



## A Comprehensive Review Of Traditional Uses, Phytochemical Profile And Pharmacological Activites Of Tridax Procumbens Extract

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### Abstract

Tridax procumbens Linn., a member of the Asteraceae family and popularly known as "Coat Buttons" or "Vishalyakarani," is a resilient perennial herb that has transitioned from being a common roadside weed to a significant subject of pharmacological interest. This review provides a comprehensive synthesis of the traditional ethnomedicinal uses, diverse phytochemical profile, and broad-spectrum therapeutic activities of Tridax procumbens leaf extract, based on literature analyzed through 2025. In the modern quest for sustainable therapeutics, the most profound medical breakthroughs often lie hidden in plain sight. Tridax procumbens Linn., historically dismissed by industrial agriculture as a resilient roadside weed, is currently undergoing a radical perceptual shift within the scientific community. No longer viewed as a mere botanical nuisance, it is emerging as a "biopharmaceutical factory" of immense complexity. This review systematically deconstructs the prevailing perception of this plant, repositioning it from a humble weed to a sophisticated source of life-saving secondary metabolites.

**Keywords:** NIL

### Introduction

In the contemporary landscape of drug discovery, there exists a profound irony: while humanity scans the farthest reaches of the globe for novel chemical entities, some of the most potent biological architectures are found beneath our very feet. Tridax procumbens Linn., historically marginalized by the modern eye as a ubiquitous roadside weed, represents a paradigm of pharmaceutical untapped potential. To the casual observer, it is a persistent invader of cultivated lands; however, to the scientific visionary, it is a sophisticated "bio-factory" capable of synthesizing a complex array of secondary metabolites that challenge the efficacy of synthetic counterparts. The rhetorical weight of this plant is anchored in its cultural identity as "Vishalyakarani."

This title is not merely a label but a testament to a legacy of healing that predates the modern apothecary. For centuries, traditional intuition has recognized in Tridax a unique hemostatic sovereignty—an unrivaled ability to bridge the precarious gap between acute trauma and cellular recovery. As we stand at the precipice of a global crisis in antibiotic resistance and chronic inflammation, the imperative to validate ancient wisdom through rigorous molecular scrutiny has never been more urgent. The "green architecture" of the Tridax leaf, rich in synergistic flavonoids and phenolic compounds, offers more than just a remedy; it offers a blueprint for a more biocompatible future in medicine. By synthesizing traditional narratives with 21st-century phytochemical analysis, this review

argues that the path to the next generation of cost-effective, sustainable healthcare does not begin in a laboratory of synthetic chemicals, but in the intelligent reclamation of the medicinal biodiversity that surrounds us. Through this lens, we invite the reader

to look past the commonality of the species and recognize the molecular brilliance of *Tridax procumbens*—a plant that is not just surviving in the shadows of modern life, but waiting to lead a revolution in plant-based therapeutics.



### Synonyms

Coat Buttons and Tridax Daisy (English), Ghamra (Hindi), Jayanti Veda (Sanskrit), Dagdi pala (Marathi), Gaddi Chemanthi (Telugu), Thata poodu (Tamil), Chiravanak (Malayalam), Cadilp Chisaca (Spanish), Herbe Caille (French), Kotobukigiku (Chinese)

### Botanical Classification

Category	Classification
Kingdom	Plantae
Division	Angiosperms
Class	Dicotyledonae
Order	Asterales
Family	Asteraceae
Genus	<i>Tridax</i>
Species	<i>Tridax procumbens</i> Linn.

### Traditional use

Upon a comprehensive review of ethnobotanical literature and research papers, it is evident that *Tridax procumbens* (Linn.) occupies a prestigious position in the global pharmacopeia of traditional medicine. Our analysis of the reviewed documents reveals that this species, while geographically widespread, maintains a

remarkably consistent therapeutic identity across diverse cultures, particularly within the Ayurvedic and African folk medicine systems.

### 1. The "Vishalyakarani" Legacy in Wound Care

The primary consensus among the reviewed studies is the plant’s unrivaled status as a hemostatic and wound-healing agent. Recognized in ancient Ayurvedic texts as “Vishalyakarani,” the literature confirms that the fresh leaf juice is traditionally utilized to treat acute trauma. Our review of pharmacological reports validates that the traditional application of crushed leaves to open cuts is not merely anecdotal but is supported by the plant’s documented ability to arrest hemorrhage and accelerate the re-epithelialization of skin tissues.

## 2. Internal Therapeutic Interventions

The reviewed data further illustrates that the traditional utility of *Tridax procumbens* extends beyond topical application. We have identified a

significant volume of ethnomedicinal evidence suggesting its role in systemic stabilization:

**Gastrointestinal Health:** Multiple reviewed sources document the use of leaf decoctions to manage infectious diarrhea and dysentery.

**Hepatoprotection:** Our synthesis of traditional records highlights the plant’s use as a liver tonic, often employed to manage jaundice and hepatic imbalances, functioning similarly to other high-value medicinal herbs like *Bhringraj*.

**Respiratory Support:** The literature review indicates that herbal infusions of the plant are a staple in treating bronchial catarrh and persistent coughs.

### Pharmacological Activity:

Plant Part	Reported Pharmacological Activities	Key Findings / Traditional & Scientific Significance
Leaves	Wound healing, antimicrobial, anti-inflammatory, antioxidant, hepatoprotective, antidiabetic, hemostatic	Most extensively studied plant part. Traditionally known as “ <b>Vishalyakarani</b> ”, the leaves are used to arrest hemorrhage and accelerate tissue repair. Rich in flavonoids, alkaloids, and tannins contributing to rapid wound contraction and antimicrobial action.
Flowers	Antioxidant, anti-inflammatory, anticancer, anticoagulant	Rich in specific flavonoids such as <b>luteolin and quercetin</b> . Flower extracts have been reported to induce apoptosis in breast carcinoma cell lines, indicating promising anticancer potential.
Stems	Antimicrobial, antioxidant, anti-inflammatory	Contain significant phenolic compounds. Stem extracts are often used synergistically with leaf extracts to enhance broad-spectrum antimicrobial and anti-inflammatory activity.

<b>Roots</b>	Antimicrobial, antidiabetic, analgesic	Demonstrated effectiveness against specific bacterial strains. Traditionally used for pain relief and management of metabolic disorders such as diabetes.
<b>Whole Plant</b>	Immunomodulatory, insecticidal (larvicidal), antihyperlipidemic, antitumoral	Essential oils extracted from the whole plant show potent larvicidal activity against <i>Aedes aegypti</i> , supporting its role in vector control and immune modulation.
<b>Seeds / Fruits (Achenes)</b>	Antioxidant, antimicrobial	Though comparatively less explored, the seeds contain protective phytochemicals that enhance seed viability and resistance under harsh environmental conditions.

## Description

*Tridax procumbens* Linn. is a creeping perennial herb belonging to the family Asteraceae, commonly known as coat buttons. The plant has prostrate, branched stems that root at the nodes, enabling rapid spreading. Leaves are simple, opposite, ovate, with toothed margins and covered with fine hairs. The flowers occur as solitary terminal capitula, with yellow disc florets surrounded by white ray florets. Fruits are achenes with a pappus, facilitating wind dispersal. The plant is widely distributed in tropical regions and is well known in traditional medicine for its wound healing, antimicrobial, anti-inflammatory, and hemostatic properties.

## Parts Of The Plant

### Leaves

The leaves of *Tridax procumbens* exhibit a pointed apex and toothed margins. They are simple, opposite, and petiolate, measuring approximately 1–2 cm in length. The lamina is broadly ovate, typically ranging from 2–6 cm in length and 2–4 cm in width. Leaves possess short petioles and are densely covered with fine hairs on both the adaxial (upper) and abaxial (lower) surfaces, contributing to their characteristic rough texture.

### Stem

The stem is cylindrical and covered with coarse, stiff hairs, including multicellular trichomes with prominent tuberculation, indicating a well-developed conducting system. The stem grows erect to ascending, reaching a height of about 30–50 cm, and is branched with sparse hair distribution. It frequently roots at the nodes, facilitating vegetative propagation. The stems are generally slender, flexible, and creeping, enabling the plant to spread rapidly and form a dense mat-like ground cover.

### Flowers

The flowers are arranged in a solitary terminal capitulum, borne on a slender and smooth peduncle. Each flower head measures approximately 1–2 cm in diameter and contains both ray and disc florets. The central region consists of yellow, tubular, bisexual disc florets, surrounded by white, strap-shaped ray florets, which are functionally female.

### Fruits And Seeds

The fruit of *T. procumbens* is an elongated, ridged achene covered with minute bristles. Each achene bears a pappus measuring about 2–3 mm in length, composed of soft, white hairs that aid in wind dispersal. This structural adaptation significantly enhances seed dissemination and enables the plant to colonize new habitats efficiently.

### Roots

Being a low-growing plant, *T. procumbens* develops a shallow root system concentrated near the soil surface. This fibrous root network provides effective anchorage and allows efficient absorption of water and nutrients from the surrounding soil.

### Phytoconstituents Of *Tridax Procumbens* Linn

#### Leaves

The leaves are the most chemically active part of the plant, known for their high mineral and flavonoid content.

1. Flavonoids: Contains procumbenetin, quercetin, and kaempferol.
2. Alkaloids: Traces of various alkaloids including Tridaxin.
3. Carotenoids: Significant amounts of Lutein and  $\beta$ -carotene.
4. Other Compounds: Fumaric acid, tannins, and high levels of Sodium, Potassium, and Calcium.

#### Flowers

The yellow-centered flowers contain unique pigments and sterols.

1. Luteolin and Glucoside: Specifically . Luteolin-7-O- $\beta$ -D-glucoside
2. Anthocyanins: Responsible for the subtle pigmentation in some varieties.
3. Sterols: Contains  $\beta$ -sitosterol and stigmasterol.

#### Stems And Whole Plant

The aerial parts yield a variety of fatty acids and long-chain compounds.

1. Fatty Acids: Myristic, palmitic, stearic, oleic, and linoleic acids.
2. Hydrocarbons: Triacontane and Dotriacontane.
3. Essential Oils: Traces of  $\alpha$ -pinene and limonene are often found in the steam distillate.

#### Roots

The root system is primarily characterized by its sterol and lipid content.

1. Sterols: High concentration of  $\beta$ -sitosterol.
2. Terpenoids: Oleanolic acid and traces of betulinic acid.
3. Saponins: Presence of various glycosides that contribute to the plant's foaming properties in aqueous extracts.

Pharmacological studies of *Tridax procumbens* Linn

#### Antibacterial Activity:

A study on antibacterial activity by Aniel Kumar O et.al on whole plant and individual parts of *Tridax procumbens* against *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus vulgaris* (Gram-negative), *Bacillus subtilis* and *Staphylococcus aureus* (Gram-positive) by agar well diffusion method using ethanolic and methanolic extracts displayed broad-spectrum activity against all the test organisms.

The results from the above study stated that there was poor or no activity from the chloroform and Petroleum ether extracts of the roots against Gram-negative bacteria.

The minimum inhibitory concentration (MIC) of both ethanolic and methanolic extracts of leaf and whole plant ranged between 1.96-19.5 and 1.96 with that of *Staphylococcus aureus* being the least. It supports its antibacterial activity<sup>12</sup>.

#### Anti-Cancer Activity:

Aqueous and acetone flower extract of the traditional plant *Tridax procumbens* were tested on Prostate Epithelial Cancerous Cells PC-3, determined by measuring cell viability by MTT assay. The inference of the experiments was the cleavage of the soluble yellow coloured tetrazolium salt MTT [3-(4, 5-dimethyl -thiazole-2- yl)-2, 5-diphenyl tetrazolium bromide] to a blue coloured formazan by the mitochondrial succinate dehydrogenase. The assay relies on the capability of mitochondrial enzymes of viable cells to reduce the yellow soluble salt MTT to purple-blue insoluble formazan precipitate which is then quantified spectrophotometrically at 570nm.

The results of these studies showed that the flower crude extract of the plant *Tridax procumbens* possesses vital anti-cancer activity<sup>13</sup>.

#### Anti Diabetic Activity:

The hypoglycemic activity of dried aqueous, alcoholic, and petroleum ether (60-80°C) extracts of leaves of *Tridax procumbens* was investigated by Durgacharan A et.al. Experimental studies reveal that the aqueous and alcoholic extracts from *Tridax procumbens* leaves (200 mg/kg) orally administered for 7 days produced a significant reduction in the blood glucose level in alloxan-induced diabetic rat's

model. Petroleum extract exhibits a very weak anti-diabetic activity<sup>14</sup>.

### Hepatoprotective Activity:

Jude Chigozie Ikwuchi *et al* screened the potential of an aqueous extract of the leaves of *Tridax procumbens* to protect against carbon tetrachloride-induced liver injury in Wistar albino rats. The carbon tetrachloride was prepared in olive oil and administered subcutaneously at 1 ml/kg body weight. The extract was administered to normal and carbon tetrachloride treated rats at 100, 200, and 300 mg/kg. Treatment dose-dependently significantly lowered ( $P < 0.05$ ) alkaline phosphatase (54.91-100.52%), aspartate transaminase (37.74-64.79%), and alanine transaminase (32.96-57.82%) activities as compared to test control. The plasma total bilirubin and total protein levels of the treated animals were lower although not considered significant. The results of this study indicated that treatment with the plant extracts protects the liver against carbon tetrachloride-induced hepatotoxicity; therefore the study suggests the use of *T. procumbens* in African tradition for the treatment of liver problems<sup>15</sup>.

### Anti-Fungal Activity:

This study was designed to evaluate the antifungal potential of alkaloids and flavonoids of different parts (root, stem, leaf and flower) of *Tridax procumbens* L against two pathogenic fungal strains (*Aspergillus flavus* and *Aspergillus niger*) by disc diffusion assay method. Antifungal activity was screened by evaluating Minimum inhibitory concentrations (MIC), minimum fungicidal concentrations (MFC) and total activity of each active extracts.

As per the study, the flavonoid extracts showed markedly significant activity against *A. niger* whereas alkaloid extracts were found inactive against both the test fungi. Significant antifungal potential was shown for free flavonoid of stem (IZ 12 mm, AI 1.2, with same MIC and MFC 0.156 mg/ml), bound flavonoid of stem (IZ 10 mm, AI 1, MIC 0.312 and MFC 0.625 mg/ml) and flower (IZ 10.2 mm, AI 1.02, with same MIC and MFC 0.312 mg/ml) against *A. niger*. These results indicated that the plant *T. procumbens* possesses antifungal activity<sup>16</sup>.

### Antileishmanial Activity:

A leishmaniasis is a group of diseases caused by *Leishmania* protozoa. Antileishmanial activity of *Tridax procumbens* extracts and a pure compound against promastigotes of *Leishmania Mexicana* was investigated in this study. Extract and (3S)-16, 17 didehydrofalcariinol (1) were obtained from *Tridax procumbens* by chromatographic methods and was identified by spectroscopic analysis. The extracts were tested for its inhibitory effect on the growth of promastigotes of *Leishmania Mexicana*. Extracts and 1 were also tested for its safety by treating with mammalian cells and cell viability was assessed using trypan blue and MTT.

*Tridax procumbens* extract and 1 possessed a markedly significant activity against *Leishmania Mexicana*. The methanol extract inhibited promastigotes growth of *Leishmania Mexicana* with a 50% inhibitory concentration (IC<sub>50</sub>) of 3g/ml, while oxylipin 1 exhibited the highest inhibition at IC<sub>50</sub>=0.478g/ml. Thus the study supports the antileishmanial activity of *Tridax procumbens* extract and 1<sup>17</sup>.

### Antiuro lithiatic And Anti-Oxidant Activities:

A renal stone formation is one of the known urological disorders. Hyperoxaluria and hypercalciuria are the major risk factors for renal stone formation. Hence oxalate exposure is toxic to renal epithelial cells and responsible for oxidative stress.

Anti urolithiatic activity of the ethanolic extract of the whole plant of *Tridax procumbens* Linn against 0.75 % v/v ethylene glycol and 2% w/v ammonium chloride induced calcium oxalate renal stones and also antioxidant activity against hyperoxaluria induced oxidative stress in the male albino rat were evaluated in this study. Increase in oxidative stress and increased urinary calcium, oxalate and creatinine were observed after ethylene glycol and ammonium chloride administration in control rats.

Calcium oxalate crystal depositions and extensive renal tubular damage were noticed by histopathology studies of kidneys. Treatment of the ethanolic extract of *Tridax procumbens* to the test rats decreases the increased levels of urinary calcium, oxalate and creatinine and significantly lowered deposition of calcium and oxalate in the kidneys. Substantial reduction in oxidative stress was also observed. Renal histology showed a marked reduction in calcium

oxalate crystal depositions. This study shows the Antiuro lithiatic and anti-oxidant activities of the plant *T. Procumbens*18.

#### **Analgesic And Anti-Inflammatory Activity:**

V Vinoth Prabhu et.al. investigated the analgesic and anti-inflammatory activity of the aqueous and ethanolic extracts of the plant *Tridax procumbens* by two analgesic and one inflammatory in-vivo pain models using male C57 BL6/J mice (25-30g) and male Sprague-Dawley rats (150-230g). In the formalin-induced pain test, late phase of moderate pain, which starts about 20 min post formalin injection and lasts about 40 min to 60 min, may be caused due to tissue and functional changes in the dorsal horn of the spinal cord. Treatment with extract produced significant inhibition of pain in the late phase. In the acetic acid-induced abdominal constriction test, treatment with extract showed a dose-dependent reduction in the abdominal writhing significantly. In CFA Induced Hyper analgesia, oral administration of *Tridax procumbens* extract significantly reduced mechanical hyper analgesia in CFA injected rats.

These results revealed that *Tridax procumbens* has markedly significant effects against centrally, peripherally and inflammatory pain models and the protective actions may be due to the presence of flavanoid and sterol 19.

#### **Antimicrobial Activity:**

This study was conducted to assess the antimicrobial potential of free and bound flavanoid extracts of pedicle and buds of *Tridax procumbens* Linn against three bacteria (*Escherichia coli*, *Staphylococcus aureus* and *Proteus mirabilis*) and four fungi (*Aspergillus flavus*, *Aspergillus niger*, *Candida albicans* and *Trichophyton mentagrophytes*) by disc diffusion assay method. Minimum inhibitory concentrations, minimum bactericidal/fungicidal concentrations were screened for determination of the antimicrobial potential of the extracts.

The flavanoid extracts showed significant antimicrobial activity against all the test pathogens except *A. flavus* against which none of the test extracts showed activity. It is observed that free flavonoids from pedicle (active against 5 out of 7 test pathogens) and bound flavanoid from bud (active against 4 out of 7 pathogens) exhibited significant antimicrobial activity. It is also found that *S.aureus* was the foremost

susceptible microorganism that was sensitive towards all extracts. This result shows the antimicrobial activity of the free and bound flavanoid extracts of pedicle and buds of *Tridax procumbens*20.

#### **Immunomodulatory Activity:**

Immunomodulatory activity of an ethanol-insoluble fraction of aqueous extract of *Tridax procumbens* was reported in this study. In this Study, Swiss albino rats were treated with *Pseudomonas aeruginosa*. Rats were divided into six groups of four per group. The first group was treated with the standard inoculum of *Pseudomonas aeruginosa* only and the second group was given 8 mL of the standard inoculum of the organism and treated with ethanolic extract of *Tridax procumbens*. The third category was treated with the ethanolic extract of *Tridax procumbens* only, whereas normal saline was administered to the last group. From the results, it was noticed that the phagocytic index, leukocyte count and splenic antibody secreting cells increases significantly. The immunomodulatory potential of ethanolic extracts of leaves of *Tridax procumbens* was also evaluated against *Pseudomonas aeruginosa* induced albino rats and was found that the extracts have the ability to inhibit the proliferation of *Pseudomonas aeruginosa*21.

#### **Anti-Ulcer Activity:**

The antiulcer activity of methanolic extracts of *Tridax procumbens* was screened by Aslam Pathan et al. During this study albino rats were treated with methanol extract 100 mg/kg of *Tridax procumbens* Linn and ulcer protection activity using myeloperoxidase activity was evaluated. The results revealed that the myeloperoxidase activity of methanol extract 100 mg/kg (2.74 U/g) is lower than experimental control (4.74 U/g). From this study, it can be concluded that the methanolic extract (100 mg/kg) of the whole plant of *Tridax procumbens* Linn possesses ulcer prevention and protection activity and should be helpful for the hindrance of ulcerative colitis22.

#### **Wound Healing Activity:**

B. Yaduvanshi et.al investigated the wound healing activity of topical ointment formulation of the leaf juice of *Tridax procumbens* using excision wound model in mice. Excision wounds (4 mm, i.d.) were inflicted on depilated back of mice. Ointment formulation of *Tridax procumbens* (50 mg of either 1

or 4 mg/g) was applied twice daily for 4 days on the dermal wound. Control group was treated with VEGF ointment (50 mg of 1 µg/g). Various parameters like re-epithelization, vascularity, fibroblast number, collagen content were observed. The healing potential of *Tridax procumbens* (1 mg/g) was compared with the control group. The results of this investigation revealed that *Tridax procumbens* possesses dose-dependent pro-healing potential, and its high dose exerts an inflammatory reaction 23.

#### Anti-Arthritic Activity:

This study was conducted to assess the anti-arthritic activity of whole plant ethanolic extract of *Tridax procumbens* using Freund's Complete Adjuvant (FCA) model. Here arthritis was induced using FCA, and the anti-arthritic effect of the ethanolic extract of *Tridax procumbens* was evaluated at doses of 250 and 500 mg/kg and the effects were compared with indomethacin (10 mg/kg). At the end of the investigation, the liver enzyme levels were determined and a radiological examination was carried out. The study implies that *Tridax procumbens* at a dose of 250 and 500 mg/kg significantly inhibited FCA-induced arthritis in the rats 24.

#### Vasorelaxant Effects:

The present study was designed to investigate the role of calcium in the vasorelaxant effect of this extract. Dose-response studies with noradrenaline (NA), potassium chloride and calcium chloride were carried out in rat aortic rings with and without the extract in physiological salt solution (PSS). Also, the role of intracellular calcium mobilization was noticed by measuring the phasic response to NA in Ca<sup>2+</sup>-free N, N-ethylene glycol tetra acetic acid (EGTA).

The results of this investigation suggest that the vasorelaxant effect of *Tridax procumbens* leaf extract may be due to non-specific, non-competitive inhibition of Ca<sup>2+</sup> influx as well as by inhibition of Ca<sup>2+</sup> mobilization from intracellular stores. This implies that the extract may have vasorelaxant agents that may have calcium antagonistic activity 25.

#### Antidiarrhoeal Activity:

The phytochemical profile and antidiarrhoeal activity of aqueous and ethanolic leaf extract of *Tridax procumbens* were performed in this study. Phytochemical investigations of aqueous and ethanol

extract of *Tridax procumbens* leaves showed the presence of twelve bioactive compounds which are the alkaloid, tannin, saponin, flavonoid, phenol, cardiac glycoside, phytosterol, steroid, phlobatannin and triterpenoid. Antidiarrhoeal activity was carried out on gastrointestinal motility and castor oil induced diarrhoea in Wistar rats. Both aqueous and ethanol leaf extracts of *Tridax procumbens* showed markedly significant antidiarrhoeal activity on gastrointestinal motility with barium sulfate milk model, whereas the aqueous extract showed no significant reduction in castor oil-induced diarrheal model when compared with Lomotil drug (standard group). This result implies that the leaf extract of *Tridax procumbens* might possess antidiarrheal activity and this supports the use of the plant in traditional medicine.

#### Conclusion

*Tridax procumbens* stands as a testament to the untapped potential of local flora. While the traditional uses have been largely validated through in vitro and in vivo models, the transition toward clinical standardization remains the next critical frontier. Future research should pivot toward isolating specific bioactive fractions for targeted drug delivery systems, ensuring that the "Coatbuttons" plant is elevated from a folk remedy to a cornerstone of evidence-based phytotherapy. Ultimately, this review confirms that within the humble architecture of *Tridax procumbens* lies a powerful, sustainable, and accessible solution to complex human health challenges.

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