A REVIEW ON ENDANGERED PLANT OF CHHATTISGARH: BUTEA MONOSPERMA (LAM.) (PARSA).

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Abstract: Butea monosperma (lam.) family: leguminosae is deciduous trees, to 10m high, bole crooked, irregular; bark 5-6 mm thick, grey to grayish-brown color tree this plant species has been found to display a wide variety of biochemical activities like antistress, astringent, anti diarrheal, antidiarrhoea, febrifuge, aphrodisiac, purgative, anticonvulsive, antidiabetic, anestrogenic, antifertility, antimicrobial, antifungal, antibacterial, chemopreventive, haemagglutinating, hepatoprotective, radical scavenging, thyroid inhibitory, antiperoxidative and various medicinally important properties. Butea monosperma widely distributed throughout India, Burma and Ceylon, popularly known as ‘kakracha’, ‘mooduga’, ‘palasamud’, ‘parasa’, ‘muttuga’, ‘dhak’ or ‘palas’. This plant is commonly known as ‘flame of forest’. Floristic study of the erstwhile seven district of Chhattisgarh was made by nation botanical research institute, lucknow and identified as Butea monosperma is endangered plant in Chhattisgarh.

Keywords: Butea Monosperma, Antistress, Chemopreventive, Palas.
INTRODUCTION

*Butea monosperma* is commonly known as Flame of forest, belongs to the family leguminosae.\(^1\)

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 except in very acrid parts. \(^2\)

According to hindu religion that the tree *Butea monosperma* is a form of Agnidev, God of Fire. It was a punishment given to Him by Goddess Parvati for disturbing her and Lord Shiva’s privacy.

In traditional medicine, there are many natural crude drugs that have the potential to treat many disease and disorders one of them is *Butea monosperma* Taub (Syn. *Butea frondosa*; Family Fabaceae) popularly known as ‘dhak’ or ‘palas’, commonly known as ‘Flame of forest’, palash, mutthuga, bijasneha, khakara, chichara, Bastard teak, Bengal kino.\(^3\)

**Scientific Classification**\(^4\)

- **Kingdom**: Plantae
- **Sub-kingdom**: Tracheobionta – Vascular plants
- **Super-division**: Spermatophyta – Seed plants
- **Division**: Magnoliophyta – Flowering plants
- **Class- Magnoliopsida**: Dicotyledons
- **Subclass**: Rosidae
- **Order**: Fabales
- **Family**: Fabaceae – Pea family
- **Genus- Butea Roxb.ex Wild.**: Butea
- **Species- Monosperma (Lam.)**: Taubert – Bengal kino

**It Is Locally Called as**\(^5\)

- **Common Names**: Flame Of The Forest, Bastard Teak
- **Chhattisgarhi**: Parsa
- **Hindi**: Dhak, Palash, Tesu
- **Assamese**: Bipornok, Kingxuk, Polax
Botanical Description

An erect tree 12-15 m high with crooked trunk and irregular branches, bark rough, ash coloured, young parts downy. Leaves 3-foliate, petioles 10-15 cm long, stipules linear lanceolate. Leaflets coriaceous (the terminal 10-20 cm long, broadly ovate 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), all obtuse, glabrous above when old, finely silky and conspicuously reticulately veined beneath; petioles 6 mm long, stout-stipels subulate, deciduous. Flowers large, in a rigid racemes 15 cm long, 3 flowers together form the tumid nodes of the dark olive-green velvety rhachis: pedicels about twice as long as the calyx, densely brown-velvety: bracts and bracteoles small, deciduous. Calyx 13 mm long, dark olive-green, densely velvety outside, clothed with silky hairs within: teeth short, the 2 upper connate, the 3 lower equal, deltoid. Corolla 3.8-5cm long, clothed outside with silky, silvery hairs, orange or salmon coloured: standard 2.5 cm
broad: keel semicircular, beaked, veined. Pods stalked 12.5-20 by 2.5-5 cm, thickened at the sutures, reticulately veined argenteo–canescent: stalked 2 cm long.3, 6

Butea Species

Butea acuminate, Butea affinis, Butea Africana, Butea apoensis, Butea balansae, Butea braamiana, Butea bracteolate, Butea cuneiforms, Butea crassfolia, Butea dubia, Butea ferruginous, Butea gyrocarpa, Butea harmandii, Butea laotica, Butea listeri, Butea littoralis, Butea loureiri, Butea macroptera, Butea maingayi, Butea merguensis, Butea minor, Butea oblong folia, Butea parviflora, Butea pellita, Butea peltata, Butea philippinensis, Butea potting, Butea pulchara, Butea purpurea, Butea ridleyi, Butea riparia, Butea rosea, Butea sanguinea, Butea sericophylla, Butea spirei, Butea squirmier, Butea suberecta, Butea superba, Butea varians, Butea volubilis.7

Butea superba is a native herb in the family of Papilionaceae. The preparation of Butea superba tubers has been used as an alternative herbal treatment for erectile dysfunction in males.8 The tubers of Butea superba have been found to contain estrogenic substances similar to follicle hormones.9 Roots of Butea superba show rejuvenating activity.10 The root barks of Butea superba shows 65% inhibitory activity on acetylcholinesterase.

Phytochemistry

A number of constituents have been reported from various species of Butea and they belong to imides, lactone, flavonoids, sterols, and alkaloids.11
Table 1: Chemical constituents of *Butea monosperma* (lam.)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Constituents</th>
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<tr>
<td>1.</td>
<td><strong>IMIDE</strong></td>
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<td></td>
<td>Palasimide&lt;sup&gt;11&lt;/sup&gt;</td>
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<td></td>
<td>Palasonin&lt;sup&gt;11&lt;/sup&gt;</td>
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<td></td>
<td>R=H, Nitrogenous Compound&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>R=Me, Methyl Ester Of Nitrogenous Compound&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>5’2-Dihydroxy-3,6,7-Trimethoxy Flavone-5-O- -D-Xylopyransyl-(1-4)-O- G-D-Glcopyranoside&lt;sup&gt;11&lt;/sup&gt;</td>
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<td></td>
<td>Butrin; R=R’gucosyl&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>Isobutrin; R=R’gucosyl&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>7 Dihydroxy-3, 6, 4’trimethoxyflavone-7-O--L-Xylopyranosyl-(1-3)-O- G-Arabinopyranosyl-(1-4)-O- G-D-Galactopyranoside&lt;sup&gt;11&lt;/sup&gt;</td>
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<td></td>
<td>Butin; R=R’=H&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>Palasitrin; R=R’= Glucosyl&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>Coreopsin; R= Glucosyl, R’=H&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>Isocoreopsin;R=Glucosyl, R’=H&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>Sulphurein; R= Glucosyl, R= H&lt;sup&gt;11&lt;/sup&gt;</td>
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<td></td>
<td>Monospermoside; R=H, R’= Glucosyl&lt;sup&gt;11&lt;/sup&gt;</td>
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<td></td>
<td>Isomonospermoside; R=H, R’= Glucosyl&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>Quercetin&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>5- Methoxygenistein; R=H, R’=CH&lt;sub&gt;3&lt;/sub&gt;&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>Prunetein; R= CH&lt;sub&gt;3&lt;/sub&gt;, R’=H&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>15-Hydroxy Pentacosanoic Acid&lt;sup&gt;11&lt;/sup&gt;</td>
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Medicinal Uses of *Butea monosperma*

*Butea monosperma* is extensively used in Ayurveda, Unani and Homeopathic medicine and has become a cynosure of modern medicine. The plants of this genus are well-known for their colouring matters. Commonly *Butea monosperma* is used as tonic, astringent, aphrodisiac and diuretics.

The **stem bark** is useful in indigenous medicine for the treatment of 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.

**Flowers** are useful in diarrhoea, astringent, diuretic, depurative, tonic, leprosy, skin diseases, gout, thirst, burning sensation.

**Wood** is used for well curbs and water scoop. It is a cheap board wood. Wood pulp is suitable for newsprint manufacturing. *Butea* is also a host to 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.

**Roots** are used in treatment of night blindness, other site defects and elephantiasis. The bark is acrid, bitter, oily appetizer, aphrodisiac, laxative, filariasis, antihelmintic, helminthiasis, piles, ulcer and tumors. It is reported to possess antifertility, analgesic activities. Useful in fracture of bones, diseases of anus, dysentery, piles, hydrocele, cures ulcer and tumors.

**Seeds of* B. monosperma* is used in inflammation, skin and eye diseases, bleeding piles, urinary stones, abdominal troubles, intestinal worms and tumor. When seeds are pounded with lemon juice and applied to the skin, they act as a rubefacient. \(^{12,13,14}\)

![Figure 1](image1.png) ![Figure 2](image2.png) ![Figure 3](image3.png)

**Figure 1** *(Butea monosperma tree)*  
**Figure 2** *(Butea monosperma leaf)*  
**Figure 3** *(Butea monosperma tree with flower)*

![Figure 4](image4.png) ![Figure 5](image5.png)

**Figure 4** *(Butea monosperma fruit)*  
**Figure 5** *(Butea monosperma flower)*
Pharmacological And Biological Activity Of Different Part

Different part of Butea monosperma possess various biological activities such as antimicrobial, antifertility, anticonvulsive, antihelmintic, antidiarrhoeal, antimicrobial, wound healing, anti-giardiasis and hepatoprotective, antihypertensive, antitumor, antidiabetic, anti-inflammatory, free radical scavenging activity.\(^\text{15}\)

BARK

The stem bark of Butea monosperma displays antifungal activity, which is due to the presence of an active constituent (-)-medicarpin.\(^\text{16}\)

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 administrating 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 peroxidation (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.\(^\text{17}\)

Wound healing

Topical administration of an alcoholic bark extract of Butea monosperma on cutaneous wound healing in rats increased cellular proliferation and collagen synthesis at the wound site, by increase in DNA, total protein and total collagen content of granulation tissues, the tensile strength also increased significantly & histopathological examinations also provide favourable result So, it possesses antioxidant properties, by its ability to reduce lipid peroxidation.\(^\text{17}\)

Anti-Diarrhoeal activity

Ethanolic extract of stem bark of Butea monosperma (Lam) Kuntz at 400 mg/kg and 800mg/kg inhibited castor oil induced diarrhoea due to inhibiting gastrointestinal motility and PGE2 induced enteropooling and it also reduced gastrointestinal motility after charcoal meal administration in Wistar albino rats Butea monosperma gum has also been found useful in cases of chronic diarrhoea. It is a powerful astringent and also decreases bilirubin level.\(^\text{17}\)
Leaves

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, by 22 and 28%.

Antidiabetic activity

Single dose treatment Ethanolic extract of *Butea monosperma* of (200 mg/kg, p.o.) significantly improved glucose tolerance and caused reduction in blood glucose level in Alloxan-induced diabetic rats. Repeated oral treatment for 2 weeks significantly reduced blood glucose, serum cholesterol and improved HDL-cholesterol and albumin as compared to diabetic control group. Ethanolic extract of leaves also have antidiabetic and antioxidant potential in Alloxan-induced diabetic mice. Ethanolic extract of seeds (300mg/kg b.w.) exhibited significant antidiabetic, hypolipidemic and antiperoxidative effects in non-insulin dependent diabetes mellitus rats. Aqueous extract significantly decreases blood glucose level both in normal (p<0.01) and Alloxan induced diabetic (p<0.001) mice at 2 and 5 hr respectively. However, the hypoglycemic effect is peaked at 90min and is not sustained as observed for the standard drug Metformin. The effect of *Butea monosperma* (Lamk.) Taub on blood glucose and lipid profiles in normal and diabetic human volunteers was evaluated which indicated a significant decrease (P < 0.05) in 2 h post-prandial blood glucose (mg/dl) on 21st day in the diabetic subgroups treated with 2 g and 3 g of powdered *Butea monosperma* (Lamk.) Taub. A significant decrease in total cholesterol (mg/dl) was observed in normal and diabetic subgroups on day 21st post treatment. Both normal and diabetic groups exhibited a significant decrease in total lipids on day 21st. This study indicates that *B. monosperma* (Lamk.)Taub might possess important hypoglycemic and hypolipidemic properties.

Flower

An extract from the flowers of *Butea monosperma* is used in India for the treatment of liver disorders and two antihepatotoxic flavonoids, isobutrin and butrin have been isolated from the extract. The effect of pretreatment of methanolic *Butea monosperma* extract prior to TAA treatment at two doses and the results suggest that it may contribute to the chemo preventive effect. *Butea monosperma* showed a significant recovery in the level of glutathione and its metabolizing enzyme in the liver induced the detoxifying enzyme system, which is shown by the elevated levels of other QR, SOD, GPx, and xanthine oxidase, which are important phase II enzymes.
Antiesterogenic and antifertility activity

Methanolic extracts of *Butea monosperma* exhibited effect on uterotropic and uterine peroxidase activities in ovariectomized rats & determine estrogenic/antiestrogenic potential of antifertility substances using rat uterine peroxidase assay. Alcoholic extract of flowers of the title plant has also been reported to exhibit antiestrogenic and antifertility activities. Butin isolated from its flowers show both male and female contraceptive properties.\(^\text{17}\)

Radical scavenging activities

Ethyl acetate, Butanol and aqueous fractions derived from total methanol extract of *Butea monosperma* flowers 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 hemolysis using 2,2' azo-bis (amidinopropane) dihydrochloride (AAPH). Methanol extract along with its ethyl acetate and butanol fractions showed potent free radical scavenging activity, whereas aqueous fraction was found to be devoid of any radical scavenging properties. The observed activity could be due to the higher phenolic content in the extracts (16.1, 25.29, and 17.74% w/w in methanol extract, ethyl acetate and butanol fractions respectively).\(^\text{17}\)

Antitumor activity

Intraperitoneal administration of the aqueous extract of flowers of *Butea monosperma* in the X-15-myc onco mice showed antitumorgenic activity by maintaining liver architecture and nuclear morphometry but also down regulated the serum VGEF levels. Immuno-histochemical staining of liver sections with anti-ribosomal protein S27a antibody showed post-treatment abolition of this proliferation marker from the tumor tissue.\(^\text{17}\)

Hepatoprotective activity

Isobutrin and Butrin, the antihepatotoxic principles of flowers were reported and this activity was monitored by means of CCl4 and GaIN-induced liver lesion *in-vitro*. The methanolic extract of *B. monosperma* possesses hepatoprotective effects and also it might suppress the promotion stage via inhibition of oxidative stress and polyamine biosynthetic pathway by significant reduction in Thioacetamide-induced serum Aspartate transaminase (AST/SGOT), Alanine transaminase (ALT/SGPT), Lactate dehydrogenase (LDH) and gamma-Glutamyltranspeptidase (GGT) activities.\(^\text{17}\)
Seed

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.\(^{17}\)

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.\(^ {17}\)

Antihelmintic activity

Palasonin a compound obtained from seeds of *Butea monosperma* has antihelmintic activity [15]. 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 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 *in-vitro*.\(^ {17}\)

Gum

*Butea monosperma* gum has also been found useful in cases of chronic diarrhoea. It is a powerful astringent and also decreases bilirubin level.\(^ {22}\) The ethanolic extract of stem bark of *Butea monosperma* at 400 mg/kg and 800mg/kg inhibited castor oil induced diarrhoea due to
inhibiting gastrointestinal motility and PGE\(_2\) induced enteropooling. It is used as nonspecific anti diarrhoeal agent in folk medicine.

**Medicinal Uses**

Butea monosperma as astringent antidiarrheal antidysenteric febrifuge aphrodisiac purgative anthelmintic properties. It is used for timber, resin, fodder, medicine, and dye. The bark and the flowers and the leaves and the gum and even the seeds are used to prepare herbal remedies. 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.

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