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Review Article

REVIEW ON *BUTEA MONOSPERMA*

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ABSTRACT

Butea monosperma (Family : Fabaceae). This is a moderate sized deciduous tree which is widely distributed throughout India, Burma and Ceylon, popularly known as 'dhak' or 'palas', commonly known as *'Flame of forest'*. The family Fabaceae compromises of 630 genera and 18,000 species . It finds use both medicinally and commercially with each part of the plant having utility. This plant species has been found to display a wide variety of biological activities. The plant is traditionally reported to possess astringent, bitter, alterative, aphrodiasiac, anthelmintic, antibacterial and anti-asthmatic properties . Bark yield red juice known as 'Butea gum' or 'Bengalkino'. Its reported pharmacological properties include anthelmintic, anticonceptive, anticonvulsive, antidiabetic, antidiarrhoeal, antiestrogenic and antifertility,antimicrobial, antifungal, antibacterial, antistress, chemopreventive, haemaggultinating, hepatoprotective, radical scavenging, thyroid inhibitory, antiperoxidative and hypoglycemic effects and wound healing activities. It is powerful astringent and is given in many forms of chronic diarrhoea. Seeds have anthelmintic property especially for roundworms and tapeworms. Flowers yields a brilliant yellow coloring matter due to presence of chalcones. Such herbal medicines may provide potential effect as of compared to the conventional available synthetic drugs, with less or no side effects.

Keywords: *Butea monosperma*, Butin, Palash, dhak.

INTRODUCTION

Butea monosperma is commonly known as Flame of forest, belonging to the family Fabaceae. It is locally called as palas, palash, mutthuga, bijasneha, dhak, khakara, chichra, Bastard Teak, Bengal Kino, Nourouc and is common throughout India, Burma and Ceylon except in very acrid parts. The pods should be collected and shown before the commencement of rains, root suckers are freely produced and help in vegetative propagation . The genus *Butea* includes *Butea monosperma* parviflora, *Butea minor* and *Butea superba* widely distributed throughout India. The flowers are widely used in treatment of hepatic disorders, viral hepatitis, diarrhea, depurative and tonic . The flowers are also good source of flavonoids. The contents of flowers are Butein, Butrin, Isobutrin, Plastron, coreipsin, and Isocoreipsin . Isolation of medicarpin with antifungal activity from this part of the plant has also been reported. From the flowers of this plant species the flavonoids Butin, Butein, Butrin, Isobutrin, Palasitrin, Coreopsin, Isocoreopsin, Sulphuresin, Monospermoside, Isomonospermoside and 7,3,4-trihydroxyflavone have been isolated. The Euphane triterpenoid 3a-hydroxyeuph-25-ene and the alcohol 2, 14-dihydroxy-11, 12-dimethyl-8-oxo-octadec-11-enylcyclohexane has been isolated from the stem. The Imide palasimide has been isolated from the pods of this plant species. Studies on anti-oxidant status following ulceration indicate that free radicals seem to be associated with the pylorus ligation and ethanol induced ulceration in rats.

Botanical Description

Morphology

It is an erect, medium-sized, 12-15 m high, deciduous tree with a crooked trunk. and

irregular branches. It grows slowly and attains a height of about 5 to 8 m and diameter of about 20 to 40 cm when it matures at the age of about 50 years or so.Its wood is greenish white in colour, soft and weighs about 14 to 15 kg per cubic foot. The bark is ash colour.

Leaves
The leaves are compound, with three leaflets. cubic foot The bark is ash colour. The leaves have 3 foliate, large and stipulate, 10-15 cm long petiole. Leaflets are obtuse, glabrous above finely silky and conspicuously reticulately veined beneath with cunnate or deltoid base.

Fig: *Butea monosperma*

Flower
These flowers start appearing in February and stay on nearly up to the end of April.The size is nearly 2 to 4 cm in diameter. These tend to be densely crowded on leaflet branches.The flowers on the upper portion of the tree form the appearance of a flame from a distance 1935

Fruits
The fruit of palas is a flat legume. Pods are stalked12.5-20 by 2.5-5 cm, thickened at the sutures. Young pods have a lot of hair, a velvety cover and mature pods hang down.

Seeds
The seeds are flat from 25 to 40 mm long, 15 to 25 mm wide, and 1.5 to 2 mm thick. The seed-coat is reddish -brown in colour, glossy, and wrinkled, and encloses two large, leafy yellowish cotyledons. [1]

Distribution
It is common throughout the greater part of India and Burma, up to 1000 m, and higher in the outer Himalaya, Khandesh Akrani up to 1200 m and hill of S. India up to 1300 m.

Vernacular names in India

SANSKRIT	:	Palasa
HINDI	:	Dhak, palas
ENGLISH	:	Bastard Teak
BENGALI	:	Mal & Mar
GUJARATI	:	Khakharo
MARATHI	:	Kakracha
TELUGU	:	Mooduga, palasamu
TAMIL	:	Parasa
KANNADA	:	Muttuga
MALYALAM	:	Brahmavriksham, kimshukam
PUNJABI	:	Chichra, dhak, palas [2, 3]

Phytochemical constituents of *Butea monosperma*
The main constituent of the flower is butrin (1.5%) besides butein (0.37%) and butin (0.04%).Also contains flavonoids and steroids. Other than these in flowers, coreopsin, isocoreopsin, sulphurein (glycoside) and other two with monospermoside and isomonospermoside structures are also identified. Roots contain glucose, glycine, glucosides and aromatic compounds. Tetramers of leucocynidin are isolated from gum and stem bark. Seed contains oil. The bright colour of the flower is attributed to the presence of chakones and aurones. [3, 4, 5]

Medicinal Uses of *Butea monosperma*
Butea monosperma is extensibly used in Ayurveda, Unani and Homeopathicmedicine and has become a cynosure of modern medicine. The plants of this genus are wellknown for their colouring matters. Commonly *Butea monosperma* is used as tonic, astringent, aphrodisiac and diuretics.

Roots are useful in filariasis, night blindness, helminthiasis, piles,ulcer and tumours. It is reported to possess antifertility, aphrodisiac and analgesic activities.

Flowers are useful in diarrhoea, astringent, diuretic, depurative, tonic, leprosy, skin diseases,gout, thirst, burning sensation.
The **stem bark** is useful in indigenous medicine for the treatmentof dyspepsia, diarrhoea, dysentery, ulcer, sore throat and snake bite. Besides medicinal uses it is also having the economic use such as leaves are used for making platters, cups and bowls**.**

Bark fibres are used for making cordage.

Wood is used for well curbs and water scoop. It isa cheap board wood .Wood pulp is suitable

for newsprint manufacturing. Butea is also a hostto the Lac insect, which produces natural lacquer, liver disorders,gonorrhoea,wound infection,Root is used in night blindness, elephantiasis, impotency and in snake bite It also causes temporary sterility in women and is applied in sprue, piles, ulcers, tumors and dropsy.

Seeds of *B. monosperma* is used in inflammation, skin and eye diseases, bleeding piles, urinary stones, abdominal troubles,, intestinal worms and tumour. When seeds are pounded with lemon juice and applied to the skin, they act as a rubefacient. [6, 7, 8]

Review of phytochemistry

Preliminary phytochemical screening of the powdered leaf revealed the following compounds - Alkaloids, Cynogenic glycosides, Phenolic compounds, Flavonoids, Terpenoids, Tannins and Saponins.

Experimental trial on animal models, conducted by different laboratories and authors

Antimicrobial activity

A new bioactive flavone glycoside was isolated from the methanol soluble fraction of the flowers of *B. monosperma* which was identified as 5,7-dihydroxy-3,6,4'-trimethoxyflavone-7-O-α -L-xylopyranosyl-(1→3)-O- **α** -L-arabinopyranosyl-(1→4)-O-β-D galacto pyranoside by several colour reactions, chemical degradations and spectral analysis. The compound showed antimicrobial activity against various fungal species.

The in vitro antimicrobial efficiency of seed oil of *B. monosperma* was studied by the filter paper disk method against several human pathogenic bacteria and fungi. The oil showed a significant bactericidal and fungicidal effect.[9,10]

Antifungal activity

Fungal endophytes were isolated from the inner bark segments of ethnopharmaceutically important medicinal tree *Butea monosperma***.**

The petroleum and ethyl acetate extracts of the stem bark from *B. monosperma* displayed antifungal activity against *Cladosporium cladosporioides*. The active constituent of low polarity was isolated by bioassay-monitored chromatographic fractionation, and identified as (-)-medicarpin by comparison of physical data. The antifungal activity of (-)-medicarpin was found to be greater than that of Benlate, a standard fungicide, while (-)-medicarpin acetate also exhibited significant activity against *C. Cladosporiodes.* [11,12]

Chemopreventive activity

The chemopreventive effects of *B. monosperma* extract on hepatic carcinogenesis and on tumor promoter induced markers and oxidative stress in male wistar rats. Treatment of male wistar rats for five consecutive days with 2-AAF i.p. induced significant hepatic toxicity, oxidative stress and hyperproliferation. Pretreatment of *B. monosperma* extract (100 and 200 mg/kg body weight) prevented oxidative stress by restoring the levels of antioxidant enzymes and also prevented toxicity at both doses*.* [13]

Anthelmintic activity

The seeds of *B. monosperma* administered as crude powder at doses of 1, 2 and 3 g/kg to sheep naturally infected with mixed species of gastrointestinal nematodes exhibited a dose and a time-dependent anthelmintic effect. The maximum reduction of 78.4% in eggs per gram of feces (EPG) was recorded on day 10 after treatment with 3 g/kg. Levamisole (7.5 mg/kg), a standard anthelmintic agent, exhibited 99.1% reduction in EPG (Iqbal *et. al*., 2006). The methanol extract of *B. monosperma* seeds, tested in vitro, showed significant anthelmintic activity. [14]

Antihyperglycaemic activity

The antihyperglycaemic activity of the ethanolic extract of *B. monosperma* was studied in glucose-loaded and alloxan-induced diabetic rats. Single dose treatment of zzethanolic extract of *B. monosperma* (200 mg/kg, p.o.) significantly improved glucose tolerance and caused reduction in blood glucose level in alloxan-induced diabetic rats. Repeated oral treatment with ethanolic extract of *B. monosperma* (200 mg/kg/day) for 2 weeks significantly reduced blood glucose, serum cholesterol and improved HDL-cholesterol and albumin as compared to diabetic control group. [15]

Antidiarrhoeal activity

The antidiarrhoeal potential of the ethanolic extract of stem bark of *B. monosperma* has been evaluated using several experimental models in wistar albino rats. The extract inhibited castor oil induced diarrhoea and PGE_2 induced enteropooling in rats; it also reduced gastrointestinal motility after charcoal meal administration. The results obtained establish the efficacy and substantiate the use of this herbal remedy as a non-specific treatment for diarrhoea in folk medicine.[16]

Antiviral activity

A potential antiviral flavone glycoside has been isolated from the seeds of *B. monosperma* and its structure determined as 5,2'-dihydroxy-3,6,7-trimethoxyflavone-5-O-β-D-xylopyranosyl-(1→4)-O-β-D-glucopyranoside by various spectral analysis and chemical degradations. [17]

Anticonvulsant activity

The bioassay-guided fractionation of dried flowers of *B. monosperma* was carried out to isolate the active principle responsible for its anticonvulsant activity. The petroleum ether extract was fractionated by column chromatography using solvents of varying polarity such as n-hexane, n-hexane:ethyl acetate, ethyl acetate, and methanol. The anticonvulsive principle of *B. monosperma* was found to be a triterpene (TBM) present in the n-hexane:ethyl acetate (1:1) fraction of the petroleum ether extract. TBM exhibited anticonvulsant activity against seizures induced by maximum electroshock (MES) and its PD (50) was found to be 34.2+/-18.1 mg/kg. TBM also inhibited seizures induced by pentylenetetrazol (PTZ), electrical kindling, and the combination of lithium sulfate and pilocarpine nitrate (Li-Pilo). However, TBM was not effective against seizures induced by strychnine and picrotoxin. TBM exhibited depressant effect on the central nervous system. After repeated use for 7 days, the PD (50) (MES) of TBM increased to 51.5+/-12.1 mg/kg. Similarly, after repeated use of TBM, the duration of sleep induced by pentobarbital was not reduced significantly. Further studies are required to investigate its usefulness in the treatment of epilepsy. [18]

Anti-giardial and immuno-stimulatory activity

Pippali rasayana, an Ayurvedic herbal medicine, prepared from *Piper longum* and *B. monosperma*, and prescribed for the treatment of chronic dysentery and worm infestations was tested for anti-giardial and immuno-stimulatory activity in mice, infected with *Giardia lamblia* trophozoites. It produced up to 98% recovery from the infection. The rasayana had no killing effect on the parasite in vitro. It induced significant activation of macrophages as evidenced by increased macrophage migration index (MMI) and phagocytic activity. Enhancement of host resistance could be one of the possible mechanisms contributing towards the recovery of animals from the giardial infection. [19]

Anti-implantation activity

Butin isolated from the seeds of *B. monosperma* and administered orally to adult female rats at the doses of 5, 10 and 20 mg/kg from day 1 to day 5 of pregnancy showed anti-implantation activity in 40%, 70% and 90% of the treated animals, respectively. At lower doses, there was a dose-dependent termination of pregnancy and reduction in the number of implantation sites. In ovariectomized young female rats, the butin exhibited estrogenic activity at comparable anticonceptive doses, but was devoid of anti-estrogenic activity. Butin is a weak estrogen in that a significant uterotrophic effect was discerned even at 1/20th the anticonceptive dose. [20]

Antihepatotoxic activity

An extract from the flowers of *B. monosperma*, a plant drug used in India for the treatment of liver disorders, showed significant activity in different models of liver damage, the extract was fractionated by solvent partitioning and HPLC. The antihepatotoxic principles isolated consisted of two known flavonoids, isobutrin (3, 4, 2', 4'-tetrahydroxychalcone-3, 4'-diglucoside), and the less active butrin (7, 3', 4'-trihydroxyflavanone-7, 3'-diglucoside). For qualitative and quantitative analysis of isobutrin and butrin in extracts of *B. monosperma* flowers a HPLC system was developed . [21]

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