

Review Article

Pharmacological Importance of *Thevetia peruviana*

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ABSTRACT

Thevetia peruviana, Belongs to family Apocynaceae and commonly called as yellow oleander or Pila kanher. All parts of the plants are toxic, and contain a variety of cardiac glycosides. This article compile all the information related to *Thevetia peruviana*.

Keywords: yellow oleander, cardiac glycosides, pharmacology.

INTRODUCTION

Medicinal plants as a group comprise approximately 8000 species and around 50% of all the higher flowering plant species of India. Millions of rural households use medicinal plants in a self-help mode. Half million practioners of the Indian system of medicine in the oral codified streams use medicinal plants in preventive, promotive and curative application. There are estimated to be over 7800 manufacturing units in India, in recent years, the growing demand for herbal product has led to a quantum jump in volume of plant metabolite previously with unknown pharmacological activities have been extensively investigated as a source of medicinal agents.

DESCRIPTION OF PLANT



Thevetia peruviana

Pharmacological Classification

Botanical name: *Thevetia peruviana*
Kingdom Plantae
Family Apocynaceae
Order Gentianales
Genus Thevetia

Species peruviana

Common name

Mexican oleander, Yellow oleander, lucky nut tree.

Distribution

This plant is native of central & South America, but now frequently grown throughout the tropical and shrub or small tree that bears yellow or orange-yellow, trumpet like flowers and its fruit is deep red/black in color enhancing a large seed that bears some resemblance to a Chinese " lucky nut". It contains a milky sap containing a compound called Thevetin that is used a heart stimulant but in its natural form is extremely poisonous, as are all part of the plant, especially the seed. Its leave is long, lance shaped and green colour. Leaves are covered in waxy coating to reduce water loss. Its stem is green turning silver/ gray as it ages.

Cultivation

Thevetia peruviana is cultivated as an ornamental plant and planted as large flowering shrub or tree standards in garden and parks in temp climates. It tolerates most soil and is drought tolerant exposure part full or reflected sun, revels in the water ample is the best soil improve garden soil with good drainage maintenance low periodic pruning and litter cleanup training when young to tree if desired can be grown as shrub or tree outside in warmer will tolerate most kinds of soil as long as they are well drained and are situated in full sun in a sheltered area. Useful as a landscaping plant in warmer climates as it does not need much maintenance.

Part use

It is an ornamental plant and mostly all parts of plants are medicinal use these are flowers, leaves, seed and root.

Toxin

These are toxic to most vertebrates as they contain cardiac glycosides. Many cases of intentional and accidental poisoning of human are known. The toxins are cardenolides called Thevetin A&B; others include Peruvoside, nerrifolin, thevetoxin and rivoside. These are not destroyed by drying or heating. They produce gastric and cardio effects. Antibodies for treatment include atropine and digoxin antibodies and treatment may include oral administration activate charcoal. Ovine polyclonal anti-digoxin fab fragment antibody can be used to treat digoxin poisoning.

MEDICINAL USES

Thevetia peruviana contains a milky sap containing a compound called thevetin that is used as a heart stimulant but in its natural form is extremely poisonous, as are all part of the plant, especially the seed. The toxins are cardenolides called Thevetin A and B (cereberoside), others include Peruvoside, nerrifolin, thevetoxin and ruvoside. These cardenolides are not destroyed by drying or heating and they are similar to digoxin from *Digitalis purpurea*. They produce gastric and cardio toxic effects. Antidotes for treatment include atropine and Digoxin antibodies and treatment may include oral administration of activate charcoal. These toxins have also been experimented for use in pest control. Entire Thevetin plant is very poisonous and the seeds are most poisonous. Tincture is cathartic emetic and febiuge seeds are used as abortifacient and purgative in rheumatism and drosy. Peruvoside is used in treatment of mild cardiac insufficiency and weak heart. This drug shows relatively high degree of therapeutic index compared to digoxin.

BIOLOGICAL PEST CONTROL

The plants toxins have tested in experiments for uses in biological pest control. *Thevetia peruviana* seed oil was used to make a plant with antifungal, antibacterial and ant termite properties; it is a plant toxin insecticide for termites. *Thevetia peruviana* inhibited spermatogenesis in rats, indicating the possibility of developing herbal male contraceptive.

PHARMACOLOGICAL ACTIVITY

Antimicrobial activity

The antimicrobial activity of ethanol extract obtained from *Thevetia peruviana* was tested against bacterial species of *Escherichia coli*, *Streptococcus lactis*, *Enterobacteraerogenes*, *Alcaligenesfaecalis pseudomonas aeruginosa*, *Proteus vulgaris* and fungal species of

Fusariumoxysporum, *Alternariahelianthii*, *Curvularialunata*, *Aspergillus niger* and *Penicillium spp.* Better antimicrobial activity was observed with the extracts showed maximum activity against *E.coli*.

Antifungal properties

Seeds of *Thevetia peruviana* were screened for their antifungal photo activity. Extracts obtained either with n-hexane or dichloromethane were fractionated by column chromatography or further analyses by thin-layer chromatography. All seed extracts and fractions were tested for inhibition of the fungus *Cladosporium cucumerinum* for the evaluation of photoactive inhibitory effect. Antifungal light-dependent activity was observed for some of the fractions and both crude extracts. The most photoactive fraction was analysed by analysed by capillary gas chromatography with mass spectrometry in order identify its constituents.

Piscicidal activity

The leaf and bark of *Thevetia peruviana* plant was administered for 24 h to the freshwater fish *Catlacatla* (Hamilton) to evaluate their piscicidal activity in laboratory and cemented pond condition. The values of leaf and bark extracts of different solvent of this plant to fish *Catlacatla* were determined. The LC50 values of acetone leaf extract of *Thevetia peruviana* plant is 88.80mg/L (24h) in laboratory condition and 529.38mg/L (24h) in cemented pond condition; acetone bark extract of this plant is 99.43mg/L (24h) in laboratory condition and 591.78mg/L(24h) in cemented pond condition against freshwater fish *Catlacatla*. Similar trend was also observed in case of other solvent (i.e., diethyl ether, ethyl alcohol, chloroform and carbon tetrachloride) of leaf and bark extract of *Thevetia peruviana* plant against freshwater fish *Catlacatla* in comparison to other solvent extract in both the conditions. So, the biochemical analysis is taken only acetone leaf and bark extract of *Thevetia peruviana* plant in laboratory condition.

Antispermatic activity

This study was conducted to evaluate the antifertility potential of *Thevetia peruviana* in male albino rats with their phytochemical evaluations. Phytochemical examination showed that plant is rich in active constituents, i.e. amyirin acetate, lupeol acetate, amyirin, lupeol and thevetigenin. *T. peruviana* stem bark of methanol extract administered orally to male rats at the dose level of 100mg/rat/day did not cause any significant reduction in body

weight, while the weight of reproductive organs reduced significantly. A significant fall in the total protein and sialic acid content of the testes, epididymides, seminal vesicle and ventral prostate as well as in the glycogen content of testes was also observed, however cholesterol was increased significantly and also cause the decline the spermatogenic elements. In conclusion *T. peruviana* inhibited spermatogenesis in rats.

Anti-Inflammatory

Thevetia peruviana seed contain glucosides of neriifolin, acetylneriifolin and therein. Seed oil distillates of *Thevetia peruviana* have been found to contain anti-bacterial activity. In the present work, the fresh flowers of *Thevetia peruviana* were subjected to phytochemical studies. The result of the study showed that the flower contain quercitine, kaempferol and quercitin-7-o-galactoside. The anti-inflammatory nature of the isolated compound was tested by in vitro method and the result of the study revealed that isolated compound showed a biphasic property.

Antidiarrhoeal and Antimicrobial

The study screened the antidiarrhoeal, antimicrobial and cytotoxic effect of ethanol-extracted leaves of yellow oleander. The extract was tested against castor oil included diarrhoea in a model of albino rats and showed significant antidiarrhoeal activity. Disc diffusion method are used for test the in vitro antibacterial activities of the extract and exhibited poor antibacterial activities against both gram + and gram - bacteria. Ethanol extract leaves of yellow oleander showed narrow zone of inhibition in the bacteria lawns *Shigella flexneri*, *S. typhi*, *S. aureus*. Cytotoxic was determined against brain shrimp nauplii and LC₅₀ of the plant was determined as 627.21 microgram/ml. The wide range of LC₅₀ value denotes the safety effect of the extract.

Anti-termite

Thevetia peruviana Seed oil was used to make a surface coating with antifungal, antibacterial and anti-termite properties. The paint exhibited inhibitory activity against *E. coli*, *S. aureus*, *Bacillus substalis* and *Candida albicans* in a concentration dependent manner. The repellent action of paint against subterranean termites was significant. From these result, it was concluded that the *T. peruviana* based oil plant was substantially protected wood from subterranean termite attack.

Flavanone and Flavone Glycosides/Reverse Transcriptase Inhibition

Flavanone and flavonol glycosides from the leaves of *T. peruviana* and their HIV-1 reverse transcriptase and HIV-1 integrase inhibitory activities: Two new flavone glycoside and a new flavonol glycoside where isolated from the leaves of *T. peruviana* and where investigated for their inhibitory effect against HIV-1 reverse transcriptase and HIV-1 integrase.

CONCLUSION

It is quite evident from this review that *T. peruviana* contains a number of Phyto constituents which reveals its uses for various therapeutic purposes. Looking upon wide prospects and potential of *Peruviana* for a various purposes. The plant or its individual parts can be used for the treatment of various disorders in human being such as, diabetes, liver toxicity fungal infection, microbial infection, inflammation, pyrexia and relive pain. Still, so much work is required with the *Thevetia* to investigate the mechanism of action with other therapeutic activities.

REFERENCES

1. Bandara A, Scott A and Weinstein, Julian White and Michael Eddlesto: A review of the natural history, toxicology, diagnosis and clinical management of Nerium oleander and *Thevetia peruviana* poisoning. *Toxicology official journal of the international society on Toxicology*. 2010;56(3): 273-281.
2. Patil RK, Makari HK and Gurumurthy H. in vitro antimicrobial activity of ethanol extract of *Thevetia peruviana*, *ejeafche*. ISSN: 1579-4377
3. Kokate CK, purohit AP and Gokhale SB: *pharmacognocny*, Nirali prakashan, Thirty second edition. 2005;201
4. Sastri BN (chief editor). *Wealth of India Thevetia peruviana* (vol.1) New Delhi National Institute of Science communication CSIR, P.218
5. <http://www.Mobot.Org./gardeninghelp/plantfinder/plant.a.sp?code=A551> Kemper Center: plant's Culture and Characteristics
6. [http://ag.arizona.edu/pima/gardening/a.ridplants/T.peruviana .htm](http://ag.arizona.edu/pima/gardening/a.ridplants/T.peruviana.htm)1
7. Shannon D, Langford & Paul J. Boor. *Oleander toxicity: an examination of human and animal toxic exposures*, *Toxicology*. 1996;109(1): 1-13. Doi: 10.1016/0300-483X(95)03296-R. PMID8619248.

8. Rajapakse S. Management of yellow oleander poisoning *Clinical Toxicology* 2009;47:3(206-212)
9. Roberts DM, Southcott E and Potter JM. Roberts, Buckley N.A, Pharmacokinetics of digoxin cross-reacting substances in patients with acute yellow oleander (T.Peruviana) poisoning, including the effect of activated charcoal" *Therapeutic Drug Monitoring* 2006; 28(6):784-792.
10. Bandara V, Weinstein SA and WHITE J and Eddleston M: A review of the natural history, toxicology, diagnosis and T.peruviana(yellow oleander) poisoning. *Toxicon*. 2010;56(3):273-281.
11. Eddleston M, Rajapakse S and Rajakanthan S, Jayalath L, Sjostrom and Santharaj W. Anti-digoxin Fab fragments in cardio toxicity induced by ingestion of yellow oleander: a randomized controlled trial. *Lancet* 2000;355:967-972.
12. Kareru PG, Keriko JM and Kenji GM and Gachanja AN. Anti-termite and antimicrobial properties of paint made from T.Peruviana (pers.) Schum. Oil extract" *African Journal of Pharmacy and Pharmacology* 2010;4(2)L087-089.
13. Gupta R, Kachhawa JB and Gupta RS, Sharma AK, Sharma MC and Dodhal MP. Photochemical evaluation and antispermatogenic activity of T.peruviana methanol extract in male albino rats." *Hum Fertil (Comb)*.2011;14(1):53-9
14. [http://en.wikipedia.org/wiki/Thevetia peruviana](http://en.wikipedia.org/wiki/Thevetia_peruviana)
15. Ravikumar HS, Patil TR and Kekuda P H.Gurumurthy: In Vitro antimicrobial activity of Ethenol extract of Thevetia peruviana. 2008;2(1).
16. Gata-Goncalves, Nogueira F, and olivia Matos, Rani Bruno de Sousa Photoactive extract from Thevetia peruviana with antifungal properties against *Cladosporium Ligia* Volume 2003;70(1):51-54.
17. Singh SK, Yadav RP and Singh A. Piscicidal activity of leaf and bark extract of Thevetia peruviana plant and their biochemical stress response on fish metabolism. 2010;14(11):915-23.
18. Ambang Z, Ngoh J Doohand and Essono G, Bekolo N and Chewachongl G. Effect of Thevetia peruviana seeds extract on in vitro growth of four strains of *Phytophpra megakarya* CC. *POJ*. 2010;3(3):70-76.
19. thilagavathi R, helen P, Kavitha and BR. venkataraman: Isolation, Characterization and Anti-inflammatory property of Thevetia peruviana ISSN: 0973-4945; CODEN ECJHAO E-journal of chemistry. 2010; 7(4):1584-1590
20. Hassan MM, Saha AK, Khanl SA, Islam A, Mahabub-uz-Zaman M and Ahmed SSU. Studies on the antidiarrhoeal, antimicrobial and cytotoxic activities of ethanol extracted leaves of yellow oleander (Thevetia peruviana) open *Veterinary Journal*. 2011;1:28-31.
21. Kareru PG, Keriko JM, Kenji GM and Gachanja AN anti-termite and antimicrobial properties of paint made from Thevetia peruviana (pers.) Schum. Oil extract *African Journal of Pharmacy and Pharmacology* Vol. 4(2).pp. 087=089, Feb,2010 *ajpp* ISSN 1996-0816 2010 *Academic Journals*
22. [http://www. Stuartxchange.org/index.html](http://www.Stuartxchange.org/index.html).