

## A REVIEW ON SOME INDIGENOUS MEDICINAL PLANTS WITH HEPATOPROTECTIVE ACTIVITY

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### ABSTRACT

Herbal medicines are widely used from their established traditional exploit for thousands of year. A number of herbal drugsshow promising hepatoprotective activities in acute and chronic liver damage. In the present paper five plants (*Madhuca longifolia*, *Polyalthia longifolia*, *Delonix regia*, *Albizia lebeck*, *Tribulus terrestris*.) are viewed for historical, morphological, phytochemical and pharmacological aspects. The plants described contain antioxidant principles that can explain and justify their use in traditional medicine in the past. Since the evidence supporting the use of botanicals to treat chronic liver disease is insufficient and only few of them are well standardized and free of potential serious side effects, most of these medications are not recommended outside clinical trials.

**KEY WORDS:** Indigenous Medicinal Plants, Hepatoprotective activity

### 1. INTRODUCTION

Liver is a primary organ involved in metabolism of food and drugs. Hepatic cells secrete bile which contains bile acids and bile salts. Bile salts are used in the emulsification and absorption of fats. Liver is also involved in breakdown of poisonous substances and gluconeogenesis via conversion of fat and proteins into glucose. Liver diseases are mainly caused by toxic chemicals (such as antibiotics chemotherapeutic agents, peroxidised oil, aflatoxin, CCl<sub>4</sub>, chlorinated hydrocarbons etc). Excess consumption of alcohol, infections and autoimmune disorder also can cause liver disease. Most of the hepatotoxic chemicals damage liver cells mainly by inducing lipid peroxidation and by generation of reactive oxidative intermediates in liver (Harsh Mohan, 2002). Use of herbal drugs in the treatment of liver diseases is very common in a large part of world. About 70-80% of the world populations rely on the use of traditional medicine, which is predominantly based on plant materials. The traditional medicine refers to a broad range of natural health care practices including Ayurveda, Siddha, Homeopathy and Unani. Herbal medicines are effective in the treatment of various ailments, in human and animals.

#### 1.1 Plant- I :

**Name of the Plant:** *Madhuca longifolia* (Koenig), The genus *Madhuca* commonly name as Mahua belong to family, Sapotaceae

**1.2 Vernacular names :** Madhūkah in Sanskrit, Mahua in Hindi & Bengali, Irippa in Malayalam, Ippi in Telugu, Errape in Kannada and Mahuda in Gujarati.

**1.3 Distribution & Habitat:** Indigenous to the moist forests on the west side of India from Konkan southwards to Travancore, Deccan, common in Ceylon, cultivated in the carnatic and upper Burma.

**1.4 Plant Description:** A large evergreen tree with a dense spreading crown with the dark grey or brownish scaly bark; leaves thin, clustered near the ends of the branches, 7.5-12.5 by 2.5-4.5cm., Sap wood is pale yellowish brown to brownish white and heartwood reddish brown.

**1.5 Phytochemical Profile** (Karnick et al. 1994): The phytochemical profile of this plant reveals the presence of bassian β-sitosterol, β-D-glucoside, stigmaterol, β-carotene, oleanolic acid, quercetine, dihydroquercetine, triterpenoids, amyirin acetate, myricetine, palmitic acid, saponin A and B. Flavonols and tannins are also reported in leaves.

**1.6 Medicinal uses** (Yosioka et al. 1974): Used in the treatment of inflammations, epilepsy, stimulant, diuretic, refrigerant and anthelmintic. Useful in strangury, verminosis, heamoptysis, hepatopathy and gastropathy in children, dipsia, bronchitis and dermatopathy, Analgesic, antibacterial.

**1.7 Hepatoprotective activity:** The ethanolic extract of *Madhuca longifolia* bark & leaves showed a significant dose dependent hepatoprotective activity against CCl<sub>4</sub> & D-galactosamineinducedhepatotoxicity model in rats respectively.

**Table.1. Pharmacognosy details of *Madhuca longifolia***

Sr No	Plant	Part used	Type of Extract	Inducer-hepatotoxicity	Animal Used	Result	Reference
1	<i>Madhuca longifolia</i>	Bark	Ethanollic extract	CCl <sub>4</sub>	Rat	Extract showed Significant hepatoprotective activity	Samaresh et al. 2010
2	<i>Madhuca longifolia</i>	Leaves	Ethanollic extract	D-galN	Rat	Extract attributes dose dependent hepatoprotective activity	Samaresh et al. 2012

**1.8 Other Reported Activity:**

- There is a presense of a genuine sapogenol protobassic acid and prosapogenol in the seed kernels of *Madhuca longifolia*. (Yosioka et al., 1974).
- Alcoholic extract of *Madhuca longifolia* (Koenig) reported for analgesic activity. (Dinesh, 2001).
- Anti-inflammatory activity of *Madhuca longifolia* (Koenig) bark. (Devendra et al., 2008).
- Antihyperglycemic activity of methanolic extract of *Madhuca longifolia* bark also proved. (Akash et al., 2010).

**1.2 Plant- II :**

**Name of the Plant:** *Polyalthia longifolia*, The genus *Polyalthia* belongs to the family Annonaceae

**1.2.1 Vernacular names** (Katkar et al. 2010): *P. longifolia* is commonly called Ashoka, Ulkatak in Sanskrit, Assoti in Malayalam, Deodari in Hindi, Debbaru in Bengali, Asokamu in Telugu, Asogu in Tamil, Asopalov in Gujarati.

**1.2.2 Distribution & Habitat:** The plant grows throughout the tropical and subtropical parts of India up to an altitude of 1500 m.

**1.2.3 Plant Description:**

Fresh leaves are a coppery brown color and are soft and delicate to touch; as the leaves grow older the color becomes a light green and finally a dark green. The leaves are shaped like a lance and have wavy edges. The leaves are larval food plant of the kite swallowtails. In spring the tree is covered with delicate star-like pale green flowers. The flowers last for a short period, usually two to three weeks, are not conspicuous due to their color.

**1.2.4 Phytochemical Profile** (Phadnis et al. 1988): *P. longifolia* mainly contains diterpenoids alkaloids, tannins, and mucilage. The chief components of the plant are O-methylbulbocapnine-N-oxide, polyfothine, N-methylnandigerine-N-oxide, oliveroline-N-oxide, pendulamine A, N-pendulamine B, 8-oxopolyalthiane, 16-oxo-5, 13-halimadien-15-oic acid, 16-Oxo-3, 13-clerodadien-15-oic acid, 16-hydroxycleroda-3, 13-dien-16, 15-olide.

**1.2.5 Medicinal uses:** Common uses of *Polyalthia longifolia* was found in the treatment of infectious diseases like fever, bronchitis, ulcer, diarrhoea, dysentery and skin diseases, diabetes, hypertension, helmenthiasis and is, febrifuge (Rastogi et al. 1997).

**1.2.6 Hepatoprotective activity:** Tanna et al reported Hepatoprotective potency of *Polyalthia longifolia* var. Pendula leaf in Wistar albino rats.

**Table.2. Pharmacognosy details of *Polyalthia longifolia***

Sr No	Plant	Part used	Type of Extract	Inducer-hepatotoxicity	Animal used	Result	Reference
1	<i>Polyalthia longifolia</i>	leaves	Ethanollic extract	CCl <sub>4</sub>	Rat	Extract showed Significant hepatoprotective activity	Tanna et al. 2009

**1.2.7 Other Reported Activity:**

- Antimicrobial property of *Polyalthia longifolia* var. pendula: isolation of alactone as the active antibacterial agent from the ethanol extract of the stem was reported. (Faizi et al., 2008).
- Antibacterial activity of Clerodane diterpenoids from *Polyalthia longifolia* seeds was screened. (Marthanda et al., 2005)
- Antifungal activity on *Polyalthia longifolia* leaves was reported. (Nair & Chanda, 2006).
- Hypoglycaemic and antihyperglycemic activity on *Polyalthia longifolia* var. pendula (Nair & Chanda, 2007).
- Anti-ulcer activity of *Polyalthia longifolia* (Sonn.) Thwaites in experimental animals was reported. (Malairajan et al., 2008).

**1.3. Plant- III :**

**Name of the Plant:** *Delonix regia*, The genus *Delonix* commonly known as Gulmohar, belongs to family Leguminosae.

**1.3.1 Vernacular names:** The plant commonly known as gold mohar, Flamboyant in English, Gulmohr in Hindi, mayarum in Tamil, Radhachura in Bengali, Gulmohar in Gujrati.

**1.3.2 Distribution & Habitat** (Kiritikar et al. 1999): The Royal Poinciana requires a tropical or near-tropical climate, but can tolerate drought and salty conditions. It also grows throughout southern Brazil, with ornamental trees in Rio Grande do Sul Canoas and Porto Alegre. It is also found in India.

**1.3.3 Plant Description:** The Royal Poinciana is endemic to Madagascar, where it is found in the Madagascar dry deciduous forests. In the wild it is endangered, but it is widely cultivated elsewhere. In addition to its ornamental value, it is also a useful shade tree in tropical conditions, because it usually grows to a modest height (typically around 5 m, though it can reach as high as 12 m) but spreads widely, and its dense foliage provides full shade. The flowers are large, with four spreading scarlet or orange-red petals up to 8 cm long and a fifth upright petal called the standard, which is slightly larger and spotted with yellow and white. The naturally occurring variety *flavida* has yellow flowers.

**1.3.4 Phytochemical Profile** (Wijayasiriwardena et al. 2009): The phyto constituents such as Alkaloids, Tannins, Triterpenoids, steroids, Glycosides, flavonoids, so-flaflavones, flavones, anthocyanine, coumarines, lignins, vitamin-A, vitamin-E, vitamin-C.β-Amyrin, hesperitin and neohesperidin have been newly isolated from the dried roots. Other phytoconstituents like Fatty acids and sterols (Stigmasterol, γ-Sitosterol, β-Amyrin), protein, lectin, thocyanin, (flavonoid pigment), alkaloid (quarternary alkaloid and/or amine oxide base), Glycoside: quercetin, zeaxanthin, hentriacontane, procatechuic acid, Tanin, Lupeol was found in the plant.

**1.3.5 Therapeutic uses:** Root decoction is used for abdominal pains and in the treatment of scorpion bite. The leaf extract was used as anti-inflammatory. The herb is also used in bronchitis and pneumonia in infants. It is used as a carminative. The twigs were used for the toothache.

**1.3.6 Hepatoprotective activity:** Ahmed et al. 2011, studied the beneficial effect of methanolic extract of aerial parts of *Delonix regia* against CCl<sub>4</sub> induced liver damage in rats. It was concluded that the plant extract was effective in preventing the liver against injury caused by CCl<sub>4</sub>.

**Table.3. Experimental details of *Delonix regia***

Sr No	Plant	Part used	Type of Extract	Inducer-hepatotoxicity	Animal used	Result	Reference
1	<i>Delonix regia</i>	Aerial part	Methanolic extract	CCl <sub>4</sub>	Rat	Extract have beneficial effects for hepatoprotection.	Ahmed et al. 2011

**1.3.7 Other Reported Activity**

- Antiinflammatory activity of the plant was reported (Wijayasirivardena et al 2009).
- The bark of *Delonix regia* showed significant anti-inflammatory and anti-arthritis activity (Muruganathan et al. 2011).
- The leaf extract of *Delonix regia* showed antinociceptive activity. (Pradeepa et al. 2012).
- The plant has been claimed to be useful as antioxidant (Aquil et al., 2006), larvicidal (Chockalingam et al., 1990), antibacterial, antifungal (Ahmed et al., 2003), anti-inflammatory, analgesic (Muruganandam et al., 2000), nutritional (Grant et al., 1991), antimalarial (Ankrah et al., 2003), antiperiodic, febrifuge, emetic, CNS depressant (Rastogi et al., 1993) and antirheumatic (Khare et al., 2007). Its aqueous and alcoholic extracts were active against roundworm. The bark contains leucocyanidin, lupeol, tannin, -

sitosterol and free OH-proline as major amino acid. Flower anthers are a rich source of zeaxanthin. Leaves contain tannins, lupeol and -sitosterol (Khare et al., 2007). *D. regia* seeds contain lectins (Pando et al., 2002).

#### 1.4 Plant- IV

**Name of the Plant:** *Albizzia lebeck* (Linn.) Benth, The genus *Albizzia* commonly known as siris belongs to family Mimosaceae.

**1.4.1 Vernacular names:** Bhu Sirisah, Bhandi in Sanskrit, Kalosadasado in Gujarati, Black siris in English, Siris in Hindi, Telsu in Telugu, Vakai, Siridam in Tamil, Bilvara in Kannada

**1.4.2 Distribution & Habitat** (Kumar et al. 2007): *Albizzia lebeck* Benth (Mimosaceae) is a large, erect, unarmed, deciduous spreading tree. Throughout India, usually planted, tropical and subtropical Asia and Africa. It is native to deciduous forests in Asia from eastern Pakistan through India and Sri Lanka to Burma. In India it is known by various names in different regions viz. siris in Bengal, Begemara in Karnataka and Pilo-srasia in Gujarat.

**1.4.3 Plant Description:** A medium to large sized unarmed deciduous about 20 m in height with an umbrella-shaped crown and grey to dark brown rough irregularly cracked bark; leaves abruptly bipinnate, main rachis with a large gland above the base and one below the upper-most pair of pinnae, pinnae 2-4 pairs, leaflets, 5-9 pairs with glands ovate-oblong, all unequal sided; flowers white, fragrant, in globose umbellate heads; fruits long, characteristic pods, bluntly pointed, thin, pale yellow, smooth shiny, reticulately veined above the seed; seeds 4-12, pale browns, ellipsoid, oblong, compressed.

**1.4.4 Phytochemical Profile** (Rastogi et al. 1990): The phytochemical profile of this plant reveals the Bark contains 7-11% tannins; d-catechin d-leucocyanidin and it yield 7 compds. Including friedlan-3-one and  $\gamma$ -sitosterol. The leaves contain echinocystic acid and it yield flavon, vicenin II and  $\beta$ -sitosterol. Flowers yield triterpenoid saponins labbekannin D and 4 saponins glycosides lebbekannins D, F, G & H. Mature leaves of *Albizzia lebeck* contained keto acids including phosphoenolpyruvate, glyoxalate, oxalacetate and  $\alpha$ -oxoglutarate; vicenin-2, reynoutrin, rutin, myricitrin and robinin from leaves.

**1.4.5 Medicinal uses:** Bark of the plant is used in the treatment of leucoderma, itching, skin diseases, piles, exercise perspiration, inflammation, erysipelas and bronchitis, Bark of the plant is used in the treatment of asthma and allergic disorders, Leaves of the plant are used in night blindness and strengthen the gums and the teeth, The seeds are useful as aphrodisiac and tonic to the brain; Used for gonorrhoea and tuberculosis glands; oil is applied topically in leucoderma, Flowers are given for asthma and snake-bite, All part of plant is recommended for the treatment of snake-bite.

#### 1.4.6 Hepatoprotective activity:

The ethanolic extract of leaves & bark of *Albizzia lebeck* showed significant hepatoprotective activity by PCM, CCl<sub>4</sub> & Thiocetamide induced hepatic injury in rat.

**Table.4. Experimental details of *Albizzia lebeck***

Sr No	Plant	Part used	Type of Extract	Inducer-hepatotoxicity	Animal used	Result	Reference
1	<i>Albizzia lebeck</i>	leaves	Ethanolic extract	Paracetamol	Rat	The results proof the remarkable hepatoprotection by the leaves extract.	Devendra et al. 2008
2	<i>Albizzia lebeck</i>	Bark	Ethanolic extract	CCl <sub>4</sub>	Rat	Hepatoprotective activity of the test extract were found be significant.	Tushar et al. 2010
3	<i>Albizzia lebeck</i>	leaves	Ethanolic extract	Thiocetamide	Rat	Extract revealed a marked hepatoprotection	Devendra et al. 2012

#### 1.4.7 Other reported activity:

- Analgesic & Anti-Inflammatory Activity of *Albizzia lebeck* was proved (Achinto et al. 2009)
- Antiulcer properties of 70% ethanolic extract of leaves of *albizzia lebeck*

- c) Antiinflammatory activity of 70% ethanolic extract of *albizzia lebbeck* leaves and *madhuca longifolia* bark was reported (Shirode *et al.*, 2008).
- d) Methanolic extract of bark of *Albizzia lebbeck* possess anti-inflammatory activity .( Pramanick *et al.*, 2005).
- e) The leaves of *Albizzia Lebbeck* possess nootropic activity in mice (Kasture *et al.*, 1996 ).
- f) V.P. reported that the Saponins of the leaves *Albizzia lebbeck* possess nootropic & anxiolytic activity .( Une *et al.*, 2001).
- g) The leaves of *Albizzia lebbeck* possess anticonvulsant activity.( Kasture *et al.*, 2000).
- h) Methanolic pod extract of *Albizzia lebbeck* (L) Benth possess antifertility activity in male rats. (Gupta *et al.* , 2004 )
- i) The seed extract of *Albizzia lebbeck* Benth. Possess antidiarrhoeal activity. (Ganguly *et al.*, 2002)
- j) The effects of the decoction of the bark and flower of *Albizzia Lebbeck* were studied for its anti-asthmatic and anti-anaphylactic activity (Tripathi *et al.*, 1977).

### 1.5 Plant- V

**Name of the plant:** *Tribulusterrestris*, The genus *Tribulus* commonly known as Gokhru belongs to family Zygophyllaceae.

**1.5.1 Vernacular names:** Goshurah in Sanskrit, Land caltrops in English, BadaGokshur in Hindi, Nerinnil in Malayalam, Gokuri in Bengali, Palleru in Telugu, Kantegokaru in Marathi, Methogokharu in Gujarati, Negalu in Kannada and Nerunji Mull in Tamil.

**1.5.21 Distribution & Habitat** (Topia *et al.* 1994): *Tribulusterrestris* is a pharmacological powerhouse. *Tribulusterrestris* L. (Zygophyllaceae) is an annual plant distributed in warm regions of Asia, Africa, Europe, America and Australia.

**1.5.3 Plant Description** (Ody *et al.* 2000): The plant is also known as puncture vine or small caltrops 10 to 60 cm height, annual herb, with pinnate leaves and yellow flowers. Studies have shown that it contains more than 25 different substances that between them have numerous effects on the body. Indeed, *Tribulusterrestris* has long been used in Ayurvedic medicine, where it is called Gokshura, in traditional Chinese medicine, where it is called BaiJi Li, in classical Arabic medicine, where it is called Qutiba and also in the folk medicine of Greece and Bulgaria. Common Western names for it include Puncture Vine, Caltrop, Yellow Vine and Goathead. *T. terrestris* is used in folk medicine as tonic, aphrodisiac, analgesic, astringent, stomachic, anti-hypertensive, diuretic, lithontriptic and urinary anti-infective

**1.5.4 Phytochemical Profile** (Evans 2002): The main constituents of *T. terrestris* are saponins (Yan *et al.* 1996), diosgenins, alkaloids (Borke *et al.* 1992) and amides.

**1.5.5 Medicinal Uses** (Majeed *et al.* 1988): *T. terrestris* used in folk medicine as a tonic, aphrodisiac, palliative, astringent, stomachic, antihypertensive, diuretic, lithon-triptc and urinary antiinfectives.

#### 1.5.6 Hepatoprotective activity:

The alcoholic extract of whole plant of *Tribulus terrestris* showed significant hepatoprotective activity by acetaminophen induced hepato toxicity in fish.

**Table.5. Experimental details of *Tribulus terrestris***

Sr No	Plant	Part used	Type of Extract	Inducer-hepatotoxicity	Animal Used	Result	Reference
1	<i>Tribulus terrestris</i>	Whole Plant	Alcoholic extract	Acetaminophen	Fish	The plant extract showed a remarkable hepatoprotective activity	Kavitha <i>et al.</i> 2010

#### 1.5.7 Other Reported Activity:

1. Gokhru is well supported with research papers published all over the world in renowned medical research journals of recent times.(Anand *et al.* 1994)
2. School of Exercise Science and Sport Management, Southern Cross University Lismore, New South Wales, Australia. study - *Tribulus terrestris* is an herbal nutritional supplement that is promoted to produce large gains in strength and lean muscle mass in 5-28 days.(Saied *et al.*, 2003)
3. In a recent *Tribulus Terrestris* study of males and females, over 90% of the participants had significantly increased sexual performance and libido within the first day. There are numerous libido enhancers available, and *Tribulus terrestris* is the main ingredient in all libido enhancers (Prakash *et al.*, 1985).

4. *Tribulus terrestris* also has phenomenal anti-aging benefits! Our testosterone levels decline as we get older, leading to many of the physiological problems associating with aging (loss of muscle, increased body fat, decreased sexual drive & function, etc.) *Tribulus terrestris* will restore your testosterone back to youthful levels, thus eliminating many of the physical signs of aging (Bowen et al., 1990).

Studies show that it works very well when stacked with DHEA and androstenedione. It increased testosterone levels in a different way, however, than either DHEA or andro do. Instead of being a testosterone precursor, it leads to the production of the luteinizing hormone (LH). When LH levels are increased, the natural production of testosterone also increases. LH is a hormone that also deals with sex drive.

## 2. CONCLUSION

The therapeutic efficacy of these plants (*Madhucalongifolia*, *Polyalthialongifolia*, *Delonixregia*, *Albizialebbeck*, *Tribulusterrioris*) used in Indian System of Medicine has been established through modern testing and evaluation (preclinical and clinical trials) in different disease conditions. The studies of crude extracts of these medicinal plants have shown a significant hepatoprotective activity in different experimental models. But the exact mechanism of hepatoprotection is still not clearly understood and requires a further elaborative scientific experimentation to understand its therapeutic potential which will prove to be beneficial for the wellbeing of humans for liver damage. These studies place this indigenous drug as a novel candidate for bioprospection and drug development for the treatment of diseases, such as liver disease, Analgesic, anti-inflammatory, cancer, infectious diseases, diabetes, and various inflammatory conditions. The medicinal applications of these plant and the countless possibilities for investigation still remain in relatively newer areas of its function.

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