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## PHARMACOGNOSTIC AND PRELIMINARY PHYSIOCHEMICAL INVESTIGATIONS OF PLANT *THEVETIA PERUVIANA* LEAVES AND FLOWERS

Amol S. Deshmukh

Department of Pharmaceutics, S. M. B. T. College of Pharmacy, Dhamangaon, Nashik - 422403, Maharashtra, India.

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### Correspondence to Author: Amol S. Deshmukh

Department of Pharmaceutics,  
S. M. B. T. College of Pharmacy,  
Dhamangaon, Nashik - 422403,  
Maharashtra, India.

E-mail: meamoldeshmukh@rediffmail.com

**ABSTRACT:** *Thevetia peruviana* is found distributed throughout tropical parts of India. Their leaves are used as cardiogenic and diuretic. Flowers of plant *Thevetia peruviana* were reported to possess good medicinal value in the traditional system of medicine; the present investigation deals with macroscopic, microscopic and preliminary phytochemical investigation of flowers of *Thevetia peruviana* which includes pharmacognostical parameters, physicochemical parameters like ash values, extractive values, and moisture content. The main aim of the present investigation is to study the macro, microscopic and some other pharmacognostic characters and physicochemical standards of flowers of *Thevetia peruviana* Pers. which could be used to prepare a monograph for the proper identification of the plants.

**INTRODUCTION:** *Thevetia peruviana*, belongs to the family Apocynaceae and commonly called yellow oleander or Pila Kanher. *Thevetia peruviana* is grown as an ornamental plant and planted as large flowering shrub or tree standards in the garden, parks, roadside, and road divider. It can grow in a wide range of polluted soil and dump site. It is also called phytoremediation plant. Useful as a landscaping plant in warmer climates as it does not need much maintenance. *Thevetia peruviana* has valuable properties; seed oil was used to make a bio-pesticide. The plant parts used for the treatment of various disorders in a human being such as liver toxicity fungal infection, microbial infection, inflammation, pyrexia and relieve pain<sup>1</sup>.

It is a small evergreen plant of 2-6 meter in height with a broad geographical and ecological distribution and its convinced parts are used as medicinal resources in Chinese folk remedy.<sup>2</sup> All parts of the yellow oleander plant are toxic to humans, animals and certain insects<sup>3</sup>. On cutting or broken branches emanate a thick, white sap. The leaves are 5 to 15 cm long, thin, acuminate or sharp in the apex, shortly petiolate, with a curvaceous dark-green cutting edge.

Flowers are shaped in fatal heads, and their colors differ from deep yellow, white, purple and orange. Each flower is about 5 cm in diameter with five petals. The fruit consists of a thin follicle 7.5 to 18.5 cm long which opens to separate feathery seeds. Oleander can be propagated by seed but, being allogamous and highly heterozygous, it shows huge unpredictability in seedling populations. Phytochemical analysis revealed that *Thevetia peruviana* contains a new cardiac glycoside called digitoxigenin, thevetin A and B, theveridoside, cerberin, galacturonic acid,

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rhamnose, aucubin, ursolic acid, cardenolides, quercetin, alpha and beta-amyrin, and phenyl acetate, as prime phytoconstituents<sup>4</sup>.

Newly found that decoction of the stem bark of *Thevetia peruviana* is used as an antipyretic agent. *Thevetia peruviana* plant extract have also been reported have anti-microbial properties against *Cladosporium cucumerinum*<sup>5</sup>. Yellow oleander flower is funnel-shaped - a narrow tube below that flares out above. A top the narrow basal tube is an area known as the "throat," and in the yellow oleander flower, the throat is where the flower manages its pollination strategy<sup>6</sup>.

### Description of the Plant:

#### Pharmacological Classification:

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

**Common Names:** Kolke, Mexican oleander, yellow oleander, Lucky nut<sup>7</sup>.

**MATERIALS AND METHODS:** The plant leaves and flowers were collected from the region of highway Kolhar-Ghoti road, Rajur, from taluka Akole, of Ahmednagar district. The chemicals used for the study were provided from the SMTB College of Pharmacy, Dhamangaon, Nashik under Pune University. All the tests performed in the college laboratory in the year 2013-2014. The fresh leaves were studied morphologically and used for the transverse section, surface preparation, and quantitative microscopy.

The dried leaves were powdered, stored in airtight containers and used for powder study and phytochemical screening. For microscopical studies, safranin was used for staining. The microscopic study was carried out using the compound microscope and camera lucida. Phytochemical screening was performed using the appropriate extracts (aqueous and alcoholic) and appropriate chemical tests<sup>8</sup>. Flowers of *Thevetia peruviana* were collected and cut into small pieces; it was shed dried and pulverized to mesh size 22 and stored in airtight container for further use.

## RESULTS AND DISCUSSION:

### Pharmacognostic Study:

#### Macroscopic Studies:

**Leaves:** *T. peruviana* leaves are simple, linear-lanceolate, 14-15 cm × 1-2 cm, glabrous, glaucous, having a sub-acute apex, short petiole, decurrent base, entire margin with few notches and upper surface dark green and lower surface light green in color.

**Flowers:** The Flowers of *Thevetia peruviana* Pers. were observed to be Narrow funnel-shaped with sword petals and dark green sepals, 6-7 × 2-3 cm size, Yellowish green to dark yellow color with the pleasant and agreeable smell, sweetish taste, and soft smooth touch. As shown in **Table 1**.

**TABLE 1: MORPHOLOGICAL PROPERTIES OF FLOWERS OF THEVETIA PERUVIANA**

S. no.	Parameter	Flower Observation
1	Shape and Structure	Narrow funnel-shaped with sword petals
2	Colour	Dark yellow, yellowish, yellowish green
3	Odour	Characteristic, pleasant smell
4	Taste	Sweetish, agreeable
5	Size	6-7 × 2-3 cm
6	Touch	Smooth

#### Microscopic Studies:

##### Leaves:

**Surface Preparation:** Surface preparation of *T. peruviana* leaf shows the presence of wavy walled epidermal cells and anisocytic stomata. As shown in **Table 2**.

**TABLE 2: QUANTITATIVE MICROSCOPY OF LEAVES OF THEVETIA PERUVIANA**

S. no.	Parameter	Observed value
1	Stomatal Index	
	Upper surface	4.77±0.08
	Lower surface	13.81±0.08
2	Palisade ratio	7±1
3	Vein islet no.	12 ±1
4	Vein termination no.	23 ±1

**Transverse Section:** Transverse section of *T. peruviana* leaf shows the presence of a thin cuticle and single layered epidermis composed of compactly arranged tabular cells. Single-layered palisade is present in the lamina, due to which the spongy parenchyma is wider. The mid-rib shows the presence of upper and lower collenchyma. Bicollateral vascular bundles are present in the

stele. Trichomes are rare. Rosette crystals are scattered in the lamina and ground tissue.

**Flowers:** In the microscopic studies, the flower shows all the typical characteristics of the flower. The sepal shows the presence of upper and lower epidermis, centrally vascular bundles as phloem surrounds with the xylem, cortex, parenchyma and also trichome. The petal shows the presence of upper and lower epidermis, centrally vascular

bundles as phloem surrounds with the xylem, cortex. The cross-section of ovary shows the presence of trichomes, vein trace, locule, ovule, and placenta.

**Preliminary Phytochemical Investigation:**

**Leaves:** *T. peruviana* powder shows mainly the presence of rosette crystals. The phytochemical screening of the leaves is as shown in **Table 3**.

**TABLE 3: PHYTOCHEMICAL SCREENING OF LEAVES OF THEVETIA PERUVIANA**

S. No.	Phytoconstituent	Test	Result
1	Alkaloids	Dragendorff's test	+ve
		Wagner's test	+ve
		Mayer's test	+ve
		Hager's test	+ve
2	Flavonoids	Shinoda test	-ve
		Lead acetate test	-ve
3	Sterols	Salkowski test	+ve
		Libermann Buchardt test	+ve
4	Cardiac glycosides	Legal's test	+ve
		Baljet test	+ve
		Keller Killiani test	+ve
		Kedde's test	+ve
5	Saponin glycosides	Foam test	-ve
		Lead acetate test	-ve
6	Phenolics	Ferric chloride test	+ve
		Folin ciocalteu test	+ve
7	Sugars	Fehling's test	-ve
		Molisch test	-ve

**Flowers:** Microscopic study of powder flower revealed the presence of basal cell of the trichomes, epidermal cell, stomata, vein – islets, vein – termination. Physiochemical tests of the powdered drug of *Thevetia peruviana*. Flower for the

presence of secondary metabolites and color observation shows the following results (in **Table 4**) when treated with different reagents. The preliminary phytochemical screening of flowers of *Thevetia peruviana* as shown in **Table 5**.

**TABLE 4: PHYSIOCHEMICAL ANALYSIS OF POWDERED DRUG OF FLOWER OF THEVETIA PERUVIANA**

S. no.	Reagents	Colour observed
1	Powder as such	Light black to Yellowish
2	Powder + Conc. HCl	Brownish black
3	Powder + Conc. HNO <sub>3</sub>	Light brownish
4	Powder + Conc. H <sub>2</sub> SO <sub>4</sub>	Light brick red
5	Powder + Glacial acetic acid	Light brownish
6	Powder + 5% NaOH	Light brownish
7	Powder + 5% KOH	Light brownish
8	Powder + 5% Ferric chloride	Yellow-brownish
9	Powder + Picric acid (Aq. Sol.)	Yellowish
10	Powder + Ammonia solution	Light brownish

**TABLE 5: PRELIMINARY PHYTOCHEMICAL SCREENING OF POWDER OF THEVETIA PERUVIANA FLOWERS**

S. no.	Phytoconstituent	Test	Result
1	Carbohydrates	Molisch's test	- ve
		Iodine test	-ve
		Fehling's test	+ve
		Barfoed's test	-ve

2	Protein & Amino Acids	Ninhydrin test	+ve
		Biuret test	+ve
		Millon's test	+ve
3	Fixed Oils & Fats	Test with tannic acid	+ve
		Spot test	+ve
4	Alkaloids	Saponification test	-ve
		Dragendroff's test	+ve
		Mayer's reagent test	+ve
		Wagner's reagent test	+ve
5	Glycosides	Hager's reagent test	+ve
		Legal's test	+ve
		Borntrager's test	+ve
6	Flavonoids	Keller-killiani's test	+ve
		Ferric chloride test	+ve
		Shinoda's test	-ve
7	Volatile Oil	Fluorescence test	-ve
		By Paper press test	+ve

**CONCLUSION:** *Thevetia peruviana* is grown as an ornamental plant and planted as large flowering shrub or tree standards in garden, parks, and roadside and road divider. The plant was found to be fully poisonous but also shows a number of pharmacological effect useful in various diseases. This effect is due to the presence of various chemical constituents present in leaves and flowers of this plant.

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**CONFLICT OF INTEREST:** Nil

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