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Phytochemical and pharmacological review study: *Tecoma Stans* Linn

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ABSTRACT

Tecoma stans Linn is an erect shrub commonly found in India. It is also known as yellow bells, yellow elder, trumpet flower, belonging to the family Bignoniaceae. *Tecoma stans*, showed antidiabetic, antioxidant, hypoglycemic, antitumor, antiinflammatory and antimicrobial properties. This review aims at describing the botanical description, classification, phytochemical and pharmacological profiles. *Tecoma stans* is a dicotyledonous herb popularly grown for its flowers as an ornamental /garden plant in normal gardens and temples. It is also known as *Bignonia stans* L. It has wide selection of medicinal and pharmacological applications. Almost all parts (leaves, root, flower, seed, fruit, and bark) of the plant are reported for its medicinal use. *Tecoma stans* could also be an herbal medicine used for treatment of diabetes, digestive problems, and control of yeast infections, as powerful diuretic, vermifuge and tonic. Preliminary phytochemical screening of this plant revealed the presence of tannins, flavonoids, alkaloids, quinones and traces of saponins and amino acids. This review supports all updated information on its phytochemical and pharmacological activities and its traditional uses.

Keywords: *Tecoma stans*, Bignoniaceae, vermifuge, tonic, medicinal use, phytochemical screening.

INTRODUCTION

Nature has been a source of medicinal agents for thousands of years and a large number of modern drugs are isolated from natural sources, many supported their use in traditional medicine. Higher plants, as sources of medicinal compounds, have continued to play a dominant role within the maintenance of human health since past¹. Over 50% of all modern clinical drugs are of natural product origin and natural products play a crucial role in drug development programs within the pharmaceutical industry. In India people have been used plants and natural products for the treatment of varied diseases from ancient time. Nearly 80% of the world's population depends on traditional medicine². In the last two decades of the century the scientists are sincerely trying to gauge many plant drugs utilized in traditional system of medicine. The pharmacognostical study is one among the main criteria for identification of plant drugs.

Tecoma stans is an erect shrub commonly found in India. Belonging to the family Bignoniaceae. The shrub has some common names in several native Indian languages. *Tecoma stans* Linn is additionally referred to as California yellow bells, yellow elder, trumpet flower in English and Piliya in hindi. *Tecoma stans* is an important medicinal plant. Leaves, bark and roots contain biologically active chemicals, and extracts from those tissues are in use as traditional folk medicines³. *Tecoma stans*, showed exhibited antitumor, antioxidant, antimicrobial, hypoglycemic, free radical antiinflammatory and antidiabetic properties. *Tecoma stans* is usually planted as a decorative in warmer climates throughout the planet because of its showy yellow flowers and pinnate foliage⁴.

Classification

Kingdom = Plantae
Division = Tracheophyta
Subdivision = Spermatophytina
Class = Magnoliopsida

Order = Lamiales
Family = Bignoniaceae
Genus = Tecoma
Species = *T. stans*
Vernacular name
Hindi = Piliya
Sanskrit = Sidhakya
English = Yellow bells, Yellow trumpet, Yellow elder
Malayalam = Subramanyakiretam
Tamil = Sonnapatti

Other species of *Tecoma*

- *Tecoma arequipensis* (Sprague)Sandwith
- *Tecoma capensis* (Thumb.) Lindl. –Cape Honeysuckle (Southern Africa)
- *Tecoma castanifolia* (D.Don) Melchior– Chestnutleaf Trumpetbush
- *Tecoma cochabambensis* (Herzog)Sandwith
- *Tecoma fulva* (Cavanilles) D.Don
- *Tecoma garrocha* Hieronymus
- *Tecoma guarume* DC.
- *Tecoma nyassae* Oliv.
- *Tecoma rosifolia* Humboldt, Bonpland& Kunth
- *Tecoma sambucifolia* Humboldt, Bonpland & Kunth
- *Tecoma stans* (L.) Juss. ex Humboldt, Bonpland & Kunth – Yellow Trumpet bush (Americas)
- *Tecoma tanaeciiflora* (Kränzlin)Sandwith
- *Tecoma tenuiflora* (DC.) Fabris
- *Tecoma weberbaueriana* (Kränzlin)Melchior⁵.

Botanical description

A large shrub or small tree, much branched, growing upto 1.5- 5m tall, but grows occasionally upto 10m in height. twigs tan or reddish tan, smooth, scarcely 4-sided; leaves opposite, pinnately compound, leaflets 1-9, usually 3-7, ovatelanceolate, apex acuminate, base acute or obliquely acute, very shortly petiolate or all but sessile, slightly hirsute on midrib and in vein axils beneath, margins irregularly serrate, leaves quite variable, rachis and petiole slender, glabrous. Inflorescence an axillary or terminal raceme, pedicels short, irregularly curved or twisted, bracts reduced to minute scales, flowers rather few, calyx narrowly cylindrical-campanulate, 5-7 cm long, with 5 sub-equal acuminate teeth, glabrous; stamens 4, attached at summit of tube, in 2 unequal pairs, included, filaments pilose at base, curved above, anthers versatile, linear, yellow, pilose, 6 mm long; sterile fifth stamen much reduced; pistil about equaling stamens, ovary narrowly cylindrical, about equaling calyx, style filiform, glabrous, stigma flat, elliptic; capsule linear, compressed, 10-20 cm long, 7-8 mm wide, brown when ripe, with raised line or suture lengthwise on each flat side, tardily dehiscent along suture, septum parallel with flat sides, firm, seeds flat, oblong, 7-8 x 4 mm, with a membranous transparent wing on each end, ends of wingerose, seeds entire including wing about 20 x 6 mm"⁶.

Reproductive biology and seed dispersal

T. stans probably pollinated by humming birds in its naturally distributed areas. This plant produces abundant light and papery seeds that are primarily wind dispersed.

They may also be spread by flood waters and through dumped garden waste. This plant is auto compatible and requires external pollination (Kranz and Passini, 1997). It can flower throughout the year, or flowering can be seasonal, usually in summer and after good rains. Only a small proportion of the flowers set fruit in its native range which can be attributed to drought conditions, pollination failure and insect attack. In contrast, fruit set in countries of introduction is high, e.g. in South Africa. Vegetative reproduction from root and stem cuttings is less important for long distance dispersal but allows for rapid densification of populations after disturbances, including attempts to remove plants mechanically. The vigorous sucker shoots tend to be erect as the specific name 'stans' implies. This plant resembles orange bells (*Tecoma alata*) and is also confused with the garden plants like golden trumpet vine (*Allamanda cathartica*) and shrubby allamanda (*Allamanda schottii*). Sometimes it is also confused with yellow oleander (*Cascabelathevetia*). These species can be distinguished by the following differences. However, *T. stans* differs from the Orange bells (*Tecoma alata*) in having compound (pinnate) leaves, oppositely arranged along the stems. These leaves have several toothed (serrated) leaflets and are borne on long slender stalks (petioles). Its moderately large (35 cm across) tubular flowers are reddish orange from outside. Its fruit are usually long and with narrow capsules (10-30 cm long) that split open when mature to release numerous papery seeds. Similarly the Golden trumpet vine (*Allamanda cathartica*) has simple leaves that are clustered (whorled) along the stems. These leaves have entire margins and are borne on short stalks (petioles). Its flowers are very large (6-15 cm across) and its fruit are rounded and have prickly (46 cm long) capsules that split open when mature to release abundant winged seeds. In the case of Shrubby allamanda (*Allamanda schottii*) it has simple leaves that are clustered (whorled) along the stems. These leaves have entire margins and are borne on short stalks (i.e. petioles). Its flowers are moderately large (36 cm across) and its fruit are rounded and prickly (46 cm long) capsules that split open when mature to release numerous winged seeds. Yellow oleander (*Cascabelathevetia*) differs in having simple leaves that are spirally arranged (densely alternately arranged) along the stems. These leaves are long and narrow (i.e. linear) with entire margins and obscure stalks (petioles). Its flowers are moderately large (46 cm across) and its fruit are large fleshy drupes (25-55 mm across) that are somewhat rounded or slightly triangular in shape.

Phytochemical Constituents

Chemical constituents of this botanical species are well known; numerous monoterpenic alkaloids are identified. The biosynthesis of those monoterpene tissues of *Tecoma stans* has been studied, alongside the identification of the presence of lapachol and other primary and secondary plant metabolites (fructose, sucrose and xylose), triterpenoids (ursolic and oleanolic acids and $\hat{I}\pm$ amyrine), psitosterol and phenolics (chlorogenic, caffeic, vanillic, ocumaric those compounds have already been identified within the whole plant at different concentrations^{7,8}. A new phenylethanoid, 2(3,4-dihydroxyphenyl) 3, 4 dihydroxyphenyl) 2propenoate] beta-D-glucopyranoside, and a novel monoterpene alkaloid, 5-hydroxyskytanthine hydrochloride, known compounds in the fruits and flowers was established in *Tecoma stans*⁹.

Medicinal uses Traditional Uses

Almost all the parts of *Tecoma stans* are of medicinal importance and used traditionally for the treatment of varied ailments, traditionally for reducing blood sugar. The *Tecoma stans* leaves, barks and roots are used for a spread of purposes in herbal medicine. Bark shows cardiostimulant and choleretic activity. Applications include the experimental treatment of diabetes, digestive problems, control of yeast infections and other medicinal contains several compounds that are known for their catnip like effects on felines. The root of the plant is reported to be a powerful diuretic, vermifuge basis of *tecoma stans* and juice is reportedly used as an external application and also taken internally in small quantities as a remedy for snake and rat bites.¹²⁻¹⁶

Pharmacological Activities

Tecoma genus possess various bioactive compounds that are reported to exhibit various pharmacological activities like antioxidant, antimicrobial and whole alcoholic and aqueous extract of *T. stans* exhibited the antibacterial activity and isolated tecomine, where the expansion of *E. coli* and *B. subtilis* was inhibited at different concentrations¹⁷. On the opposite hand, the methanol extract of *T. stans* leaf was reported to possess property¹⁸. Flavonoids are proven to display a good range of pharmacological and biochemical actions, like antimicrobial and anticarcinogenic activities

free radical scavengers and terminate the radical chain reactions that occur during the oxidation of triglycerides in the food systems¹⁹. They may explain its potent bioactivities known to possess potent antioxidants²⁰. The saponins from plant extracts already have antioxidant activity²¹. The presence of phytoconstituents like phytosterol, triterpene, flavonoids, saponins, and tannins either individually or combined together may exhibit the synergistic effect towards healing of wounds²².

CONCLUSION

The yellow bells plants belonging to the family Bignoniaceae. Is planted as an ornamental surub it is widely cultivated in gardens as an ornamental of medicinal activity has been used the flowers and bark are used for treatment of varied cancers. A cured by this plants antidiabetes, digestive problems, disease also. However, requires further testing we will find something, then we can able to cure any other new disease. Sustainable management of medicinal plant species is important thanks to their value as a possible source of latest drugs. *Tecoma stans* is used by for the treatment of various diseases. Phytochemical and Pharmacological reviews on plants will give valuable information which will assist the scientists knowledge about a plant species. This review was to collate the research work undertaken by various scientists order to provide a base line for future works.

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