



## PHYTOCHEMICAL AND PHARMACOLOGICAL POTENTIAL OF *TRIDAX PROCUMBENS* LINN.

Satish A. Bhalerao and Tushar S. Kelkar

Environmental Sciences Research Laboratory, Department of Botany, Wilson College, Mumbai – 400 007

### ABSTRACT

India is a country where very rich culture, folk medicine and nature go hand in hand. Since India is blessed by all kinds of environmental conditions like Himalayan to temperate to tropical, very rich flora is observed throughout the year. In nature many of the plants are present to which we call as Weeds, since their cultivation and economical status is not very high. But such weeds can be of great medicinal value. Traditional medicines or folk medicines are an important source of potentially useful new compounds for the development of chemotherapeutic agents. The essential values and uses of some plants have been worked out and published, but many of them remain unexplored to date. Therefore, there is a necessity to explore their uses and to conduct broad spectrum studies to discover their medicinal properties. *Tridax procumbens* Linn. is a spreading herb found throughout India but unfortunately its medicinal and scientific studies are not done up to the mark. Hence the present review aims to explore new avenues for the improvement of phytochemical and pharmacological potential of *Tridax procumbens* Linn. this review attempts to highlight the available literature on the plant with respect to chemical constituent, phytochemical properties and summary of various pharmacological potential.

**KEY WORDS** - *Tridax procumbens* Linn, phytochemical properties, pharmacological potential, chemical constituent, medicinal value

### INTRODUCTION

*Tridax procumbens* Linn. (*Tridax*) family Compositae commonly known as ‘Ghamra’ and in English popularly called ‘coat buttons’ because of appearance of flowers has been extensively used in Ayurvedic system of medicine for various ailments and is dispensed for “Bhringraj” by some of the practitioners of Ayurveda which is well known medicine for liver disorders (Bhagwat *et al* 2008)

*Tridax procumbens* L. is a common medicinal herb used by ethno-medical practitioners, belonging to family Asteraceae. It is best known as a widespread weed and pest plant. It is native to tropical America but it has been introduced to tropical, subtropical and mid temperate regions worldwide. The plant is a procumbent herb and is valued for its pharmaceutical properties (Sahoo M. and Chand P, 1998). The plant is native of tropical America and naturalized in tropical Asia, Africa, Australia, and India. It is a wild herb distributed throughout India. It is also found along roadsides, waste grounds, dikes, riverbanks, meadows and dunes.

*Tridax procumbens* L. is a small perennial herb having short, hairy blade like leaves. Corolla is yellow in colour. It is a common weed grows in open places, coarse textured soils of tropical regions, sunny dry localities, fields, waste areas, meadows and dunes. It is a semi prostrate, annual, creeper herb. Stem is ascending 30-50cm height, branched, sparsely hairy, rooting at nodes. Leaves are simple, opposite, exstipulate, lanceolate to ovate. 3-7 cm long irregularly toothed margin, base wedge shaped, shortly petioled, hairy on both surfaces. Flowers are tubular, yellow with hairs, inflorescence capitulum. *Tridax*

has two types of flower: ray florets and disc florets with basal palcentation. (Khan, 2008) Flowering-Fruiting throughout the year. Fruit is a hard achene covered with stiff hairs and having a feathery, plume like white pappus at one end. The plant is invasive in part because it produces so many achenes and each achene can catch the wind in its pappus and be carried some distance. Calyx is represented by scales or reduced to pappus. Seed have pendulous embryo, endosperm is absent (Jain and Jain, 2012)

### Vernacular Names

English Coat Buttons and *Tridax* Daisy, Hindi Ghamra, Sanskrit Jayanti Veda, Marathi Dagadi Pala, Telugu Gaddi Chemanthi, Tamil Thata poodu, Malayalam Chiravanak, Spanish Cadillp Chisaca, French Herbe Caille, Chinese Kotobukigiku

### Chemical Constituents

The phytochemical screening revealed the presence of alkaloids, carotenoids, flavonoids (catechins and flavones) and tannins. It is richly endowed with carotenoids and saponins. (C. Ikewuchi Jude, 2009). Mineral composition of *T. procumbens* reported from leaves is calcium, magnesium, potassium, sodium and selenium (Chen, 2008).

Leaf of *Tridax* mainly contains croud proteins 26%, crude fiber 17% soluble carbohydrates 39% calcium oxide 5%, Luteolin, glucoluteolin, quercetin and isoquercetin have been reported from its flowers. Whereas the fumaric acid, fl-sitosterol and tannin has also been reported in the plant (Verma and Gupta, 1988). Oleanolic acid was obtained in good amounts from *Tridax* and found to be a potential

antidiabetic agent when tested against aglucosidase (Muhammad Shaiq Ali *et al.*, 2002).

Earlier workers have reported presence of dexamethasone, luteolin, luteolin, beta sitosterol and quercitin. (Reddy *et al.*, 2006), (Subramanian, 1968). Two water soluble polysaccharide; WSTP-IA and WSTP-IB containing  $\beta$ -(1->6)-DGalactan main chain has also been purified from the leaves of the plant (Raju and Davidson, 1994).

Four new terpenoids along with bis-bithiophene were reported from *T. procumbens*: taraxasteryl acetate, beta-amyrenone, lupeol and oleanolic acid (Ali and Jahangir, 2002) Two new flavones, 8,3'-dihydroxy- 3,7,4'-trimethoxy-6-O- $\beta$ -D-glucopyranosyl flavone and 6,8,3'-trihydroxy-3,7,4'- trimethoxyflavone were isolated from *Tridax procumbens* Linn., together with the four known compounds puerarin, esculetin, oleanolic acid and betulinic acid. The structures of the two new flavones were elucidated based on chemical analysis and spectral methods (IR, 1D and 2D NMR, ESIMS, HR-ESI-MS), (Runsheng *et al.*, 2010)

Leaf of tridax mainly contains crude proteins 26%, crude fiber 17%, and soluble carbohydrates 39%, calcium oxide 5%. Oleanolic acid was also obtained in good amounts from *Tridax* and found to be a potential antidiabetic agent when tested against  $\alpha$ -glucosidase (Verma and Gupta, 1988), (Ali and Jahangir, 2002)

### Pharmacological Activities

#### Antidiabetic Activity

The aqueous and alcoholic extract of leaves of *Tridax procumbens* Linn. shows significant decrease in the blood glucose level and it shows antidiabetic activity in the model of alloxaninduced diabetes in rats (Bhagwat *et al.* 2008). The oral administration of acute and sub chronic doses of 50 % methanol extract of *T. procumbens* significantly reduces fasting blood glucose levels in diabetic rats. This plant material does not affect the sugar levels in normal rats (Pareek, 2009), (Salahdeen, 2004)

#### Hepatoprotective Activity

The hepatoprotective activity of aerial parts of *Tridax* shows significant protection in alleviation of DGalactosamine/ Lipopolysaccharide (D-GalN/LPS) induced hepatocellular injury. D-GalN/LPS have been proposed to be hepatotoxic due to its ability to destruct liver cells. The multifocal necrosis produced by D-GalN and the lesion of viral hepatitis in humans are similar. This amino sugar is known to selectively block the transcription and indirectly hepatic protein synthesis and as a consequence of endotoxin toxicity, it causes fulminant hepatitis within 8 hr after administration. (Vilwanathan, 2005)

#### Antimicrobial Activity

Whole plant of *Tridax* has reported for its antimicrobial activity on various species of bacteria. A whole plant is squeezed between the palms of hands to obtain juice. Fresh plant juice is applied twice a day for 3-4 days to cure cuts and wounds. The extract of whole plant of *Tridax* showed antibacterial activity only against *Pseudomonas aeruginosa*. The disk diffusion method was used to test the antibacterial activity. Four strains of bacteria employed in test were two-gram positive *Bacillus subtilis*, *Staphylococcus aureus* and two gram negative

*Escherichia coli* and *Pseudomonas aeruginosa*. (Mahato and Chaudhary, 2005)

#### Wound Healing Activity

The process of wound healing is a complex and dynamic which has ability to restore the cellular structures and tissue layers. The Aqueous extract of whole plant of *Tridax procumbens* Linn. has ability to set the normal and immunocompromised wound healing in rats (Nia *et al.*, 2003). The wound healing process by application of this plant material involves complex interaction between epidermal and dermal cells, the extra cellular matrix, controlled angiogenesis and plasma-derived proteins all coordinated by an array of cytokines and growth factors (Bhat *et al.*, 2007). The plant not only increase lysyl oxidase but also, protein and nucleic acid content in the granulation tissue, probably due to increase of glycosamino glycan content. (Udupa *et al.*, 1991), (Diwan *et al.*, 1982)

#### Anti-Cancerous Activity

The effect of anti cancer activity of traditional plant *Tridax procumbens* flower crude aqueous and acetone extract was tested on prostate epithelial cancerous cells PC3 was determined by measuring cell viability by MTT assay. Experiment consists of 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 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 is then quantified spectrophotometrically at 570nm. The results of this analysis revealed the fact that flower crude extract has anti-cancer activity (Vishnu priya *et al.*, 2011)

#### Immunomodulatory Activity

Ethanol insoluble fraction of aqueous extract of *Tridax procumbens* has been reported for immunomodulatory activity. It significantly increases the phagocytic index, leukocyte count and splenic antibody secreting cells. The immunomodulatory activity of Ethanol extracts of leaves of *Tridax procumbens* Linn. have been also studied in Albino rats with *Pseudomonas aeruginosa*, which has ability to inhibit the proliferation of this microorganism (Oladunmoye, 2006)

#### Hypotensive effect

The cardiovascular effect of aqueous extract obtained from the leaf of *Tridax procumbens* Linn. was investigated on anaesthetized *Sprague-Dawley* rat. The aqueous extract has ability to cause significant dose dependant decreases in the mean arterial blood pressure. The higher dose leads to significant reduction in heart rate where as lower dose did not cause any changes in the same. The leaves of *Tridax procumbens* Linn. shows hypotensive effect (Salahdeen *et al.*, 2004)

#### Repellency Activity

In other study, essential oils were extracted by steam distillation from leaves *Tridax procumbens* Linn. and they were examined for its topical repellency effects against malarial parasite *Anopheles stephensi* in mosquito cages. All essential oils were tested at three different concentrations (2, 4 and 6 %). Of these, the essential oils

of *Tridax* exhibited relatively high repellency effect (> 300 minutes at 6 % concentration) and concluded that *tridax* are promising as repellents at 6 % concentration against *An. stephensi*. (Rajkumar and Jebanesan, 2007)

#### Other activities

*Tridax procumbens* Linn. was also reported for its anti inflammatory and anti oxidant activity (Nia *et al*, 2003). Leaves of *Tridax* were good hair growth promoters and has ability to prevent falling of hairs (Verma and Gupta , 1988), Rathi *et al*, 2008). This plant was also used as a good bioadsorbent for the removal of highly toxic ions of Cr (VI) from industrial wastewater. Hence *Tridax procumbens* Linn. recommended for bioremediation (Raina *et al*, 2008). This plant was also used for bronchial catarrh, dysentery, diarrhoea and in the West Africa and for a remedy against conjunctivitis (Rathi *et al*, 2008), (Mahato and Chaudhary, 2005).

#### CONCLUSION

*Tridax procumbens* Linn. (Compositae) is widely distributed weed. Each and every part of it is useful having pharmacological activity. The plant product over synthetic compound is the need in treatment of diseases, as it does not have any deleterious effect in higher animals including man. India is home to a variety of traditional medicinal systems that rely to a very large extent on native plant species for their raw drug material. The work done till date on various pharmacological activities like hepatoprotective effect, immunomodulating property, wound healing activity, antidiabetic, antimicrobial, anti inflammatory and antioxidant, bronchial catarrh, diarrhea, dysentery and hair treatment give immense importance to the herb. The qualitative analysis revealed the presence of the biomolecules such as anthraquinone, catamol, flavonoids, phenolic compounds, saponins, steroids, tannins and terpenoids. The studies on plant *Tridax procumbens* also desire development of novel therapeutic agents from the various types of compounds with diverse pharmacologic properties isolated from it. Therefore, there is huge room for research in direction of more pharmacological activities of plant and to elucidate the mechanism of action of same in future.

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