



## A review of Siris properties and therapeutic applications

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### Abstract

Siris (*Albizia lebbek*) is an annual tree belonging to legume family (Fabaceae). It has been cultivated throughout the world and used for thousands of years for used in folk remedies in bolus, food and in traditional medicine. Mostly Siris contains aromatic hydrocarbons oxygenated monoterpenes, Saponins, n-hydrocarbons, alkanals and Sesquiterpene Saponins. Antidotal value of Siris is not found correct. Beside this, there are other therapeutic properties present in *Albizia lebbek* like anti anaphylactic, antiasthmatic, anti-diarrheal, anti-spermatogenic, anxiolytic activity etc. However most of the therapeutic properties are proved in animal experiment model, therefore it is very necessary to conduct controlled clinical studies so that more clinical data in support of effectiveness of medicine can be collected.

**Key words:** Saponins, Fabaceae, Medicine, Aantiasthmatic, Quercetin

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### 1. Introduction

Siris (*Albizia lebbek* L.) Benth is annual tree belonging to the legume family (Fabaceae) sub-family Leguminosae (South-Australia), Mimosoideae (new South-Wales) [1]. It has been used for thousands of years and also become essential component in (cooking) medicinal recipes. Siris is generally considered indigenous to seasonally dry tropical and subtropical regions of mainland Asia from eastern Pakistan Europe, including Britain, south and east from Scandanavia to most parts of the Africa, North And West Asia [2]. Variability found in morphology, growth habit, flower color, leaves, stems and chemical composition. Siris cross pollination by insects long distance pollination found as a result variety in genetic diversity appears. *Albizia lebbek* is known by different names where we are in the world. In English is typically called Siris, In Arabic (lebbek), In Bengali (sirish, sirisha), In Burmese (kokko), In Creole (tcha tcha), In French (bois noir, bois savane, tchatcha), In Gujarati (polo-barashio), In Hindi (hirih, garso, kothiakoroi, siris, kalbaghi, sirs), In Indonesian (kitoke, tarisi, tekik.), In Khmer (chreh), In Javanese (tekik); Lao (SinoTibetan); Malay (batu, batai, oriang, kungkur); Nepali (kalo-siris); Sanskrit (sirisha); Spanish (florestina, lengua viperina, faurestina, amor plantónico, cabellos de ángel, acacia chachá, lengua de mujer, aroma francesca Aroma, algarroba de olor.); Swahili (mkungu, mkingu). Ethiopia: lebbek Fiji: vaivai ni vavalagi French: bois noir, bois

savane, ebénierd'Orient, tchatcha (Creole) German: lebachbaum, Andamanen-kokko. Since it is one of the most prevalent and widely spread species in the world, it's often simply known as "Siris," but it may refer to any prevalent locally known species of this genus. However, this has a wide range of varieties and cultivars, varying in flavor, scent and uses. Shoot formation in tissue cultures of three cultivars of *Stylosanthes guyanensis*. The plant can be shrubby or tree, varying in size 18–30 m tall depending on the specie. Flower color ranges white to yellowish brown.[3]. *Albizia lebbek* can reach a height of up to 30 m and a diameter of about 1 m. The height of the lebbek is usually 15-20 m and is fissured to about 50 cm of diameter, bark grey violet with the rusty-brown breathing pores, rough. Bi-pinnate compound leaves, slightly hairy or glabrous on axis; pinnae 2-4 pairs with 2-11 pairs are obliquely oblong, 15-45 x 8-22 mm leaflets. Glabrous glands are elevated; elliptical to the circular, at the top of the stem near the base and among many pairs of leaf [1].

### 2. History/Origin

*Albizian lebbek* (AL) is an Albizian species, indigenous to Indo-malaya, Northern Australia, New Guinea and the other tropical and subtropical areas of the Indian sub-continent. The generic name, *Albizia*, comes from Greek word that means large genus of unarmed trees and shrubs. There are various proposed backgrounds for the Siris word. Its specie name comes from Arabic name for this

plant, 'laebach'. When agitated by the wind, pods and the enclosed seeds are said to make continuous rattle likened to the chatter of women, hence its name is 'woman's tongue'. Shireesha is a significant anti-poisoning herb of Ayurveda. It is even shown to be used in poisoning snake bite. It is a large tree, often discovered on Southern India's highway sides. [4]. During the last two centuries it has been widely planted as a garden or roadside ornamental and has become naturalized in many tropical and northern subtropical countries worldwide. In the drier regions, such as Madhya Pradesh, the Satpura, Gujarat and parts of Tamil Nadu, the trees are commonly found up to a girth of 1.2 to 1.5m [5]. *Albizia lebeck* is a tree originating in Africa from leguminous families, and widely distributed as an ornamental tree in Asia and the America. In China, it is used as traditional medicine for the treatment of psychological disorders, warts and insomnia [6].

### 3. Demography/Location

Siris is grown in a variety of climatic and environmental conditions, the tree is commonly found on alluvial ground along streams, and in moist even swampy places. It is particularly common in low lying moist Savannahs [5]. Siris is widely in the following countries: India (Assam, Bihar, Gujarat, Haryana) China, Papua New Guinea, Indonesia, Australia, Bangladesh Indonesia, Malaysia, Egypt, Nigeria, Sudan, Uganda, Zimbabwe, USA, Brazil, Iran, Venezuela, Nepal, Thailand, Sri Lanka, Thailand, Pakistan, Myanmar [7]. Absolute figures for siris oil production are difficult to acquire. There are many local growers and producer working on small scale operations whose production number are not included in national statistics. Initial weighing of seeds prior to extraction revealed that *A. lebeck* contains only 1% of oil. The leaves oil contains 24 compounds which constituted about 91.2 % of the oil.

### 4. Botany, Morphology, Ecology

*Albizia lebeck* is a tall tree growing to about 30 m tall in the native forests and a diameter of about 1 m. In open circumstances, trees are spreading, sometimes multi-stemmed, to 25 meters high and 30 meters in width, with green colour lower branches. Bi-pinnate compound leaves are somewhat hairy or glabrous on the axis; 2-4 pairs of pinnae, each with the 2-11 pairs of indirectly oblong leaflets 15-45 x 8-22mm, shortly stalked; glabrous glands are raised up, elliptic to the circular. Flowers are greenish yellow in peduncle heads arranged in large lax terminal panicles. Flowers are similar to mimosa, in showy, rounded cluster near the tip of stem 5-6 cm (2-2.5 in) across, yellowish-white or cream, each flower with several long stamens. The fruits are produced in larger quantities, flattened pods 10 to 20 cm longer and 2.5 to 3.8 cm broader. Each fruit contain numerous seeds. Colors of immature pods are greenish, at maturity green color changes to straw-colored, generally 6 to 8 months after the flowering. The

pod are indehiscent. The fragrant white to greenish-yellow flowers are borne 15-40 together in rounded, axillary clusters 2-3.8 cm in diameter at the ends of lateral stalks (peduncles) 4 to 10 cm long. Individual flowers are 3 to 4 cm long, with a tubular five-toothed calyx 3 to 4 mm long; a narrow, tubular, white corolla 8 to 10 mm long with triangular 2.5 mm-long lobes; numerous threadlike spreading stamens 15 to 30 mm long that are whitish-yellow at the bases transitioning to pale green at the tip; and a pistil of narrow ovary and threadlike style [5]. The seeds are smooth, greenish brown with a leathery testa, brown, flat, 8-10 x 6-7m. The 6-12 seeds are placed transversely in the pod. There are 7,000-12,000 seeds per kg.[8].[9]. The fruits, flattened pods containing 4-12 seeds, are 10 to 30 cm long and 2 to 4.5 cm wide, linear-oblong, bluntly pointed, thin, green turning straw-colored on maturity, reticulate veined above the seeds, smooth, and shining. The pods are produced in large numbers, remain green for a period of 6 to 8 months after flowering, and may remain on the tree throughout the dry season when mostly all of the leaves have been shed, until well into the next flowering season.[9]. In the areas of its natural distribution the absolute shade temperature ranges from about 36 to 46 °C [5]. It is highly resistant to drought and is present in regions with rainfall as low as 300 to 400 mm / yr [10]. *Albizia lebeck* is a light-demanding species that is indifferent to soil type [11]. Plants can develop to 5 m in one year under best circumstances, but growth in the areas with annual rainfall of less than 800 mm is considerably lower [12].

### 5. Chemistry

*Albizia lebeck* is aromatic plant use as a herb and having high smelling. Two new tri-*O*-glycoside flavonols: kaempferol and quercetin 3-*O*- $\alpha$ -rhamnopyranosyl (1' 6)  $\beta$ -glucopyranosyl (1' 6)- $\beta$ -galactopyranosides, were identified from the leaves of *Albizia lebeck*.

#### 5.1. Chemical Composition

The chemical profile of essential oil obtained from the *AL* plant was investigated by some researchers. Mostly GC-MS analysis is used for the characterization of obtained oil [13-18]. The oil contains 24 compounds which comprised approximately 91.2% of the oil and which were dominated by the 35.9 % aromatic hydrocarbons, 32.3 % monoterpenes, 13.7 % hydrocarbons, 8.1 % alkanals and 0.4 % sesquiterpene. There are about 14 compounds present in the oil of flowers which constituted about 96.2 % of the oil and were dominated by 54.4 % n-hydrocarbons, 14.1 % aromatic hydrocarbons, 13.2 % alkanals and 8.2 % oxygenated monoterpenes. The cytotoxicity assay of the two oils against brine shrimp larvae gave  $LC_{50} = 0.5283 \mu\text{g/mL}$  (flowers) and  $9.4507 \mu\text{g/mL}$  (leaves) [19]. The results exposed that the presence of bioactive compounds comprising the saponins (1.46 to 1.72 mg/100 g), alkaloids (1.24 to 1.34 mg/100 g), flavonoids (1.61 to 1.34mg/100 g),

tannins (0.02 to 0.61 mg/100g) and phenols (1.32 to 1.44 mg/100g). The medicinal plants contained thiamine (0.31 to 0.15 mg/100g), ascorbic acid (33.21 to 20.12 mg/100 g), riboflavin (0.24 to 0.72 mg/100 g) and niacin (0.03 to 0.05 mg/100 g) [19].

## 5.2. Phytochemistry

*Albizia lebbbeck* has the main Phyto constituents of plant are melacacidin, D-catechin, -sitosterol, *albizia* hexoside, betulnic acid and echinocystic acid glycosides [20]. Phytochemical screening of successive extracts of leaves of the *A. lebbbeck* shows the presence of alkaloids, glycosides, flavonoids, proteins, tannins, carbohydrates and the amino acids. The succeeding ethyl acetate extract of *A. lebbbeck* leaves were found to have the inhibitory effect against *Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus cereus* and *Staphylococcus aureus*. The extract showed sensitivity for both gram negative and gram positive bacteria with maximum against *Pseudomonas aeruginosa* and minimum against *Escherichia coli* [21].

## 6. Post-Harvesting Technology

Seeds collected from the ripen pods. Low lipid content is a favorable factor in preventing in rancidity of seeds stored for long periods. Pods are dried in the sun till they open up. The seeds retain viability for a long time. Seeds kept in a gunny bag for 2 years, germinate as freely as fresh seeds. The seed was separated manually from its pods and separately ground in a laboratory mill. Prior to the analysis, seeds were saved in cellophane bags at 4°C [22].

## 7. Value Addition

There are various herbal medicines used in multiple medical treatments, either separately or in conjunction, to cure distinct diseases. *A. lebbbeckis* one of them which are commonly used in Ayurvedic and Unani system of medicines [23].

## 8. General Uses

India's trade in siris for sawn timber has been well established. Because of its nectar and pollen manufacturing, it is also called as a honey tree. It is used to treat various diseases like inflammations, cough, boils, eye infections, lungs problem, flu, pectoral problem, gingivitis, tonic, hernia, abdominal tumors and secondary infertility [24]. Shireesha is a vital anti-poisoning herb of Ayurveda. Its use is even specified in the snake bite poisoning. It is valued for its timber, as an ornamental and road side tree, and as a source of shade and fodder in agroforestry and silvopastoral systems [8]. It is an outstanding species of fuel wood and charcoal and the wood is appropriate for building, furnishings and veneer. The shallow root system makes it a good soil binder and suitable for and erosion control of the soil conservation [25]. Leaves parts are useful in the night blindness [26]. All parts of the plants are recommended for the treatment of snake bite [23]. *Albizia lebbbeck* seems to be promising plant in various activities therefore plant further explored for pharmacological activities.[6].

## 8.1. Pharmacological Uses

Pharmacological evaluation of *Albizia lebbbeck* beneath flower provided particular parameters that will be helpful in the scientific evaluation, authentication and identification of the drug. Warty trichomes, tannin comprising cells, prismatic crystals of calcium oxalate and pollen grains are the characteristics of the flower [27]. The leaves of *A. lebbbeck* were taken for the pharmacological evaluation, shade dried and powdered in a Willey mill, passed through 40 mesh sieves, processed for powder assessment, and stored in an airtight container [28]. In Indian traditional system and folks medicine *Albizia lebbbeck* is also used to treat various inflammatory diseases such as antiseptic, asthma, burns, arthritis, anti-dysenteric, bronchitis, allergic rhinitis, paralysis, learning of mice, leprosy, burns, anti-tubercular and helminthes infections [29]. Seeds, flowers, bark and leaves of *Albizia lebbbeck* are used for various medicinal purposes [4]. Generally, essential oils extracted from the plant possess good antimicrobial activity due to the presence of various active components [30-32]. Saponins are glycosides components often referred to as 'natural detergent' because of their foamy nature. It has been established that saponins have anti-carcinogenic activity, immune modulation activities and regulation of cell proliferation as well as health benefits such as cholesterol lowering capacity. The toxic effect of cyanogenic glycoside decreases heart rate, decreases sympathetic activity & decreases systemic vascular resistance. *A. lebbbeck* was reported to have medicinal importance because it is used for treatment of the ringworms and wounds by washing the impacted areas of plant. It is also used to treat leucorrhoea, gonorrhoea and many other genital diseases. In order to cover fundamental health requirements in developing countries, traditional medicinal techniques and in particular the use of medicinal crops still play an important role. It balances all the three Dashes.

### 8.1.1. Antibacterial activity

*Albizia* contains antibacterial activity against infectious diarrhoea. Chloroform and the aqueous methanol extract of AL contain activity species of salmonella and *E.Coli*. Solvent DMSO used as negative control while Gentamycin and Ampicillin were used as positive controls. At the end of the incubation moment an inhibition zone diameter was assessed around each disk (inhibition zonediameter minus disk diameter). Three replicates were used to measure an average zone of inhibition. Good antibacterial activity was considered to be an inhibition area of 8 mm or more. Among the 20 plants examined in this study, 14 plants showed variable levels of anti-bacterial activity against one or more of the test species [33].

### 8.1.2. Anti-microbial activity

According with the ethno botanical literature a number of medicinal crops are used in the treatment of microbial diseases, in particular in rural Yemen, where the

traditional folk treatment remains a significant source of cures for minor diseases.

### 8.1.3. Anti fertility Effect

*Albizia lebbbeck's* methanol pod extract has been orally administered to the male Albino rats for 60 days at 50 mg, 100 mg and 200 mg kg<sup>-1</sup>day<sup>-1</sup>. Sperm density and motility in the cauda epididymis were evaluated. In the blood samples and the reproductive organs body and organ weights, biochemical and histological analysis were conducted. Reduced sialic acid content of the testis and accessory organs may change the acrosomal membrane's structural integrity, which eventually impacts sperm metabolism, motility, and the fertilizing ability. The lower glycogen contents in the testis are potentially because of inhibition of the activation of phosphorylase or depletion of some other enzymes that could block the androgen synthesis. Cholesterol is the precursor to steroid hormone synthesis and cholesterol has been formed in order to maintain ordinary testicular activity.

### 8.1.4. Anti asthmatic activity

*Albizia lebbbeck* has been shown to possess an anti-asthmatic activity clinical trials with the bark have presented important relief in the case of bronchial asthma. Asthma is now recognized to be a primarily inflammatory condition; inflammation underlying hyperactivity. AL showed antiasthmatic activity, in the case of bronchial asthma clinical studies with the bark have shown important relief. The decoction of flower in the 50 mg / kg dose considerably shielded the guinea pig from the bronchospasm caused by histamine. Now, it has been recognized that both the flower and bark decoction of the AL protects the guinea pig against Histamine induced bronchospasm owing to the smooth muscle relaxation.

### 8.1.5. Cytotoxic Activity

Ethanol extracts were checked for their anti-bacterial activity against both gram-negative and gram-positive bacteria and cytotoxic activity of 20 preferred plant species used by Yemeni traditional healers for treatment of the infectious diseases. The biological guided fractionation of the methanol extract of *A. subdimidiata*, was used to isolate two active saponins, Albiziatriosid A and B. *A. subdimidiata*, demonstrated the important cytotoxicity of the cell line A2780 [29]. A new oleanane-type saponins coriariosides A, accompanied by known saponins was isolated from roots of the *A. coriaria*.

### 8.1.6. Nootropic and Anxiolytic Activity

The impact on cognitive manner and anxiety in the albino mice were investigated by incorporating saponins n-butanolic fraction (BF) taken from dried *Albizia lebbbeck* leaves by some researchers. Studies showed that the BF possesses nootropic and anxiolytic activity. BF inhibited baclofen induced passivity and hypothermia. Thus, the study suggested that saponin acts by adjusting the GABA ergic mechanism. Effect of the saponins that contains n-butanolic

fraction (BF) obtained from dried *Albizia lebbbeck* leaves on memory and learning was studied in the albino mice by the use of passive shock avoidance paradigm. Important improvement was observed in retention ability of the amnesic and normal mice as compared to their particular controls. Effect of the BF on behavior influenced by the serotonin (5-HT), dopamine and noradrenalin have been studied. The brain levels of dopamine, serotonin and gamma-amino butyric acid (GABA) were also investigated to correlate the behavior with neuro-transmitter levels. Brain concentrations of the dopamine and GABA were reduced, whereas the 5-HT level was enlarged [23].

## 9. Summary

Siris (*Albizia lebbbeck*) is an annual tree belonging to legume family (Fabaceae). It has been cultivated throughout the world and used for thousands of years for used in folk remedies in bolus, food and in traditional medicine. Mostly siris contains aromatic hydrocarbons oxygenated monoterpenes, Saponins, n-hydrocarbons, alkanals and Sesquiterpene Saponins. Antidotal value of shirish is not found correct. Beside this, there are other therapeutic properties present in AL like anti anaphylactic, antiasthmatic, anti-diarrheal, anti-spermatogenic, anxiolytic activity etc. However most of the therapeutic properties are proved in animal experiment model, therefore it is very necessary to conduct controlled clinical studies so that more clinical data in support of effectiveness of medicine can be collected.

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