

# A Review on Formulation of Gel Using Triax Procumbens

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**Abstract-** *Triax Procumbens*, known by ayurveda *Jayanti Veda*, also known as *Jivanti* or *Leptadenia reticulata*, is a plant highly valued in Ayurveda. *Triax procumbens* (*Jayanti Veda*) belongs to the Asteraceae family and is an Ayurvedic herb of Asia with a history of traditional use. *Triax procumbens* have been used since ancient times to treat wounds and skin diseases, and leaf extract promotes blood coagulation. It possesses antileishmanial, antioxidants, anticancer, immunomodulatory agent, insecticidal, anthelmintic cardiovascular, antiseptic, antimicrobial, and insecticidal properties. Purpose of Article: This review article aims to collate past and present updated information on traditional uses, morphology, chemical constituents and pharmacological activities, miscellaneous activities, and relevant patents of this plant, thereby providing useful data for researchers and pharmaceuticals and introducing wound healing properties of the herb. Keywords: *Triax procumbens*, Wound Healing, Blood coagulation, Anticancer, Antiseptic.

## I. INTRODUCTION

*Triax procumbens* is a widely spread hispid, procumbent herb, usually found as a weed. *T. procumbens* is perennial in nature with flowering fruiting throughout the year. *T. procumbens* is commonly called as „Jayanti-veda“ in Sanskrit, Tikki- kasa/„Ghamra“ in Hindi and „Wild daisy“, „Mexican daisy“ and „Coat buttons“ in English based on the appearance of the flower. The scientific name is, *Triax procumbens*. The generic name is derived from the Greek, meaning „summer eating“, implying that it was a summer vegetable [1].

*T. procumbens* belongs to the kingdom: Plantae, sub-kingdom: Tracheobionta, division: Magnoliophyta–Dicotyledons, Magnoliopsida, sub-class: class: Asteridae, order: Asterales, family: Asteraceae, genus: *Triax* L. and species: *procumbens* [1].

Many ancient traditions including the Ayurveda, Siddha and the Unani systems of medicine have advocated the use of several herbal preparations like plant juices and extracts for diseases including infectious ones. 74% of the plant-derived medicines have a modern indication that correlates with their traditional, cultural and sometimes ancient uses.

Hence, traditional medicine is an important source for the development of novel chemotherapeutic agents which are less toxic and more economic [2].

## II. LITERATURE REVIEW

Taxonomy *Triax procumbens* belongs to the Domain of Eukaryota, kingdom: Plantae, sub-kingdom: Tracheobionta, Phylum: Spermatophyta, Subphylum: Angiospermae, Class: Dicotyledons, Sub-class: Asteridae, Order: Asterales, Family of Asteraceae or compositae.

Genus: *Triax* and Species: *Triax procumbens*. The other species of this genus include *T. balbisoides* and *T. trilobata*. The plant is known to possess remarkable medicinal properties. The name *Triax* refers to the three lobes of the ray flowers while *procumbens* refers to the prostrate, trailing habit of the stems.

Table 1: Common names of *Triax procumbens* throughout the world

Country/region	Common names	References
Chinese	Kotobukigiku	
English	Coat buttons, <i>Triax</i> daisy	(Chauhan BS and Johnson DE, 2008; Ravikumar V, et al., 2005; Bhagwat DA, et al., 2008)
French	Herbe cailli	
Latin	<i>Triax procumbens</i> Linn.	
Kannada	Jayanthi	
Spanish	Cadillo chisaca	
Sanskrit	Kumminippacha	
Telugu	Gaddi chemanthi	
Tamil	Thata poodu	
Assamese	Bikhayakarani	
Hindi	Ghamra	
Bengali	Tridhara	
Oriya	Bishaya karani	
Malayalam	Chiravanak	
Marathi	Kambarmodi, jakhajudi and tantani	
Gujarati	Ghaburi	(Saxena VK and Albert S, 2005)
Japanese	Kotobukigiku	
Thai	Tin tukkae	
Nigeria	Ighalobe, muwagun, muriyam pachila, jayanti, vettukkaaya-thala	(Sureshkumar J, et al., 2017)
United States	<i>Triax</i> daisy	
Guatemala	Bull grass, bull's herb	(Gambo-Leon R, et al., 2014)

## Extraction of plants

For therapeutic application plants can be used either directly or indirectly for various purposes. Indirectly, a medicinally active constituent of plant can be extracted using selective solvents through standard procedures to attain the

therapeutically important portions and to eliminate unwanted material. The amount of product extracted depends upon time of extraction, temperature, nature of solvent, solvent concentration, polarity and quantity of plant material to be extracted. The different types of solvent that are generally used for extraction include water, acetone, alcohol, chloroform, ether, dichloromethanol and hexane

Table 2: Phytochemicals present in different parts of *Tridax procumbens*

Extraction	Plant part	Compounds	References
Chloroform extract and Chloroform water extract	Leaves	Steroid, saponin, coumarins, alkaloids, amino acids, diterpenes, phenol and flavonoids, amino acids, phlobatannin	
Acetone-water extract and acetone extract	Leaves	Steroid, tannin, saponin, anthocyanin, coumarins, alkaloids, diterpenes, phenol and flavonoids, proteins, carbohydrate, antioxidant property	
Methanol extract	Leaves	Alkaloids, tannin, anthocyanins, proteins saponin, steroid, phlobatannin, terpenoids, flavonoids, amino acids, phenols and cardiac glycosides, antibacterial activity, antioxidant properties	(Dhanabalan R, 2008)
Ethanol extract	whole plant	Flavonoid, quercetin, Alkaloids, tannins, flavonoids, saponins, and phenolic compounds	(Petchi RR, et al., 2013)
Acetone extracts	Roots, leaves	Antibacterial activity	
Aqueous extract	Leaves	Blood clotting properties	
Petroleum ether and ethanolic extract	Whole plant	Antibacterial activity against <i>B. faecalis</i> due to presence of alkaloids, tannins, steroids, purines, carbohydrates, proteins	(Christudas S, et al., 2012)
Chloroform extract	Whole plant	Against <i>B. faecalis</i> and <i>E. coli</i>	(Christudas S, et al., 2012)
Aqueous extract	Leaves	DPPH radical scavenging activity (µg/mL)	(Singh P, et al., 2017)
Ethanol extract	Leaves	Polyphenol content, flavonoids, antibacterial activity against <i>Pseudomonas aeruginosa</i>	(Singh P et al., 2017; Pai C, et al., 2011)
Methanol extract fractionated with Dichloromethane (DCM)	Aerial parts of plant	9, 12-octadecadienoic acid ethyl ester (18.04%), 5-cholestane (12.42%), hexadecanoic acid ethyl ester (4.86%) and 9-octadecenoic acid ethyl ester (4.72%). Cholesterol glycosides and rhamnositides are known for their potent cytotoxicity against malignant tumor cells	(Policegoudra RS, et al., 2014; Liu XT, et al., 2008)

The GC-MS analysis of the methanolic and ethanolic extracts of *Tridax procumbens* revealed the presence of four phenolic compounds namely thymol (1.78 and 1.52 mg/g), eugenol (49.64 and 49.88 mg/g), gallic acid (0.34 and 0.52 mg/g) and isobutyl gallate (2.88 and 63.32 mg/g). The result also revealed that the ethanolic extract (166.7 mg/g of gallic acid), has more phenolic content compared to the methanolic extract (54.64 mg/g of gallic acid). The in vitro antioxidant activity has also demonstrated that ethanolic extracts expressed higher antioxidant activity compared to methanol and aqueous extract (Singh P, et al., 2017).

Eight secondary metabolites from the aqueous and methanolic leaf extract of *Tridax procumbens* Linn. (Dhanabalan R, 2008) showed the presence of eight phytochemicals such as alkaloids, tannin, saponin, steroid, phlobatannin, terpenoids, flavonoids and cardiac glycosides form the methanolic extract of leaves. *Tridax procumbens* leaves have also been found to contain anthraquinones and anthracene derivatives of rhein, emodol, aloe-emodin, sennosides A and B, 4, 5-dihydroxy-1-hydroxymethylanthrone and 4,5-dihydroxy-2-hydroxymethylanthrone. Amongst other secondary metabolites some compounds such as ellagitannin, naphthalene, phenolic acid, purine, and xanthone are also found.

Compounds such as kaempferol glycosides and anthraquinones, have already proven to have antimicrobial properties. The in vitro antioxidant activity namely DPPH,

total polyphenol content, total flavonol content and reducing power assay were analysed.

Table 3: Pharmacological properties of *Tridax procumbens*

Pharmacological property	Active against	Phytochemicals responsible for the activity	Extraction procedure	Reference
Antifungal activity	<i>C. albicans</i>	Phenols, flavonoids, saponins, sterols and fatty acids, puerarin, esculetin, oleanolic acid, betulinic acid, centaurein, bergenin and centaureidin. Bioactive compounds 9, 12-octadecadienoic acid ethyl ester, cholestane, hexadecanoic acid ethyl ester and 9-octadecenoic acid ethyl ester.	Methanol extract, Diluted Cardiomyopathy (DCM) fraction	(Policegoudra RS, et al., 2014)
Antioxidant activities	DPPH (1, 1-diphenyl, 2-picrylhydrazyl)	Phenolics, proteins, vitamins, flavonoids, tannins, catechins and pectins	Ethyl acetate and n-Butanol	(Habla JD, et al., 2010)
Anti-inflammatory activity	COX-1 and COX-2	Centaurein and bergenin, flavonoids and other polyphenols	Ethyl acetate extract	(Jachak SM, et al., 2011)
Antibacterial activity	<i>Staphylococcus aureus</i> , <i>Klebsiella pneumoniae</i> , <i>Salmonella typhi</i> , <i>Escherichia coli</i> and <i>Bacillus cereus</i>	Alkaloids, flavonoids, glycosides and other aromatic compounds	Methanol and ethyl acetate extracts	
Anti-cancer activity	Potent cytotoxic activity against malignant tumor cells	5 $\alpha$ -cholestane, monoterpenes (alpha and beta pinenes)	Crude flower aqueous and acetone extracts,	
Hepatoprotective activity	Reduced levels of aspartate transaminase, alanine transaminase, alkaline phosphatase, lactate dehydrogenase and gamma glutamyl transferase) and bilirubin	Flavonoids, procumbenin	95% Ethanol extract	(Ravikumar V, et al., 2005)
Immunomodulatory activity	Humoral and cell mediated immune system Sheep Red Blood Cells (SRBC) induced delayed type hypersensitivity reactions	Triterpenoids and sesquiterpene Flavonoidal fraction and saponin fraction	<i>T. procumbens</i> Ethanol Insoluble Fraction (TPEIF) of the aqueous extract. EFTP (Ethyl Acetate Fraction) and NFTP (N Butanol Fraction)	(Tiwari U, et al., 2004)

Enlist the therapy activity:

**Antifungal activity :** The antifungal activity of *T. procumbens* may be due to the presence of many bioactive compounds such as, phenols, flavonoids, saponins, sterols and fatty acids. The essential oils obtained from the flowers of *Tridax procumbens* L. were found to be active against the tested fungi (Joshi RK and Badakar V, 2012). Methanol extract fractionated with dichloromethane have produced zones of inhibition ranging from 17 to 25 mm against various fungal strains including *Microsporum fulvum* (MTCC 8478), *Microsporum gypseum* (MTCC 8469), *Trichophyton mentagrophytes* (MTCC 8476), *Trichophyton rubrum* (MTCC 8477) and *Candida albicans* (MTCC 854). Among all other species *C. albicans* was highly susceptible. The anti-

dermatophytic activity of the DCM fraction may be attributed to the presence of unsaturated fatty acids, 5-cholestane and different siloxanes (Policegoudra RS, et al., 2014) *Tridax procumbens* also possesses anti fungal property against three phytopathogenic fungi i.e. *Helminthosporium oryzae*, *Rhizoctonia solani* and *Pycularia oryzae*. The flowers also have excellent inhibitory potential against the tested plant pathogen, *Fusarium oxysporum*. Free flavonoids and sterols of *T. procumbens* (flower) have also completely inhibited the spore germination of the fungi (Sharma B, Kumar P, 2009) [5].

**Anti-cancerous activity:** The in vitro anticancer activity of essential oil obtained from the leaves of *T. procumbens* was evaluated for MCF-7 cell line by MTT assay, where the result revealed that the essential oil has significant anticancer activity which may be attributed to the presence of important terpenes like  $\alpha$ -pinene and  $\beta$ -pinene. The flower crude aqueous and acetone extract of the plant *Tridax procumbens*

was also tested on prostate epithelial cancerous cells PC3 by measuring cell viability by MTT assay. The assay was based on the capacity of mitochondrial enzymes of viable cells to reduce the yellow soluble salt MTT to purple blue insoluble formazan precipitate which was then quantified spectrophotometrically at 570 nm. The results of the analysis revealed anti-cancer activity of the crude flower extract.

**Anti-inflammatory activity:** The most active fraction of *T. procumbens* responsible for anti-inflammatory activity is Ethyl Acetate (ETA) fraction as it was found to contain moderate polar natural products like alkaloids and flavonoids. The alkaloids and flavonoids can counteract Reactive Oxidative Species (ROS) involved in the pathogenesis of inflammation and related ailments in biological systems. *Tridax procumbens* leaves were tested for their contractile activity in response to the potent gastrointestinal constrictors. Oral exposure of Aqueous *Tridax procumbens* Leaf Extract (ATPLE) to the adult male wistar rats potentiated the contraction in duodenal and jejunal small intestinal smooth muscle. Contraction in response to M3 receptor subtype activator (acetylcholine) which couples to Gq and PKC, H1 receptor subtype activation (histamine) and high conductance Ca<sup>2+</sup>-activated K<sup>+</sup> channel activator (KCl) was significantly enhanced in ATPLE treated group as compared to control group. Thus, The enhancement in the contraction of ATPLE treated rats may be predicated on *Tridax procumbens* ability to offer protection against inflammation and tissue damage to gastrointestinal smooth muscle [6].

## CHEMICAL CONSTITUENTS

In many research studies, the different parts of plants show various phytochemical compounds. Phytochemical screening of this plant, observed that Alkaloids, flavonoids, carotenoids, saponins, fumaric acid, Tannins, Anthocyanins, phenol and steroids are present. *T. Procumbens* is sodium, potassium and calcium rich medicinal plants.[8] In a present research study, it has been estimated that the leaves of the plant mainly contain crude proteins 26%, crude fiber 17%, soluble carbohydrates 36%, and calcium oxide 5%. The flower of this plant consists of luteolin, glucoluteolin, quercetin and isoquercetin.[7] Oleanolic acid is obtained from this plant found to be a potential antidiabetic agent when tested against alpha-glucosidase. [7]

### A. Botanical Morphology

1) **Habitat:** *Tridax procumbens* is an annual or perennial herbaceous weed found in tropical and subtropical areas of the world, growing mainly during the rainy season at meadows, croplands, disturbed areas, lawns, roadside (Figure 2) or

settled areas. This medicinal herb shows a typical feature of a beneficial weed[9,10, 11,12,13].

2) **Growth:** Plants are prostrate or erect, forming patches, with flowering axis 15 to 35 cm high.

3) **Leaves:** Leaves are opposite, simple, carried by a petiole, 1 to 2 cm long. They are thick, soft and dark green. The lamina is oval to lanceolate, 2 to 6 cm

long and 2 to 4 cm wide, base attenuate in the corner and with strongly and irregularly serrated margin.

Both sides are hispid, with tuberculate based bristles. Pubescence is most abundant on the underside.



Figure: 2. Leaves

1) **Flower:** Capitulum formed of 3 to 8 ligulate daisy-like female flowers, creamy white on the periphery of the capitulum, tridentate. In the center of the capitulum, flowers are yellow, tubulate bisexual. The tube, 6 mm long, with five short lines at the top. This plant has two types of flowers as ray florets and disc florets with basal placentation.



Figure: 3. Flower

2) **Inflorescence:** Inflorescences in solitary capitulum (Figure 5), held by a peduncle, 12 to 32 cm long, abundantly hispid. The bracts of the involucre are arranged in 2 rows. They are oval to lanceolate; 6 mm long, pubescent and green.



Figure : 4. Inflorescence

1) Stem and Root: Stem is cylindrical, hispid, covered with multi-cellular hairs of 1 mm; tuberculation at the base. The Root is a strong taproot system. [14]

2) Genetics: The chromosome numbers of *Tridax procumbens* has been registered as  $2n=36$  numbers of *Tridax procumbens* has been registered as  $2n=36$ . [15]

Enlist Pharmacological Activities:

- 2.1. Antibacterial activity
- 2.2. Antifungal activity
- 2.3. Hypotensive effect
- 2.4. Immunomodulatory
- 2.5. Anti-inflammatory
- 2.6. Antioxidant activity
- 2.7. Hepatoprotective activity
- 2.8. Wound healing activity
- 2.9. Anticancerous activity
- 2.10. Antihyperlipidemic activity
- 2.11. Hemostatic activity
- 2.12. Antiarthritic activity
- 2.13. Anti-juvenile hormone activity
- 2.14. Antidiarrheal / Antisecretory activity
- 2.15. Air growth promoting activity
- 2.16. Insecticidal activity
- 2.17. Antimicrobial activity
- 2.18. Antiparasitic activity
- 2.19. Anti-ulcer activity
- 2.20. Anti-obesity activity
- 2.21. Antimalarial activity
- 2.22. Antileishmanial activity
- 2.23. Antilitiatic activity
- 2.24. Repellency activity
- 2.25. Miscellaneous

#### A. Anti-Lithiatic Activity (Kidney Stones)

Ethanol extract of the plant was also used for treating kidney stone disorders. It showed activity against 0.75% v/v ethylene Glycol and 2% w/v ammonium chloride induced

calcium oxalate urolithiasis, and hyperoxaluria induced oxidative stress in Animal models. Treatment with the decoctions of the plant was able to reduce calculogenesis induced urinary excretion and Renal deposition of calcium oxalate and resultant lipid peroxidation, indicating anti-urolithiasis and anti-oxidant effects. [16, 17] Thus, *Tridax procumbens* has proven its effect is useful in treatment of renal stone disease. Inhibitors (extracts) was lesser than blood glucose levels. Madhumeha is another name of diabetes in which a patient passed sweet urine and exhibits sweetness all over the body in Form of sugar .i.e.,sweat , mucus ,urine blood .from ancient time various other Herbal medicine used for lowering blood glucose levels as such or in juices Form[24]. Aq. And alcoholic extract of leave of *Tridax Procumbens* leave (200mg/kg) orally administered for 7days produced a Significant reduced in the blood glucose level. *Tridax Procumbens* can impart not only by hypoglycemic effect but also by Improving lipid metabolism, antioxidant properties and capillary action in diabetics[25].

#### EXTRACTION OF LEAF MATERIALS (T. PROCUMBENS)

The plant material can be extracted by drying the specified plant in the shade and then grinding it into a fine Powder. After that, the dried powdered material is percolated in a Soxhlet extractor for 48 hours using the polar Solvent hexane, then with the non polar solvent hexane.

##### A. Procedure of Extraction

- 1) Take a dried leaves were ground to a coarse powder.
- 2) Then, take 500 mg of powder was extracted with solvent like ethanol or aqueous solution.

Extraction process was carried out using soxhlet apparatus for 36 hrs blood glucose levels. Madhumeha is another name of diabetes in which a patient passed sweet urine and exhibits sweetness all over the body in Form of sugar .i.e.,sweat , mucus ,urine blood .from ancient time various other Herbal medicine used for lowering blood glucose levels as such or in juices Form[24]. Aq. And alcoholic extract of leave of *Tridax Procumbens* leave (200mg/kg) orally administered for 7days produced a Significant reduced in the blood glucose level. *Tridax Procumbens* can impart not only by hypoglycemic effect but also by Improving lipid metabolism, antioxidant properties and capillary action in diabetics[25].

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- 4) Then, take 500 mg of powder was extracted with solvent like ethanol or aqueous solution.
- 5) Extraction process was carried out using soxhlet apparatus for 36 hrs.



#### MATERIAL AND METHODS FOR HERBALGEL

1. Collection of plant – For the purpose of formulation of gel *Tridax procumbens* plants was collected from farms and surrounding areas of and our village near solapur in Maharashtra, also some of leaves collected from surrounding areas of College of Pharmacy Solapur, Maharashtra. (3)

2. Preparation of extract - Flowers of collected plants were removed then Remaining parts washed with tap water then with Distilled water and dried on a filter paper in shade For seven days. After complete drying of plants which has leaves, stem and roots powdered in an Electric blender then powder were collected and passed through sieve No.12 to remove unwanted Materials. After this step powder was dissolved in Water with proportion 1:10 after removing the flowers from the collected plants, the remaining parts were cleaned with tap water, distilled water, and filter paper in the shade. Seven days in a row. Once the plants have dried completely which is powdered leaves, stem, and roots in an Electric blender, after which powder was gathered and went through sieve No. 12 to eliminate undesired Contents. Following this stage, the powder was mixed with Water in a 1:10 ratio. This mixture was kept for incubation for 24 hours .After that, it was filtered, the filtrate was saved for the water to evaporate, and sticky extract was saved for preparation Of gel(1)

TABLE NO.4 FORMULATION

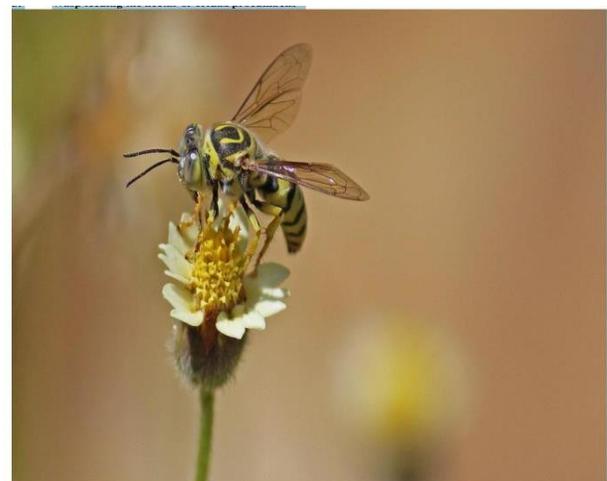
Sr. No	Ingredient	F1	F2
1	<i>Tridax procumbens</i> extract	500mg	500mg
2	Carbocol 940	-	1.5mg
3	HPMC	1.5 mg	-
4	Triethanolamine	4ml	2ml
5	PEG 400	5ml	5ml
6	Propyl paraben	50mg	50 mg
7	Water	Up to 50 ml	Up to 50 ml

1. Flowers and leaves of *Tridax procumbens* –

2. Ripe fruit and flower of *Tridax procumbens* –



1. Wasp feeding the nectar of *Tridax procumbens* –



2. Exoskeleton of *Tridax procumbens* –



Binomial name – *Tridax procumbens* L.

Synonyms – • *Amellus pedunculatus* Ortega ex Willd.  
*Balbisia canescens* Rich. ex Pers. • *Balbisia divaricata* Cass.  
*Balbisia elongata* Willd. • *Balbisia pedunculata* Hoffmann's.  
*Chrysanthemum procumbens* (L.) Sessé & Moc.  
*Amellus pedunculatus* Ortega ex Willd.  
*Balbisia canescens* Rich. ex Pers.  
*Balbisia divaricata* Cass.  
*Balbisia elongata* Willd.  
*Balbisia pedunculata* Hoffmann's.  
*Chrysanthemum procumbens* (L.) Sessé & Moc.  
*Tridax Procumbens* var *canescece*  
*Tridax Procumbens* var. *Ovatifolia*

#### Formulations of gel– Procedure –

1. Required quantity of carbopol was taken and 20ml of water was added in it; it was stirred at 300- 500RPM in a homogenizer for 15 minutes.
2. After achieving a sticky consistency add triethanolamine and more 10ml of water. Again it was stirred at higher than 500RPM.
3. After another 20 minutes a gel base was formed then *Tridax procumbens* extract was added; and it was further stirred for 10 minutes at higher rpm, Propylene glycol, Propyl Paraben and methyl paraben were further added in geometric proportions to yield a homogenous gel. Add glycerine in the formulation and stirred for 10 minutes to proper mix up.
4. Finally this whole mixture was stirred for another 45 minutes with small incremental addition of water.

#### Characterizations of *Tridax Procumbens*

1. *Tridax Procumbens* has been proven to show antibacterial activity against *staphylococcus aureus* and can enhance skin Infection healing process.

2. *Tridax Procumbens* is a perennial herb that has creeping stem which can reach from to 8 – 30 inches (20 -75cm ) long
3. The leaves of *Tridax Procumbens* are opposite , pinnate , oblong to ovate and 1-2 inches (2.5-5 cm) long with fun date bases , coarsely serrate margins , and acute apexes .
4. *Tridax Procumbens* L. is a hirsute , perennial herb with dense hairy structure .
5. The leaves are simple, ovate to lanceolate in shape decussate with cuneate base , acute apex , serrated to coarsely dentate margins and ex – stipulate opposite phyllotaxi
6. It grows up to 40 cm or more in height
7. Flowers with whitish or creamy yellow rays , disc yellow or greenish  
;January may to June and September .
8. This includes aspects of the outward appearance (shape , structure ,Odor, pattern, size), i.e. external morphology (or eidonomy), as well as the form and structure of the internal parts like bones and organs,  
i.e. internal morphology (or anatomy ).
9. This is in contrast to physiology, which deals primarily with function. Morphology is a branch office life science dealing with the study of gross structure of an organism or taxon and its component parts. 10.*Tridax procumbens* Linn. Strongly proved for anti – inflammatory and Analgesic activity in Animal study .
10. Traditionally, *Tridax procumbens* has been use in India for wound healing and as an anticoagulant, antifungal ,and insect repellent .
11. Although *Tridax procumbens* Linn was reported as a weed to invade in many crop , it has been long employed as a traditional drink to cure treat bronchial catarrh , diarrhoea , dysentery ,and liver disease.
12. *Tridax procumbens* is well adapted for the occupation of disturbed habitats having several adaptative life – history characteristics such as rapid colourizations of disturbed successional habitats  
;high reproductive rates ,early and continues reproduction and rapid somatic growth .
13. The leaves of *Tridax procumbens* were screened for the presence of bioactive molecules .
- 15 They had high flavonoids, tannins ,alkaloids  
;hydroxycinnamates , phytosterols , moderate benzoic acid derivatives and ligans ,and low carotenoids contents .
16. Its fruit is a hard achene covered with stiff hairs and having a feathery,plume white pappus at one end.

#### Phytoconstituents:

The various research studies, it was showed that the plant has different phytochemical screening, it was observed that alkaloids, carotenoids,saponins, flavonoids and tannis are present in this medicinal plants.

1. Alkaloids: Alkaloids are a diverse group of organic compounds that often have pharmacological effect. many alkaloids have been found to possess medicinal properties, such as analgesic, antimicrobial or antidiarrheal activities. Alkaloids are defined as any class of nitrogenous organic compounds of plant origin that have pronounced physiological effect on human. *Tridax procumbens* in the presence of some alkaloids has also been reported. phytochemical screening analysis using aqueous extraction of leaves. thirty nine alkaloids were present, mainly: Akuamidine (73.91%) and Voacangine (22.33%) (Ikewuchi, 2012). Besides Alkaloids, the extract contained sterols and tannins. Alkaloids of the pedicle and buds of *T. procumbens* showed antimicrobial activity against *Proteus mirabilis* and *Candida albicans*; alkaloids from buds showed activity against *E. coli* and *Trichophyton mentagrophytes*. The total amount of alkaloids in the pedicle was 32.25mg/gdw In the pedicles and 92.66mg/gdw in the buds . The presence of these alkaloids point once more to the great potential of this plant.

2. Carotenoids: Carotenoids are fat-soluble pigments found in the leaves that have three main functions in a plant: light-harvesting, protection from photooxidative damage, and pigmentation to attract insects. Carotenoids have been postulated to prevent damage to DNA by oxidative stress. Many types of these secondary metabolites have been isolated from *T. procumbens* including beta carotene, which can be converted to vitamin A, which is important for maintenance of epithelial tissues. Vitamin A deficiency can result in impairment of immunity and hematopoiesis, night blindness, and Xerophthalmia. Carotenoids such as beta-carotene and lutein have shown activity in the reduction of UV-induced erythema. The photo protective properties have also been linked with the antioxidant properties of carotenoids.

2. Saponins: Saponins are steroidal glycosides that contain pharmacological and medicinal properties and have been detected in *T. procumbens*, specifically a steroidal saponin and pB- Sitosterol-3-O-β D-xylopyranoside in the flowers of the species . Another study determined that saponins from an ethanolic extract of *T. procumbens* could potentially contain antidiabetic properties by inhibiting the sodium glucose co-transporter-1 in the intestines of male Wistar albino rats.

3. Flavonoids: A recent study has demonstrated the presence of twenty-three flavonoids in *T. procumbens* with total content around 65 g/kg. Kaempferol and catechin and its derivatives (-) epicatechin, (+)- catechin, (-)- epigallocatechin, (+)- gallic acid, (-)- Epigallocatechin-3-Gallate (EGCG) and (-)-Epicatechin- 3-Gallate) account for about 17.59% and 26.3% respectively. The remaining 56.11% represent sixteen flavonoids namely biochanin, apigenin, naringenin, daidzein,

quercetin, butein, robinetin, baicalin, nobiletin, genistin, ellagic acid, l, myricetin, baicalin, isorhamnetin and silymarin [

4. Tannins: Tannins are naturally occurring water-soluble polyphenols found in plants. Tannins have anti-microbial properties, as well as anti-carcinogenic and antimutagenic properties, potentially because of their antioxidant capabilities. Several researchers have described the presence of tannins in *T. procumbens*. Acetone-water Chloroform- water showed the presence of tannins in leaf extracts of *T. procumbens*. Tannins are present in the pedicle and buds of *T. Procumbens*.

#### 1 Medicinal Uses and traditional Uses

The aqueous leaf extract of *Tridax procumbens* possesses cardiovascular effects by significantly reducing heart rate and blood pressure. The lyophilized aqueous leaf extract exhibits anti-inflammatory action comparable to commonly used anti-inflammatory drugs such as ibuprofen and aspirin. The whole aerial parts of *Tridax procumbens* have hepatoprotective properties, meaning they can protect the liver from damage. Additionally, they exhibit antisecretory activity, which can help in reducing diarrhea. *Tridax procumbens* shows activity against bacteria, protozoa, and fungi, making it potentially useful in combating various infections. The leaf juice of *Tridax procumbens* is traditionally used for wound healing, particularly in dead space wounds. The seeds of *Tridax procumbens* are utilized to check all types of bleeding. The aqueous extract of the whole aerial parts of *Tridax procumbens* is used as an immunomodulator, meaning it helps modulate the immune system. *Tridax procumbens* has a long history of traditional use in different cultures. It has been used for treating anemia, colds, inflammation, hepatopathies, bacterial and fungal infections, vaginitis, stomach pain, diarrhea, mucosal inflammations, and skin infections. In Guatemala, it is used to treat protozoal infections, high blood pressure, diabetes, and various gastrointestinal and respiratory infections. Some of the traditional uses of *Tridax procumbens* are supported by scientific studies, such as its anti-plasmodial activity against Chloroquine-resistant malaria parasites (*Plasmodium falciparum*) and its wound-healing and antibacterial properties.

2. Traditional Uses: In Nigeria, the entire plant is used to treat typhoid fever, cough, fever, stomachache, backache, diarrhea and epilepsy. Farmers in Africa use the plant for treatment of livestock for example, *Tridax* is used along *Vigna parkeri* to treat chronic mastitis by grinding both plants, and adding salt and water and applying to the udder. A study investigated the antibacterial effect of *Tridax* against mastitis-causing bacteria and found that the ethanolic extract had significant activity against *Staphylococcus aureus*. However, there was little or

no activity from the aqueous extracts against *Streptococcus uberis* and *Klebsiella pneumoniae*, in comparison with *Spathodea campanulata* extracts. In Benin, breeders complement the feed of rabbits or other livestock combining with other plants; although rabbits consume it in lower amounts than other fodder, probably due to low palatability. In Togo, the fresh, crushed leaves are used for dressing wounds. The decoction of the leaves is used against pain, to treat malaria, and against abdominal and gastrointestinal mycosis. In India it is known as an insect repellent, used to treat diarrhea, and to help check for Hemorrhages. In addition, some reports include the use as a cure for hair loss. A study in Tamilnadu, India, revealed that native inhabitants apply the juice from the leaves for the healing of wounds. The same study also infers that *T. Procumbens* is one of the most useful traditional medicinal plants. It has also been shown to have many minerals like calcium, selenium, magnesium, potassium and sodium. The people in Udaipur, India, have traditionally ingested powdered *T. procumbens* leaves, along with other herbs, to treat diabetes. The species has shown to be a Great source of potassium, which is used for the treatment of cramps and a safe source ingredient for future medicinal uses. These traditional uses demonstrate the potential uses of this plant. *Tridax procumbens* has been extensively utilized in the Ayurvedic system of medication and is well accepted medicine for a liver disorder. It's been found to possess significant medicinal properties against malaria; dysentery, Diarrhoea, bronchial catarrh, blood pressure, hair fall, stomach ache, headache and hair fall. It also has wound healing properties and check hemorrhage from cuts and bruises. Antiseptic, insecticidal and parasiticidal properties were reported in flowers and leaves. The plant also possesses immunomodulatory, antidiabetic, antihepatotoxic And anti-oxidant, anti- inflammatory, analgesic activity.

### PHYSICAL CHARACTERISTICS

**Leaves:** The leaves of *Tridax procumbens* are simple, toothed and arranged in a rosette at the base of the plant. They are often lobed or flowers are the most distinctive feature of *Tridax procumbens*. They look like daisies, with a central yellow flower surrounded by white, yellow or pink flowers. The flowers are usually small and numerous, forming

**Stem:** The trunk of the plant is prostrate or trailing, often reaching up to 50 cm in length. They can take root at the nodes, which allow the plant to

**Fruits and seeds:** After pollination, disc flowers produce small cylindrical fruits called achenes. Each achene contains a single seed and is covered

with a tuft of white hairs called pappus. This cloth helps to disperse the seed by the wind.(12)



Fig.2: Leaves & Flower of *T. Procumbens* Plant

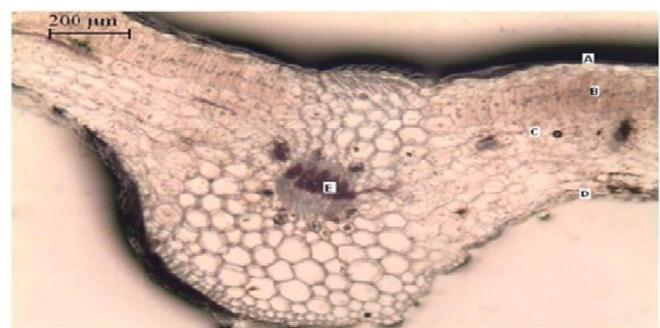


Fig.3: Stem & Fruits of *T. Procumbens* Plant

### HISTOLOGICAL STUDIES

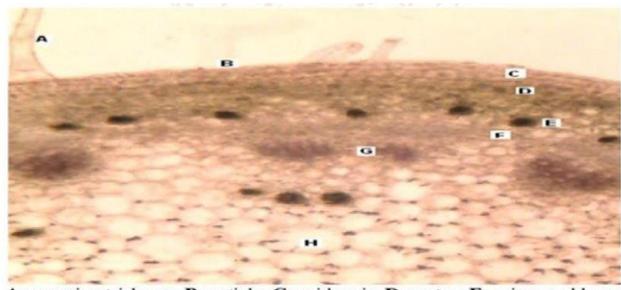
- 1. Leaf Structure:** The leaves typically exhibit a simple structure with an epidermis covered by a cuticle. The mesophyll is divided into palisade and spongy parenchyma, aiding in photosynthesis.
- 2. Stem Anatomy:** The stem has a well-defined epidermis, collenchyma for support, and vascular bundles arranged in a ring, contributing to its structural integrity.
- 3. Flower Structure:** The flowers are composed of numerous ligulate florets, with an intricate arrangement of cells in the corolla and a central receptacle containing vascular tissue.

- 1. Root Anatomy:** Roots show a typical dicot structure, with an epidermis, cortex, and a central vascular cylinder. (13-16)



A: Upper epidermis, B: palisade cells, C: mesophyll, D: lower epidermis, E: vascular bundles

Fig 4: TS of Leaf of *Tridax procumbens* X40



A: covering trichome, B: cuticle, C: epidermis, D: cortex, E: primary phloem, F: cambium, G: primary xylem, H: pith

Fig 6: TS of Stem of *Tridax procumbens* X40

## CHEMICAL CONSTITUENTS

The purpose of using plants as a source of medicinal products depends on many forms, such as biological compounds that can be isolated for direct use medicinal products or for the manufacture of biological compounds as medical devices, i.e. Use the whole plant and its parts as herbal medicine (17). Number active chemical constituent were isolated & Reported from the plant *Tridax procumbens*. As a alkaloids, Flavonoids, carotenoids,  $\beta$ -sitosterol, fumeric acid, Luteolin, Quercetin, oxoester, lauric acid, myristic, palmitic, arachidic, Linoleic acid and tannin etc (18- 19).

Some of the other abundant phytochemicals present in *T. procumbens* are 2, 6- dihydroxyacetophenone, 2-O- $\beta$ -D glucopyranoside, echioidin, pinostrobin, dihydroechioidin, tectochrysin-5-glucoside, salicylate methyl glucoside, 5, 7, - trimethoxyflavone., skullcapflavone-2 methyl ether, androechin, tectochrysin, 5, 7, 2'-trimethoxyflavone, echioidin, skullcapflavone ii, 5, 7-dimethoxyflavone and andrographidine. (20)

Different extraction techniques Used to isolate various compounds found in *T. procumbens* will be discussed.

Table 5. Phytochemicals found in *Tridax procumbens*.

Extraction	Compounds/activity	Plant organ	References
Aqueous	Antidiabetic compounds	Aerial parts	Caceres et al., 1998 Ikwuchi, 2012 <sup>(21)</sup>
Chloroform, Acetone	Tannins, condensed catechic	Leaves	Sawant and Godhate 2013(22)
Ethyl acetate, aqueous, ethanol	Flavonoids, kaempferol, (-)-Epicatechin, Isoquercetin, and Glucoluteolin	Leaves, Stem, Root, and Flowers	Kumar et al., 2012; Harborne, 1994. <sup>(23)</sup>
Aqueous	Alkaloids, Akuammide and Vaucangine	Leaves.	Ikwuchi 2012. <sup>(24)</sup>
Methanol-dichloromethane	Bioactive components for antifungal activity against Dermatophytes.	Aerial parts.	Policegoudra et al., 2014.(25)
Ethanol- acetic acid	Alkaloids for antimicrobial activity, against human pathogens, antioxidant, Hepatoprotective	Pedicle and buds.	Jindal and Kumar 2012. Hemalatha 2008.(26)
Petroleum Ether	Antioxidant uses against DPPH.	Dried plants.	Saxena et al., 1977.
Distilled Water-ethanol	Immuno-modulatory effects in rats	Aerial parts.	Tiwari et al., 2004
methanol -n-butanol	Isolation of antioxidant chemicals, mostly flavonoids and saponins	Dried leaves.	Saxena et al., 2013
n-hexane	Antimicrobial against Mycobacterium smegmatis, Escherichia coli, Salmonella spp.	Flowers and aerial Parts.	Kethamakka and Deogade, 2014.(27)
Ethanol	Saponin B-Sitosterol-3-O- $\beta$ -D-xylopyranoside.	Flowers	Saxena and Albert, 2004(28).
Petroleum ether, ethanol	Anti-ulcerogenic effects	Leaves	Jhariya et al., 2015(29)
Hydro- distillation	Essential oil, anti- microbial and anti-inflammatory	Leaves.	Manjamaia et al., 2012b(30)
	Effects, Terpenes, alpha and beta pinenes		
Ethanolic extract	Phytochemical screening: alkaloids, glycosides	Whole plant dried.	Kamble and Dahake, 2015(31)

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