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A REVIEW ON *TECOMA STANS* JUSS PLANT

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ABSTRACT: Many medicinal plants have been said to be protective against insect damage without any scientific proof that they posses' insecticidal activity. This study was aimed to establish the pharmacognostic profile and insecticidal activity of leaves of *Tecoma stans* juss (Bignoniaceae) to confirm its traditional application and justify continuous usage. *Tecoma stans* is a popular ornamental plant mostly found in tropical regions. The presence of flavonoids, alkaloids, phenolic content, indoles (tryptophan, tryptamine), terpenoid, in raw leaf of the plant was observed. We underscore the therapeutic promise of the plant and suggest future research paths, such as conducting clinical trials and exploring pharmacokinetics. Through a comprehensive analysis of Tecoma stans properties and applications, this review aims to aid in the development of innovative plant-derived therapeutics. The crude extract and fractions produced anthelmenthic, anti oxidant, anti - inflammatory, anti-diabetic, wound healing property, anti-microbial, anti-fungal, hepatoprotective, anti-urolithic, anti-cancer activities. This review represents a scientific understanding of clinical correlations and application of phyto-compounds from *T. stans* in combating and alleviating various health complaints and disorders.

INTRODUCTION: *Tecoma stans* (L.) Juss. ex Kunth, commonly referred to as yellow bell, is a member of the Bignoniaceae family and is found across the globe, predominantly thriving in tropical and subtropical region [1]. *Tecoma stans* [*T. stans*] derives its generic name from "tecomaxochit," a term from Mexican indigenous languages for plants featuring tubular flowers, which are alternatively called yellow bells, yellow-elder, yellow trumpet bush, trumpet bush, ginger-thomas, esperanza, and tronadora [2].

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The leaves of *T. stans* have demonstrated the ability to inhibit yeast infections, and both the flowers and leaves are noted for their medicinal benefits in cancer treatment. Additionally, studies have explored the plant's anticancer activity and its antioxidant components [4]. *T. stans*, a plant used in traditional medicine around the world, is known for its efficacy in treating a range of ailments including diarrhea, dysentery, conjunctivitis, edema, inflammation, swelling, and muscle soreness.

Its extract, valued for its antibacterial, antiviral, and antifungal activities, is commonly applied in various countries to manage digestive disturbances, muscular pain, and abdominal cramps [13]. Plant-based traditional medicine continues to serve as a vital health resource for more than 80% of the world's population, especially in less developed

regions [14]. The plant harbors numerous active substances in its leaves, bark, pods, and flowers, such as Tecostatin and Tecomine, as well as additional compounds including alkaloids, phenols, flavonoids, and monoterpenes. It is commonly found throughout India, thriving in the region's humid environments [10].

Extracts from *T. stans* demonstrated potential antimicrobial and analgesic properties, along with effectiveness in inhibiting induced platelet aggregation and reducing symptoms of diabetes mellitus [15]. This plant loses its leaves annually and is known for being a dangerous invasive species, with its spread facilitated by cross-pollination from insects, ants, hummingbirds, and honeybees [11].

The practice of using crushed leaves mixed with lemon juice, either applied to the bite area or taken orally in small amounts, is believed to offer relief from snake bites [9]. The literature survey shows that *T. stans* is rich in a variety of bioactive compounds, such as saponins, flavonoids, alkaloids, phenols, steroids, anthraquinones, tannins, terpenes, phytosterols, triterpenes, hydrocarbons, resins, essential oils, and glycosides [5].

Morphologically, *T. stans* typically reaches a height of 20-30 feet and features moderate growth, with clustered, elongated fruits and yellow flowers. Its leaves are green, compound, imparipinnate and lanceolate, displaying serrated edges with 2 to 5 pairs of leaflets and a larger terminal leaflet. The leaflets are lanceolate, approximately 10 cm in length, with serrated edges, a mid-green color on top, and a soft texture [2].

TABLE 1: SCIENTIFIC CLASSIFICATION [9]

Botanical Name	*Tecoma Stans*
Family	Bignoniaceae
Sub Family	Asteriidae

TABLE 2: TAXONOMICAL CLASSIFICATION [9]

Kingdom	Plantae
Division	Tracheophyta
Sub division	Spermatophytina
Class	Magnoliopsida
Order	Lamiales
Family	Bignoniaceae
Genus	*Tecoma*
Species	*Stans*
Binomial name	*Tecoma stans* [L] Juss. Ex Kunth
Common name	Yellow trumpet bush, Yellow Bell.

FIG. 1: *TECOMA STANS* JUSS (BIGNONIACEAE)

TABLE 3: VERNACULAR NAMES [10]

Language	Vernacular Name
Kannada	Koranekelar
English	Ginger Thomas, Tecoma, Trumpet flower, yellow bells, Yellow bignonia, Yellow cedar, Yellow elder, Yellow trumpet tree
French	Tecoma jaune, herb de st Nicholas, fleur de st Pierre, Chevalier
Arabic	Tacoma
Creole	Chevalye, flesenpie, Zebsennikola
Italian	Tecomagiallo
Spanish	Saucoamarillo, roble Amarillo
Tamil	Sonapatti
Hindi	Piliya
Marathi	Ghantiful
Nepali	Ghatapushpa, Saawari

Ecological Information: *T. stans* is commonly found in diverse habitats such as roadsides, riparian zones, open woodlands, grasslands, forest margins, abandoned areas, rocky terrains, sandy lake shores, and various dispersed sites in tropical and subtropical regions, demonstrating significant adaptability to both dry and moderately dry conditions**.**

Leaves: The plant features opposite, stalked, pinnate compound leaves that consist of 3-7 elliptic to elliptic-ovate leaflets. Each leaflet is narrowly egg-shaped (ovate-lanceolate), ranging from 25 to 100 mm in length and 30 to 80 mm in width. The leaf margins are serrated, and the foliage remains evergreen throughout the year [9].

- Leaf arrangements: opposite/subopposite
- Leaf type: odd-pinnately compound, made up of 5-13 leaflets.
- Leaf margin: Serrate

- ❖ Leaf shape: lanceolate to elliptic
- ❖ Leaf venation: pinnate, brachidodrome.
- ❖ Leaf type and persistence: semievergreen, evergreen.
- ❖ Fall colour: no colour change
- ❖ Fall characteristics: not showy [10].

Morphology of Plant:

- ✓ Height: 10-30 feet.
- ✓ Spread: 8-30 feet Crown.
- ✓ Uniformity: Irregular.
- ✓ Crown Shape: Oval.
- ✓ Crown Density: Moderate.
- ✓ Growth Rate: Moderate.
- ✓ Texture: medium[10].

Phytochemical Constituents: Phytochemical screening was performed to detect saponins, flavonoids, steroids, phenols, anthraquinones, alkaloids (following Obdoni and Ochuko, 2001), and tannins (based on Kaur and Arora, 2009).

Specific reagents used included Wagner's and Heger's for alkaloids, Mg-HCl and Zn-HCl for flavonoids, acetic anhydride and sulfuric acid for steroids, chloride and gelatin for tannins, ferric chloride for phenols, and hexane with diluted ammonia for anthraquinones. These tests were conducted on individual extracts of distilled water, ethanol, and methanol [7].

The products were examined for an array of phytochemical components such as carbohydrates, amino acids, proteins, steroids, and flavonoids [8].

Dried leaves of *T. stans* (1.2 kg) were extracted by macerating in methanol (3 x 2L). After evaporating the methanol at 40°C using a rotary evaporator, the resulting residue was reconstituted in water and then partitioned sequentially with petroleum ether (3 x 2L), chloroform (3 x 2L) and n-butanol (3 x 2L). The individual fractions were concentrated under reduced pressure and employed in insecticidal assays [6].

Pharmacological Activity: *T. stans* have various pharmacological activities like antioxidant, anti-microbial, anti-inflammatory, anti-helminthics, anti-cancer, wound healing properties [16].

Antioxidant Activity Determined by DPPH Method: The antioxidant potential of the methanol extract and its fractions, evaluated through DPPH radical scavenging activity .This activity is demonstrated by the notable color change of the DPPH solution from purple to yellow. The EtOAc fraction from the leaves exhibited the highest antioxidant activity at 83.4±0.31%, closely followed by the EtOAc fraction from the branches at 82.06±0.54%. This was succeeded by the CHCl3 fraction from the leaves (79.17±0.20%), the methanol extract from the leaves (74.16±0.85%), and the methanol extract from the branches (72.85±0.31%). For comparison, the methanol extract's scavenging activity was recorded at 58.92% (Govindappa *et al.,* 2011), and Marzouk *et al.* (2006) also identified strong antioxidant properties in *T. stans*. Notably, ethanol extracts exhibited superior antioxidant activity compared to methanol and acetone extracts [5].

Antimicrobial Activity: Devillers *et al.* (1989) employed the Well Diffusion method to assess the antibacterial and antifungal activities of *T. stans*, testing its effectiveness against Gram-positive bacteria such as *Staphylococcus aureus* and *Enterococcus faecalis*, as well as Gram-negative bacteria including *Escherichia coli* and *Klebsiella pneumoniae* and evaluating its antifungal potential against the pathogenic yeast *Candida albicans* [12].

Anthelmintic Activity: The anthelmintic effectiveness was evaluated using adult Indian earthworms (Pheretimaposthuma) because their anatomical and physiological similarities to the intestinal roundworm parasite, Ascaris lumbricoides, make them suitable for this study. Earthworms, ranging from 8 to 10 cm in length, were collected from damp and waterlogged regions in the Guntur district and were authenticated by a zoologist. Extracts at concentrations of 100 and 200 mg/mL were prepared by dissolving the sample in distilled water, with a control setup consisting of distilled water in a separate petri dish. Fresh solutions of the extracts and standard drugs were made just before the experiments began.

The various concentrations of the successive extracts (50 mL each) were placed in petri dishes, where the earthworms were introduced. All petri dishes were held at the typical room temperature. For each extract, six earthworms were tested and monitored for signs of paralysis or death. Paralysis was recorded when no movement was detected unless the worm was shaken vigorously. Death was determined when worms showed no movement even when shaken or subjected to external stimuli and was confirmed by the loss of motility and the fading of body color [3].

Anti-inflammatory: The anti-inflammatory potential of *T. stans* extracts was evident in methanol, ethanol and water, as they effectively prevented heat-induced albumin denaturation and maintained red blood cell membrane integrity. Another investigation found that administering alcohol extracts at 250 and 500 mg/kg decreased edema within 3 hours after carrageenan administration, whereas aqueous extracts at the same dosages began reducing edema 4 hours after carrageenan treatment. This likely involves mitigating multiple inflammatory factors and mediators. Furthermore, the extracts demonstrated a pronounced reduction in paw edema at 200 mg/kg (with a 50.93% inhibition at 4 hours), showing significantly enhanced anti-inflammatory activity compared to the control group [9].

Anti-diabetic Activity: The aqueous extract of *T. stans* at a dose of 500 mg/kg effectively reduced hyperglycemic peak values, achieving results similar to those obtained with carbose at the same dosage in both healthy and streptozotocin-induced diabetic male Sprague-Dawley rats. This extract also facilitated glucose absorption in insulin-sensitive and insulin-resistant mice and humans without notable procardiogenic or adverse effects on antiadipogenesis in human adipocytes. Additionally, the ethanolic extract of *T. stans* stems at 200 mg/kg produced a statistically significant decrease in blood glucose levels [9].

Wound Healing Activity: Research into *T. stans* Linn bark extract, prepared in methanol, has explored its potential for accelerating wound healing in albino rats. The healing process relies on a sophisticated network of blood cells, cytokines, and growth factors working together to restore injured tissues to their original state. To facilitate effective wound repair with minimal pain, discomfort, and scarring, wound care must occur in an environment that supports physiological repair and regeneration. Findings suggest that methanol extracts of *T. stans* bark, when applied locally or administered systemically, significantly enhance wound healing in both excision and incision models, reinforcing the plant's value in traditional woundcare practices [10].

CONCLUSION: In conclusion, the leaf extract of *T. stans* has demonstrated remarkable potential in various scientific studies, showcasing its antioxidant, anti-inflammatory, anti-cancer, antimicrobial, wound healing and antidiabetic properties. Its rich phytochemical composition and traditional medicinal uses make it a valuable resource for the development of novel therapeutics. Further research is warranted to fully explore the extract's pharmacological effects, toxicity, and potential applications in human health. As a natural remedy, *T. stans* leaf extract may offer a promising alternative or complementary approach to conventional treatments, contributing to the advancement of healthcare and wellness.

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