmacological properties. However, further research is necessary to fully understand its therapeutic potential and to establish its safety and efficacy for human use. Overall, this review provides a comprehensive and up-to-date overview of *Acalypha indica* and its potential as a source of novel drugs. It will be of interest to researchers, healthcare professionals, and individuals interested in traditional medicine and natural products.

INTRODUCTION

Acalypha indica, commonly known as Indian acalypha, is a perennial herbaceous plant that belongs to the spurge family Euphorbiaceae.^[1] It is widely distributed in tropical and subtropical regions of Asia and Africa, and is a common weed in fields, gardens, and waste places. The plant has a long history of use in traditional medicine, and is known for its anti-inflammatory, analgesic, antipyretic, and anti-diarrheal properties.^[2]

In traditional Indian medicine, *Acalypha indica* is known as "Kuppi" or "Kuppameni".^[3] and has been used to treat a wide range of ailments for centuries. The leaves and root of the plant are used in Ayurvedic medicine to treat skin disorders, respiratory problems, and urinary tract infections.^[4,5] It is also used to relieve pain and inflammation, and to reduce fever.^[6]

Several studies have been conducted to investigate the medicinal properties of *Acalypha indica*. The plant has been found to contain a number of bioactive compounds, including alkaloids, flavonoids, tannins, and terpenoids.^[7] These compounds have been shown to have a wide range of pharmacological activities, including anti-inflammatory, analgesic, antimicrobial, and antioxidant properties.^[8]

In addition to its medicinal properties, *Acalypha indica* has also been studied for its potential use in agriculture.^[9] The plant has been found to have allelopathic effects, which means that it can inhibit the growth of other plants in its vicinity.^[10] This has led to investigations into the potential use of *Acalypha indica* as a natural herbicide.^[11]

Overall, *Acalypha indica* is a versatile plant with a long history of use in traditional medicine. Its wide range of pharmacological activities and allelopathic effects make it an interesting target for further study. As such, it is a plant of great interest to the scientific community, and its potential for use in medicine and agriculture is being explored in more detail.

Botanical description

Inflorescence: The inflorescence of *Acalypha indica* is a spike-like raceme that is 5-10 cm long. It is composed of small, unisexual flowers that are either male or female. The male flowers are located at the top of the raceme, while the female flowers are at the bottom.^[15]

Acalypha indica, commonly known as Indian acalypha, is a species of flowering plant in the spurge family Euphorbiaceae. It is a perennial herbaceous plant that is native to tropical and subtropical regions of Asia and Africa.^[12] Here is a complete botanical description of *Acalypha indica*

Habit: *Acalypha indica* is a prostrate or erect herb that grows up to 1 m in height. It has a woody base and a fleshy stem that is often red or green in color.^[13]

Leaves: The leaves of *Acalypha indica* are simple, alternate, and ovate in shape. They are 5-12 cm long and 3-7 cm wide, with a pointed apex and a serrated margin. The leaves are dark green in color and have prominent veins.^[14]



Flowers: The flowers of *Acalypha indica* are small and inconspicuous. The male flowers have 8-10 stamens and no petals, while the female flowers have a small, greenish, 3-lobed ovary and no petals.^[16]



Fruits: The fruits of *Acalypha indica* are small, 3-lobed capsules that are 2-3 mm in diameter. They are green in color and turn brown when mature. The capsules contain 3 seeds that are 1-2 mm in diameter.^[17]



Roots: The roots of *Acalypha indica* are fibrous and shallow.

Distribution: *Acalypha indica* is native to tropical and subtropical regions of Asia and Africa. It is widely distributed in India, where it is a common weed in fields, gardens, and waste places.^[18]

Ecology: *Acalypha indica* is a hardy plant that can grow in a wide range of conditions. It prefers moist, well-drained soil and can tolerate partial shade. It is commonly found in disturbed areas such as roadsides, fields, and waste places.^[19]

Chemical constituents of *Acalypha indica* plant:^[20]

Active constituents	Reported uses
Flavonoids (quercetin, kaempferol, rutin, and apigenin)	Antioxidant, anti-inflammatory, anti-cancer, and anti-diabetic properties
Alkaloids (acalyphine, acalyphidine, and acalyphosine)	Antinociceptive, anti-inflammatory, and antibacterial activities
Tannins	Astringent and antioxidant properties, used to treat diarrhea and dysentery
Essential oils (carvacrol, limonene, and linalool)	Antibacterial, antifungal, and insecticidal activities
Sterols (β -sitosterol)	Anti-inflammatory, anti-cancer, and anti-diabetic properties
Saponins	Antioxidant, anti-inflammatory, and antimicrobial activities
Coumarins (scopoletin and umbelliferone)	Anti-inflammatory, antinociceptive, and anti-cancer properties
Phenolic acids (gallic acid, caffeic acid, and ellagic acid)	Antioxidant, anti-inflammatory, and anti-cancer properties

Pharmacology of *A. Indica*

Anti-inflammatory activity

Acalypha indica has been shown to possess significant anti-inflammatory activity. The plant's extracts and compounds have been found to inhibit the release of inflammatory mediators and to suppress the expression of pro-inflammatory enzymes. This activity makes *Acalypha indica* a potential candidate for the development of anti-inflammatory drugs.

Antimicrobial activity

Acalypha indica has been reported to possess antimicrobial activity against a wide range of microorganisms, including bacteria, fungi, and viruses. The plant's extracts and compounds have been found to inhibit the growth of various pathogens. This activity is attributed to the presence of bioactive compounds, such as alkaloids, flavonoids, and tannins.^[21]

Antioxidant activity

Acalypha indica has been found to possess significant antioxidant activity. The plant's extracts and compounds have been shown to scavenge free radicals and to inhibit

lipid peroxidation. This activity makes *Acalypha indica* a potential candidate for the development of natural antioxidants that can be used in the food and pharmaceutical industries.^[22]

Anticancer activity

Acalypha indica has been reported to possess anticancer activity against various cancer cell lines. The plant's extracts and compounds have been found to induce apoptosis, inhibit cell proliferation, and modulate signaling pathways that are involved in cancer development and progression. This activity is attributed to the presence of bioactive compounds, such as flavonoids, terpenoids, and phenolic compounds.

Antidiabetic activity

Acalypha indica has been shown to possess significant antidiabetic activity. The plant's extracts and compounds have been found to lower blood glucose levels, improve insulin sensitivity, and protect pancreatic β -cells. This activity makes *Acalypha indica* a potential candidate for the development of natural antidiabetic agents.^[23]

Hepatoprotective activity

Acalypha indica has been reported to possess hepatoprotective activity. The plant's extracts and compounds have been found to protect the liver from various hepatotoxic agents, such as carbon tetrachloride and paracetamol. This activity is attributed to the presence of bioactive compounds, such as flavonoids, tannins, and terpenoids.

Wound healing activity

Acalypha indica has been shown to possess significant wound healing activity. The plant's extracts and compounds have been found to accelerate the healing process, increase the tensile strength of wounds, and reduce scar formation. This activity is attributed to the presence of bioactive compounds, such as alkaloids, flavonoids, and tannins.^[24]

Immunomodulatory activity

Acalypha indica has been reported to possess immunomodulatory activity. The plant's extracts and compounds have been found to modulate the immune response by regulating the production of cytokines and the activation of immune cells. This activity makes *Acalypha indica* a potential candidate for the development of immunomodulatory drugs.^[25]

Neuroprotective activity

Acalypha indica has been shown to possess significant neuroprotective activity. The plant's extracts and compounds have been found to protect neurons from various neurotoxic agents, such as glutamate and hydrogen peroxide. This activity is attributed to the presence of bioactive compounds, such as flavonoids, tannins, and terpenoids.

Gastroprotective activity

Acalypha indica has been reported to possess gastroprotective activity. The plant's extracts and compounds have been found to protect the gastric mucosa from various ulcerogenic agents, such as ethanol and indomethacin.^[26]

CONCLUSION

In conclusion, *Acalypha indica* is a well-known traditional medicinal plant with significant pharmacological potential. Its various parts have been used for centuries in traditional medicine to treat a wide range of ailments. Recent scientific studies have validated many of these traditional uses and have also revealed new therapeutic potentials of this plant.

The plant is rich in various phytochemicals such as alkaloids, flavonoids, terpenoids, and phenolics that are responsible for its diverse pharmacological actions. *Acalypha indica* exhibits a range of pharmacological actions, including antioxidant, anti-inflammatory, antimicrobial, wound healing, immunomodulatory, antidiabetic, and anticancer activities, among others.

However, further research is necessary to identify and isolate the active compounds responsible for the observed pharmacological effects and to better understand the underlying mechanisms of action. Clinical trials are also needed to confirm the safety and efficacy of *Acalypha indica* in humans.^[27]

Overall, the evidence suggests that *Acalypha indica* is a promising medicinal plant with a wide range of therapeutic potentials. Its use in traditional medicine and the available scientific data support its potential use in the development of new drugs for various diseases. Further research is necessary to fully explore its potential as a source of novel drugs and to establish its safety and efficacy for human use.

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