



A Review on Pharmacological Activity and Various Aspects of *Tridax Procumbens*

¹Mr. Shubham Shivaji Pawar, ²Miss. Jawal D.T.

¹Student, LNBCIOP, Raigaon, Satara

²Asst. Prof., LNBCIOP, Raigaon, Satara

ABSTRACT-

A medicinal plant *Tridax procumbens* is known as 'cotton daisy' and belonging to asteraceae family, it is ayurvedic herb of Asia with history of traditional use. *Tridax procumbens* have been used from ancient times to treat wounds, skin diseases, and to stop bleeding in folk medicines. It is very promising that produces secondary metabolites such as alkaloids, steroids, carotenoids, flavonoid, Fatty acid, phytosterols and minerals reported wide range of activity such as antibacterial, antioxidant, anti-diabetics, antibacterial, anti-inflammatory, immunomodulatory, hepatoprotective, which has scientifically screened. This study aims to review scientific literatures regarding medicinal properties, morphology, traditional uses phytoconstituents and pharmacological activities to prove and compile that useful herbal medicine. Also the review provides species information to provoke the importance of plant which is beneficial and available at low cost and further future development.

KEYWORDS- *Tridax procumbens*, Phytochemicals, antibacterial, antioxidant, antidiabetic, antileishmanial, hepatoprotective, immunomodulatory, wound healing, antifungal, hemostatic, hypotensive, anti-arthritis, Deflouridation, repellancy.

1. INTRODUCTION:

Tridax procumbens, also referred to as "coat buttons", is a perennial plant from the asteraceae family that is native to tropical America and is the most potent species among 30 species. It is also a widespread weed and pest plant that was originally from tropical America but was introduced to tropical climates (1). *Tridax procumbens* uses a herbal plant in ayurveda to treat wounds (2). *Tridax procumbens* is present across INDIA, but is particularly common in Maharashtra, Madhya Pradesh, Chattisgarh, and other regions (3). Its common name is tridax daisy, and it also goes by several names in many languages, including ghajadvu and ghaburi in Gujarati, ghamra in Hindi, tridhara in Bengali, and kambarmodi, jakhamjudi, and tantani in Marathi(4).

Tridax procumbens Linn will also demonstrate a variety of pharmacological actions, including those that are immunomodulatory, antioxidant, hepatoprotective, analgesic, anti-diabetic, anti-leishmanial, anti-inflammatory, and vasorelaxant..



Fig 1. *Tridax Procumbens*

BIONOMICAL NAMES:

Tridax procumbens

SYNONYMS :

1. *Balbisiacanescens*
2. *Balbisiadivercata*
3. *Balbisiapenuncalta*
4. *Balbisiaelongata*
5. *Chrysanthemum procumbens* .

The purpose of this review is to objectively assess *Tridax procumbens* as a significant medicinal plant and its roles in many signalling pathways that can have a variety of pharmacological effects.

The purpose of the review is to demonstrate value of the *Tridax procumbens* species as a medicinal plants.

2. TRADITIONAL USE :

Traditional and complimentary medicine is being increasingly recognised as an integrative approach to health care in many country(5). the use plant for medicinal purpose date back to the middle paleolithic age approximately 60,000 years ago(6). *Tridax procumbens* is also used as treatment for boils , blisters, and cuts by local healer in part of India. It is dispensed as 'Bhringraj' for liver disorders(4) , the leaf posses insecticidal , parasitical properties and it is also used to stop bleeding from cuts , bruise (7). it is report to be against anemia , cold, inflammations , and hepatopathies , in cuba , this plant is used extensively for the treatment of tonsillitis and oral ulcerations (8). It posses anticoagulant , anticancer , cardiovascular, antiseptic, antimicrobial , anthelminitic , immunomodulatory agent, insecticidal (9). *Tridax procumbens* is used as antibacterial , antifungal , antiviral (10) as well as usedas for vaginitis, stomach pain, diarrhea , mucosal infections and skin infection(8) . Aqueous extract of *Tridax procumbens* have strong anti-plasmodial activity against chloroquineresistant *plasmodium falciparum* parasites(11) . In Nigeria , the entire plant is used to treat typhoid , fever , cough, stomach, backbone , diarrhea and epilepsy (12, 13). It has been shows minerals like calcium , potassium, sodium, selenium(14). The decoction of the leaves is used aginst pain to treat malaria , abdominal and gastrointestinal myeosis (15).

Table 1.traditional uses and plant preparation-

Location	Preparation/extract	Plant ailments uses	References
Guatemala	Leaves : juice	Anemia , colds , inflammations, hepatopathies , vaginitis , stomach pain , diarrhea , mucousal inflammation, skin infection, bleeding	(10) (8)
	Leaves: poultice, dried infusion Stems : dried	Reduce inflammation, gastrointestinal and respiratory infections, high blood pressure, diabetes	(16) (17)
	Whole plant: dried	Protozoal infections, treatment of chronic ulcer caused by leishmaniasis, gastrointestinal disorders	(18)
India	Leaves: dried and other herbs ingested orally , juice	Diabetes, insect repellent, used to treat diarrhea, and to help check for hemorrhages, as well as hair loss. Jaundice, healing of wounds, inflammation	(19), (20), (21) (22) (8) (23) (24)
Africa	Whole plant : blending with other herbs adding salt and water	Treating mastitis in livestock	(25)
Ghana	Decoction with <i>phyllanthusamarus</i>	Anti- malarial, antibacterial, wound healing	(26) (11)
Africa Nigeria	Aqueous extracts	Anti-plasmodial activity	

Benin	Whole plant : dried	Fever, typhoid fever , cough, back ache, stomach ache, diarrhea , epilepsy	(12)
Togo	Whole plant: dried	Rabbit or livestock feed	(13)
			(27)
	Leaves : dried	Dressing wounds , pain , malaria and abdominal and gastrointestinal mycosis	(28)
			(15)

3.PHYTOCHEMICAL:

Phytochemical studies shows that the *Tridax procumbens* is a rich source of chemicals and minerals , compounds can isolated from different part and extracts of *Tridax procumbens*. Phytochemical screening revealed the presence of alkaloids , carotenoids, flavonoids, and tannins. The proximate profile shows is rich in sodium , potassium and calcium .

3.1. Flavonoids –

Phytochemical studies shows that the *T. procumbens* a rich source of flavonoids with a percentage of flavones and flavonones most commonly present in the *astereceae* family. Commonly used in indian traditional medicine as anticoagulants, hair tonic, antifungal, hair tonic, insect repellent , in bronchial catarrh, diarrhoea , dysentery, And wound healing (29).

A new flavonoid can be isolated from aerial part of *Tridax procumbens* 3,6-diamethoxy -5,7,2',3',4'- pentahydroxyflavone 7-0-B-D-glucopyranoside on the basis of spectroscopic techniques and named procumbetin[ali et al 2000] ,two new flavones 8,3-dihydroxy-3,7,4'-trimethoxy-6-0-beta-D-glucopyranosyl flavone and 6,8,3'- trihydroxy-3,7,4'-trimethoxyflavone elucidated on the basis chemical analysis and spectral method(IR ,1D, and 2D NMR , ESI –MS HR-ESIMS) (30) . Luteolin ,glucoluteolin , quecetin and isoquercetin have been reported its flowers (31).

3.2. Tannins –

Tannin are naturally occurring water soluble polyphenols found in plants. Tannin have anti microbial properties , as well as anti-carcinogenic and anti-mutagenic because of their antioxidant capabilities. Several studies shows that the presence of tannin in *Tridax procumbens*[kumar et al] .the acetone water and chloroform water extract of *Tridax procumbens* shows the presence of tannin(32).

3.3. Carotenoids –

Carotenoids are fat soluble pigment found in the leaves. Many types of these secondary metabolites are have been isolated from *Tridax procumbens* including beta-carotene which can beconverted to vitamin A, which is important for maintenance epithelial tissue. Carotenoids may protect cells from oxidative stress by quenching free radicals capable of causing cellular damage and serves lots of actions such as antioxidant, inhibit mutagenesis and immune response, reduce photo induced neoplasm. Carotenoids mainly lutein ,Neoxanthin, antheraxanthene , carotene are be identified from *Tridax procumbens*(33).

3.4. Alkaloids –

Alkaloids are defined as any class of nitrogenous organic compound of plant origin that have pronounced physiological effect. The studies will be performed alkaloids of pedicel and buds shows antimicrobial activity against *S.aureus* , *p. mirabilis* and *C. albicans* , wherease alkaloids of buds show activity against *E.coli* and *T. mentagrophyte*. The total amount of alkaloids in the pedicel shows 32.25mg/gdw and buds shows 92.66mg/gdw. The presence of alkaloid has great potential of this plant.

3.5. Saponins –

Saponins are very vast group of glycosides and widely distributed in higher plants and it posses various activities such as haemolytic ,molluscicidal, anti-inflammatory, antifungal, antimicrobial , antitumor , antiviral activities(sparg) .specifically steroidal saponin and pB-sitosterol -3-O-beta-D-xylopyranoside in the flower species (4) . and another study will be performed saponin from an ethanolic extract of *Tridax procumbens* could have potential contain antidiabetic properties by inhibiting the sodium glucose co-transport -1 (S-GLUT-1)in the intestines of male wister albino rats (34).

4. PHARMACOLOGICAL ACTIVITIES:

4.1. Antidiabetic activity –

Diabetes mellitus can be found everywhere. Although being widespread around the world, diabetes is listed among the top 10 global diseases, possibly even in the top 5. History demonstrates that has been inhabited by Indians since prehistoric times. Another word for diabetes is madhumeha, in which the patient has sweet urine and displays sweetness throughout their body in the form of sugar found in their perspiration, mucus, urine, and blood. *Tridax procumbens* dried leaf extracts in aqueous, alcoholic, and petroleum ether have been shown to have hypoglycemic effects in wister rats (35).

4.2. Hepatoprotective activity –

Hepatitis is a frequent illness in underdeveloped nations that is treated by giving patients hepatoprotective drugs orally. Research demonstrate that the hepatoprotective efficacy of aerial portions of *Tridax procumbens* was studied against D-Galactosamine / Lipopolysaccharides (D-GalN/Lps) caused hepatitis in rats. It was hypothesised that D-GalN/Lps may cause liver cell destruction(36).

4.3. Immunomodulatory activity –

The ethanolic extract of *Tridax procumbens* has immunomodulatory effects in Swiss albino rats, which include stimulating phagocytosis and providing protection from infections with *Pseudomonas aeruginosa*. In albino rats infected with *Pseudomonas aeruginosa*, it is clear that *Tridax procumbens* has a substantial immunomodulatory action. (37).

4.4. Wound healing activity –

Flavonoids have anti-inflammatory, antifungal, and antioxidant properties, and research on phytochemistry have shown that the presence of flavonoids in an ethanolic extract of *Tridax procumbens*. Studies on the wound healing potential of various *Tridax procumbens* extracts have been conducted in vitro and in vivo, and one study reveals that the 2.5–5.0% simple ethanolic ointment extract of *Tridax procumbens* exhibits the most potent wound healing potentials in diabetic and non-diabetic incision and excision. It is also noted that non-diabetic group exhibits better wound healing property than diabetic group. The author will explain why this is so since the *Tridax procumbens* extract contains active ingredients including flavonoids and tannin (38). Studies on the topic of treating wounds using medicinal plants have been conducted recently. *Tridax procumbens* employs leaf juices to speed up the collagenation and epithelialization phases of wound healing, which reduces the amount of granulation and scarring (39).

4.5. Antileishmanicidal activity –

Effective activities against *Leishmania Mexicana* are produced by the combination of the *Tridax procumbens* leaves extract and the *Allium sativum* extract. Mice were injected with *Leishmania Mexicana* promastigotes to test the antileishmanial activity in vivo. The mice were given either *Tridax procumbens* extract or *Allium sativum* extract for up to 14 days, after which the 14th day was compared with control group monitoring, and after 12 weeks of infection, blood samples were collected and determined by ELISA with total immune globulins. The result showed an increasing I type immune response in mice, and the increased ratio of IgG2a to IgG1 indicates a tendency to raise the immune response, leading researchers to conclude that neither treatment(40)

Antioxidant activity –

In the one study shows that various extract can be given such as methanol, ethanol, aqueous and chloroform extract of leaves of *Tridax procumbens* will be given among all the extract shows antioxidant activity that studies shows ethanol extract showed good antibacterial activity other research shows it only given flavonoids and phenolic derivative will show antioxidant activity various assay will be given such as hydrogen donating and reducing power assay (41), further studies will be performed reducing power ability as an antioxidant using in 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay and total phenolic using folin-cloateu method, author concluded that higher percentage of antioxidant activity (96-97%) will be observed than standard that will be gallic acid(90-92%) and ascorbic acid (92-94%) (42).

4.6. Anti-inflammatory activity –

Anti-inflammatory activity of *Tridax procumbens* on carrageenan induced paw edema in rats along with standard drug ibuprofen which reduce paw edema significantly, the oral administration equi-effective of *Tridax procumbens* of individually active rendered by administration one with ibuprofen, the effect of *Tridax procumbens* along with various dose regimen shows greater anti-inflammatory activities than the ibuprofen alone(43).

4.7. Antifungal activity-

Research will be given of antifungal property of *Tridax procumbens* against three phytopathogenic fungi such as *Helminthosporium aoryzae*, *Rhizoctonia solani* and *Pycularia aoryzae* which given two concentration 0.1 and 0.01% methanolic extract which show higher efficacy in the percentage inhibition of radial growth of *H.oryzae* with respect value of *rhizoctonia solani* and *pyricularia aoryzae*. Further studies will perform by using methanolic extract of leaves of *Tridax procumbens* with *Aspergillus niger* and *Aspergillus oryzae* comparing with ciprofloxacin which shows active against two

fungi, the fungal active strain *A. niger* and *A. oryzae* shows zone of inhibition 13 mm to 12mm will shows respectively which shows similar action to ciprofloxacin 11 mm and 10mm respectively(44).

4.8. Hemostatic activity –

Tridax procumbens leaves of different extract were tested for hemostatic activity. This carried out by studying the clotting time of 10 human volunteers by in vitro method. Ethanol extract showed positive activity. The ethanolic extract of the *Tridax procumbens* leaf reduce the clotting time uniformly in the blood samples. The study showed that the hemostatic activity, thus effecting hemostasis(45).

4.9. Hypotensive activity –

The hypotensive effect of *Tridax procumbens* leaf was investigated was investigated Sprague – Dawley rat. They showed the leaf having cardiovascular effect and it has ability cause dose dependent decreases in the mean arterial blood pressure. The higher dose indicates significant reduction in heart rate whereas lower dose did not cause any changes in the same they were reported that leaves of *Tridax procumbens* possess hypotensive effect(46).

4.10. Anti-arthritis activity –

The inflammatory disorder which involves damage to one or more joints is known as Arthritis. It is increasing due to the low consumption of fluids, as a result of the hectic lifestyle. Many studies have been done to report the arthritic effect of *Tridax procumbens* ethanol extract at dose of 250 mg/kg and 500 mg/kg. Indomethacin (10 mg/kg) was used as the standard. The whole plant extract of *Tridax procumbens* showed significant anti-arthritis activity in the Freuds Complete Adjuvant model. The results were comparable with that of Indomethacin (47).

4.11. Defluoridation activity –

Natural fluoride present in drinking water. Water companies added fluoride as a protective agent for teeth. However, in some natural drinking water, fluoride levels may be above safe level considered by the World Health Organization. Recently by using natural products has been rediscovered by water supply Technologists with more scientific rigor. Recently in India researchers have developed a filter system-based on a medicinal herb. This can be very quickly and easily remove “fluoride” from drinking water. *Tridax procumbens* was tested in water for the extraction of toxic heavy metals. The study suggested that *T. procumbens* can be used as a biocarbon absorbent for fluoride. By loading up plant tissue with aluminum ions possible to make a safe biocarbon filter. This filter readily absorbs fluoride ions from water warmed to around 27 °C passing through the filter. The results showed that the filter remove 98 % of fluoride by taking just 3 hrs to with just 2 g of the biocarbon filter. It is an inexpensive way to defluoridate water. In many regions, like India, China, Sri Lanka, West Indies, Spain, Holland, Italy, Mexico, North and South America were contains the natural level of this mineral is high in ground water. The biocarbon filter from *T. procumbens* play an significant role of defluoridation of water in worldwide(48).

4.12. Repellency activity –

Essential oils were extracted by using steam distillation from leaves of *Tridax procumbens* Linn. The extracted oil was examined against malaria parasite *Anopheles stephensi* in mosquito cages for its topical repellency effects. All essential oils were tested at three different concentrations (2, 4 and 6 percentage). Of these, the essential oils of *Tridax* exhibited relatively high repellency effect (>300 minutes 6 percentage 203 © 2019 by JPS Scientific Publications, India concentration) and concluded that *Tridax* are promising as repellents at the 6 percentage concentration against *Anopheles stephensi* (49).

4.13 Antibacterial activity -

The *Tridax procumbens* having antibacterial activity which was tested against the *Pseudomonas aeruginosa*. *Pseudomonas* is the nosocomial strain which was isolated from ventilator associated with pneumonia patient secretions like tracheal secretions and broncho alveolar lavage. This study reported that the ethanolic extract showed very good anti bacterial activity against *Pseudomonas aeruginosa*. Increased zone of inhibition at the concentration of 5 mg/ml. The strain was compared to some control antibiotics like augmentin, ciprofloxacin, cephotaxime and even ticarcillin showed resistant whereas the sensitivity only to imipenem. This report was a statistically significant because the ethanol extract of *Tridax* having inhibition zone against the leading gram negative bacteria associated with nosocomial infections (50). Whole plant of *Tridax* is having antibacterial activity. In this whole plant extract with two Gram positive (*Bacillus subtilis*, *Staphylococcus*) and two Gram negative (*Escherichia coli* and *Pseudomonas aeruginosa*) bacteria. This report showed that the effective antibacterial activity of *Tridax* whole plant only against with *Pseudomonas aeruginosa* by the method of Disc diffusion (51). The leaf extract of *Tridax procumbens* used for the analyzing of antibacterial activity by using various solvents like hexane, chloroform, butanol, ethanol and water. Antibiotic test carried out with *Escherichia coli*, *Pseudomonas aeruginosa*, *Micrococcus sp.*, *Staphylococcus aureus*, *Proteus vulgaris*, *Klebsiella pneumoniae*, *Bacillus subtilis*, *Citrobacter sp.* and *Serratia marcescens* by Disc diffusion method. Gram negative bacteria showed the more zone of inhibition reported in this study (52). Antibacterial activity was carried out with different solvent extracts *Tridax procumbens* leaf against *Staphylococcus aureus*, *Escherichia coli*, *Proteus mirabilis* and *Vibrio cholerae*. In this study 5 different solvents like hexane, petroleum ether, chloroform and methanol were used. Antibacterial activity tested against both gram positive (*Staphylococcus aureus* and *Bacillus subtilis*) and gram negative

(*Enterobacter aerogenes*) by using Agar well diffusion method. Results indicated that more bioactive compound present in methanol than in hexane extract (53). Three different enteropathogens are tested against methanol extract of *Tridax procumbens* by Disc diffusion method. The methanol extract showed highest activity against *Salmonella typhi*, *Shigella flexneri* and least activity against *Escherichia coli* (54).

5. CONCLUSION-

Plants play remarkable role in ecosystem which is very important of biodiversity. In our country posses huge and interesting background about medicinal plant. Resistant power of drug has been increased , it is inscapable to search for new compound with higher potential therefore , we need to continue use because they are a rich source of novel drug having no side effects, easily available at cheap price. *Tridax procumbens* species is widely distributed weed. Each and every part of the plant is having useful pharmacological activity .the vast varieties of different pharmacological activities are hepatoprotective activity, immunomodulatory agent, wound healing activity, anti-diabetic, antimicrobial, anti-inflammatory and antioxidant, bronchial catrrh , dysentery, and hair treatment give immense importance to the herb . several studies , reported a large number of active chemical constituent mainly present in different part of *Tridax procumbens* the large number of chemical constituent responsible for various pharmacological activities . therefore this plant can be explored in chemical, analytical, and biological due to essential importance in aromatherapy, agriculture, cosmetics, and food industry. Flavonoids are the major class compound identified in *Tridax procumbens* and has found in main constituent for biological activities . na , k, ca ions containing inorganic compounds present in *Tridax procumbens* are also responsible for wound healing, vasorelaxation, hemostatic activities. Several studies on the pharmacological activities of *Tridax procumbens* have been conducted , with the majority of studies performed on extracts than compounds . by developing and modulating vio active components of *Tridax procumbens* become a effective natural drug for various disease in future. The review will be helpful in further research and activities for further developments.

6. REFERENCE-

- [1]. Powell, A.M., 1965. Taxonomy of *Tridax* (Compositae). *Brittonia* 17, 47–96. <https://doi.org/10.2307/2805391>.
- [2]. Udupa, S.L., Udupa, A.L., Kulkarni, D.R., 1991. Influence of *Tridax procumbens* on lysyl oxidase activity and wound healing. *Planta Med.* 57, 325–327
- [3]. SurendraAgrawal, et al. Pharmacological activities of *Tridax procumbens* (Asteraceae) Medicinal Plants. *Int J PhytomedRelat Ind.* 2010; 2(2): 73-78.
- [4]. Saxena, V.K., Albert, S., 2005. β -Sitosterol-3-O- β -D-xylopyranoside from the flowers of *Tridaxprocumbens* Linn. *J. Chem. Sci.* 117, 263–266.
- [5]. <https://doi.org/10.1007/BF02709296>
- [6]. WHO, World Health Organization. (2013). WHO traditional medicine strategy 2014-2023. Hong Kong SAR, China. ISBN 978 92 4 150609 0.
- [7]. Solenki, R., &Shanidar, I. V. (1975). A Neanderthal flower burial in Northern Iraq. *Science*, 190(4217), 880-881. <https://doi.org/10.1126/science.190.4217.880>
- [8]. Saraf, S., Pathak, A., & Dixit, V. K. (1990). Hair growth promoting activity of *Tridaxprocumbens*. *Fitoterapia*, 62(6), 495-498
- [9]. Taddei, A., Rosas-Romero, A.J., 2000b. Bioactivity studies of extracts from *Tridaxprocumbens*. *Phytomedicine* 7, 235–238. [https://doi.org/10.1016/S0944-7113\(00\)80009-4](https://doi.org/10.1016/S0944-7113(00)80009-4)
- [10]. Syed, A., Benit, N., Alyousef, A.A., Alqasim, A., Arshad, M., 2020. In-vitro antibacterial, antioxidant potentials, and cytotoxic activity of the leaves of *Tridaxprocumbens*. *Saudi J. Biol. Sci.* 27, 757– 761. <https://doi.org/10.1016/j.sjbs.2019.12.031>
- [11]. Caceres, A., López, B., González, S., Berger, I., Tada, I., Maki, J. (1998). Plants used in Guatemala for the treatment of protozoal infections. I. Screening of activity to bacteria, fungi and American trypanosomes of 13 native plants. *J. Ethnopharmacol.*, 62(3), 195-202. doi:10.1016/S0378-8741(98)00140-8
- [12]. Appiah-Opong, R., Nyarko, A. K., Doodoo, D., Gyang, F. N., Koram, K. A., &Ayisi, N. K. (2011). Antiplasmodial activity of extracts of *Tridaxprocumbens* and *Phyllanthusamarus* in in vitro *Plasmodium falciparum* culture system. *Ghana Med J.*, 45(4), 143-150
- [13]. Soladoye, M. O., Ikotun, T., Chukwuna, E. C., Ariwaodi, J. O., Ighanesebor, G. A., Agbo-Adediran, O. A., &Owolabi, S. M. (2013). Our plants, our heritage: Preliminary survey of some medicinal plant species of Southwestern University Nigeria Campus, Ogun State, Nigeria. *Annals of Biological Research*, 4(12), 27-34.
- [14]. Mann, A., Abdulkadir, N. U., & Muhammad, G. (2003). Medicinal and Economic plants of Nupe Land. Juber Evans Books.
- [15]. Ikewuchi, J. C., Ikewuchi, C. C., & Ngozi, M. I. (2009). Chemical profile of *Tridaxprocumbens* Linn. *Pakistan Journal of Nutrition*, 8(5), 548-550. <https://doi.org/10.3923/pjn.2009.548.550>

- [16]. Agban, A., Gbogbo, K. A., Amana, E.K., Tegueni, K., Batawila, K., Koumaglo, K., & Akpagana, K. (2013). Evaluation des activités antimicrobiennes de *Tridax procumbens* (Asteraceae), *Jatropha multifida* (Euphorbiaceae) et de *Chromolaena odorata* (Asteraceae). *European Scientific Journal*, 9(36), 278-290
- [17]. Pöhl, E. (2005). Medicinal and Aromatic Plants of Guatemala and the Need for Their Conservation. Proc. WOCMAP III, Congress on Medicinal and Aromatic Plants 2: Conservation Cultivation & Sustainable Use of MAPs Eds.: A. Jatisatienr, T. Paratasilpin, S. Elliott, V. Anusarnsunthorn, D. Wedge, L.E. Craker and Z.E. Gardner *Acta Hort.*, 676, 167-170. <https://doi.org/10.17660/ActaHortic.2005.676.21>
- [18]. Berger, I., Barrientos, A. C., Cáceres, A., Hernández, M., Rastrelli, L., Passreiter, C. M., & Kubelka, W. (1998). Plants used in Guatemala for the treatment of protozoal infections: II. Activity of extracts and fractions of five Guatemalan plants against *Trypanosoma cruzi*. *J. Ethnopharmacol.*, 62(2), 107-115. [https://doi.org/10.1016/S0378-8741\(98\)00011-7](https://doi.org/10.1016/S0378-8741(98)00011-7)
- [19]. Gamboa-Leon, R., Vera-Ku, M., Peraza-Sanchez, S. R., Ku-chulim, C., Horta-Baas, A., & Rosado-Vallado, M. (2014). Antileishmanial activity of a mixture of *Tridax procumbens* and *Allium sativum* in mice. *Parasite*, 21(15). <https://doi.org/10.1051/parasite/2014016>
- [20]. Pareek, H., Sharma, S., Khajja, B., Jain, K., & Jain, G. C. (2009). Evaluation of hypoglycemic and anti-hyperglycemic potential of *Tridax procumbens* (Linn.). *BMC Complementary and Alternative Medicine*, 9(48). <https://doi.org/10.1186/1472-6882-9-48>
- [21]. Policegoudra, R. S., Chattopadhyay, P., Aradhya, S. M., Shivaswamy, R., Sing, L., & Veer, V. (2014). Inhibitory effect of *Tridax procumbens* against human skin pathogens. *Journal of Herbal Medicine*, 4(2), 83-88. <https://doi.org/10.1016/j.hermed.2014.01.004>
- [22]. Saraf, S., Pathak, A.K., Dixit, V.K., 1991. Hair growth-promoting activity of *Tridax procumbens*. *Fitoterapia* 62, 495–498
- [23]. Rajendran, K., Balakrishnan, R., & Chandrasekaran, S. (2003). Common medicinal plants and their utilization by villagers in East Coast districts of Tamilnadu. *Journal of Economic and Taxonomic Botany*, 27(3): 727-731
- [24]. Yabesh, J. E. M., Prabhu, S., & Vijayakumar, S. (2014). An ethnobotanical study of medicinal plants used by traditional healers in silent valley of Kerala, India. *Journal of Ethnopharmacology*, 154, 774-789. <https://doi.org/10.1016/j.jep.2014.05.004>
- [25]. Pardeshi, B. M., & Bhiungade, V. (2016). *Tridax procumbens*: A medicinal gift of nature for healing diabetic wound. *International Journal of Chemical and Physical Sciences IJCPS*, 5, 107-112.
- [26]. Byavu, N., Hnrard, C., Dubois, M., & Malaisse, F. (2000). Phytothérapie traditionnelle des bovins dans les élevages de la plaine de la Ruzizi. *Biotechnol. Agron. Soc. Environ.*, 4(3), 135-156
- [27]. Koram, K. A., Ahorlu, C. S. K., Wilson, M. D., Yeboah-Manu, D., & Bosompem, K. M., (Eds). (2014). *Towards Effective Disease Control in Ghana: Research and Policy Implications. Volume 1: Malaria.* University of Ghana Readers. Sub-Saharan Publishers
- [28]. Aboh, A. B., Olaafa, M., Dossou-Gbété, G. S. O., Dossa, A. D., & Djagound, N. (2002). Ingestion volontaire et digestibilité apparentée d'une ration à base de la farine de grains de *Mucuna purpuria* var. utilis complétée de fourrages chez les lapins. *Tropiculture*, 20(4), 165-169.
- [29]. Edeoga, H., Okwu, D., & Mbaebie, B. (2005). Phytochemical constituents of some Nigerian medicinal plants. *African Journal of Biotechnology*, 4(7), 685-688. <https://doi.org/10.5897/AJB2005.000-3127>
- [30]. A new flavonoid from the aerial parts of *Tridax procumbens* [https://doi.org/10.1016/S0367-326X\(00\)00296-3](https://doi.org/10.1016/S0367-326X(00)00296-3)
- [31]. Xu, R., Zhang, J., Yuan, K., 2010. Two new flavones from *Tridax procumbens* Linn. *Molecules* 6357–6364. <https://doi.org/10.3390/molecules15096357>
- [32]. Kumar, L., Prasad, A., Iyer, S., & Vaidya, S. (2012). Pharmacognostical, phytochemical and pharmacological review on *Tridax procumbens*. *International Journal of Pharmaceutical & Biological Archives*, 3(4), 747-751.
- [33]. Sawant, R., & Godghate, A. (2013). Preliminary phytochemical analysis of leaves of *Tridax procumbens* Linn. *International Journal of Science, Environment and Technology*, 2(3), 388-394. (Tannin)
- [34]. Biological actions of carotenoids ADRIANNENE Bendich, James Allen Olson *The FASEB journal* 3 (8), 1927-1932, 1989 <https://doi.org/10.1096/fasebj.3.8.2656356> Ikewuchi, C.C., Ikewuchi, J.C., Ifeanacho, M.O., 2015. Phytochemical composition of *Tridax procumbens* Linn leaves: potential as a functional food. *Food Nutr. Sci* 06, 992–1004. <https://doi.org/10.4236/fns.2015.611103>
- [35]. Petchi, R.R., C. Vijaya, S. Parasuraman. (2013). Anti-arthritis activity of ethanolic extract of *Tridax procumbens* (Linn.) in Sprague Dawley rats. *Pharmacognosy Research*. 5(2):113–7.
- [36]. D. A. Bhagwat, S. G. Killedar, R. S. Adnaik. Antidiabetic activity of leaf extract of Palpa district, Nepal. *Scientific World*, 2005, 3(3), 26-31. of *Tridax procumbens*. *Intl. J. Green Pharma*, 2008, 2, 126128. <http://www.greenpharmacy.info/index.php/ijgp/article/view/46>
- [37]. Ravikumar, V., Shivashangari, K. S., & Devaki, T. (2005b). Hepatoprotective activity of *Tridax procumbens* against d-galactosamine-lipopolysaccharide-induced hepatitis in rats. *J. Ethnopharmacol*, 101(1-3), 55-60. doi:10.1016/j.jep.2005.03.019

- [38]. Oladunmoye, M.K. (2006). Immunomodulatory effects of ethanolic extract of *Tridax procumbens* on swiss Albino rats orogastrically dosed with *Pseudomonas aeruginosa* (NCIB 950). *International journal of tropical medicine*. 14: 152-155
- [39]. Shrivastav, A., Kumar Mishra, A., Abid, M., Ahmad, A., Fabuzinadah, M., Khan, N.A., 2020. Extracts of *Tridax procumbens* Linn leaves cause wound healing in diabetic and Nondiabetic laboratory animals. 29. *Wound Med* 29, 100185. <https://doi.org/10.1016/j.wndm.2020.100185>
- [40]. A review of herbal medicines in wound healing Tina Maver¹, MPharm, Uros Maver², PhD, MPharm, Karin Stana Kleinschek¹, PhD, Dragica M. Smrke³, PhD, MD, and Samo Kreft⁴, PhD, Mpharm <https://doi.org/10.1111/ijd.12766>
- [41]. *Tridaxprocumbens* (coat buttons)-a gift of nature: an overview RR Amutha, A Sudha, P PandiselviSaranraj P., Feliciano Dire G. & Jayaprakash A., *Pharmacological Benefits of Natural Products*. Jps
- [42]. Syed, A., Benit, N., Alyousef, A.A., Alqasim, A., Arshad, M., 2020. In-vitro antibacterial, antioxidant potentials, and cytotoxic activity of the leaves of *Tridaxprocumbens*. *Saudi J. Biol. Sci.* 27, 757–761. <https://doi.org/10.1016/j.sjbs.2019.12.031>
- [43]. Total phenolics and antioxidant activity of *Tridaxprocumbens*Linn.J. D. Habila^{1*}, I. A. Bello¹, A. A. Dzikwi³, H. Musa² and N. Abubakar² https://academicjournals.org/article/article1380791374_Habila%20et%20al.pdf
- [44]. Awasthi, S., Irshad, M., Das, M. K., Ganti, S. S., & Moshahid, A. R. (2009). Anti-inflammatory activity of *Calotropis gigantea* and *Tridax procumbens* on carageenin-induced paw edema in rats. *Ethnobotanical Leaflets*, 13(5), 568-577.
- [45]. Antifungal property of *Tridax procumbens* L. against three phytopathogenic fungi
- [46]. Sandeep Acharya , R.C.Srivastava .
- [47]. Bhagwat, D.A., S.G. Killedar and R.S. Adnaik. (2008). Antidiabetic activity of leaf extract of *Tridaxprocumbens*. *International Journal of Green Pharmacy*. 2: 126-128
- [48]. Salahdeen, H.M., O.K. Yemitan and A.R. Alada. (2004). Effect of Aqueous leaf extract of *Tridax procumbens* on blood pressure and heart rates in Rats. *African Journal of Biomedical Research*.7:27 – 29.
- [49]. Petchi, R.R., C. Vijaya, S. Parasuraman. (2013). Anti-arthritis activity of ethanolic extract of *Tridax procumbens* (Linn.) in Sprague Dawley rats. *Pharmacognosy Research*. 5(2):113–7
- [50]. Muthusamy, R., K.Vasu, L. Kanagaraj, D. Ponnampallam and B.Wilson. (2013). Phytochemical Screening and Antibacterial activity of methanol extract of *Tridax procumbens*. *International Journal of Pharmacy and Biological Science*. 3(1), 521-524. Navin Anand Ingle, Harsh Vardhan Dubey, Navpreet Kaur and Rahul Gupta. (Jan -Apr 2014). *Tridax procumbens*: A Multiuseful Weed A Review. *Journal of Advanced Oral Research* Vol. 5: No.1.
- [51]. Rajkumar, S and Jebanesan .(2007). Repellent activity of selected plant essential oils against the malarial fever mosquito *Anopheles stephensi*. *A Tropical Biomedicine*, 24(2): 71–75.
- [52]. Paramythiotou, E., J.C. Lucet and J.F. Timsit. (2004). Acquisition of MultidrugResistant *Pseudomonas aeruginosa* in Patients in Intensive Care Units, Role of Antibiotics with antipseudomonal Activity. *Clinical Infectious Diseases*. 38(5):670-677.
- [53]. Mahato, R.B. and R.P. Chaudhary. (2005). Ethnomedicinal study and antibacterial activities of selected plants of Palpa district, Nepal. *Scientific World*. 3(3): 26-31
- [54]. Dhasarathan, P., N. Hemalatha, P. Theriappan and A.J.A. Ranjitsingh. (2011). Antibacterial activities of extracts and their fractions of leaves of *Tridax procumbens* Linn. *The Association of Japanese Business Studies*. 1(1):13-17
- [55]. Sathya, B.S., K.S. Jayasurya, S. Sankarnarayanan and P. Bama. (2012). Antibacterial activity of different phytochemical extracts from the leaves of *Tridax procumbens* Linn: identification and mode of action of the terpenoid compound as antibacterial. *International Journal of Pharmacy and Pharmsceutical Sciences*. 4(1):557-564
- [56]. Muthusamy, R., K.Vasu, L. Kanagaraj, D. Ponnampallam and B.Wilson. (2013). Phytochemical Screening and Antibacterial activity of methanol extract of *Tridax procumbens*. *International Journal of Pharmacy and Biological Science*. 3(1), 521-524. Navin Anand Ingle, Harsh Vardhan Dubey, Navpreet Kaur and Rahul Gupta. (Jan -Apr 2014). *Tridax procumbens*: A Multiuseful Weed A Review. *Journal of Advanced Oral Research* Vol. 5: No.1