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Phytochemical analysis in the root and leaf of *Thespesia populnea* (Linn) Soland ex correa

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Abstract

Thespesia populnea is an herbal medicinal plant known for its therapeutics values in urinary and inflammatory disorders. Leaves are useful in dysentery; the plant can also act as an antihelminthic. The current study dealt to provide details information about *Thespesia populnea* phytochemical analysis. Current investigation involve quality control characterization of plant *Thespesia populnea*. The plant extract evaluated for phytochemical and chromatographic analysis. HPLC fingerprint was carried out, which can be used for correct identification of the plant. The plant extract contains alkaloids, tannins, terpenoid and steroid. The present study provides evidence that solvent extract of *Thespesia populnea*. Contain medicinally important bioactive compounds.

Keywords: *Thespesia populnea*, Phytochemical, Medicinal plant, Leaf, Root, High-performance liquid chromatography

1. Introduction

Thespesia populnea commonly called as *Hibiscus populnea* belongs to the Family: Malvaceae. *Thespesia populnea* is an evergreen tree. The Leaves are alternate, simple, with petioles of length 5-10cm long. The flowers *Hibiscus* like single at upper leaf axils, corolla yellow with a red center. The Fruits are Globose. Is a large tree found in the tropical regions and coastal forests in India and cultivated in the gardens. All the parts of the plant used in traditional system of medicine. The bark, leaves, flower and fruits are useful in cutaneous infection such as scabies, psoriasis, eczema, ringworm, and guinea worm. The decoction of the bark is commonly used for the treatment of skin and liver diseases. A compound oil of bark and capsules is useful in urethritis and gonorrhoea. The bark, root, fruits were used in dysentery, cholera and haemorrhoids (Chabra *et al.*, 1994). The fruits of the plant are used in ayurveda for the control of diabetes⁵. An ayurvedic preparation contains *Thespesia populnea*, namely "panchvalkala" posses' free radical. The barks and flowers posses astringent, hepatoprotective, antioxidant and antiinflammatory activities in rats (Shirwaikar *et al.*, 1995, Illavarasan *et al.*, 2003, Satyanarayana *et al.*, 2004 and Manivasudevan *et al.*, 2007) ^[9, 8, 7, 10] also supposed to improve the memory (Vasudevan and Parle, 2006) ^[11]. The Seeds are Black, hairy. The main chemical constituents are Kaempferol, Quercetin and its glycosides, herbacetin and its glucoside, populneol, populnin, populnetin, rutin, gossipetin, gossypol, lupeol, sesquiterpenoidal quinones viz; thespeson, thespone, mansonones C, D, E and F, amino acids and carbohydrates.

The main uses of *Thespesia populnea* are cutaneous infections, skin and liver diseases. Fruit juices are used on rheumatism sprains, scabies, swellings, insect bites and warts. Pulps of fresh fruits were applied for relief of migrane. Unripe fruit juice was used to cure piles. Decoction of bark was given to treat diarrhoea and arthritis. Root, fruit and leaf used in psoriasis, scabies and other cutaneous diseases. Bark was used for the treatment of hemorrhoids and chronic dysentery. Leaf used as an anti-inflammatory (Asima chatterjee, Satyesh Chandra Pakrashi, 1994 and Jean, 1999) ^[1, 2]. The leaves and bark of this tree are still used to mix with oil for the treatment of fracture wounds and as an anti-inflammatory poultice applied to ulcers and boils, as described in folk medicine. Gossypol was found to be the major component of *Thespesia populnea* (Akila, Rani, 1993) ^[12] producing anti-fertility effects in rats (Murthy *et al.*, 1981, Bhattacharya, 2004) ^[14, 13], as well as in human beings¹⁵. Four naturally occurring quinones viz thespone, thespesone, mansonone-D, and mansonone-H have been extracted from heart wood of the plant (Qian, Wang, 1984) ^[15]. The phytochemical study of bark reveals the presence of gossypol, tannin and coloring matter (Johnson *et al.*, 1999) ^[16] and leaf extract indicates the presence of lupeol, lupenone, β -sistosterol (Daniel, 1994) and also acetatin, quercetin, vanillic, syringic, melilotic, and ferulic acid.

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Herbal industry suffering many problems regarding quality control standardization of plant material, thus the present investigation of *Thespesia populnea* plant carried out to establish a pharmacognostic and high-per liquid chromatography.

2. Materials and Methods

2.1 Plant Material: Plant material of *Thespesia populnea* was collected from Karur Tamil Nadu, during the month of December 2014. The plant specimen was identified with Gambles Flora of the Presidency of Madras and the identity is confirmed with the herbarium specimen deposited in Department of Botany, Periyar EVR College (Autonomous) Tiruchirappalli, Tamil Nadu.

2.2 Preparation of the Extract: Plant materials leaf and root was washed with distilled water and shade dried. The dried samples were manually ground to a fine powder. The plant materials was identified and authenticated by Botanical Survey of India (Southern Circle, Coimbatore Tamil Nadu, India). A voucher specimen of both has been deposited for future reference in the Department of Botany Periyar EVR College (Autonomous), Tiruchirappalli - 620 023, Tamil Nadu. *Thespesia populnea* leaves and root were chopped into small pieces, shade dried. Dried samples were powdered in a Wiley mill. Powdered samples were stored in polythene containers at room temperature. The leaves and root samples were taken for analysis to detect the presence of certain biologically active compound(s). The extract contains polar components of the material and 2 μ l sample of the solution was employed in HPL for analysis of different compounds.

2.3 Extraction: 50 g of *Thespesia populnea* (Leaves) and (Root) coarse sample using Soxhlet method, extraction 24 hrs and using Methanol (MT) solvent.

2.4 Preliminary phytochemical screening: The condensed extracts of different solvent used for preliminary phytochemical screening were carried out using standard procedures to test the presence of bioactive compounds (Amarasingham *et al.*, 1964) [3], (Chabra *et al.*, 1984) [4], Harborne (1984) [5].

Qualitative Analysis of phytochemicals: The analysis of phytochemicals from the solvent free extract of *Thespesia populnea* leaves was individually carried out using various qualitative test for alkaloids, flavonoids, protein, amino acid, tannins, phenolics, glycosides, saponins and carbohydrates compounds. Extraction of phytochemicals. The individual phytochemical was extracted in the appropriate solvent and stored in air tight containers at 4°C till further use.

2.5 Test for alkaloids: The small portion of extract were stored separately with a few drops of dilute hydrochloric acid and filtered. The filtrate was tested with various alkaloidal agents, such as Mayer's reagent (White precipitate or turbidity). Test for flavonoids Shinoda test One ml of the extract was treated with magnesium turnings and 1-2 drops of concentrated HCl. Formation of pink or red colour shows the presence of flavonoids.

2.6 Test for protein and amino acids: Ninhydrin test: One

ml of the extract, 2 drops of freshly prepared 0.2 per cent ninhydrin reagent was added and heated. The appearance of blue colour indicates the presence of proteins, peptides or amino acids.

2.7 Test for tannins and phenolic compounds: One ml of the extract was treated with few ml of the gelatin solution; a white precipitate reveals the presence of tannins and phenolic compounds.

2.8 Test for glycosides Legal test: The extract was dissolved in pyridine and freshly prepared sodium nitroprusside solution was added. The formation of pink to red colour indicates the presence of glycosides.

2.9 Test for saponins

To 1 ml of the extract, alcoholic vanillin solution and a few drops of concentrated sulphuric acid were added. A deep violet colour confirms the presence of saponins. Test for carbohydrates Benedict's test Five ml of Benedict's solution was added to the extract and boiled in water bath. The appearance of red yellow or green precipitate indicates the presence of reducing sugars.

2.10 Maceration: Powdered dried leaves (1g) and root (1 g) were macerated with methanol: water (1:1; v/v, 10 mL) and left at rest (7 days, room temperature). The material was filtered and the crude extract obtained was analyzed directly by GCMS and HPLC-UV. This procedure was repeated in triplicate.

3. Results and discussion

It was observed when similar kind of weight of sample was taken the analysed herbs shows the peak area maximum in case of mint. The rest of herbs showed lower content. So mint can be used as a rich source of thespeson, thespone, populnin and populnetin from herb.

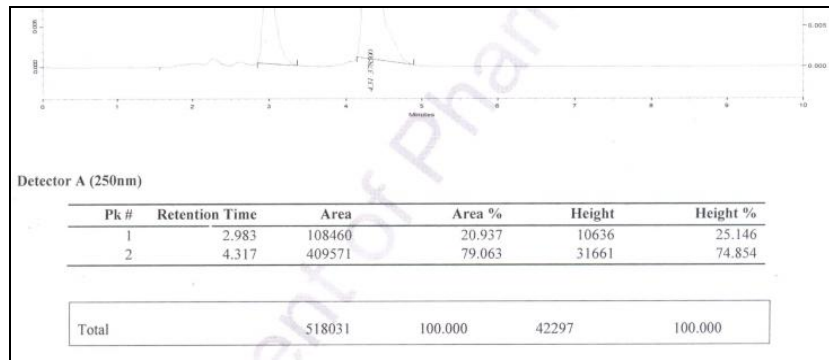
Phytochemical screening of the test was performed on methanol extract of *Thespesia populnea* leaves (Table 1).

Table 1: Phytochemical constitute of the Leaf extracts of *Thespesia populnea*.

Extract Name	Chemical constituent
Methanol	Alkaloids
	Carbohydrates
	Glycosides
	Phytosterols
	Tannins
	Phenols
	Proteins
	Amino Acids
	Gums
	Mucilage
	Flavanoids
	Terpenes
	Volatile Oils

Table 2: HPLC analysis of leaf extract of *Thespesia populnea*

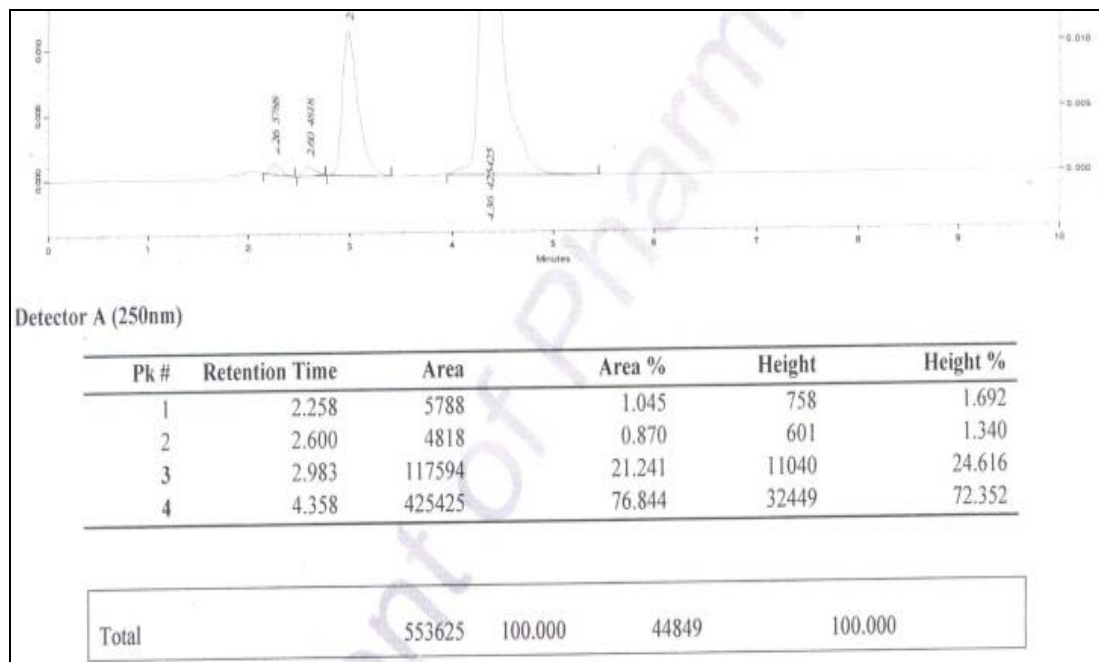
S. No.	Name of the herb	Retention time	Peak area	Height %
1.	<i>Thespesia</i>	2.983	108460	25.146
	<i>populnea</i>	4.317	409571	74.854

Table 2.1: HPLC analysis of leaf extract of *Thespesia populnea***Table 3:** Phytochemical constitute of the Root extracts of *Thespesia populnea*

Extract Name	Chemical constituent
Methanol	Alkaloids
	Carbohydrates
	Glycosides
	Phytosterols
	Tannins
	Phenols
	Proteins
	Saponins
Flavanoids	

Table 3.1: HPLC analysis of root extract of *Thespesia populnea*

S. No.	Name of the herb	Retention time	Peak area	Height %
1.	<i>Thespesia populnea</i>	2.258	5788	1.045
		2.600	4818	0.870
		2.983	117594	21.241
		4.358	425425	76.8448

Table 3.1: HPLC analysis of root extract of *Thespesia populnea*

3. Conclusion

In conclusion, from the results of the present investigation, it could be inferred that *T. populnea* leaf and root is found to have significant medicinal activities. Phytochemical screening and HPLC study substantiate that *T. populnea* Leaf and root methanol extract contain pharmacologically active principles. The phytochemical analysis of the extracts revealed the existence of various constituents including steroids,

terpenoids, esters, acids, tannins etc. The active constituent needs to be isolate and should be considered for further *in vivo* or *in vitro* studies to confirm the tradition. Biological study inferred that, seed extract active as anti oxidant.

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