



Review Article

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A REVIEW ON PHARMACOGNOSTIC STUDY OF *BUTEA MONOSPERMA*

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Received on: 19/01/17 Accepted on: 29/03/17

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DOI: 10.7897/2277-4343.082112

ABSTRACT

The plant *Butea monosperma* is a wonderful medicinal plant with lots of uses. The plant is used for many therapeutic properties like astringent, anti-diarrheal activity, anti-implantation activities, etc. Due to different pharmacological effects, intense studies have been done on its chemical constituents. It is called as the 'Flame of Forest' due to its look. The flowers look like fire and therefore considered as a form of Agnidev (God of Fire). Mostly found in the greater parts of India, and less found in the arid regions. It is known by different names according to the region or place in which it is found. Its gum is called as Bengal Kino or Butea Gum and is used for many purposes. Other parts of the plant are well known for different uses and this article is all about the wonderfulness of *Butea monosperma*.

Keywords: Fabaceae, Astringent, Palash

INTRODUCTION

Butea monosperma is a very admirable and wonderful plant. It is commonly known as Palash (in Hindi Language). It comes under the family of Fabaceae. It is native to Bangladesh, India, Nepal, Pakistan, Thailand, Sri Lanka, Western Indonesia and Myanmar. Absent in arid regions, mostly found in the greater parts of India and in the greater parts of the India up to 1000 MSL (minimum sea level) or greater in the outer Himalaya. It grows well in the waterlogged conditions, saline and alkaline soil, black cotton soil, and barren land. Palash is described in Upanishads, Vedas, Susruta Samhita, Charaka Samhita, Astanga Sangraha, Ashtanga Hridaya. It is called as Flame of the forest. It is known by different vernacular names and this is given in Table 1. It possesses the height of 10-15m, the branches are irregular and the trunk is crooked¹. Branches are of ash color. Leaves are three foliated, petioles are 13-17 cm long, and stipules are linearly lanceolate. Flowers are orange-red in color. Calyx is 13mm long and olive green in color. Corolla is 2.8 to 6 cm long. It is rich in a number of different chemical constituents that are used for the treatment of various kinds of diseases like epilepsy, inflammation, as anti-stress, antidiabetic, etc. The gum which is obtained from the incision made on the tree is good astringent. It is also known as 'Kamarkas' and Bengal Kino and is used in a certain number of dishes and also as the source of tannin in the leather industry. It acts as a substitute for Kino gum. The dyeing agent present in the flowers of Palash that imparts its color is used as insecticide and coloring agent². It is considered as a sacred tree. From wood, utensils are made from the wood of *Butea monosperma*. The dried stem is used to make sacred fire. Flowers are used in place of blood in religious ritual. It acts as the host for lac insect and plays a role in the production of lac. The astringent constituents of gum had been mentioned by Chakradattapani. When the seed of palash is powdered, and mixed with lemon juice, it acts as the rubefacient. People say

that a tree is a form of Agnidev, who is the God of Fire³. It possesses tremendous pharmacological activities due to which this plant has great importance. This article encompasses through all those points that are not scant and will provoke to give it recognition.

Botanical Classification

- Kingdom: Plantae
- Sub-Kingdom: Tracheobionta
- Division: Magnoliophyta
- Class: Magnoliophyta
- Order: Fabales
- Family: Fabaceae
- Genus: *Butea*
- Species: *Monosperma*

Synonyms of Palash

- Palash: Leaves are beautiful as well as fleshy
- Ksharashrestha: Good source of alkali (Kshar)
- Parna (Leaf): Leaves are useful
- Yajniya: Used in religious rituals
- Raktapuspa: Flowers are red in color (the color of blood or rakta)
- Vatapotha: Pacifies vata (constitution)
- Bijanasha: Seeds (beej) are oily
- Vakrapushpa: Its flowers (pushpa) are curved
- Krmighna: Potent anthelmintic drug
- Kharaparna: Leaf is rough to touch
- Putadra: Sacred tree
- Samidvara: Useful in Yajna (ritual sacrifice with a specific objective)

- Triparna (Leaf of sacred Bael): Trifoliate leaves
- Bramhavrishka (embodiment of absolute reality that is Brahma): Used in religious sacrifices and rituals

Plant or Botanical Description

Butea monosperma is a medium-sized erect deciduous tree which has a height of 12 to 15 meters. It has up to 43 cm DBH (diameter at breast height). Young trees grow at a slow rate that is only few feet per year. Branches are crooked and irregular. Wood is gray in color. There are no annual rings. Medullary rays are broad and the darker tissue between the rays is broken into oblong patches by concentric bands of pale tissue⁴. The bark is fibrous, have reddish exudates and of grayish brown color. Its leaves are trifoliate; petioles are 10 to 15 cm long with linear-lanceolate stipules. Leaflets are more or less leathery. Petioles are 6mm long and stout. Stipels are subulate. Flowers have an indeterminate type of inflorescence and are borne on short pedicels lying along a common axis. This type of inflorescence is known as Raceme. Flowers are 5-40 cm long; Corolla is 5-6 cm long, covered with silky hairs on an outside, orange-red or salmon colored, keel semi-circular, beaked and veined⁵.

Calyx is about 12mm long, dark olive green in color, have silky hairs from within, teeth short, two upper connate and the lower three are equal and triangular. They are densely pubescent. Fruits are pods, stalked; covered with brown hairs, appear yellowish brown in color when ripe. Fruit is about 13-20 cm long and 4-5 cm broad, Reticulate veined and argenteo-canescent stalked 2 cm long. Only single seed present near the apex, Seed is ellipsoid and 3 cm long. Seed is brown in color⁶. The figure 1 and 2 show the flowers and seeds of Palash.

Distribution of plant in world

This plant is widely distributed in tropical and subtropical regions of Indian subcontinent. It is common in the south-East Asia ranging from Bangladesh, India, Nepal, Sri Lanka, Myanmar, Thailand, Indonesia, Malaysia, and Vietnam. It is very common throughout the greater part of the India up to 1000 MSL or higher in the outer Himalaya. In India, the drier parts, open grasslands, and other wastelands have *Butea monosperma*⁷.

Ecology

Butea monosperma is a plant which is commonly found in the drier parts of the India. Although the tree is drought resistant but the leaves turn white and fall off. The area or the native places of this plant receives most of the rain during the monsoon season while the autumn and summer are usually dry and don't receive it. The plant can survive in those areas which have an annual rainfall of 450-4500 mm. It can also grow on wide varieties of soils like black cotton soil, clay loam, shallow, and even waterlogged soils. It forms patches in the grazing grounds and other places showing its ability to reproduce from seed and root sucker. The seedling of this plant can thrive best in rich loamy soil with pH ranging 6 to 7 under high temperature and relative humidity⁸.

Phytochemical study or chemical constituents in different parts of the plant

1. Flowers: Butein, alpha-amyrin, Flavonoids (palasitrin and prumetin), beta-sitosteron, coreopsin, isocoreopsin(butin 7-glucoside), isomonospermoside, monospermoside (butein 3-e-D-glucoside) and steroids.

2. Leaves: Leaves contain Glucoside, Kino-oil that contains palmitic acid lignoceric acid, oleic and linoleic acid.
3. Resin: Z-amyrin, e-sitosterone glucoside and sucrose, lactone-nheneicosanoic acid-delta-lactone, laccijalaric esters III, IV, jalaric esters I, II.
4. Seeds: Oil-yellow in color and tasteless containing lypolytic and proteolytic enzymes, nitrogenous acidic compound along with palasonin, monospermoside (butein 3-e-d-glucoside).
5. Stem: 3-Z-hydroxyeuph-25-ene and 2, 14-dihydroxy- 11, 12- dimethyl-8-oxo-octadec-11 enylcyclohexane, Stigmasterol-Dglucopyranoside and nonacosanoic acid.
6. Gum: Mucilaginous material, pyrocatechin and Tannin.
7. Bark: palasitrin, butolic acid, cyanidin, lupeol, lupenone, palmiside, shelloic acid, butrin, butolic acid, histidine, Gallic acid, pyrocatechin, Kino-tannic acid⁹.

Ayurvedic Properties

These are the properties of the drug on the premise of Rasa, Guna, Veerya, Vipak. Rasa means taste or essence or sap. The taste of the drug or herb helps to understand the qualities of the herb. The science of herbal energetic of Ayurveda classifies the taste or rasa into 6 types: Sweet (madhur), sour (amla), pungent (katu), salty (lawana), bitter (tikta) and astringent (kasaya). Veerya here means potency or the energy of the herb. In ayurveda, it means heating (usna) or cooling herb (sita). Potency describes the drug's effect on pitta dosh. The most cooling is bitter which is followed by astringent and then sweet. Pungent is the most heating followed by sour and then salty¹⁰. Vipak is the post digestive effect of the drug on the body. Caraka and Vagbhata have mentioned sweet, sour and pungent vipakas. Guna is the attribute. Ayurveda has recognised 10 important pairs of opposing qualities that influence living organisms like Heavy and Light, Cold and Moist, Clear and Sticky and likewise. The Ayurvedic properties of *Monosperma butea* is given in the table 2.

Therapeutic Uses

Anti-diarrheal activity

The ethanolic extract of the stem bark has been found to inhibit the castor oil induced diarrhea by decreasing the gastrointestinal motility. It reduces the Gastro-intestinal motility after charcoal meal administration in Wistar Albino rats. The gum of Palash has been found useful in the treatment of chronic diarrhea¹¹.

Anthelmintic activity

The seeds of Palash possess the anthelmintic activity. It eradicates the parasitic worms from the Gastro-intestinal tract. Seeds of *Butea monosperma* extract when tested in vitro, showed the anthelmintic activity. Crude powder of Palash seeds given at the doses of 1, 2, 3 g/kg to sheep with mixed species of gastro-intestinal nematodes or round worms; it showed a dose and time dependent anthelmintic activity.

Anti-convulsant activity

A triterpene whose name is TBM has been found in Palash. It is responsible for the anticonvulsive activity but more research is required in this aspect yet. TBM shows the anticonvulsant activity against seizure induced by MES (Maximum Electro Shock), lithium sulfate, and pilocarpine nitrate, electrical killing, and pentylenetetrazol (PTZ). It also shows depressant effect on the CNS (Central Nervous System) after repeated use for a total of 7 days. In the same way, after repeatedly using the TBM, the duration of sleep induced by pentobarbital was not decreased.

Anti-diabetic activity

The ethanolic extract of Palash causes the reduction in blood glucose level in the Alloxan induced diabetic rats. After repeated oral treatment of this herbal drug for 14 days, blood glucose gets reduced, reduction in serum cholesterol and improved HDL (High Density Lipoprotein)-cholesterol were noted as compared to control diabetic group. Ethanolic extract of seed shows antidiabetic, hypolipidemic and antiperoxidative effects in type 2 diabetes mellitus rats. Aqueous extract of this drug reduces the blood glucose level in both the normal and Alloxan induced diabetic mice at 2 and 5 hours respectively. Nonetheless, the hypoglycemic effect is peaked at 90 minutes and is not as sustained as which is seen with metformin drug therapy.

Anti-stress Activity

The ethanolic extract of the part of *Butea monosperma* that is water soluble was found to be useful in reducing the water immersion stress induced high concentration of serotonin and plasma cortico-steroidal hormone.

Anti-Implantation Activity

Butin isolated from the flowers of Palash shows both male and female contraceptive activity. Butin which had been isolated from the seeds of Palash (*Butea monosperma*), was given to female rats at the doses of 5, 10 and 20 mg/rat from day 1 to day 5 of pregnancy and it presented anti-implantation activity in 40%, 70% and 90% of the treated animals respectively. Alcoholic extract of palash has been found to show the anti-fertility activity. Butin is a weak estrogen as sufficient uterotrophic effect was recognized even at 1/20th the contraceptive dose.

Anti-Inflammatory Activity

Butea monosperma methanolic extract was studied for the anti-inflammatory activity against carrageenan or carrageenin-induced rat paw inflammation and cotton pellet induced granuloma in albino rats. The agent MEBM was found from that extract. MEBM at oral doses of 600mg/kg and 800mg/kg inhibited the carrageenan-induced paw edema. At the same doses, MEBM was also found effective in reducing the granuloma tissue formation in the case of cotton pellet induced granuloma. It also reduced the serum lysosomal enzymes and lipid peroxides when compared to control groups.

Antifungal Activity

The ethyl acetate and petroleum extracts of Palash show the antifungal activity against *Cladosporium cladosporioides*. The chemical constituent that was responsible for this antifungal activity was medicarpin. Its activity against fungus was found to be greater than the standard fungicide that is Benlate.

Hepatoprotective Activity

When the powdered flower of *Butea monosperma* was given to rabbits, then the paracetamol induced serum marker enzymes got inhibited. In paracetamol treated group, there was the increase in the alanine phosphatase and alkaline transaminase. Butrin and the isobutrin acted as hepatoprotective agent.

Products of palash

1. Fooder: Young leaves of Palash are used for eating purpose by livestock especially buffaloes.
2. Fuel: The parts are also used for fuel. Woods are used for gunpowder charcoal.
3. Lipids: The seed gives the clear oil.
4. Poison: The seed has some bactericidal property.

5. Fiber: The fibrous material from the inner bark is used for making ropes and cordage¹².

Table 1: Different vernacular names of *Butea monosperma*

Languages	Names
English	Bastard tree, Flame of the forest
Hindi	Desuka jhad, dhaak, chalcha
Marathi	Palash
Urdu	Palashpapra
Kannada	Kinshuk
Bengali	Polash
Burmese	Pauk
Assamese	Polash
Telgu	Modgu
Gujarati	Khakda

Table 2: Palash Ayurvedic Properties

Rasa	Katu, Titka, Kasya
Guna	Laghu, Snigdha
Veerya	Ushna
Vipak	Madhura



Figure 1: Flowers of Palash¹³



Figure 2: Seeds of Palash¹⁴

CONCLUSION

Butea monosperma is a gracious and medicinal plant. All parts of *Butea monosperma* have different uses. It would be right to say that nature has blessed us with this herb. The tree has the very beautiful look due to its flowers and is called as the 'Flame of the Forest'. Various chemical constituents have various activities for which it is being used tremendously in Ayurvedic formulations. Some of the miraculous activities are anti-inflammatory, hepatoprotective, anticonvulsive, etc. It is found in the greater parts of the India and is also native to Myanmar, Sri Lanka, Nepal, etc. More research is yet to be done to find more pharmaceutical uses of Palash or *Butea monosperma*.

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Cite this article as:

Aditya Gupta *et al.* A review on pharmacognostic study of *Butea monosperma*. Int. J. Res. Ayurveda Pharm. 2017;8(Suppl 2):196-199 <http://dx.doi.org/10.7897/2277-4343.082112>

Source of support: Nil, Conflict of interest: None Declared

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