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Butea monosperma (LAM.) kuntze – A comprehensive review

Manas Kumar Das 1*, Papiya Mitra Mazumder 2, Saumya Das 3, Sanjita Das 3

1*Department of Pharmacy, IEC-CET, Greater Noida, India.
2Department of Pharmaceutical Sciences, Birla Institute of Technology, Mesra, Ranchi, India.
3Department of Pharmaceutical Technology, Noida Institute of Engineering & Technology, Greater Noida, India

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The traditional systems of medicine together with folklore medicine continue to play a significant role in our health care system for the betterment of mankind. Butea monosperma (Lam.) kuntze is a commonly used herb in Ayurvedic medicine. B. monosperma (Palas) belongs to the family Fabaceae, grown wildly in many parts of India. The plant is highly used by the rural and tribal people in curing various disorders. B. monosperma has effective natural origin that has a tremendous future for research. The novelty and applicability of B. monosperma are hidden. Such things should be overcome through modern scientific concept. The present article enumerates various traditional and medicinal utility of the plant and an attempt was made to gather information about the chemical composition and pharmacological aspects of the plant.

Keywords: Butea monosperma, traditional uses, scientific reports, phytochemistry, pharmacological activities.

INTRODUCTION

Butea monosperma (Lam.) kuntze, family- Fabaceae, is also known as ‘Flame of the Forest’ and Bastard Teak in English; in Hindi: Dhak, Tesu; Sans.: Kimsuka, Raktapusaka, Beng.: Palas; Ori.: Poras, Guj.: Kesudo; Urdu.: Dhak, Palaspada; Kan.: Muttug, Muttala; Mal.: Plasu, Camata; Mar.: Palas; Punj.: Palas, Dhak, Tesu; Tam.: Parasu, Paras; Tel.: Moduga, hettu. (Patil et al., 2006, Kirtikar KR and Basu 1935)

It grows throughout the Indian subcontinent, especially in Indo-Gangetic plains. It is said that the tree is a form of Agnidev, ‘God of Fire’. This tree grows up to 50 ft high, with cluster of flowers. It loses its leaves as the flowers develop in the month of January – March [Kirtikar and Basu, 1935; Kapoor 2005]. The flowers yield an orange dye, used as an insecticide. Leaves are essential for various religious rituals in Hindu homes as plates and cups. It is a sacred tree: its dry stem pieces are used to make sacred fire. In different areas these are used for wrapping tobacco to make biddies. The leaves are further used to pack parcel materials. The seeds are used in Ayurvedic and Unani medicine for treating different disorders. Flowers are offered in place of blood in sacrifices and rituals to goddess Kali. [Ambasta 1994]

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 color, soft and weighs about 14 to 15 kg per cubic foot [Boutelje, 1980]. 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. [4] Calyx is dark, olive green to brown in colour and densely velvety outside. The corolla is long with silky silvery hairs outside (Agarwal 1976). The bark of palas is fibrous and bluish gray to light brown in color. When injured, it exudes a kind of red juice. The leaves are compound, with three leaflets. The texture of the leaflets is tough, coriaceous with the surface glabrescent above and hairy silken beneath. The shape is obliquely ovate and broadly elliptic. The leaves fall off by December and reappear during spring. When the tree is leafless, it bears flaming orange to red-colored flower.
These flowers start appearing in February and stay on nearly up to the end of April [Cowen, 1984]. The size is nearly 2 to 4 cm in diameter. These tend to be densely crowded on leafless branches. Flowers are large, rigid racemes, 15 cm long, 3 flowers together form the tumid nodes of the dark olive-green velvety rachis. The calyx i.e. the lower whorl of the flower tends to be darkish gray like the supporting branch itself. The upper parts are brick red. The flowers on the upper portion of the tree form the appearance of a flame from a distance [Kirtikar and Basu 1935; Suguna et al., 2005]. The fruit of palas is a flat legume. Pods are stalked 12.5-20 by 2.5-5 cm, thickened at the sutures. Young pods have a lot of hair, a velvety cover and mature pods hang down. 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. The hilum is conspicuous, and situated near the middle of the concave edge of the seed. [Boutelje, 1980; Huxley, 1996]. It is porous and soft in texture and has not very distinct annual rings. It generally perishes fast when used open to vagaries of weather, but lasts much longer when used under water. It is therefore used for making well curbs and piles [Kala 2004].

TRADITIONAL USES

Flower of B. monosperma is traditionally used as anticonvulsant, antioxidant, antistress, memory and behaviour stimulant, antigout, diuretic, antiinflammatory, antiulcer, astringent and antihepatotoxic. Flower is also used to treat enlarged spleen, menstrual disturbances, burning sensation and eye diseases.

Leaf of B. monosperma is traditionally used as anti-inflammatory, antitumor, diuretic, antidiabetic, antimicrobial, antihelmintic, appetizer, carminative, astringent and aphrodisiac. These are also used to treat stomach disorders, diabetic soar throat, irregular bleeding during menstruation, flatulent colic, cough and cold.

Stem bark is traditionally used as aphrodisiac, antisyndentery, antiulcer, antitumor, antimicrobial, antifungal, antipyretic, blood purifier and anti-asthmatic. It is also used in bleeding hemorrhoid disorder, dysmenorrheal, hydrocele, liver disorders, gonorrhoea, wound, worm infections, scorpion sting, cough and cold [Kirtikar and Basu, 1935; Kala, 2004].

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.

Seed 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.

Gum is used in stomatitis, corneal apacititis, ring worm, leucorrhoea, septic soar throat, excessive perspiration and diarrhea [Kirtikar and Basu, 1935].

MEDICINAL USES

Flowers

Kasture et al. (2002) evaluated anticonvulsive activity of Butea monosperma flowers in laboratory animals (Veena and Kasture, 2002). Mishra et al. (2007) reported free radical scavenging activity of various extracts of flower by using different in-vitro models like reducing power assay, scavenging of 2,2 diphenyl-1- picrylhydrazyl (DPPH) radical, nitric oxide radical, super oxide anion radical, hydroxyl radical and inhibition of erythrocytes hemolysis by using 2,2 azo-bis (amidinopropane) dihydrochloride (AAPH). Methanolic extract along with its ethyl acetate and butanol fractions showed potent free radical scavenging activity. The observed activity could be due to higher phenolic contents in the extracts [Mishra and Lavhale, 2007.] Kasture et al. (2007) evaluated antistress and anticonvulsive activity of flowers. Water soluble part of ethanolic extract improved water immersion stress, induced elevation of brain serotonin and plasma corticosterone levels. The ulcer index also decreased in dose dependent manner. The anticonvulsive principle was found to be a triterpene present in the n-hexane : ethyl acetate (1:1) fraction of the petroleum ether extract. Triterpene exhibited anticonvulsant activity against seizures induced by Maximum Electro Shock MES, pentylene tetrazole, electrical kindling and the combination of lithium sulphate and pilocarpine nitrate. Further studies are required to investigate its usefulness in the treatment of epilepsy. Gawale et al. (2001) reported effect of flowers in memory and behaviour mediated via monoamine neurotransmitters. The acetone soluble part of petroleum ether and ethanolic extract exhibited nootropic activity in the elevated plus maze paradigm and active avoidance learning [Gawale et al., 2001]. Wagner et al. (1986) reported isobutrin and butrin as the antihapatotoxic principles of flowers. The antihapatotoxic principles isolated consisted of two known flavonoids, isobutrin and the less active butrin [Wagner et al. 1986]. Mishra et al. (2000) reported the presence of flavonoids in ethyl acetate fraction of methanolic extract [Mishra et al., 2000]. Shah et al. (1990) reported that flowers have phytochemical studies and antiestrogenic activity. Alcoholic extract exhibited significant antiestrogenic activity, while ethyl acetate extract containing butrin and isobutrin exhibited poor activity. Significant inhibition of uterus weight gain, vaginal epithelium cornification and characteristic histological changes have been observed [Shah et al., 1990]
**Seeds**


**Leaves**


**Roots**

Bodakhe et al. (2004) reported in vitro lens protective and antimicrobial activity of roots [Bodakhe and Ahuja, 2004].

**Stems**

Savitri et al. (1989) reported antifungal constituents from petroleum and ethyl acetate extracts of stem bark. Extract exhibited significant antifungal activity against *C. cladosporiodes* [Savitri and Swama, 1989]. Gunakkunru et al. (2005) reported antidiarrhoeal potential of ethanolic extract in castor oil induced diarrhoea model, PGE2 induced enteropoolingin in rats. Extract also reduced gastrointestinal motility after charcoal meal administration [Gunakkunru et al., 2005]. Suguna et al. (2005) investigated the effect of alcoholic bark extract on cutaneous wound healing in rats [Suguna et al., 2005]. Agarwal et al. (1994) reported use of “Ayurvedic Rasayana” (herbal medicine) containing *B. monosperma* in the management of giardiasis perhaps by immunomodulation as the “Rasayana” did not exhibit killing effect on the parasite in *vitro* [Agarwal et al., 1994].

**PHYTOCHEMISTRY**

**Flowers**

The main phytoconstituents of *B. monosperma* are butrin (1.5%), butein (0.37%) and butin (0.04%) [Lavhale and Mishra, 2007]. Triterpene, isobutrin, coreopsin, isocoreopsin (butin 7-glucoside), sulphurein, monospermoside (butein 3-e-D-glucoside), isomonospermoside, chalcones, aurones, flavonoids (palasintrin, prunetin) and steroids are other phytoconstituents present in the flower. Phytochemical screening of the dried flowers of the allied species *B. frondosa* showed the presence of seven flavones and flavonoid constituents including butrin and isobutrin and also four free amino acids [Gupta et al., 1970; Singh et al., 1974].

Gupta et al. (1970) investigated three glucosides, identified as coreopsin, isocoreopsin and sulphurein. The remaining two are new and have been assigned the structures monospermoside and isomonospermoside [Gupta et al., 1970]. Shah et al. (1992) isolated and identified free sugars and free amino acids from the petroleum ether extract of flowers [Shah et al., 1992].

**Seeds**

The seed of *B. monosperma* contains oil, proteolytic and lipolytic enzymes, plant proteinase and polypeptidase, a nitrogenous acidic compound, along with palasonin. It also contains monospermoside (butein 3-e-D-glucoside) and monospermoside. From seed coat allophanic acid has been isolated and identified [Jawaharlal et al., 1978; Rastogi and Mehrotra, 1979]. Singh et al. (1974) reported components of soft resin. Four essentially pure acid esters, which together constitute the bulk of soft resin were isolated. These acid esters were termed as jalaric ester-I, jalaric ester-II, laccijalaric ester-I and laccijalaric ester-II [Singh et al., 1974].

**Leaves**

Glucoside, Kino-oil contain oleic and linoleic acid, palmitic and lignoceric acid [Nadkarni, 2002].

Mishra et al. (2000) reported 3,9-dimethoxypterocapan from ethyl acetate fraction of methanol extractives from leaves, and hexane fraction of methanol extractives yielded 3-alpha hydroxyeuph-25-enylheptacosanoate. [Mishra et al., 2000].

**Barks**

Contain kino-tannic acid, gallic acid and pyrocatechin [Nadkarni, 2002]. The plant also contains palasintrin, and major glycosides as butrin, alanind, allophanic acid, butolic acid, cyanidin, histidine, lupenone, lupeol, (-)-medicarpin, miroestrol, palasimide and shellolic acid [Mishra et al., 2000; Schoeller et al., 1938].

**Stems**

CONCLUSION

From the time immemorial, plants have been used as curative agent for variety of ailments. Herbs are the natural drugs used to regain the alterations made in normal physiological system by foreign organisms or by any malfunctioning of the body. In every ethnic group there exists a traditional health care system, which is culturally patterned. In rural communities, health care seems to be the first and foremost line of defense. It is very essential to have a proper documentation of medicinal plants and to know their potential for the improvement of health and hygiene through an eco friendly system. Thus importance should be given to the potentiality of ethnomedicinal studies as these can provide a very effective strategy for the discovery of useful medicinally active identity. A detailed and systematic study is required for identification, cataloguing and documentation of plants, which may provide a meaningful way for the promotion of the traditional knowledge of the herbal medicinal plants. The present review reveals that the plant B. monosperma is used in treating various ailments. Wherein a detailed research work in the characterization and standardization is utmost required for this potential plant for developing its various formulations, which can ultimately be beneficial for human beings as well as animals. However, various studies are carried out, and authenticated comparative study will explore much depth about this plant used in the name “Flame of the forest”.

REFERENCES


