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# Comparative Pharmacognostical Studies On *Albizia Lebbeck (L.) Wild* and *Albizia Procera* (Roxb.) Benth. Leaves

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**ABSTRACT:** Traditional medicine refers to health practical approaches, knowledge and benefits incorporating plant, animal and mineral based medicines applied singularly or in combination to treat, diagnose and prevent illness or maintain well being. Herbs have been used as food and for medicinal purpose for centuries. Herbal medicine is based on the premise that plants contain natural substances that can promote health or alleviate illness. Pharmacognosy is a highly specialized science that represents one of the major disciplines of pharmaceutical Science. A number of drugs used by the ancients are still employed in much the same manner by today's medical practitioners. Although it is true that extraction, separation, isolation, and identification of the component constituents of plant and animal drugs have occurred in relatively recent years, nevertheless the purpose for which many of these medicinal substances are employed today parallels closely the use for which they were intended by our predecessors in the study of pharmacy and medicine. *Albizia lebbeck* (L.) Wild is commonly known as 'Shrisha'. It is found throughout India ascending to 900m in the Himalayas and also in the Andaman. Bark is dark brown to greenish black, rough with longitudinal and transverse fissures on outer surface inner surface whitish with fine longitudinal stations. The sapwood is white or yellowish white and the heartwood is dark brown, streaked with dark and white shades. Leaves are bipinnate with 8-18 leaflets. Flowers are stalked, greenish yellow. *Albizia procera* (Roxb) Benth. is a large, fast-growing tree that is seen on many different sites. Like other Asian *Albizias*, it grows in forests and savanna woodlands, but prefers moisture sites than its relatives. This species provides wood for a variety of purposes, nutritious fodder for live stock and shade for tea plantations. It is an important reforestation and agro-forestry species. It is commonly called white 'Srish' or tall *Albizia*. Because of common vernacular name of both species in most part of India, various parts of the two species are therapeutically used one for the other. Hence, pharmacognostical studies on leaves of *A. procera* and *A. lebbeck* were carried out to identify, distinguish and to evolve standard mentioned in Indian systems of medicine. Pharmacognostical evaluation of *Albizia lebbeck* Benth and *A. procera* leaves provided specific parameters that will be useful in scientific evaluation, identification and authentication of the drug. Phytochemical study revealed the presence of saponin, steroids, tannins, glycosides, flavanoids in methanolic and aqueous extracts of leaves, while saponins were found only in aqueous extract.

**KEY WORDS:** *Albizia lebbeck*, *Albizia procera*, Pharmacognosy, saponin, steroids, tannins, glycosides, flavanoids.

### I. INTRODUCTION

Traditional medicine refers to health practical approaches, knowledge and benefits incorporating plant, animal and mineral based medicines applied singularly or in combination to treat, diagnose and prevent illness or maintain well being. Indian subcontinent is a rich source of plant and animal wealth, which is due to its varied geographical and agro-climatic regions. Beside it has varied, bio-diversity, and has a diverse cultural heritage too (WHO, 2008). Therapeutic efficacy of herbal drugs depends upon the quality of the active compounds they contain. Plants have

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played a significant role in maintaining human health and improving the quality of human life for thousands of years, and have served human as well as valuable components of seasonings, beverages, cosmetics, dyes and medicines. Herbs have been used as food and for medicinal purpose for centuries. Herbal medicine is based on the premise that plants contain natural substances that can promote health or alleviate illness. A variety of herbs and herbal extracts contain different phytochemicals with biological activity that can provide therapeutic effects. Several herbs can help to reduce high blood cholesterol concentrations, provide some protection against cancer, and stimulate the immune system. Our ancient systems of medicine have a high heritage which includes Ayurveda, Siddha, Unani and folk medicine. Among these Ayurveda and Siddha are of Indian origin. 70 percent of the Indian population depends on traditional systems of medicine and 80 percent of world's population depends on herbal medicine. Pharmacognosy is a highly specialized science that represents one of the major disciplines of pharmaceutical Science. A number of drugs used by the ancients are still employed in much the same manner by today's medical practitioners. Although it is true that extraction, separation, isolation, and identification of the component constituents of plant and animal drugs have occurred in relatively recent years, nevertheless the purpose for which many of these medicinal substances are employed today parallels closely the use for which they were intended by our predecessors in the study of pharmacy and medicine (Tyler *et al.*, 1981).

*Albizia lebbek* (L.) Wild is commonly known as 'Shrisha'. It is found throughout India ascending to 900m in the Himalayas and also in the Andaman. Bark is dark brown to greenish black, rough with longitudinal and transverse fissures on outer surface inner surface whitish with fine longitudinal striations. The sapwood is white or yellowish white and the heartwood is dark brown, streaked with dark and white shades. Leaves are bipinnate with 8-18 leaflets. Flowers are stalked, greenish yellow. Flowering and fruiting season starts from April to June. Pods are yellowish brown with 6-10 seeds. Mature pods remain on the tree for long period and are available till May-July. The tree is good substitute for teak (*Tectona grandis* Linn.) and ('Sala, *Shorea robusta* Gaertn). Leaf of *A. lebbek* has great medicinal as well as nutritional value. Phytochemically the leaves contain saponin, tannin and cardiac glycoside (Chintawar *et al.*, 2002). In Ayurveda, expressed juice of leaf is advocated to instill in to nostrils in case of poisoning. The plant has been reported to possess anti-inflammatory (Prakash *et al.*, 2009). Anti-allergic activity of hot aqueous stem bark decoction and its butanolic fraction in various models like anti PCA or mast cell stabilizing activity (Baruah *et al.*, 2001) anti-convulsion effect (Kasture *et al.*, 2000) antioxidant (Resmi *et al.*, 2006). Systematic pharmacognostic and phytochemical studies have been reported till date. So a detailed investigation of fresh as well as powdered of leaves of *Albizia lebbek* L. (Wild) has been carried out using various pharmacognostical and physico-chemical parameters.

*Albizia procera* (Roxb) Benth. is a large, fast-growing tree that is seen on many different sites. Like other Asian *Albizias*, it grows in forests and savanna woodlands, but prefers moisture sites than its relatives. This species provides wood for a variety of purposes, nutritious fodder for live stock and shade for tea plantations. It is an important reforestation and agro-forestry species. It is commonly called white 'Srish' or tall *Albizia*. This tree grows naturally in India, Nepal, Bangladesh, the Andaman Islands, Burma (Neelsen, 1979). It is naturalized in the Virgin Islands and Puerto Rico. Biological compounds like A-spinasterol, hentria contane and hexacosanol have been isolated from leaf. Heartwood and bark yield isoflavones, biochanin A and formononetin, genistein and diadzein. A new pterocarpan – demethylmedicarpin, biochanin A, formononetin, genistein, daidzein and  $\beta$  – Sitosterol have been isolated from bark. Degraded gum contains galactose, mannose, glucuronic acid and 4-O- methyl –D- glucuronic acid. A saponin has been isolated from seeds, which on hydrolysis gives proceric acid, seeds contain procerogenin A, mechaerinic acid. Proceric acids, proceyanin A, (hypotensive in animals), oleanolic acid and saponin. Root contains a – spinasterd and oleanelic acid (Asolkay *et al.*, 1992; Rastogi and Mehrotra, 1993).

*A. lebbek* and *A. procera* are very common in Tamil Nadu and in Cauvery Delta region. These two species share common morphological features but differ in some detailed morphological characters. Medicinal properties like Anti-ulcer, Anti inflammatory are also common for these two trees. In Siddha medicine and Folk medicine, parts of *A.lebbek* and *A.procera* are used one for the other whether knowingly or unknowingly. Though some phytochemical and pharmacological works in *A.lebbek* in *A. procera* are available, a detailed pharmacognostical study on leaves of these two species is lacking. No works are carried out on physiochemical and phytochemical differences in leaves collected during different growth phases. And hence, the present work report a comparative pharmacognostical,

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physiochemical and phytochemical profiles on leaves of *A. lebbek* and *A. procera* collected in three different growth phases like vegetative, flowering and fruiting phases.

## II. MATERIALS AND METHODS

### Pharmacognosy

Collection of plant materials: Leaves of *Albizia lebbek* (L.) Wild. and *Albizia procera* (Roxb.) Benth were collected in and around in Thanjavur, during three different growth phases viz. vegetative, flowering and fruiting.

### Plant Identification

Collected specimen were carefully examined and identified with the help of Regional Floras (Gamble, 1967; Kirtikar and Basu, 1980; Matthew, 1983; Nair and Hendry, 1983) and the Botanical identification was authenticated by Dr.M. Jegadeesam, Formerly Professor and Head, Department of Environmental and Herbal sciences, Tamil University, Thanjavur. Specimen was further confirmed with reference to Herbarium sheets available in the Botanical Survey to India, Southern Circle, Coimbatore. Voucher specimen has been deposited at Tamil University Herbarium for future reference.

### Taxonomy

Systematic position of the plant specimen has been assigned as per the Angiosperm Taxonomic Classification of Bentham and Hooker (1862 – 1883).

### Preparation of specimen

The plant specimens for the proposed study were collected from the areas of Thanjavur. Care was taken to select healthy plants and normal organs. The leaves of *A. lebbek* and *A. procera* at three different growth phases, vegetative, flowering and fruiting were cut and removed from the plant and fixed in FAA (Formalin-5ml + Acetic acid-5ml + 70% Ethyl alcohol-90ml). After 24 hrs of fixing, the specimen was dehydrated with graded series of tertiary-butyl alcohol as per the schedule given by Sass, (1940). Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58-60 c) until TBA solution attained super saturation. The specimens were cast into paraffin blocks.

### Sectioning

The paraffin embedded specimens were sectioned with the help of rotary microtome. The thickness of sections was 10-12µm. Dewaxing of the sections was done by customary procedure (Johansen, 1940). The sections were stained with toluidine blue as per the method published by O'Brien et al., (1964). Since toluidine blue is a polychromatic stain, the staining results were remarkably good and some cytochemical reaction was also obtained. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage, blue to the protein bodies etc. Wherever necessary sections were also stained with safranin and Fast-green and IKI (for starch).

### Powder microscopy study

For studying the stomatal morphology, venation pattern and trichome distribution, paradermal sections (sections taken parallel to the surface of leaf) as well as clearing of leaf with 5% sodium hydroxide or epidermal peeling by partial maceration employing Jeffrey's maceration fluid (Sass, 1940) were prepared. Glycerine mounted temporary preparation were made for macerated/cleared materials. Powdered materials of different parts were, mounted in glycerine medium after staining. Different cell component were studied and measured.

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## Qualitative Phytochemical Analysis

Qualitative phytochemical analysis was done using the procedures of Kokate (1994). Alkaloids, carbohydrates, tannins, and phenols, flavonoids, gums and mucilage, fixed oils and fats and saponins were qualitatively analyzed.

### Preparation and concentration of Extracts (successive)

The leaf powder of *A.lebbeck* and *A. procera* were extracted successive by using Soxhlet apparatus with petroleum ether (60 -80°C), benzene 60°C, chloroform 60°C. Each time before extracting next solvent powdered materials was dried in hot air oven below 50°C. The extracted dried over anhydrous sodium sulphate, stored in sealed vials in a refrigerator (5-8°C). Finally mark was macerated with chloroform water for 24 hrs to obtain the aqueous extract. The extract was concentrated by distilling off the solvent and then evaporated to dryness on a water bath.

### Cold Extraction

The air -dried material was coarsely powdered to aid the extraction. They were soaked in alcohol and kept for 48 hours. The extract thus obtained was decanted and filtered. The clear extract was subsequently concentrated using rotary vacuum evaporator. This method was used to save the active principles that would have been otherwise inactivated by a heating process that usually involved in any concentration process. Pilot biological studies conducted using these extracts. The active principles withstood the heating up to 65°C for least 24 hours. So subsequently the extracts were concentrated over a boiling water bath on glass Petridishes by free evaporation.

### Preparation of Extract

Water extract was prepared according to the methodology of Indian Pharmacopoeia (Anonymous, 1996). The water extract was subjected to pharmacological studies and GCMS.

## Quantitative phytochemical studies

Isolation of flavonoid from the ethanol extract of leaf was carried out on the basis of solubility by using the method of Jain *et al.*, 2006; Tannin determination by Van-Burden and Robinson (1981) method; Thin layer Chromatography is based upon the principles of column and partition Chromatography (Harborne, 1984, 1973; Stahl, 1969).

## III. RESULTS

### Morphological observations on *A. lebbeck* and *A. procera*

The trees of the two species could easily indentified by their stem (trunk) bark colour and pattern, canopy side and pod site and colour. *A. lebbeck*, trunk is larger in diameter (1-2m) with greyish bark irregularly fissured, whereas that of *A.procera* is smaller in circumference (0.5-1m) with dark brown and smooth bark canopy of *A.lebbeck* is more robust than that of *A.procera*. Leaf, flowers, fruits and seeds of both the species also reveal distinguished characters (Table 1). The two species are distinct in size and shape of leaflets. Flowers are pale yellow in *A.lebbeck* white in *A.procera* stamen in *A.lebbeck* longer than corolla but equal in length in *A.procera* pods of *A.lebbeck* and could be distinguished by their larger size, yellow colour and many seeded nature.

### Anatomical features

Anatomical characters of leaves of *A.lebbeck* and *A.procera* show distinct characters. Shape of midrib, leaf margin, stomatal type, trichomes (two types in *A. lebbeck*), presence or absence of phloem fibres in isolated elements are useful to identify the two species. Previous pharmacognostical works on leaves of *A.lebbeck* could not bring about

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detailed features (Rahul Chulet *et.al*, 2010) and Shymalal Singh Yadav *et al.*, (2011). Rahul Chulet *et.al*, (2010) described only vascular bundle and qualitative and quantitative phytochemical analysis of *A.lebbeck* leaf while Shymalal Sing Yadal *et al.*, (2011) had described detailed anatomical features of *A.lebbeck* leaf and physiochemical and phytochemical (including HPLC) estimation of leaf powder. In the present work, both *Albizia* species exhibited difference in the physiochemical and qualitative physiochemical values. Estimation of leaf powders of *A.lebbeck* and *A.procera* are made and compared. In addition phsiochemical and phytochemical profiles of leaves in three growth phase's viz. Vegetative, flowering and fruting were elucidated. While the physiochemical and qualitative values of *A.lebbeck* by earlier worker, are in agreement with values of the our present work, earliar works did not mention about season or growth phase of collection of leaf samples. Seasonal and /or growth phases of a medicinal plant tent show variations in their phytochemical and biochemical consstituents especially in their vegetative parts like leaves, bark, or root. Many researchers have reported variation in phytochemical values (both qualitative and quantitative) in leaves, barks and roots of medicinal plants colleted at different seasons and growth phases. Kamalam, M. and M. Jegadeesan (1998) reported highest yield of Wedelolactone was observed in *Eclipta prostate* and *Wedelia chinencis* collected during July-August. Greewal *et al.*, (1979) observed that optimal production of alkaloid coincide with the ouses of senescence in *hyocyanus muticus*. Yield of steroided saponins is higher in *Solanum aculeatissimum* (Ikenega *et al.*, 1998). In the present work, both *Albizia* species exhibited difference in the physiochemical values. While, *A.lebbeck* and *A.procera* have quite distinct values in these parameters which could be used as standard for comparition and for identification.

### Histochemical analysis

In this study, two species of plant leaves were utilized for the histochemical analysis of powder which showed the presence of tannins, starch, phenols, lignin and flavonoids Savithrammal *et al.*, (2014). Among them tannins and phenol were mostly present in Flowering phase of *Albizia lebbeck* and Flavonoid swas present in vegetative phase of plant sample. Other chemicals were moderately present in plant samples which were indicated by the colouration, and results are tabulated (Table 1). While analysis of the plant sample, the *Albizia procera*, lignin was highly present in all three phase of plant leaf sample, whereas tannins and phenol were highly observed only in vegetative and fruiting phase of samples, other phytochemicals were moderately present in *Albizia procera* (Table 2).

**Table-1. Histochemical analysis leaf powder of *Albizia lebbeck* in Vegetative, Flowering and Fruiting phases**

S.No	Chemicals	Test	Observation	Vegetative	Flowering	Fruiting
1	Powder + Iodine Solution	Starch	Blue Color	+	+	+
2	Powder + FeCl <sub>3</sub>	Tannins Phenols	Bluish Green	++	++	+
3	Phloroglucinol + HCl	Lignin	Red Color	+	+	+
4	H <sub>2</sub> SO <sub>4</sub> + Ammonia	Flavonoids	Yellow Color	++	+	+

(+) Presence (++) Moderately present

**Table-2. Histochemical analysis leaf powder of *Albizia procera* in Vegetative, Flowering and Fruiting phases**

S.No	Chemicals	Test	Observation	Vegetative	Flowering	Fruiting
1	Powder + Iodine Solution	Starch	Blue Color	+	+	+
2	Powder + FeCl <sub>3</sub>	Tannins Phenols	Bluish Green	++	+	++
3	Phloroglucinol + HCl	Lignin	Red Color	++	++	++
4	H <sub>2</sub> SO <sub>4</sub> + Ammonia	Flavonoids	Yellow Color	+	+	+

(+) Presence (++) Moderately present

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## Qualitative Phytochemical Analysis

The preliminary qualitative phytochemical screening of the crude powder plants was done to assess the presence of bioactive component. In this study, three types of season variation samples were carried out for the phytochemicals analysis and moreover 5 solvents extract were utilized.

### *Albizia lebeck*

In this study, five solvents extracts successive were utilized for the qualitative analysis of phytochemicals from *Albizia lebeck*, among them highest phytochemicals was observed from methanol extract. Among the five types of extracts, highest phytochemicals was observed from alcohol extract and followed by hexane extract. The lowest numbers of phytochemicals were observed from petroleum ether (Table-3).

**Table -3. Qualitative phytochemical screening of successive extracts of *Albizia lebeck* leaves at different growth phases.**

S.No	Phyto constituents	Vegetative					Flowering					Fruiting				
		Pet.Ether	Hexane	Chloroform	Alcohol	Aqueous	Pet.Ether	Hexane	Chloroform	Alcohol	Aqueous	Pet.Ether	Hexane	Chloroform	Alcohol	Aqueous
1	Tannin	-	-	-	+	-	-	+	+	+	-	-	-	-	+	+
2	Phlobatannins	-	-	-	-	-	-	-	-	-	+	+	-	+	+	-
3	Saponin	-	+	-	-	+	-	-	-	+	+	-	+	-	-	+
4	Flavonoids	-	-	++	++	+	-	-	-	+	-	-	-	-	+	-
5	Steroids	-	+	-	-	-	+	+	-	-	-	-	-	-	+	-
6	Terpenoids	-	++	-	-	-	+	+	+	+	+	-	-	+	+	-
7	Triterpenoids	-	-	-	+	+	+	+	+	+	+	+	+	-	-	-
8	Alkaloids	-	+	-	+	-	-	-	+	-	+	-	+	+	-	-
9	Carbohydrate	-	-	+	+	+	-	-	+	+	++	-	-	-	+	-
10	Protein	+	-	+	+	-	-	-	++	+	++	+	+	+	+	+
11	Anthroquinine	+	-	-	+	+	-	-	+	+	+	-	-	-	+	-
12	Polyphenols	-	+	+	+	+	+	+	+	+	-	-	-	-	+	+
13	Glycosides	+	-	+	+	-	-	+	-	-	+	+	-	+	+	-

10

(-) Absence ; (+) Presence ; (++) Moderately present ; (+++) : Highly present

In vegetative phase of leaf samples, all solvent extracts consisted of Polyphenols, where as Terpenoids and Triterpenoids were observed from flowering phase of all extracts. In fruiting phase, only protein was observed from all extracts. From overall result, among the 13 types of phytochemicals, Protein and polyphenols were highly observed and second most was Triterpenoids and followed by Terpenoids and Glycosides.

The Phlobatannins was observed from lowest number of solvents. Among the three phases of plant extracts, highest phytochemicals were observed from flowering sample and followed by vegetative sample. In this study, next

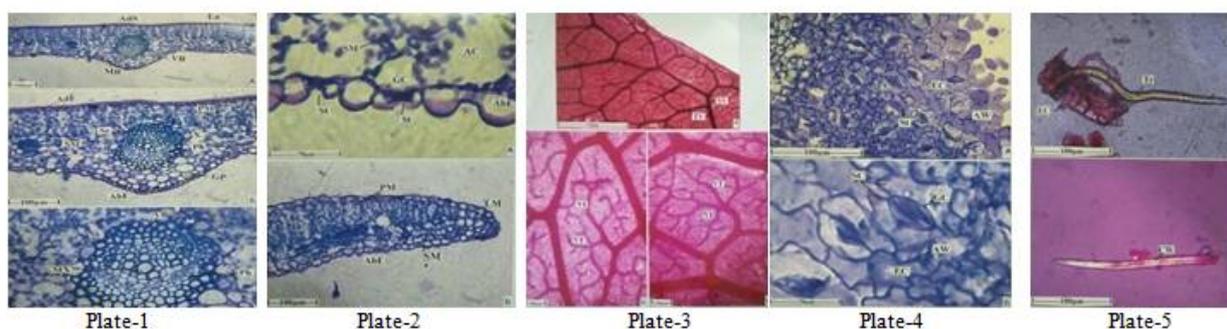
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process was investigating the phytochemicals analysis from cold extract plant sample. For this analysis, 100%, 50% of alcohol and water were utilized. Out of 13 phytochemicals, Flavonoids, Triterpenoids, Polyphenol and Carbohydrate were observed in all types extracts as well as in three growth phases of plant samples. In the present study, following phytochemicals were not observed from any one of the samples namely Phlobatannins, Saponin and Anthroquinine (Table-4).



**Plate-1.** Transfer Section (TS) of *Albizia lebeck* leaves. A. TS of leaf. B. TS of leaf through midrib. C. Vascular bundle of the leaf. **Plate-2.** A. TS of lamina showing stomata on the abaxial epidermis. B. TS of leaf Margin. **Plate-3.** A. Lamina cleared to show the venation pattern. B and C. Vein islets and vein terminations enlarged. **Plate-4.** A. Paradermal Section of the lamina showing stomata. B. Paracytic wall. **Plate-5.** A. Long curled epidermal trichome. B. Short straight epidermal trichome.

**Table -4. Qualitative Phytochemicals screening of cold extractives of *Albizia lebeck* leaves at different growth phases.**

S.No	Quantitative Analysis	Vegetative			Flowering			Fruiting		
		100% Ethanol	50% Ethanol	Aqueous	100% Ethanol	50% Ethanol	Aqueous	100% Ethanol	50% Ethanol	Aqueous
1	Tannin	-	+	+	-	+	+	-	+	-
2	Phlobatannins	-	-	-	-	-	-	-	-	-
3	Saponin	-	-	-	-	-	-	-	-	-
4	Flavonoids	+	++	+	+	++	+	+	++	+
5	Steroids	+	-	-	+	-	-	+	+	-
6	Terpenoids	-	-	-	-	-	-	+	+	+
7	Triterpenoids	+	+	+	+	++	+	+	+	+
8	Alkaloids	-	+	-	-	-	-	-	-	-
9	Carbohydrate	+	+	+	+	+	+	+	+	+
10	Protein	-	-	-	-	-	-	+	+	+
11	Anthroquinine	-	-	-	-	-	-	-	-	-
12	Polyphenols	+	++	+	+	++	+	+	+	+
13	Glycosides	+	+	+	-	-	+	-	-	-

*Albizia procera*

Among the 13 phytochemicals, following phytochemicals were observed in all solvents extracts namely flavonoids, protein and polyphenols. The phlobatannins, alkaloids and anthroquinine were not observed in any extracts and glycosides observed only in water extract. Carbohydrate was observed in water and methanol extracts only. Among the three phases of plant samples, highest phytochemicals were observed in vegetative phase and second most was in flowering phase and lowest in fruiting phase. In this study, most of the phytochemicals were observed from alcohol

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and aqueous extracts followed by chloroform extracts but at the same time highest concentration of phytochemicals were observed from hexane, chloroform and alcohol extract (Table 5).

**Table-5. Qualitative phytochemical screening of successive extracts of *Albizia procera* leaves at different growth phases.**

S.No	Phyto constituents	Vegetative					Flowering					Fruiting				
		Pet. Ether	Hexane	Chloroform	Alcohol	Aqueous	Pet. Ether	Hexane	Chloroform	Alcohol	Aqueous	Pet. Ether	Hexane	Chloroform	Alcohol	Aqueous
1	Tannin	-	-	++	+++	+	-	-	+	+	+	-	-	+	+	+
2	Phlobatannins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Saponin	+	++	++	+	+	-	+	+	+	-	-	+	+	-	
4	Flavonoids	+	++	++	++	+	+	+	++	+	+	+	+	+	+	
5	Steroids	-	+	-	-	-	+	-	-	-	+	+	+	+	+	
6	Terpenoids	+	++	++	+++	-	+	+	++	++	-	+	+	+	+	
7	Triterpenoids	+	++	+++	+++	-	+	+	++	++	-	-	-	+	+	
8	Alkaloids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9	Carbohydrate	-	-	+	+	+	-	-	+	+	+	-	-	-	+	
10	Protein	+	++	+++	++	+	+	+	+	+	+	+	+	+	+	
11	Anthroquinine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12	Polyphenols	-	++	+++	++	+	+	+	+	+	+	+	+	+	+	
13	Glycosides	-	-	-	-	+	-	-	-	-	+	-	-	-	+	

Furthermore cold extract was also subjected for preliminary phytochemicals studies. Among the 3 types of extracts, high concentration of phytochemicals was observed from 50% of alcohol extract and following phytochemicals were observed from all phases of plant such as Flavonoids and Protein (Table-6). In this investigation highest concentration of phyconstitutes were observed from vegetative phase of plant sample.

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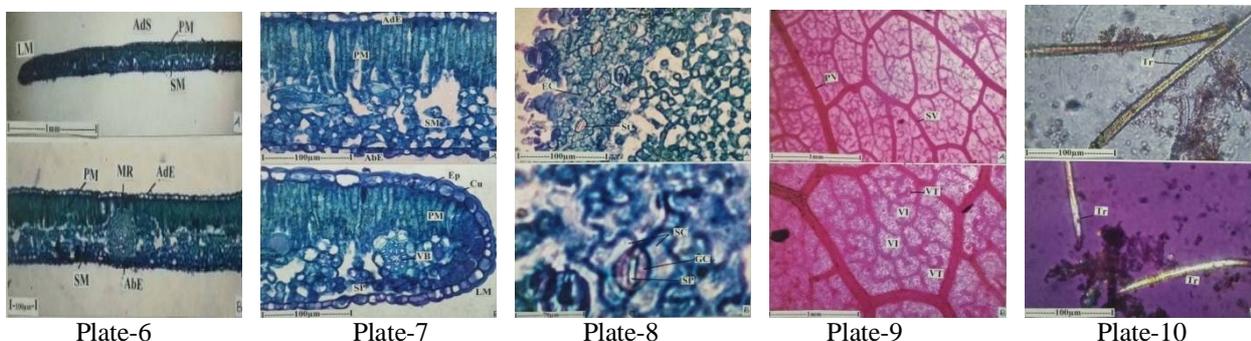
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**Table-6. Qualitative phytochemical screening of cold extracts of *Albizia procera* leaves at different growth phases.**

S.No	Quantitative Analysis	Vegetative			Flowering			Fruiting		
		100% Ethanol	50% Ethanol	Aqueous	100% Ethanol	50% Ethanol	Aqueous	100% Ethanol	50% Ethanol	Aqueous
1	Tannin	-	++	+	-	++	+	-	+	+
2	Phlobatannins	-	-	-	-	-	-	-	-	-
3	Saponin	-	++	+	-	++	+	-	-	-
4	Flavonoids	+	++	+	+	++	+	+	+	+
5	Steroids	+	-	-	+	-	-	+	-	-
6	Terpenoids	+	++	-	+	+	-	+	+	-
7	Triterpenoids	+	++	-	+	+	-	+	+	-
8	Alkaloids	-	-	-	-	-	-	-	-	-
9	Carbohydrate	++	++	+	++	++	+	+	-	+
10	Protein	+	++	+	+	+	+	+	+	+
11	Anthroquinine	-	-	-	-	-	-	-	-	-
12	Polyphenols	+	++	+	+	++	+	+	-	+
13	Glycosides	-	-	+	-	-	+	-	-	+
		7	8	7	7	8	7	7	5	6

In the present study, screening of two selected medicinal plants clearly revealed that the maximum classes of phytoconstituents were present in *Albizia procera* extract while compared to *Albizia lebbek*. Some of the phytochemicals were not present in the *Albizia lebbek*, especially, protein, Terpenoids and flavonoids were absent in some solvent extracts. In case of concentration, most of the phytoconstituents were highly observed in *Albizia procera* compared to *Albizia lebbek*.



**Plate-6.** Transfer Section (TS) of *Albizia procera* leaves. A. TS of leaf showing this midrib. B. TS of lamina through midrib. **Plate-7.** A. TS of lamina. B. TS of leaf margin. **Plate-8.** A. Paradermal section of the lamina showing the stomata. B. A paracytic stomata enlarged. **Plate-9.** A. Lamina cleared to show the venation patterns. B. Vein Islets and vein Terminations enlarge. **Plate-10.** Powder microscopic observation. A. Fibres – isolated.

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## Quantitative analysis of different extract of Vegetative and Flowering phases of *Albizia lebeck* and *Albizia procera*

The two selected plants species were subjected to quantitative analysis by standard methods. All the phases of samples were extracted with alcohol solvent which was analyzed for flavonoids, phenols and tannins. (Table-7) illustrates the qualitative phytochemicals composition of *Albizia lebeck*. Flavonoids ( $122.21 \pm 4.12$ mg/5gm) and Phenols ( $126.14 \pm 11.10$  mg/5gm) were highly observed in vegetative plant samples whereas tannins ( $110.01 \pm 5.21$  mg/5gm) were highly observed from flowering phase of samples.

**Table -7. Quantitative phytochemical estimation of leaves powder of *Albizia lebeck* at different growth phases.**

S.No	Quantitative Analysis	Vegetative (mg/5gm)	Flowering (mg/5gm)	Fruiting (mg/5gm)
1	Flavonoids	122.21±4.12	113.00±11.81	101.00±10.11
2	Phenols	126.14±11.10	85.00±12.01	75.66±20.12
3	Tannin	86.00±6.72	110.01±5.21	75.00±5.10

In this study, another plant of *Albizia procera* also utilized for the quantitative analysis of phytochemicals. (Table 18) illustrate the results of quantitative analysis of Flavonoids, Phenols and Tannins, among them Phenol was highly present in vegetative sample ( $344.00 \pm 24.08$ mg/5gm) and second most in flowering sample ( $314.66 \pm 21.98$  mg/5gm) and  $266.66 \pm 18.62$  mg/5gm from fruiting samples. The second highest concentration of phyto component was Flavonoids, which was highly present in vegetative ( $184.00 \pm 12.88$  mg/5gm) and followed by Fruiting ( $168.00 \pm 11.76$  mg/5gm), flowering ( $141.26 \pm 9.87$  mg/5gm).

## IV. DISCUSSION

Pharmacognostical studies on leaves of *A. procera* and *A. lebeck* were carried out to identify, distinguish and to evolve standard and to validate their therapeutic efficacies as mentioned in Indian systems of medicine. Pharmacological studies help to identify adulterants and test the purity and quality of crude drugs in either entire or, dried powdered or extract or in a finished form. *A. lebeck* and *A. procera* leaves have been used in Traditional Indian medicine one for the other since their vernacular name (vagai) is similar. This work was undertaken to identify the leaves of the two species.

Extractive value of *A. lebeck* leaf powder was maximum in alcohol (16.31%, 14.41%, and 13.21% respectively) in vegetative, flowering and fruiting phases followed by water. Among different growth phase vegetative phase leaf gave maximum % extractive. In *A. procera* also maximum extractive percentage was observed in alcohol (17.30%, 15.47 and 14.20%) followed by petroleum ether. In this species also, in vegetative phase leaf yield maximum extractive value. Previous workers have also identified, quantified many biological active compounds like saponin, steroids, tannins, glycosides, flavanoids in methanol extract of leaf of *A. procera* (Mahfuza *et al.*, 2013). In *A. lebeck* leaf and bark, alkaloids, glycosides, tannins, saponins, flavonoids, triterphenoids, quercetin, isoquercetin, anthraquinone glycosides were isolated (Chullet Rahul *et al.*, 2010; De Assis *et al.* 1999).

## V. SUMMARY AND CONCLUSION

Indian medicinal plants, *Albizzia lebeck* and *Albizzia procera* are commonly used for various diseases by Traditional Indian Systems of Medicine like Ayurveda and Siddha and in Folk Medicine. The two species are called by same or similarly sound names 'Sirshi' or 'Vagai' and so, all parts of these two trees (leaf, bark, fruits and seeds) are used one for the other in most parts of India. The present investigation, therefore, undertaken to study their pharmacognostical aspects and to establish standards to identify and test purity and quality of leaves of the two species. Since, quality and quantity of phytochemical constituents of herbs do vary in different geographical, climate and seasonal conditions, leaves of *A. procera* are analyzed for their phytochemical constituents and their pharmacological activities. Phytochemical studies like qualitative and quantitative estimation of biological compounds of *A. procera*

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were undertaken which would help to test quality and purity of the leaf of *A. procera*. TLC and GCMS studies established isolation and identification of biological active compounds present in leaf of this species. Pharmacognostical evaluation of *A. procera* leaves provided specific parameters that will be useful in scientific evaluation, identification and authentication of the drug. Phytochemical study revealed the presence of saponin, steroids, tannins, glycosides, flavanoids in methanolic and aqueous extracts of leaves, while saponins were found only in aqueous extract. The observations of the study may become a reference for future studies.

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