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A REVIEW ON PHARMACOLOGICAL PROFILE OF *BUTEA MONOSPERMA*

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ABSTRACT

New synthetic drugs have much more drawbacks, it shows side effect on health. This problem can be minimized by herbal formulation and *Butea monosperma* tree has been accepted traditionally in the form of natural medicine.This is popularly known as 'dhak' or 'palash',commonly known as *'Flame of forest'*. The family Fabaceae compromises of 630 genera and 18,000 species . *Butea monosperma* (Lam.) is a medium-sized deciduous tree growing throughout India, South Asia, Indonesia, Japan, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam. 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. It has been used for the treatment of different aliments. Various *invitro* and *invivo* studies have indicates its Anti-diabetic, Anti-cancer, Anti-microbial, Anti-viral, Anti-oxidant, Anti-convulsant, Anti-inflammatory, Nephroprotective and Hepatoprotective. This review will discuss the recent findings on traditional and remarkable reported pharmacological activity of *Butea monosperma*.

Key words: Palash; Flame of forest; traditional uses; Anti-diabetic; Anti-cancer.

INTRODUCTION

Natural products have played an important role throughout the world in treating and preventing human diseases. Traditional medicine (TM) describes a group of health care practices and products with a long history of use. It frequently refers to medical knowledge developed by indigenous cultures that incorporates plant, animal and mineral-based medicines, spiritual therapies and manual techniques designed to treat illness or maintain wellbeing.TM tends to be practiced outside of allopathic medicine (also known as biomedicine, conventional or Western medicine), which is the dominant system of medicine in the developed world. In many cultures, TM functions as a comprehensive system of health care refined over hundreds or even thousands of years. Some of the best-known TM systems include traditional Indian (Ayurveda) medicine, traditional Chinese medicine (TCM), and traditional Arabic (Unani) medicine.

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According to world health organization, 80% of the populations in the world depend on traditional medical practitioners for their medicinal needs. Particularly in rural India, uses of raw plant products as well as some concoction of plant products in Ayurvedic medicines are sought after to a great proportion, because of cheap availability and less adverse effects, and in urban areas too those are increasingly popular for cultural nuances that exist. In ethno-botanical literature of India, several hundreds of plants are known to have the potential to treat many diseases and one of those popular one is *Butea monosperma* [1].

BUTEA MONOSPERMA

Butea monosperma (Palash)(synonym: *Butea frondosa)* belonging to family leguminosae-papilioneae is a medium-sized deciduous tree. The *Butea monosperma* tree is also known as 'flame of the forest' and bastard teak. It grows throughout all over the Indian subcontinent. It is also known as tesu, palash, mutthuga, bijasneha, dhak, khakara, chichra, bastard teak, Bengal kino by local person and tribes. normally it grows in open grasslands

and scattered in mixed forest. The plantations of butea monosperma can be raised both on irrigated and dry lands [2]. About the tree it is said that the tree is a form of agnidev, the god of fire and goddess Parvati punishes him (agnidev) for disturbing her and lord Shiva's privacy.

Butea monosperma tree gets up to 50 ft height, with stunning flower bunches. The leaves of tree loses with the flowers develop, in month of January - March. The leaves of butea monosperma are also used for preaparation of cheap leaf plates (pattals) and cups (donas) for rural feasts. In some parts of the India these are used for biddies manufacturing by wrapping tobacco leaf. The cattle eagerly eats the palash foliage. The bark of *Butea monosperma* yielding a kind of coarse and brown colored fiber and these are used for rough cordage. The gum of tree (BM) is a dried juice obtained from incisions in the stem of the tree and it posses astringent effect. The gum from the tree, called *kamarkas*in Hindi, is used in certain food dishes. The gum is also known as Bengal Kino, and is considered valuable by druggists because of its astringent qualities, and by leather workers because of its tannin .The butea gum is a good option as a substitute for kino gum. The flowers of Butea monosperma yielded an red or orange dye which is used as an insecticide and as coloring agent. The tree is a good host for the lac insect and therefore, it is useful in production of natural lac [1].

Botanical name: *Butea monosperma* (Lam.)

Botanical Classification	
Kingdom	Plantae
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Butea
Division	Magnoliophyta
Species	Monosperma (Lam.) Taubert

Common Names

Paalasha, Kimshuka, Raktapushpaka (Ayurvedic); Dhaak, Samagh Dhaak, Kamarkas (Unani); Palasam, Purasus (Tamil); Kimsuka, Brahma Vrksa, Karaka (Sanskrit); Flame of forest, Parrot Tree (English); Palas, Tesu, Dhak (Hindi); Kimsuk (Bengali); Keshu (Punjabi); Moduga (Telugu); Kesudo (Gujarati); Palashpapra (Urdu); Muthuga (Kannada.); Pangong (Manipuri).

Synonym

Butea frondosa

Distribution

Butea monosperma (Lam.) is a medium-sized deciduous tree growing throughout India, South Asia, Indonesia, Japan, Laos, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam. It is commonly found up to an altitude of 1200 m except in very arid regions. Generally it grows gregariously on open grasslands and scattered in mixed forest. Plantations can be raised both on irrigated and dry lands. It grows on a wide variety of soils including shallow, gravelly sites, black cotton soil, clay loams, and even saline or waterlogged soils. Seedlings thrive best on a rich loamy soil with pH 6-7 under high temperature and relative humidity. There are four common species of *Butea* viz., *Butea monosperma* (Lam.) Taub syn. *Butfrondosa* Wall. *Butea superba* Roxb. Ex Willd, *Butea parviflora* Roxb. & G.Don and *Butea minor* Buch-Ham ex Wall. Of these *Butea monosperma* is the most common species that is abundantly grown. It includes many species of trees, shrubs and lianas [2].

DESCRIPTION

Butea monosperma is an erect tree with height of 12-15 m and irregular branches bark rough, ash coloured, and young parts downy.

The Leaves of plant are 3-foliate, with 10-15 cm long petioles and stipules linear lanceolate, all obtuse, glabrous above when old, finely silky and conspicuously reticulate veined beneath, petioles 6 mm long, stout-stipels subulate, deciduous. The coriaceous (the terminal 10-20 cm long, broadly ovate Leaflets from a cuneate base, the lateral smaller, 10-15 by 7.5 – 10 cm, obliquely rounded at the base, equilateral, the lower side the larger). The Calyx of flower is 13 mm long, dark rachis, pedicels about twice as long as the calyx, densely brown-velvety bracts and flowers are large, in a rigid racemes 15 cm long, deciduous, olive-green, densely velvety outside, clothed with silky hairs within teeth short, the 2 upper connate, the 3 lower equal, deltoid and the corolla is 3.8-5 cm long, clothed with silky, silvery hairs at outside. Orange or salmon colored, standard 2.5 cm broad, keel semi-circular, beaked, veined.

Pods stalked are 12.5-20 by 2.5- 5 cm, and thickened at the sutures, reticulate veined argenteocanesent stalked 2 cm long [3].

TRADITIONAL USES

Butea monosperma is a sacred tree, called as a treasurer of the gods. Sacred utensils are made from its wood. The flowers are used as in place of blood in sacrifice rituals to goddess kali. The dry stem pieces are offered to make sacred fire. Butea monosperma is an anthropogenic tree of several castes. The use of its gum as external astringent application is mentioned by Chakradatta.

The flowers of *Butea monosperma* is traditionally used as an anticonvulsant, antioxidant, anti-stress, memory and behavior stimulant, anti-gout, diuretic, anti-leprotic, anti-inflammatory ,astringent, antiulcer, and anti-hepatotoxic. The flower is also used to treat cases of

enlarged spleen, menstrual disturbances, burning sensation and eye diseases. These are used as depurative and tonic.

The leaves of *Butea monosperma* is traditionally used as an anti-inflammatory, antiulcer, antitumour, diuretic, antidiabetic, antimicrobial, anthelmintic, appetizer, carminative, astringent and aphrodisiac. These are also used to treat stomach disorders, diabetic sore throat, irregular bleeding during menstruation, flatulent colic, cough and cold, cure boils, used as tonic.

The stem bark is traditionally used as aphrodisiac, anti-dysentery, antiulcer, antitumor, antimicrobial, antifungal, antipyretic, blood purifier and anti-asthmatic. It is also used in bleeding hemorrhoid disorder, dysmenorrheal, hydrocele liver disorders, gonorrhea, wound, worm infections, scorpion stings, cough and cold, dyspepsia, sore throat.

The root is used in night blindness, elephantiasis and snake bites,. It also causes temporary infertility in women and is applied in sprue, piles, ulcers, tumours and dropsy, helminthiasis, filariasis. The seed of *Butea monosperma* is used in inflammation, skin and eye diseases, bleeding piles, urinary stones , abdominal troubles, intestinal warms and tumours, antihyperglycemic and has antioxidant potential

The gum is used in stomatitis, ring worm, leucorrhea, septic sore throat, excessive perspiration and diarrhea [4, 5].

REPORTED PHARMACOLOGICAL USES

Pharmacological activity of flower extracts and their active principles

Triterpene, isobutrin, coreopsin, isocoreopsin (butin 7-glucoside), sulphurein, monospermoside (butein 3-e-D-glucoside) and isomonospermoside, chalcones, aurones, flavonoids (palasitrin, prunetin) and steroids. Investigation of the flowers of *Butea monosperma* resulted in the isolation of twelve flavonoids. These included a new dihydrochalcone, dihydromonospermoside, together with three known chalcones, butein (**2**),13 monospermoside and isoliquiritigenin, one flavone, 7,3,4-trihydroxyflavone,four flavanones, butin, butrin, isomonospermoside and liquiritigenin and three isoflavones, formononetin afrormosin and formononetin-7-*O* -β-D-glucopyranoside. It also contains myricyl alcohol, stearic, palmitic, arachidic, lignoceric acids, glucose, fructose, phenylalanine, aspartic acid, alanine and histidine. Stearic, palmitic, arachidic and lignoceric acids, glucose, fructose, histidine, aspartic acid, alanine and phenylalanine, pyrocatechin,Gum, tannins and mucilaginous material [6].

PHARMACOLOGICAL ACTIVITY OF LEAVES EXTRACTS AND THEIR ACTIVE PRINCIPLES

Leaves contains Glucoside, Kino-oil containing oleic and linoleic acid, palmitic and lignoceric acid. 36 most probable steroid compounds has been found out. The major constituents were Beta sitosterol, stigmasterol acetate, Beta sitosterol acetate, Cholesterol, Cholesta-3,5-diene, Dihydrotachysterol, Gamma Sitostereol, Stigma hydroxychlolesterol, Retinol. 36 most probable steroid compounds includes:

stigmastan-6, 22-dien, 3,5-dihydro; cholesta-6, 22,24-trien, 4,4-dimethyl; stigmasta-5, 22-dien-3ol, acetate, (3,beta, 22), 5,10-pentadecadiyn-1-ol, acetate; stigmasterol; dihydrotachysterol; stigmasterolmethylether; (1s, 2e, 4s, 6r, 7e, 10e, 12s)-2,7,10-cembratriene-4, 6,12-triol, 26,hydroxycholestrol; ergosta-7, 22-dien-3-ol (3,beta 22e); 26,27-dinitrocholesta-5, 22-dien-3-ol (3,beta 22e); retinol; ergost-5, 22-dien-3-ol, acetate (3,beta 22e); stigmata-5, 22-dien-3-ol acetate (3,beta 22z); stigmata-5, 22-dien-3-ol; 1s, 2e, 4s, 6r, 7e, 11e)-6-acetoxy-2, 7, 11-cembratriene-4ol; gamma sitosterol; cholest-5-en-3ol (3,beta)-carbonochloridate; gorgost-5-en-3-ol (3, beta); chola-5, 22-dien-3ol, (3,beta 22e); cholest-5-en-3-ol (3,beta)-carbonochloridate; cholest-5-ene, 3-bromo-(3,beta); bata-sitosterol aceta ergost-5, en-3-ol, (3,beta)-propanoate; ergost-5, en-3-ol, acetate (3,beta 24r); cholesta-3, 5-diene; cholesterol; cholest-5-en-3-ol (3,beta)-tetradecanoate; methyl (25rs)-3,beta-acetoxy-5-cholesten-26-oate; 22,23-bisnor-5-cholenicacid, 3,beta-hydroxy, acetate; dihydrotachysterol; stigmastan-3, 5-dien; 21-acetoxypregnenolone; pregena-3, 5-dien-20-one; ergost-5, 22-dien-3-ol, acetate (3,beta 22e); cholane-5, 20(22)-diene-3b-phenoxy [63].

Pharmacological Activity Of Bark Extracts And Their Active Principles

Kino-tannic acid,Gallic acid, pyrocatechin. The plant also contains palasitrin, and major glycosides as Butrin, butolic acid, cyanidin, allophanic acid, histidine, lupenone, lupeol, (-)-medicarpin, miroestrol, palasimide and shellolic acid. Two compounds, 3, 9-dimethoxypterocarpan, and triterpenoid ester, 3α-hydroxyeuph-25-enyl heptacosanoate**.** A flavone, quercetin has been isolated from stem bark of *Butea* frondosa. Two aliphatic compounds identified as 3-hydroxy-25-ene and 2, 14- Dihydroxy-11, 12- dimethyl-8-oxo-octadec-11- enylcyclohexane have been isolated from the stem of *Butea monosperma*. Nonacosonic acid has been isolated from the stem of *Butea monosperma*. The petroleum ether extract of *Butea monosperma* stem bark yielded Lupenone, lupeol sitosterol. Three compounds identified as stigmasterol, stigmasterol- -D-glucopyranoside has been isolated from the stem of *Butea* monosperma. Four compounds identified as 3-methoxy-8, 9-methylene dioxypterocarp-6- ene, 21- methylene- 22-hydroxy -24-oxooctasanoic acid methyl ester, 4-pentacosanylphenol and pentacosanyl- -glucopyranoside

have been isolated from the stem. It also contains proanthocyanidine. two isoflavones was identified as Genistein (4r, 5, 7-trihydroxy isoflavone) and the 4r, 5-dihydroxy, 7-methoxy isoflavone was identified as prunetine. Phytochemical investigation from the stem bark of *Butea monosperma*, led to the isolation and identification of three new compounds named buteaspermin A (**1**), buteaspermin B (**2**) and buteaspermanol (**3**), along with 19 known compounds.

Pharmacological Activity Of Root Extracts And Their Active Principles

The root of *Butea monosperma* contains glucose, glycine, a glycoside(aglycone) and an aromatic hydroxyl compound [111].

Pharmacological activity of seed extracts and their active principles

Oil (yellow, tasteless), proteolytic and lypolytic enzymes, plant proteinase and polypeptidase. (Similar to yeast tripsin), Lectins. A nitrogenous acidic compound, along with palasonin is present in seeds. It also contains monospermoside (butein 3-e-D-glucoside) and somonospermoside. From seed coat allophonic acid has been isolated and identified [116].

Flavone glycoside

5,2'-dihydroxy-3,6,7-trimethoxy flavone -5-O-β-D-xylopyransyl-(1-4)-O-β-D-glycopyranoside.

Alkaloids:- monospermin.
Aliphatic Compounds:- 2-hydroxy-ω-methyl allophanic acids.
δ-**Lactone**:- heneicosanoic acid.
Fatty Acids:- Myristic, palmitic, stearic, arachidic, behenic, lignoceric, oleic, linoleic and linolenic, Monospermin.
Acid Imide:- 15- Hydroxypentacosanoic acid nheneicosanoic acid δ-lactone, 10, 16-dihydroxyhexadecanoic acid, Phosphatidylcholine, phosphatidylethanolamine and phosphatidylinositol.
Miscellaneous:- Palasonin, nitrogenous acidic compound and its methyl ester, β–sitosterol ; β-sitosterol-β-D-glucoside**,** α-amyrin and sucrose**,** Proanthocyanidins.
Seed Coat:
Aliphatic Compound:- 15-hydroxy pentacosanoic acid and 1-carbomethoxy-2-carbomethydrazine, 3-α-hydroxy-euph-25-ene and 2,14-dihydroxy-11,12-Dimethyl-8-oxo-octadec-11-enylcyclohexane [117].

Phytochemical investigation of the methanolic extract of the seeds of Butea monosperma (Lam.) Taub. (Fabaceae) led to the isolation of three higher fatty acids, viz., *n*-docosanoic, *n*-octacosanoic, and *n*-dotriacontanoic acids, together with /-sitosterol xyloside and a zingiberene diglucoside, characterized as 3,4-dihydrozingiberen-14-ol-β-D-glucopyranosyl-(1→4)-/-D-glucopyranoside [120].

The analysis of phospholipids of seed resulted in the identification of phosphatidylcholine, phosphatidylethanolamine and phosphatidylinositol. Small amount of lysophosphatidylcholine and cardiolipin also reported [118,119].

Pharmacological activity of gum and their active principles

Tannins, mucilaginous material, pyrocatechin.

Pharmacological activity of *butea monosperma pod* and their active principles

A new imide, palasimide, has been isolated from the pods of *Butea monosperma* and identified as palasonin-*N*-phenyl imide [142].

Table 1. Pharmacological activity of flower extract of *Butea monosperma*

Activity	Extract	References
Anti-hyperglycemic [7-12]	Hydroalcoholic extract,Ethanolic extract,Methanolic extract ,n-butanolic fraction.	Jamkhande *et al*, 2010. Praveen and Siddiqui, 2011. Rajani *et al*, 2015. Sharma and Garg, 2009. Somani *et al*, 2006. Talubmook and Buddhakala, 2011.
Hepatoprotective [13-16]	Aqueous extract	Mathan *et al*, 2007. Sharma and Shukla, 2011. Sehrawat and Sultana,2006. Wagner *et al*,1986.
Free radical scavenging/anti-oxidant activity [7, 17-23]	Methanol,ethanol,ethyl acetate and butanol extract	Edwin *et al, 2009a,2009b.* Lavhale and Mishra, 2007. Nithin and Sarika. Piyush *et al*,2010. Prasad *et al.*

		Padmapriya and Rajamadhavan, 2013.
Anti-asthmatic [24]	n-butanolic fraction	Shirole *et al*,2013.
Anti inflammatory [25-30]	Methanol,ethanol extract.	Firdaus and Mazumder, 2015. Krolikiewicz-Renimel *et al*,2013. Lau *et al*,2010. Rasheed *et al*, 2010. Shahavi and Desai, 2008. Sapkale *et al*, 2013.
Thermal wound healing [31]	Gels of flower extract	More *et al*, 2015.
Wound healing [32]	Methanolic extract	Rozy *et al*, 2012.
Chemotheraphy induced alopecia [33, 34]		Piyush *et al*, 2013. Shankar *et al*, 2012.
Nephroprotective [35-37].	Ethanolic extract, n-butanol fraction.	Maheshwari *et al*. Nisha *et al*, 2014. Sutaria *et al*, 2015.
Anticonvulsant [38,39].	Petroleum ether	Kasture *et al*, 2000. Kasture *et al*, 2012.
Anticancer [40-44].	Aqueous, hydroalcoholic ,methanolic extract and n-butanol fraction	Anuradha and vijay. Choedon *et al*, 2010. Ganeshan *et al*. 2015. Kamble *et al*. 2015. Yangi *et al*, 2014.
Antistress45	Ethanolic extract	Bhatwadekar *et al*,1999.
Anti-microbial, anti-fungal and anti-bacterial [46-53.	Methanolic	Kalorey *et al*, 2003. Malpani *et al*, 2012. Mehta *et al*,2011. Sharma *et al*,2013. Shailendra *et al*, 2008. Shahu and Padhy, 2013. Tambekar and Khante, 2010. Yadav and Latha, 2007.
Anti diarrhoeal [54]	Methanolic extract	Rozy *et al*, 2014.
Anthelmintic [55,56].	Aqueous and alcoholic extract	Amita *et al*, 2014. Verma *et al*, 2014.
Antioestrogenic [57,58].	Alcoholic, ethereal and water extract	Laumas and Unival, 1996. Shah and Baxy,1990.
Anti dopaminergic [59].	Methanolic extract	Velis *et al*, 2008.
Skin disease in veternary [60]		Sharma and Chinmay, 2004.
Supplementation on cockerels [61].	Powder	Madhuri *et al*, 2010.
Erectogenic and aphrodisiac [62].	Methanolic extract	Sumanta *et al*, 2013.

Table 2. Pharmacological activity of leaves extract of *Butea monosperma*

Anti-stress [64].	Aqueous and alcoholic extract.	Soman *et al*, 2004.
Noortropic/ Cognitive activity [65]	Aqueous and alcoholic extract.	Zafar *et al*, 1989.
Anti-bacterial [66,67].	Aqueous, ethanolic and methanolic extract.	Ambersing *et al*, 2014. Bharathirajan and Prakash, 2014.
Anti-filarial [68].	Aqueous, methanolic and hexane ethanolic extracts	Deshmukh *et al*, 2014.
Sunscreen activity [69].	Cream	More *et al*, 2013.
Anti-convulsant [70,71].	Methanolic and ethanolic extract.	Sangale *et al*, 2015.

		Silambujanaki *et al*, 2010.
Anti-anthelmintic [72,73].	Alcoholic,ethyl acetate and aqueous extract.	Borkar *et al*, 2011. Bibhilesh *et al*, 2000.
Anti-oxidant [74-77].	Ethanolic, chloroform and aqueous extract.	Raqibul *et al*, 2009. Singh *et al*, 2015. Sharma *et al*, 2009. Vijay *et al*, 2008.
Anti-diabetic [78,79].	Ethanolic and aqueous extract	Harish *et al*, 2014. Samad *et al*, 2014.
Anti-nociceptive/ Ameliorative potential [80,81].	Ethanolic extract	Venkata *et al*, 2013. Venkata *et al*, 2012.
Anti-microbial [82,83].	Aqueous, Ethanolic and Methanolic extract	Malpani *et al*, 2010. Pundir and Bishnoishreya, 2011.
Anti-clastogenicity [84].	Ethanolic and aqueous extract	Amarjeet *et al*, 2015.
Oular anti-inflammatory [85].	Aqueous extract	Mengi and Deshpande, 1995.
Nephroprotective [86].	Ethanolic	Nisha *et al*, 2014.
Antiamnesic [87].		Malik *et al*, 2013.
Anticancer [88].	Ethanolic extract	Banurekha and Jayakar, 2011

Table 3. Pharmacological activity of bark extract of *Butea monosperma*.

Wound healing [89,90].	Ethanolic extract and acetone fraction	Miriyala *et al*, 2005. Muralidhar *et al*, 2011.
Anti-diarrhoeal [91].	Ethanolic extract	Muralidhar *et al*, 2013.
Anti-microbial [92].	Ethanolic and aqueous extract	Gunakkunru *et al*, 2005.
Antifungal [93].	Petrolieum and ethyl acetate extract	Pattari *et al*, 2010.
Anti-ulcer [94].	Ethanolic extract	Ratnayake *et al*, 1989.
Anti-obese [95].	Ethanolic extract	Prakash *et al*, 2009.
Osteogenic [96-98].	Butea total extract and its acetone fraction	Dixit *et al*, Kimani *et al*, 2013. Pandey *et al*, 2011.
Anti-thyroid [98].		Kimani *et al*, 2013.
Anti-diabetic [99-102].	Aqueous and ethanolic extract	Divya and Mini, 2014. Panda *et al*, 2009. Sachdev *et al* ,2012.
Free radical scavenging [103,104].	Acetone and methanolic extract	Choudhary and Swarnkar, 2010. Deore *et al*, 2008. Rajkumar and Leena, 2011.
Hepatoprotective [105,106].	Hydro alcoholic and methanolic extract	Tiwari *et al*, 2011.
Anti pyretic [107].	Methanolic extract	Sathish *et al*,2011.
Anti inflammatory [108].	Flavanoid fraction and methanolic extract	Willium and Krishna, 2007.
Antifertility [109].	Aqueous and alcoholic extract	Shaista *et al*, 2012.
Antivenom [109].	Aqueous and ethanolic extract	Shaista *et al*, 2012.
Antilithiatic [110].		Mute and Avari. 2009.

Table 4. pharmacological activity of root extract of *Butea monosperma.*

Anti spermatogenic [112].	Petroleum ether and chloroform extract.	Neeru *et al*, 2011.
Lens protective/ prevention of cataract [113,114].		Bodakhe and Ahuja, 2004. Mengi and Deshpande, 1995.
Antihelmintic [115].	Aqueous and alcoholic extract.	Pankaj and Kayande, 2014.

Table5. pharmacological activity of seed extract of *Butea monosperma*

Anti-conceptive [120-125]	Alcoholic and oil	Bhargava. 1986. Gupta *et al*, 2010. Pokharkhar *et al*, 2009. Sethi *et al*, 1990.
Anti-helmintic [126-128].	Methanolic extract and crude powder	Iqbal *et al*, 2006. Kaleysa and Kurup, 1968. Prashanth *et al*, 2001.
Antiviral [129].		Yadava and Tiwari, 2005.
Antimicrobial [130].	Seed oil,	Mehta *et al*, 1983.
Larvicidal and ovicidal [131].	Ethyl acetate and Chloroform extract.	Deepa and Ramadevi, 2011.
Anti-diabetic [132,133].	Ethanolic extract	Bavarva and Narasimhacharya, 2008. Sharma *et al*, 2011.
Physostigmine like action [134,135].		Rajapurkar *et al*, 1961. Rastogi and Mehrotra, 1990
Anti-tryptic [136].	Ammonium sulphonate fraction	Prabhash *et al*, 2010.
Hemagglutinating [137].		Wongkham *et al*, 1994.
Protease inhibitor [138].		Pandey *et al*, 2014.

Table 6. Pharmacological activity of gum extract of *Butea monosperma.*

Anti microbial [139].	Aqueous and methanolic extract	Malpani *et al*, 2010.
Posrpartum care [140].		Neelam *et al*, 2010.
Anti inflammatory [141].	Alcoholic extract	Prabir *et al*, 1990

Tabe 7. Pharmacological activity of pods of *Butea monosperma.*

Antibacterial activity [143].	Ethanolic extract	Jyotiram *et al*, 2014.

Fig 1. Tree of *Butea monosperma*

Fig 2. Leaves of *Butea monosperma*

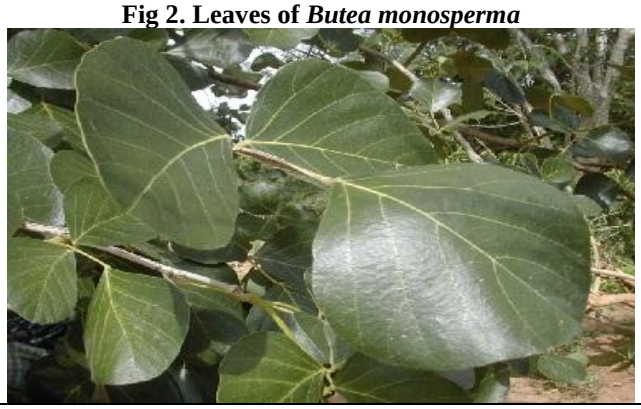

Fig 3. Flowers of *Butea monosperma*

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CONFLICT OF INTEREST:
The authors declare that they have no conflict of interest.

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