



RESEARCH ARTICLE

BIO-CHEMICAL STUDIES OF BUTEA MONOSPERMA (PALASH)

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ABSTRACT

Butea monosperma is a medium sized tree, growing from 6 to 12 m high and the trunk is usually crooked and twisted with irregular branches and rough grey bark. It is seen in all its ugliness in December and January when most of the leaves fall, but from January to March it truly becomes a tree of flame, a lot of orange and vermilion flowers. The palas is sacred to the moon and to Brahma and is said to have sprung from the feather of a falcon impregnated with the soma the beverage of the gods and thus immortalized. The plant is also popularly known as Kakracha, Mooduga, Palasamu, Parasa, Mutthuga, Dhak and Palas. In the present study we were describe the antioxidant, anti-inflammatory, anti-diabetic and antiesterogenic activity of various parts of *Butea monosperma*.

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INTRODUCTION

Butea monosperma popularly known as dhak or Palash. Commonly known as flame of forest, bastard, teak as a tree growing in most part of India. In India peninsula famous for its religious general and therapeutic application (Nisha, 2014). Tree is almost leafless during spring season forming an orange red hue of flower on the upper portion (Varsha, 2011). It grows through the Indian subcontinent, especially in indo-genetic plains. It is said that the tree is the form of Agni Dev god of fire (Manas Kumar Das et al., 2011). The plant is extensible used in Ayurveda, Unani and homeopathic medicine and has become a treasure of modern medicine this is a moderate sized deciduous tree which is widely distributed throughout India, Burma and Ceylon extending in the North West Himalayas as far as Jhelum (Sindhia et al., 2010). These are also used as cheap leaf plates and cups for rural feasts. In some parts of the country these are used for wrapping tobacco to make biddies. The bark of the plant is an appetiser, lessens inflammation, dysmenorrhoea used in liver disorders, fractures, and gonorrhoea, topically in piles and hydro- cele purifies the blood (Pranshant Tiwari et al., 2011).

The gum seed, flower, barks and leaves have great medicinal value. Externally the local bath with decoction of its bark in useful in bleeding piles and flower below the navel facilitate the maturation (Sharma Yashaswini et al., 2011). The main constituents of this plant are butrin, butein, butin, terpinen such as lupeol and lupenone. *Butea monosperma* (Lam.) Kuntz also contains flavonoids and steroids. Flowers contain coreopsin, isocoreopsin, sulphurein, monospermoside and isomonospermoside were also identified (Manas Kumar Das et al., 2014). The plant is much demand in folk medicine stem bark extract with jeera powder used for leucorrhoea, jaundice, and skin disease (Mahendra Aileni et al., 2014).

Scientific classification (Satish et al., 2014)

Scientific classification and vernacular names of *Butea monosperma* were given in Table 1 & 2 respectively.

Table 1. Scientific Classification of *Butea monosperma*

Kingdom	Plant
Sub-Kingdom	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Sub-Class	Rosidae
Order	Fabales
Family	Fabaceae
Genus	<i>Butea</i>
Species	<i>Monosperma</i>

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Vernacular names (Nelam, 2015)

Table 2. Vernacular Name of *Butea monosperma*

Hindi	Dhak, Tesu
English	Bastard, teak
Kannada	Muttunga
Tamil	Parasa, Pilasu
Bengali	Palas
Gujarat	Khakharo
Punjabi	Chichra

DISEASES AND PETS

No serious diseases have so far been reported on Palas though several fungi have been recorded on it including *Pestalotia Butea*, which causes leaf spots (Apte Madhavi, 2013).

BOTANICAL DESCRIPTION

Butea monosperma is a small to medium-sized deciduous tree, 5-15 (max. 20) m tall, up to 43 cm dbh; trunk usually crooked and tortuous, with rough grayish-brown, fibrous bark showing a reddish exudates; branch lets densely pubescent (Agroforestry Data base orwal *et al.*, 2009).

Leaves: Leaves are long-petiole, 3- foliolate. It begins to fall during Nov-Dec and by the end of January the tree is leafless or nearly so. The new leaves appear in April or early May; Petiole slender, cylindrical, thickened at the base, downy when young; Stipules small, deciduous, linear- lanceolate; Leaflets are 3-8 inches long, coriaceous, broadly ovate, densely finely silky below, flower bud dark brown (Bharat Parashar *et al.*, 2011).

Flower: Flower is large, bright orange red to somewhat yellow and produced in rigid racemose. Flowering begins in January and continuous till the end of April (Bharat Parashar *et al.*, 2011).

Fruit: Fruit flat legumes, pods are stalked 12.5-20 by 2.5-5cm, thickened at the suture, young pods have a lot of hairs, a velvety cover (Divya Fageria, 2015).

Bark: Bark is fibrous and bluish-gray to light brown in color. When injured, it exudes a kind of red juice of known as *Butea* gum or Bengal kino (Divya Fageria, 2015).

Flowering and Fruit time: The leaves begin to fall during Nov-Dec and by the end of January the tree is leafless or nearly so. The new leaves appear in April or early May. Flowering begins in January and continues till the end of April, according to the locality. The pods with a seed each at the apex ripen during May-Jun (Anonymous, 1988).



Flower of *Butea monosperma*

CHEMICAL CONSTITUENT

Flower: The main chemical constituents of *Butea monosperma* are buterin (1.5%), butein (0.37) and butin (0.04). triterpene, isobutrin, coreopsin, isocoreopsin, (butin-7-glucoside), sulphurein, monospermamide (butein-3-e-D-glucoside), isomonosperamide, chalcones, auronas, flavonoids and steroids are other chemical constituents present in the flower (Mazumadar, 2011).

Leaves: leaves contain glucoside, linoleic acid, palmitic lignoceric acid. 3-alpha-hydroxyeuph-25-enylheptacosanoate and 3,9-dimethoxypterocapan (Brijesh Kantilal Sutariya, 2015).

Seed: Oil (yellow, tasteless), proteolytic and lypolytic enzymes, plant proteinase and polypeptides. A nitrogenous acidic compound, along with palasonin is present in seeds, it also contains monosperamide (Ashish Mishra, 2012).

Root: The root of *Butea monosperma* contains glucose, Glycine a glycoside and other aromatic compound (Firdaus Rana, 2012).

Bark: Kino-tannic acid, Gallic acid, pyrocatechin, the plant also contains palasitrin and major glycosides as butrin, alanind, allophanic acid (Hajare *et al.*, 2013).

Stem: 3-Z-hydroxyeuph-25-ene and 2, 14-dihydroxy-11, 12-dimethyl-8-oxo-octadec-11-enylcyclohexane. Stigmasterol-D-glucopyranoside and nonacosanoic acid (Hajare *et al.*, 2013).

PHARMACOLOGICAL ACTIVITY OF DIFFERENT PART

Antidiabetic activity

The oral treatment of *B.monosperma* fruit powder for 30 days caused a significant ($p < 0.05$) antihyperglycemic effect. The capacity of the *B.monosperma* fruit to significantly decrease elevated blood glucose levels to almost normal levels is an essential trigger for the liver to reverse to its normal homeostasis in experimental diabetic patients (Fizza Naeem, 2010). The single dose treatment of ethanolic extract of *Butea monosperma* flowers at the dose of 200mg/kg p.o significantly improved glucose tolerance and cause reduction in blood glucose level in alloxan induced diabetic rats (Somani *et al.*, 2006). The hydroalcoholic extract of bark is used in alloxan induced diabetic mice. The single dose of 300 mg/kg for 45 days, result showed the lower blood glucose level (Sharma, 2012).

Antioxidant activity

Ethyl acetate, butanol and aqueous fractions derived from total methanol extracts of *Butea monosperma* flower were evaluated for radical scavenging activities using different in vitro models like reducing power assay, scavenging of 2,2 diphenyl-1-picrylhydrazyl (dpph) radical, nitric oxide radical superoxide anion radical, hydroxyl radical and inhibition of erythrocyte hemolytic using 2,2 azo-bis (amidinopropane) dihydrochloride (AAPH) (Lavhale, 2007). The aqueous and ethanolic extract leaf extract of *B.monosperma* contain compounds capable of inhibiting the cyclophosphamide induced oxidative stress and subsequent DNA damage in both the peripheral blood and

bone marrow cells in mice (Singh *et al.*, 2015). The methanolic extract of *Butea monosperma* flower possesses strong antioxidant activity and it might be useful in the management of various pathophysiological conditions associated with oxidative stress (Prasad *et al.*, 2013).

Anti-inflammatory activity

The leaves of *Butea monosperma* exhibit ocular anti-inflammatory activity in rabbits. The anti-inflammatory activity of methanolic extract of *Butea monosperma* evaluated by carrageenin induced paw edema and cotton pellet granuloma. In carrageenin induced paw edema at 600 and 800 mg/kg inhibition of paw edema, by 26 and 35% and in cotton pellet granuloma inhibition of granuloma tissue formation (Shahavi, 2008). The hydroalcoholic extract of *Butea monosperma* flowers and butrin, isobutrin enriched fraction were able to decrease the secretion of pro-inflammatory cytokines, matrix metalloproteinase and prostaglandin production (Krolikiewicz-renimmel, 2013)

Hepatoprotective activity

The methanolic extract of stem bark of *Butea monosperma* also showed significant hepatoprotective effect CCl₄ induced acute liver injury (Satish, 2011).

Anthelmintic activity

Seeds 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 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 eggs per gram. The anthelmintic activity of different species of *Butea monosperma* has been reported against *Ascaridia galli*, *ascaris lumbricoides*, earthworms, *toxocara canis*, oxyurids, *dipylidium caninum* and *taenia*, methanol extract of *Butea monosperma* seeds showed significant anthelmintic activity (Chandraker, 2014).

Anticonceptive activity

Butin which is isolated from the seeds of *Butea monosperma* administered orally to adult female rats at the doses of 5, 10 and 20 mg/rat 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. It was reported that seed oil use as traditional sexual toner and contraceptive (Pandey, 2001)

Hemagglutinating activity

Seeds of *Butea monosperma* showing specificity towards human erythrocytes. The lectins such as *Butea monosperma* agglutinin (BMA) isolated from the seeds of *Butea monosperma* are responsible for agglutinating property; this

property was only shown by seeds not by flowers, leaves, roots and stems. Human blood group-A-specific agglutinins have been demonstrated in some of the N-acetyl galactosamine/galactose-binding lectins, such as the lectins. Hemagglutination test showed that N-acetyl galactosamine is the strongest inhibitor of agglutination (Ajay Kumar Sharma, 2011).

Thyroid inhibitory, antiperoxidative and Hypoglycemic effects

Stigmasterol, isolated from the bark of *Butea monosperma* was evaluated for its thyroid hormone and glucose regulatory efficacy in mice by administering 2.6 mg/kg/d for 20 days which reduced serum tri iodothyronine (T₃), thyroxin (T₄) and glucose concentrations as well as the activity of hepatic glucose-6-phosphatase (G-6-Pase) with a concomitant increase in insulin indicating its thyroid inhibiting and hypoglycemic properties. A decrease in the hepatic lipid per oxidation (LPO) and an increase in the activities of catalase (CAT), superoxide dismutase (SOD) and glutathione (GSH) suggested its antioxidative potential. The highest concentration tested (5.2 mg/kg) evoked pro-oxidative activity (Ajay Kumar Sharma, 2011).

Conclusion

This reviewed detail different activities to give information on the cure of some disease such as different type of disease such as skin disease, leucorrhoea, and jaundice. *Butea monosperma* has a good potential of medicinal values. The aim of present paper is to provide scientific evidence concerned to the medicinal values of Palash.

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