



## A Comprehensive Review on Tridax Procumbence

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### ABSTRACT

Tridax procumbens Linn., a weed commonly found across India, belongs to the daisy family. Known as

“Ghamara” in local terms and “coat buttons” in English, it is also referred to as “Bhringraj” in Ayurveda.

This plant is rich in carotenoids, saponins, and important minerals like sodium, potassium, and calcium. Tridax procumbens has several potential health benefits, including antiviral, antioxidant, and antibiotic properties. It can aid in wound healing and has insecticidal, anticancer, and anti-inflammatory effects. Key compounds found in its flowers include luteolin, glucoluteolin, quercetin, and isoquercetin. Phytochemical studies show that it contains alkaloids, reducing sugars, glycosides, flavonoids, tannins, and gums. Its pharmacological activities include protecting the liver, lowering blood sugar, treating bronchial issues, and fighting infections. The leaf juice is especially useful for stopping bleeding, serving as a hair tonic, acting as an antiseptic, repelling insects, and helping with cuts and bruises.

**Key Words:** - Tridax Procumbence, Weed, Anti-oxidants, Anti-Microbial

### 1. Introduction

Medicinal plants have been important for treating human illnesses since ancient times. About 1.42 billion people, or one-fourth of the world's population, rely on traditional medicine for various health issues. More and more people are turning to herbal remedies because they prefer options that don't have the side effects often caused by synthetic drugs. The Tridax Procumbens is a widely distributed weed. Weeds are Not really “unwanted,” especially in terms of traditional Herbal medicines. These “naturally growing plants” are Generally known as a group of very aggressive, noxious, Competitive, and troublesome plants.(1)

Tridax procumbens Linn. (Tridax) family composite Commonly known as “Ghamra” and in English Popularly called “coat buttons” because of appearance Of flowers [Figure 1]. It has been extensively used In Ayurvedic system of medicine for various Ailments and is dispensed for “Bhringraj” by some Of the practitioners of Ayurveda.(2)

T. procumbens is widely distributed in India up to 2400 m above Sea level. The leaves of the plant are used as raw feed to Cattle and food additive by humans as well. The leaves have Medicinal value and used to treat catarrh, dysentery and diarrhoea. The different leaf extracts are used as antiseptic to treat fresh cuts, Wounds, burns and in anaemia. It also contains hair growth Enhancing ability.(3)





Figure no 1. T. Procubens leaves and flowers

### 1.2 Plant Morphology and cytology

*T. procumbens* is a creeping herb that grows about 30-50 cm tall. Its stem is branched and can root at the nodes. The leaves are simple, opposite, and have a toothed edge, measuring 3-7 cm long. They are fleshy, hairy, and shaped like a lance or oval, with a wedge-shaped base and short stems. The leaves have a top and bottom surface that are different, with a thick outer layer (cuticle) to protect them. The upper layer has hair-like structures, while the lower layer has tightly packed, elongated cells. The plant also contains calcium oxalate crystals in its xylem vessels, and its vascular bundles are arranged concentrically, with a central bundle surrounded by some supportive tissues.(4)



Figure no. 2 Tridax Procumbens leaf and flower

Flowers are tubular in nature, yellow in colour with hairs having a Capitulum inflorescence.(4,5) This has two types of flowers. Ray florets and disc florets with basal placentation .Fruit is a hard achene covered with stiff hairs and having a feathery, Plume-like white pappus at one end, which assists in aerial dispersal.(5) The heads are heterogeneous, having long peduncles which May reach up to a height of 2 ft. The ray florets are female with Ligulate corolla, trifold and invariably pale-yellow in colour.(5)

*T. procumbens* seeds germinate at higher temperatures (35/25 and 30/20 °C) in the presence of 58 to 78 % light.

These are very Sensitive to salt concentration and water stress . The Chromosome numbers are 36 (diploid) and 18 (haploid) in gametes. The propagation is through spreading stems and seed Production.(5)

### 1.2 Taxonomy

T. procumbens belongs to the kingdom: Plantae, sub-kingdom: Tracheobionta, division: Magnoliophyta– Dicotyledons, class: Magnoliopsida, sub-class: Asteridae, order: Asterales, family: Asteraceae, genus: Tridax L. and species: procumbens [4].

<b>Kingdom</b>	<b>Plantae-Plant</b>
Subdivision	Tracheobionta-vascular plant
Class	Magnoliopsida Flowering plants
Order	Asterales
Genus	Tridax L-Tridax
Family	Asteraceae – Aster family
Species	Tridax Procumbens Linn Coat button
Botanical name	Tridax Procumbens

### 1.3 Chemical composition

1. The phytochemical analysis revealed that the plant contains flavonoids, carotenoids, alkaloids, tannins, and saponins. It is also high in salt, potassium, and calcium.
2. The main components of Tridax procumbens leaves include proteins, fiber, carbohydrates, and calcium oxide, along with fumaric acid and tannins.
3. Tridax procumbens has a good amount of oleanolic acid, which may help lower blood sugar. It also contains various alkaloids, flavonoids, carotenoids, fumaric acid, lauric acid, and tannins.
4. The plant has high moisture content, with 88.30% in the stem and 90.05% in the leaf. It is rich in protein, with the stem containing 37.44% protein (dry weight) and the leaf containing 34.57%. The total lipid content is low in both stem (0.85%) and leaf (6.03%), while carbohydrate content is higher, with 41.03% in the stem and 51.26% in the leaf. In terms of energy, the stem provides about 321.54 Kcal (dry weight) and 37.62 Kcal (wet weight), while the leaf provides 397.59 Kcal (dry weight) and 39.56 Kcal (wet weight). (6,7,8,9)

### 1.4 Uses (8,10,11,12)

1. The aqueous extract of T. procumbens leaves is effective in treating and preventing liver damage caused by carbon tetrachloride.
2. Tridax procumbens, a common weed in India, is used in traditional medicine for various ailments, including jaundice.
3. Ethanol extracts of Tridax leaves can boost the immune response in albino rats and inhibit the growth of Pseudomonas aeruginosa bacteria.
4. Both aqueous and alcoholic extracts of Tridax leaves significantly lower blood sugar levels in rats with alloxan-induced diabetes.
5. An extract of the whole Tridax plant shows antibacterial activity only against Pseudomonas aeruginosa.
6. The aqueous extract slightly increases the enzyme lysyl oxidase more than the whole plant extract, enhancing protein and nucleic acid content in healing tissue, likely due to increased glycosaminoglycan levels.
7. The leaf extract promotes wound healing in both healthy and immunocompromised (steroid-treated) rats in a model for dead space wounds.

## 2. Pharmacological Activity

### 2.1 Hepatoprotective Activity

The liver is the body's main detox organ and contains enzymes that help with detoxification. When liver cells are injured, these enzymes leak into the bloodstream, indicating the level and type of liver damage. Research shows that T. procumbens has protective effects on the liver. In experiments with rats, a chloroform extract of T. procumbens significantly reduced liver damage caused by substances like lipopolysaccharide and Galactosamine. This was shown by lower levels of key enzymes and bilirubin in their blood. The extract helps repair liver cells and promotes their regeneration. Similar benefits were also seen with an aqueous extract of T. procumbens combined with chloroquine. (13, 14, 15, 16)

## 2.2 Antioxidant Activity

Oxygen free radicals produced by immune cells activate a protein called NF- $\kappa$ B, leading to inflammation and tissue damage. To counter this, *T. procumbens* has been shown to have antioxidant properties. Tests using DPPH(2,2-Diphenyl-picrylhydrazil hydrate) and ABTS(2,2-bisazino-1(3-ethylbenzothiazoline-6-sulphonic acid) methods confirmed this. The chloroform and ethyl acetate extracts of *T. procumbens* had the strongest antioxidant effects, with an IC50 value of 37.39  $\mu$ g/ml. The antioxidant activity is mainly due to the flavonoids and alkaloids found in these extracts.(17)

## 2.3 Anti-inflammatory activity

The aqueous, ethyl acetate, methanol, and ethanol extracts of *T. procumbens* showed strong anti-inflammatory effects by blocking substances that cause inflammation, like histamine and prostaglandins. Key compounds identified, such as Bergenin, Centaureidin, and Centaurein, were found to inhibit COX-1 and COX-2 enzymes. The flavonoid Quercetin is particularly responsible for reducing pain and inflammation. It may also help alleviate pain from nerve injuries in certain models.(18,19)

## 2.4 Anti-Arthritic Activity

Arthritis is an inflammatory condition that damages one or more joints. The ethanolic extract of *T. procumbens* showed strong anti-arthritic effects in a rat model induced by Freund's Complete Adjuvant, outperforming the standard drug indomethacin. The evaluation showed improvements like increased body weight, higher red blood cell counts, better haemoglobin levels, and decreased levels of inflammation markers and bone destruction. Rheumatoid arthritis leads to cartilage loss and swollen tissues, which results in narrower joint spaces. Treatment with the ethanolic extract of *T. procumbens* helped normalize these issues, confirming its anti-arthritic benefits.(20)

## 2.5 Anti-cancer activity

The aqueous extract of *T. procumbens* leaves, which contains essential oils, has shown anti-cancer effects in mice with lung cancer (using the B16 F-10 melanoma cell line). This extract helped reduce body weight gain and normalized white blood cell and haemoglobin levels. The main active compounds in the extract  $\alpha$ -pinene,  $\beta$ -pinene, phellandrene, and sabinene—are all part of a group called monoterpenes. These compounds increased the levels of proteins involved in cell death (caspase-3 and p53), as shown by a specific test. Additionally, the acetone extract from the flowers produced an apoptotic effect (programmed cell death) within 24 hours of treatment. Lupeol, a compound found in the dried leaves of *T. procumbens*, also showed strong anti-cancer activity in lab tests, effectively killing over 90% of human lung cancer cells (A-549). It works by inhibiting an enzyme called COX and promoting DNA breakdown through the activation of certain cell enzymes, leading to cell death.(21,22)

## 2.6 Anti-Microbial activity

The whole plant of *Tridax* has been tested for its ability to fight bacteria. To make the juice, the plant is squeezed by hand, and this fresh juice is applied to cuts and wounds twice a day for 3-4 days. The extract from the whole plant showed antibacterial effects only against *Pseudomonas aeruginosa*. The disk diffusion method was used to check its antibacterial activity, testing against four types of bacteria: two gram-positive (*Bacillus subtilis* and *Staphylococcus aureus*) and two gram-negative (*Escherichia coli* and *Pseudomonas aeruginosa*). (23)

## 2.7 Immunomodulatory Activity

The ethanolic extract of *T. procumbens* boosts the immune system by helping phagocytes (cells that eat particles) take in more foreign matter. It also triggers a stronger immune response by increasing the number of certain white blood cells. The main active ingredient, a type of compound called sesquiterpene lactone, can cause a delayed allergic reaction. Additionally, this extract can prevent allergic reactions to BSA (bovine serum albumin) by producing IgG antibodies that block the interaction between BSA and IgE, which stops mast cells from releasing histamines. This effect was also seen in infections caused by *Pseudomonas aeruginosa*.(24,25)

## 2.8 Anti-diabetic Activity

Extracts from *T. procumbens* (in water, methanol, and ethanol) have been found to help lower blood sugar levels in Wistar rats with diabetes induced by alloxan. Alloxan damages insulin-producing beta cells in the pancreas, leading to diabetes. The extracts not only reduce blood glucose levels but also help repair the damaged beta cells, improve insulin release, and enhance how the body uses glucose. A compound called dihydroxy-olide from the plant's hexane extract plays a key role in this anti-diabetic effect by reducing glucose absorption and lowering blood sugar spikes after meals in Type II diabetes.(26, 27,28)

## 2.9 Wound Healing activity

*Tridax* helps improve wound healing by counteracting some of the negative effects of dexamethasone, a medication that can slow healing. While dexamethasone reduces tissue growth and strength, *Tridax* doesn't interfere with its ability to prevent scarring and excessive tissue formation. The aqueous

extract from Tridax increases lysyl oxidase levels, though not as much as the whole plant extract. Additionally, both extracts promote healing in normal and steroid-treated rats, enhancing protein and nucleic acid levels in the healing tissue, likely due to an increase in glycosaminoglycans, which are important for tissue repair.(29)

### **1.10 Antihypertensive Activity**

A wider difference between systolic and diastolic blood pressure (called pulse pressure) can predict heart problems, including heart attacks and heart failure, regardless of overall blood pressure levels. Additionally, a high heart rate (tachycardia) is linked to a higher risk of death from both heart and non-heart issues. In studies using Sprague-Dawley rats, an extract from *T. procumbens* leaves was shown to reduce both average blood pressure and heart rate.(31,32)

### **1.11 Mosquitocidal activity**

Alpha-Terpinene,  $\alpha$ -Terpineol, and  $\beta$ -Pinene are the main chemicals found in the essential oil from the *T. procumbens* plant. These compounds were found to be effective at repelling the malaria-carrying mosquito *Anopheles stephensi* when used at a concentration of 6%.(30)

### **1.12 others application**

#### **A) Isolation of Sulphated Polysaccharide**

Sulphated polysaccharides have been isolated from the leaves of *T. Procumbens*. These are responsible for exhibiting antioxidant, Anticoagulant, antithrombotic, antiviral and antitumor activities. The Presence of high sulphate content (up to 2%) exhibit anticoagulant And antiviral activities .(33)

#### **B) In Waste Water Treatment**

Activated biocarbon made from the dried leaves of *T. procumbens* is effective at removing heavy metals like zinc (Zn II) and cadmium (Cd II) from wastewater. The results matched both the Langmuir and Freundlich adsorption models, showing better performance than standard commercial charcoal methods. Additionally, this activated carbon is also good at removing hexavalent chromium from synthetic and industrial tannery wastewater.(34)

The leaves of *T. procumbens*, combined with aluminium ions, are used as a biocarbon filter to remove fluoride ions from water through an ion-exchange process. This biocarbon is also effective at removing mercury (II) ions. Additionally, powdered *T. procumbens* leaves act as a bio-adsorbent that can convert chromium (VI) to chromium

(III) and remove both chromium (III) and cadmium (II) from water.(35)

### **3.Toxicity induced by T. Procubence**

The ethyl acetate extract from *T. procumbens* increased the body weight of experimental animals over four weeks at a dose of 800  $\mu\text{g}/\text{kg}$ . It also caused an increase in the size of organs like the spleen, liver, lungs, and kidneys, but the heart rate went down. Additionally, the number of red blood cells, packed cell volume (PCV), and lymphocytes rose compared to the control group. Blood glucose and AST enzyme levels dropped, while ALT, urea, sodium (Na<sup>+</sup>), and potassium (K<sup>+</sup>) levels went up.(36)

When the ethyl acetate extract was given at doses of 50-100 mg/kg body weight, it led to increased deposits of hemosiderin in different organs. The liver showed the most deposits, along with inflammation and white blood cell infiltration. The kidneys had slight hemosiderin deposits and some bleeding within the glomeruli, which became more pronounced with higher hemosiderin levels.(36)

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## **3. Conclusion**

*Tridax procumbens* Linn. (Compositae) is Universally distributed weed. It found everywhere in India, America, Tropical Africa, Asia, and Australia. This plant Extensively used and it's each and every part having noble And effective pharmacological activity. The plant product is The need in treatment of diseases over than synthetic Compound. It does not have any harmful and toxic effect in Animal and man. This is Dispensed for "Bhringraj" by some of the practitioners of Ayurveda. This studies on plant *Tridax procumbens* Linn. Also desired development of novel therapeutic agents Which are isolated from it, as isolation of oleanolic acid a Single triterpenoids is reported from this plant. The qualitative analysis Revealed the presence of the biomolecules such as Anthraquinone, catechol, flavonoids, phenolic compounds, Steroids, tannins, terpenoids and saponins. The work done now days on its having Various pharmacological activities like hepatoprotective Effect, immunomodulating property, antidiabetic, wound healing property, hypotensive effect, Antimicrobial, insect repellent activity, anti inflammatory, Antioxidant, dysentery, diarrhoea, bronchial catarrh and also Prevent falling of hairs and leads to hair growth promotion. This plant also used as bioadsorbent for removal of Cr (VI) From the industrial wastewater. In the future, there is a lot of potential for research on this plant.

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