A REVIEW ON *TECOMA STANS*

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Abstract: Yellow bells is a flowering perennial shrub which belongs to the family Bignoniaceae. It is a native of America, grown as ornamental shrub throughout India. It grows as a weed in India. From the ancient times the parts of the plant like leaves, seeds, pods, roots are used medicinally. Researches on *T.stans* gives the evidence that it contains chemical constituents like alkaloids, aminoacids, phytosterols, monoterpenes, triterpenes, glycosides, phenols, tannins, saponins, quines and flavonoids. However the researches also proves that it is used as anti-diabetic, anti-oxidants, anti- fungal, anti–microbial and anti-spasmodic. This article collates the phytochemicals and pharmacological activities of *T.stans*.

Key Words:*Tecomastans*, Phyto chemicals, Pharmacological properties.

INTRODUCTION:

The genus *Tecoma* composes of 14 species of small trees or shrubs belonging to the family Bignoniaceae. Of the 14 species 12 originate in America and 2 originate in Africa[1]. All the plants in this genus posses a common name Trumpet bush. *Tecoma stans* is fast growing ornamental plant which grows throughout India.(1) It is traditionally used in Mexico to control diabetics,hepatic,dysentric, anorexia problems. It was reported that *Tecoma stans* possessing anit-inflamatory activity and other species *Tecoma sambucifolia* possessing anti-nociceptive activity in the alcoholic extract of pods and flowers. It was reported that plant extract reduced the area under glucose tolerance curve in rabbit. *Ginger Thomas* has many active constitutents in leaves,barks, pods and flowers like Tecostanine, Tecomine, It also constitutes other chemical constituents like alkaloids, phenols, flavonoids, monoterpenes etc.(8-12)

Vernacular Names: The plant is known by different names in different areas by people. It is commonly called as *Yellow bells* because of the appearance of flower in bright yellow bell shaped.(2)

Synonyms: Ginger-Thomas, Yellow Trumpet, Yellow-Elder.

Language	Name
Hindi	Piliya/ Pila kaner
English	Yellow bells
Kanada	Koranekelar
Tamil	sonnapatti
Telugu	Pachagotla
Bengali	chandaprabha
Marati	Ghantiful

Botanical characteristics: *Tecomastans* is a fast growing plant in the trumpet vine family Bignoniace. It has sharp toothed, compound and imparipinnate with 2 to 5 pairs and a signle terminal leaflets. Leaves are lanceolate which grows up to 10cm long with serrate margins and mid green coloured. *Tecoma stans* bears clusters of bright yellow flowers in the trumpet shaped with 5 rounded lobes, 6cm long. Pods are narrow, slightly flattened to pointed capsules ranges up to 20cm long. These pods contain seeds and are green when young,turns to brown upon ripening giving untidy appearance without shedding off for many months.

FIG.1: *TECOMA STANS* FOUND IN TELANGANA IN ITS HABITAT

DISTRIBUTION:

T. stans is an ornamental drought tolerated plant that grows well in warm climates. It is widely spread in tropical and sub-tropical regions. The genera *Tecoma* is a taxonomic version of Bignoniaceae family which includes 120 other genera and 800 different species of trees and shrubs which often grows as twinning vines or climbing trees and rarely hurbs. It is a native to the Florida, West Indies and Mexico to the South America. It is typically sold in nurseries St. Louis area as a container plant for patios like *Bouganvillea* and *Mandevilla.* In India it is distributed through out the country as it required humid climates to grows. [2-4]

PHYTOCHEMICAL PROPERTIES:

Phytochemical research is important in developing the herbal medicines form ancient time. Phytochemistry is the heart of herbal therapy. The major bio active compounds like alkaloids, phenols, terpenoids, glycosides, flavonoids, saponins has been isolated. These bioactive compounds contains various phytoconstituents.[3]

Bianco.A et.al isolated plantarenaloside, stansioside, and a new iridoid glycoside with a formyl group at C-4which was shown to be 5- Deoxy stansioside by ^{13}C NMR and ^{1}H NMR spectroscopy from the crude extract of whole *T.stans* plant [8]

Like wise Satya P.Kunapuli and C.S. Vaidhyanathan isolated Indole, tryptophan, tryptamine and skatole from the leaves of *Tecomastans*. Presence of anthrallic acid in its free form and indole acid indicates that they are true substrates and products of indole oxygenase.[9]

ArletePaulinoLins and Joana D'ArcFelicio isolated two novel monoterpenic alkaloids from the ethanolic extract of *T.stans* fruits.[10]

Table 1: Phytochemical constituents reported in different parts of plant *T.stans* by various authors.

SNO	PLANT PART	CHEMICAL CONSTITUENTS	AUTHOR AND YEAR.	References.
1	Crude Extracts of whole plant	5- Deoxy stansioside and iridoid glycoside	Bianco.A et.al -1981	8
2	Leaves	Indolic compounds	Satya P.Kunapuli-1984	9
3	Fruits	Monoterpenic alkaloids	ArletePaulinoLins, Joana D'ArcFelico-1993	10
4	Crude Extracts of whole plant	Tecomine	Luca Costantino, Laura Raimondi et. Al-2003	11
5	Fruits and Flowers	5-hydroxy skythanthine hydro chloride.	SunitaVerma-2016	12
6	Crude Extracts of whole plant	Chrysoeriol, Apigenin and other polyphenols	Guuillermo Ramirez et.al.-2016	13

PHARMACOLOGICAL ACTIVITIES:

As *T.stans* is believed to posses medicinal properties, it has been used as anti-diabetic from the ancient time. This belief led to many invivo and invitro investigations by various methods and shown positive results for various activities. Few of the pharmacological that are shown by *T.stans* are as follows.

Anti-Diabetic activity: The aqueous extract of *T.stans* (500mg/kg) showed decreased hyperglycemic peak values in a magnitude similar to that of acarbose (500mg/kg) in both healthy and streptozotocin (STZ) induced diabetic male Sprague–Dawley rats.A study by L.Aguilar-Santamaría et.al showed that the sub-chronic administration of aqueous extract of *T.stans* reduced triglycerides and cholesterol, with no change in fasting glucose.

Anti-Bacterial activity: Invitro anti-bacterial studies of crude leaf extracts of *T.stans* were done against various bacterial starins like Staphylococcus aureus, Staphylococcus epidermidis, Salmonella typhi, Klebsiella pneumoniae and Vibrio parahemolyticus which were previously procured by disc diffusuionmenthod.Invitro studies by C.S Senthilkumar etal, showed a varied Zone of Inhibition results for the above strains.

Anti-Microbial activity: The anti-microbial activity of methanolic and ethanolic extracts of *Tecoma stans* plant parts was carried out using "Paper disc method" against various microbes like *Clavibactermichiganensis sub sp. michiganensis, Staphylococcus aureus, Pseudomonas fluorescens*, and fungi including *Alternariahelianthi, Cercosporacarthami, Fusarium solani, Fusarium oxysporum* by Govindappa.M et al. The studies showed a strong anti microbialacitivity against varied species with a varied Zone of Inhibition.

Antioxidant activity: The antioxidant activity of methanolic and ethanolic extract of *Tecoma stans* plants parts was measured by the capability of DPPH free radicles scavenging in comparission to the standards, ascorbic acid and Butylated hydroxytoulene. Govindappa.M et al. studies shows that at a concentration of 0.1mg/ml the scavenging activity of ethanolic extract was 56.88% and while that of methanolic extract was 58.99%.

Anti-Cancer activity: The anti-cancer activity of leaf extract of *T.stans* was carried out using breast cancer MCF-7 cell line culture. In-vitro studies by M. Thirumal, G. Kishore et al. showed anticancer activity of MCF-7 cell line culture at increasing concentrations, and the inhibitory concentration (IC50) was found to be 64.5 µg/ml.

Anti-Ulcer activity: The studies by Shanmukhaet.al showed that the ethanolic extract of *Tecomastans* leaves has gastro protective effect against acetone induced ulcer and pylorus ligation induced ulcer in rats at a dose of 500mg/kg body weight.

Table 2: Pharmacological Activitites reported in *Tecomastans* by various authors.

SNO	EXTRACT	PLANT PART	ACTIVITY	AUTHOR AND YEAR	Reference
1	Aqueous extract	Flowers	Anti-proliferative and antioxidant	Marzouk M, Gamal-Eldeen A, et.al. 2006	14
2	Methanolic extract	Leaves	Antispasmodic	GharibNaseri MK, et.al, 2007	15
3	Aqueous extract	Leaves	Anti-Diabetic activity by Streptozotocin induced diabetics in Sprague dawly rats method.	L.Aguilar Santamaria.-2009	16
4	Aqueous extract	Leaves	Anti Bacterial activity against Human pathogenic bacteria.	C.S Senthil Kumar, M.Suresh Kumar, et.al-2010	17
5	Methanolic extract	Leaves	Wound healing potential	Das C, Mohanty A, et. al -2010	18
6	Ethanol, Methanol & Aqueous	Leaves	Anti Microbial activity &Anti oxidant activity.	Govindappa.M, Sadananda T.S, et.al-2011	19
7	Ethanolic extract	Leaves	Anti Cancer activity on breast cancer using cell lines.	M.Thirumal, G.Kishore, R.Prathika.-2012	20
8	Ethanol, Methanol & Aqueous	Heart Wood of Stem	Anti Microbial activity against Human Pathogenic Microbes.	A.Kottai Muthu A.ThangaTripathi, et.al-2012	22,29

9	Ethanolic extract	Stem	Anti-Diabetic activity by induced diabetics in albino rats method.	Elosch.G, Palavinel.V-2013	2.
10	Ethanolic extract	Leaves	Gastro intestinal disorder using Aspirin induced ulcer in albino rats method.	Shanmukha Vijay Kumar-2013	23
11	Ethanolic extract	Flower	Anti Microbial activity against Human Pathogenic Microbes	Rajamurgan.R Thirunavukkarasu Ch., et.al-2013	24
12	Ethanolic extract	Flower	Anti Oxidant activity by DPPH model.	Rajamurgan.R Thirunavukkarasu Ch., et.al-2013	24
13	Ethanol, Methanol & Aqueous	Leaves & Branches	Anti Oxidant activity by DPPH model.	Mohammed. Z.M Saleem, Yousry M. Gohar, et.al-2013	25
14	Alcholic extraxct	Flowers	Anti Fungal activity.	Vikas Gupta, UmeshDhakad, et.al-2014	26.28
15	Ethanolic extract	Flowers	Anti-Diabetic activity by Alloxan induced diabetes in Dawley rats.	Vikas Gupta, UmeshDhakad, et.al-2015	26
16	0.15M Nacl Extract	Leaves	Trypsin inhibitor activity	Leydianne, L.S Patriota, et.al-2013	27

CONCLUSION:

Tecomastans is an attracting ornamental plant, which is traditionally used as antidiabetic, antimicrobial, etc. Researches on this plant are increasing day by day because of its potent pharmacological uses. The various phytochemical researches resulted in isolation of different potent chemical compounds which are basis for its specific pharmacological activities. As this plant is widely spread across tropical and sub-tropical regions like America, Mexico, West-Indies, and India, more research work is still continued. The moto of this review was to collate the research work undertaken by various scientists at different places till date in order to provide a base line for future works.

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CONFLICT OF INTERST:

None of the authors of this paper has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper.

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