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# PHARMACOGNOSTIC, PHYTOCHEMICAL, PHYSICOCHEMICAL AND TLC PROFILE STUDY OF LEAVES THESPESIA POPULNEA SOL.EX.CORREA. (MALVACEAE)

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## ABSTRACT

Thespesia Populnea Is A Very Important Medicinal Plant Belonging To The Family Malvaceae Which Is Used In Traditional System of Medicine. It Is Commonly Known As Indian Tulip Tree, Pacific Rosewood. It Is A Small Tree or Arborescent Shrub That Has A Pantropical Distribution, Found on Coast Around The World, Comman Native To Asia. Thespesia Populnea Is A Fast Growing, Medium Sized Evergreen Tree, Upto 10m Tall With Yellow, Cup Shaped Flowers Having Maroon Centre & Distributed Throughout Coastal Forest of India & Also Largely Grown As A Roadside –Tree. The Aim of Study Deals With Pharmacognostic & Phytochemical Studies of Leaves of Plant. Work Comprises of Collection, Identification, Microscopical & Phytochemical Evolution of Leaves of Plant. T.S. Shows Presence of Epidermis, Vascular Bundles, Glandular Trichomes, Leaf Showing Vein-Islet, Vein -Termination & Mucilage. Powder Shows Crystals of Peltate Scale. Extraction Is Carried Out By Using Soxhlet Extraction Technique. Alcoholic Exact of Leaf Shows Presence of Alkaloids, Carbohydrates, Flavonoids, Proteins & Amino Acid, Phytosterols, Gum, Mucilage, Terpenes, Saponins, Tannins Etc. Physicochemical Analysis Was Carried Out on This Leaves, Which Include Parameter Such As Moisture Content, Water Soluble Ash, Alcohol Soluble Ash, Alchol Soluble Extractive Value of Plant Were Determined. Tlc Profiling of Plant Extract In Different Solvent System Was Performed & Different Rf Values Are Obtained. The Plant Has Been Used As Astringent, Antibacterial, Anti-Diarroheal & Healing Activity.

**KEYWORDS:** Thespesia populnea, Phytochemical screening, Microscopical study, Antihelmentic, TLC.

## INTRODUCTION

Plant have played a significant role in maintaining human health & improving the quality of human life for thousands of years & have served humans well as valuable components of medicines. Herbal Medicine is based on the premise that plant contain natural substances that can promote health & alleviate illness. Thespesia Populnea is also known as Portia Tree belonging to the family Malvaceae. Thespesia Populnea is a large tree found in the tropical regions & coastal forest of India It is common plant of Coastal stand across Old World Tropies. The assignment such as macroscopy, pharmacognostic, preliminary phytochemical screening & physicochemical parameters were performed. Various Parts of Thespesia Populnea posseses Different Medicinal Properties such as Anti-Bacterial, Anti-Diarrheal, Anti-Oxidant, Purgative, Anti- Inflammatory, Anti-Microbial, Anti-Helmentic. Thespesia populnea is an evergreen middle sized tree, indigenous to India. It is commonly known as Portia tree, belonging to family Malvaceae. It is used as folklore medicine in the treatment of several diseases. It is an effective remedy for scabies, psoriasis, skin diseases, dysentery, piles, diabetes.[1] Thespesia Populnea Linn 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. 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.[2,3]

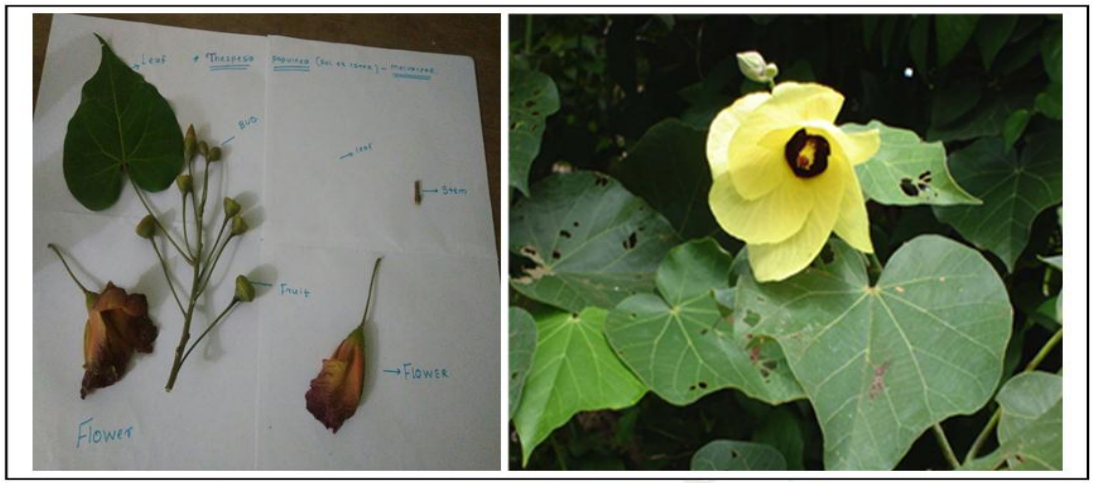


**Fig.1: Leaves of Thespesia Populnea Sol.Ex.Correa.**

**Vernacular names**
Sanskrit :-Parshwapipal
Hindi:- Bhendi, Pipal
English:- Portia Tree
Gujarati:- Paras Piplo
Marathi:- Aashta, Paras-Bhendi
Bengali:- Gajashundi
Tamil:- Puvarasu
Telugu:-Gangaravi
Malayalam :- Cilannthi
Kannada:- Arasi
French:- Catalpa

**Taxonomical Classification**
Kingdom :- Plantae
Sub-Kingdom :-Tracheobionta
Super division :-spermatophyta
Division :-magnoliophyta
Class :- magnoliopsida
Subclass :- Dilleniidae
Order :-Malvales
Family :-Malvaceae
Genus :-Thespesia.Sol.ex.Correa
Species :-Thespesia Populnea(L.)Sol.ex.Correa.

**Distribution & Habitat**
1. Global distribution= pantropical.
2. Indian distribution= State(Maharashtra, Kerala).

**Part's used** – The entired plant leaves, flowers, fruit, bark, stem etc. are used in medicine, normally/preferably in fresh state.

## MATERIALS AND METHODS

**Collection of plant material**
The Plant of THESPESIA POPULNEA was widely found in throughout the India, for our project work it was collected from area of campus of Vishal Institute of pharmaceutical & research Centre during the month of August& authenticated by Botanist. After collection of leaves washed 2-3 times in distilled water then dried in shade and grinded into fine powder, stored in closed container separately with proper labelling for further use. Powdered plant leaves were subjected to alcohol extraction and aqueous extraction.

**Description**
**(A)Macroscopic Examination**
**Botanical description**
Tree type is deciduous, Leaves are simple, leaf shape is ovate or bicular, leaf apex is accumanate, base is cordate, leaf margin is entired.

**Table 1: Morphology of Leaves of Thespesia Populnea.**

| Sr.No. | Characters | Apperance |
|---|---|---|
| 1. | Colour | Dark green |
| 2. | Odour | Characteristics |
| 3. | Taste | Astringent |
| 4. | Shape | Heart-shaped |
| 5. | surface | 6-22 m long |

**(B) Microscopic Examination**
For the study of crystals, starch grains and lignified cells polarized light microscope was employed. Descriptive terms of anatomical features are as given in the standard anatomy books.[4]

**Table 2: Staining / Diagnosis/ Microchemical Test.**

| Sr.No. | Reagents | Observations | Characteristics |
|---|---|---|---|
| 1 | Phloroglucinol+Hcl(1:1) | Pink | Lignified tissues:xylem(vascular bundle) |
| 2 | Sudan Red III | Pink | Cutin/cuticle |
| 3 | Ruthenium red | pink | Mucilaginous cells of epidermis |
| 4 | Sulphuric acid | Needle shape crystals from calcium sulphate are formed. | Calcium oxalate crystals |
| 5 | Alcoholic Picric acid | Yellow | Aleurone Grains |
| 6 | Iodine | Blue | Starch |
| 7. | Acetic Acid | Insoluble | Calcium oxalate crystals |

**Table 3: Quantitative Microscopy**

| Sr.No. | Leaf Constant | Mean value |
|---|---|---|
| 1 | Stomatal Index | 5.4±0.5 |
| 2 | Upper Surface | 4.9±0.4 |
| 3 | Lower Surface | 15.9±0.5 |
| 4 | Palisade Ratio | 5±1 |
| 5 | Vein Islet Number | 12±1 |
| 6 | Vein Termination Number | 15±2 |

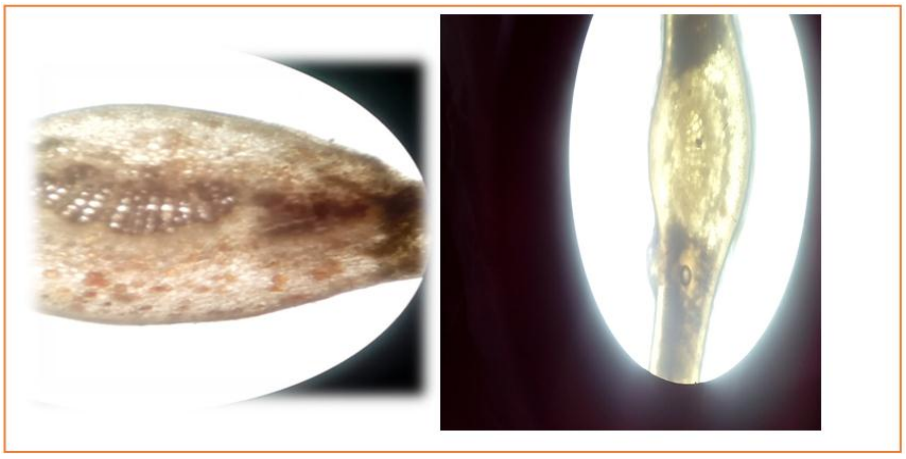

**Fig.2: Microscopic Examination of Leaves**

**(C) Physico-Chemical Parameter**

Crude powdered drug of leaves was used for the determination of various physicochemical parameters such as total ash value, acid insoluble ash value, water soluble ash value, loss on drying, foreign matter, pH, moisture content and extractive values.[5]

**Table 4: Physico-Chemical constant of leaves of Thespesia Populnea.**

| Sr No. | Parameters | Observations |
|---|---|---|
| 1 | Foreign org. matter | 1.7 |
| 2 | Moisture content(LOD) | 7.2 |
| 3 | Ash value<br>1.Total Ash<br>2.Acid Insoluble Ash<br>3.Water Soluble Ash | <br>17.3<br>4.5<br>9.2 |
| 4 | Extractive Value<br>1.Water Soluble Extractive Value<br>2.Alcohol Soluble Extractive Value | <br>0.7<br>0.3 |

**(D) Phytochemical Screening of Leaves exatract**

The phytoconstituents present in the alcoholic extract of were expressed in the Table: 5 Phytochemical screening procedure.

**1) Test for alkaloids**

To the extract dilute hydrochloric acid will be added and filtered. The filtrate will be treated with various alkaloid reagents

**a) Mayer's test**
The filtrate will be treated with Mayer's reagent: appearance of cream colour indicates the presence of alkaloids.

**b) Dragendroff's test**
The filtrate will be treated with Dragendroffs reagent: appearance of reddish brown precipitate indicates the presence of alkaloids.

**c) Hager's test**
The filtrate when treated with Hager's reagent, appearance of yellow colour precipitate indicates the presence of alkaloids.

**2) Test for carbohydrates and reducing sugar**
The small quantities of the filtrate will be dissolved in 4ml of distilled water and filtered. The filtrate will be subjected to

**a) Molisch's test**
A small portion of the filtrate will be treated with Molisch's reagent and sulphuric acid. Formation of a violet ring indicates the presence of carbohydrates.

**b) Fehling's test**
The extract will be treated with Fehling's reagent A and B. The appearance of reddish brown colour precipitate indicates the presence of reducing sugar.

**3) Test for steroids**
**Liebermann bur chard's test**
The extract will be treated with 3ml of acetic anhydride, few drops of glacial acetic acid followed by a drop of concentrated sulphuric acid. Appearance of bluish green colour indicates the presence of steroids.

**4) Test for proteins**
**a) Biuret test**
The extract will be treated with copper sulphate solution, followed by addition of sodium hydroxide solution; appearance of violet colour indicates the presence of proteins.

**b) Millon's test**
The extract will be treated with Millon's reagent; appearance of pink colour indicates the presence of proteins.

**5) Test for tannins**
The extract will be treated with 10% lead acetate solution; appearance of white precipitate indicates the presence of tannins.

**6) Test for phenolic compounds**
a) The extract will be treated with neutral ferric chloride solution; appearance of violet colour indicates the presence of phenolic compounds.

b) The extract will be treated with 10% sodium chloride solution; appearance of cream colour indicates the presence of phenolic compounds.

**7) Test for flavonoids**
a) 5ml of extract will be hydrolyzed with 10%sulphuric acid and cooled. Then, it will be extracting with diethyl ether and divided in to three portions in three separate test tubes. 1ml of diluted sodium carbonate, 1ml of 0.1N sodium hydroxide, and 1ml of strong ammonia solution will be added to the first, second and third test tubes respectively. In each test tube. Development of yellow colour demonstrated the presence of flavonoids.

**b) Shinoda's test**
The extract will be dissolved in alcohol, to which few magnesium turnings will beaded followed by concentrated HCL drop wise and heated, and appearance of magenta colour shows the presence of flavonoids.

**8. Test for gums and mucilage**
The extract was treated with 25 ml of absolute alcohol, and filtered. The filtrate will examine for its swelling properties.

**9. Test for glycosides**
When a pinch the extract was treated with glacial acetic acid and few drops of ferric chloride solution, followed by the addition of conc. Sulphuric acid, formation of ring at the junction of two liquids indicates the presence of glycosides.

**10. Test for saponins**
**Foam test**
About 1 ml of the extract was diluted to 20 ml of with distilled water and shaken well in a test tube. The formation of foam in the upper part of test tube indicates the presence of saponins.

**11. Test for Triterpenoids**
The substance was warmed with tin and thionyl chloride. Pink colour indicates the presence of triterpenoids.[4,6,7,8]

**Table 5: Phytochemicals of Extracts of Leaves of Thespesia Populnea.**

| Phytochemicals | Test | Petroleum Ether | Ethanol |
|---|---|---|---|
| Alkaloids | Dragendorff's test | + | + |
| | Hager's test | + | + |
| | Mayer's test | + | + |
| Tannins& Phenolics | Ferric chloride test | _ | + |
| Saponins | Foam Test | _ | + |
| | Lead Acetate Test | _ | + |
| Flavonoids | Shinoda Test | + | + |
| | Lead Acetate Test | + | + |
| Carbohydrates | Fehling's Test | _ | + |
| | Molisch Test | _ | + |
| Proteins & Amino Acid | Million's Test | _ | + |
| | Biuret Test | _ | + |
| Phytosterols | Salkowaski test | _ | + |
| Gum & mucilage | Ruthenium red test | + | + |
| Terpenoids | Libermann-Buchardt Test | + | + |

**(-)=Absent (+) =Present**

**(E) Thin layer chromatography**

The ethanolic extract of plant was performed on thin layer chromatographic (TLC) plates, composed of silica gel g plate. The plate was developed in chamber was previously saturated by mobile phase. The mobile phase was chloroform: methanol: Formic acid[(28.9)100: (0.1)2.5: (0.3)1 (all solvents were analytical grade) After Drying, plate was investigated; visually, under UV 254 nm waves and iodine chamber spray reagent[9]

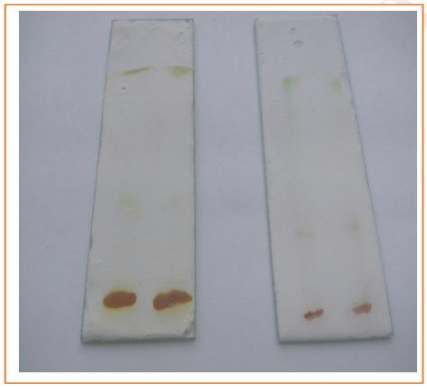

**Fig.3.1: Thin layer chromatography of Leaves Extract.**

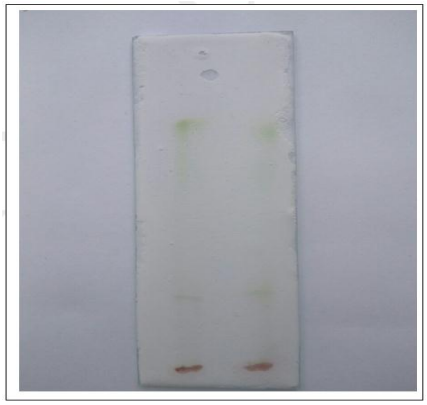

**Fig.3.2: Thin layer chromatography of Leaves Extract**

## RESULT AND DISCUSSION

Now-a-days there has been drastic increase in the standardization of selected medicinal plants of potential therapeutic significance. Despite the availability of modern techniques, it is more reliable to identify a plant drug by pharmacognostic evaluation. A complete and systematic study of a crude drug which comprises of collection, preservation, storage, macroscopical, microscopical, organoleptic characters, etc. is claimed to be the scientific or pharmacognostic evaluation. Standardization is an essential measure for quality, purity and sample identification. Standardization of herbal drugs is a very challenging task for herbal drug industry because of complex nature and variation of chemical constituents. Microscopical evaluation is one of the simplest methods for identification of drugs. According to WHO, the macroscopic and microscopic evaluation is the first step to be carried out to establish its identity and purity. The evaluation of physico-chemical constants is an important parameter in detecting adulteration or improper handling of drugs. The extractive values are immensely useful to evaluate the chemical constituents that are present in the crude drug. These extractive values are also helpful in the estimation of specific constituents soluble in particular solvent. The moisture content for vegetable drug was an indication that the plant can be stored for a long period of time with less probability of microbial attack. The total ash is particularly important in the evaluation of purity of drugs. The aim of performing ash value is to remove all traces of organic matter. The total ash value obtained from the study can be used to detect foreign organic matter and adulteration with sand and earth, therefore, reflecting the kind of care that must be taken in preparing the plant for drug. Ash value varies within equitably wide limits and is therefore an important parameter for the evaluation of crude drug. All crude drugs were standardized for the active phytoconstituents. Here preliminary phytochemical studies confirmed the presence of saponins, flavonoids, glycosides, triterpenoids, carbohydrates and fats. These findings are

not only helpful in the pharmacological and therapeutic evaluation of the seeds but also assist in standardization for quality, purity and sample identification. And all the evaluation parameter were maintion in Table.1-5.

## CONCLUSION

The present study i.e., Pharmacognostic, Phytochemical, Physicochemical And TLC Profile Study Of Leaves Thespesia Populnea Sol.Ex.Correa. (Malvaceae) is helpful in the characterization of the crude drug. Physiochemical and phyto-chemical analysis of leaves confirm the quality and purity of plant and its identification. The information collected is useful for further pharmacological and therapeutical evaluation of leaves Thespesia populnea sol.ex.correa. (malvaceae) and anthology of quality control of crude drug. The leaves Thespesia populnea sol.ex.correa. was screened for phytochemical constituents and found to be good source of medicinally active elements which can be further exploit to isolate and synthesize modern medicines. This work justifies the need to isolate and characterize the medicinally active compounds.

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