



# Medicinal Values of *Butea monosperma*: A review

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**Abstract:** *Butea monosperma*, commonly known as 'Palash' and 'Flame of the Forest', is medium sized deciduous tree widely distributed in South-east Asia. It encompasses both conventional and scientific importance as it has high medicinal, religious, economical, aesthetic and ornamental values. It is widely used in cure of many diseases and ailments in homeopathy, Unani and ayurveda. The purpose of this review is to compile information on botany and therapeutic usefulness of *B. monosperma*. This manuscript is entirely dependent on secondary sources of information. Fifty-one published articles were retrieved from various internet portals, and all of the data was collected, processed, and presented in a clear and concise manner in this descriptive form. Several plant parts, including as the stem, bark, leaves, flowers, pods, and seeds, have therapeutic and medicinal effects. Anti-inflammatory, anti-hepatoprotective, anti-helminthic, anti-tumor, anti-ulcer, and wound-healing qualities are among its many benefits. More work is needed on the therapeutic potential of this tree.

**Keywords:** Palash, Ethnomedicine, Flame of forest, Anti-helminthic, Anti-ulcer, Anti-inflammatory

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## INTRODUCTION

Nepal, occupies only 0.09% of land area globally, is undoubtedly rich in biodiversity. Within this small area, 5856 species of flowering plant i.e., 2.7% of world's recorded flowering plants are found. 1792-2331 species of angiosperms were listed as Medicinal and aromatic plants (MAPS) in Nepal (Rokaya et al., 2010). Along with this, 28 species of Gymnosperms, 853 species of Bryophytes, 380 species of Pteridophytes, 687 species of algae, 465 species of lichen and 1500 species of fungi are recorded in Nepal (Siwakoti, 2006). According to the World Health Organization (WHO), around 80% of total population in developing countries directly depend on traditional treatment and medicine (Sahu & Padhy, 2013). Medicinal herbs are the basic raw materials used in manufacture of modern medicines and treatment in developed countries (Pandey et al., 2013). In context of Nepal, only around 15-20% population have access to modern medicines while most people still rely on traditional herbs and medicines (Sharma et al., 2004; Bhattarai et al., 2009). *Butea monosperma* (Lam.) Taub. is one of the important medicinal plants of Nepal which is widely used in traditional and modern treatment of many diseases or ailments (Sindhia & Bairwa, 2010).



*B. monosperma* is a medium sized deciduous tree which is widely distributed in Southeast Asia (Sindhia & Bairwa, 2010; Das & Smita, 2018). It has many names according to the different languages and places like 'Flame of Forest', 'Parrot tree', 'Bastard Teak' in English, 'Tong-kwoaw' in Thailand, 'Dhak and Palash' in Hindi, 'Palash' in Nepali and 'Palasa' in Sanskrit (Sharma & Garg, 2009; Chokchaisiri et al., 2009; Jhade et al., 2009; Rana & Avijit, 2012). It lies under the category 'Vulnerable' in IUCN Red list of Threatened Wetland Dependent Plants (Siwakoti, 2006). In Nepal also, *B. monosperma* is vulnerable species around Ghoda-ghodi Lake Complex and Koshi Tappu Wildlife Reserve (Siwakoti, 2006). *B. monosperma* is an important tree species as it has high medicinal, religious, economical, aesthetic and ornamental values (Das & Smita, 2018). It is widely used in cure of many diseases and ailments in homeopathy, Unani and Ayurveda (Sindhia & Bairwa, 2010). *B. monosperma* is often termed as sacred tree as it is considered as the treasurer of the gods. In Hinduism, it is believed that *B. Monosperma* is a form of Agnidev, God of fire. It is said that Agnidev disturbed the privacy of God Shiva and Goddess Parvati so he was given form of tree as a punishment by Goddess Parvati (Jhade et al., 2009).

Similarly, the flowers of *B. monosperma* are offered to Goddess Kali in place of blood scarification and leaves are also widely used in religious Hindu rituals (Jhade et al., 2009). Dry stems are used to make sacred fire while its wood is used to make sacred utensils (Jhade et al., 2009). The leaves of *B. monosperma* are often used to wrap tobacco for making 'bidi' in rural Nepalese and Indian community (Jhade et al., 2009). *B. monosperma* is used for the extraction of resin and dyes. Its wood is soft and durable which is used as timber (Das & Smita, 2018). In traditional rural areas, *B. monosperma* leaves are used as plates and cups. (Jhade et al., 2009). The bark of this plant is also used in the treatment of various diseases and ailments (Das & Smita, 2018).

*B. monosperma* has a wide range of application in economic, ecological, aesthetic and religious aspects but its major application and importance is observed in medicinal and medical aspect all around the world (Burlia & Khadeb, 2007). So, this study is conducted to study the traditional and modern pharmacological, phytochemical and therapeutic values of *B. monosperma*. The main objective of this paper is to compile and provide authentic information about distribution, general botany, chemical composition, propagation, traditional medicinal and pharmacological values of *B. monosperma*. Along with this, the paper explicitly deals with the application of *B. monosperma* in cure of different diseases or ailments.

## MATERIALS & METHODS

This review article is completely based on secondary data from various public sources including academic papers, research reports, journal articles, books and thesis report from 1970-2020 A.D. A total of 51 articles were extracted from online databases such as Research Gate, Scopus and Google Scholar. The keywords like *B. monosperma*, *Palash*, *Ethnomedicine*, *Flame of forest* etc. were used for searching the articles. Various articles, reports, and scientific papers about the ethnobotanical, pharmacological, phytochemical, general biological and medicinal values of *B. monosperma* were found. Information regarding the taxonomy, distribution, botany, medicinal, religious and economic importance of the species were



collected, studied, analyzed, compiled, arranged and presented scientifically in this review article.

## RESULTS AND DISCUSSION

Table 1: Taxonomy of *B. monosperma* (Burlia & Khadeb, 2007)

Kingdom	Plantae
Phylum	Magnoliophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Tribe	Phaseoleae
Genus	<i>Butea</i>
Species	<i>monosperma</i>
Habit	Tree
Synonyms	Flame of forest, Palash, Bastard Teak

*Distribution:* *B. monosperma* is widely distributed in arid and semi-arid regions, especially in India, Sri Lanka and Burma in huge amount (Sharma & Garg, 2009). The tree is flourished up to 1300 m elevation from the sea level (Rana et al., 2012) on Asian countries like Nepal, Bangladesh, Bhutan, China, India, Cambodia, Thailand, Vietnam, Java, Laos, Pakistan (Burli & Khade, 2007).

*Botany:* *B. monosperma* is deciduous tree of height about 50 feet with crooked, rough grey trunk and irregular branches (Chokchaisiri et al., 2009). The tree loses its leaf in winter i.e., in December and regrows on spring season. Bark is ash colored and secretes juice of red colored during injury (Jhade et al., 2009). Compound leaves with 3 obtuse glabrous and finely silky leaflets are neatly reticulate veined on under leaf part. Fruits are 12.5 to 20 cm long and 2.5 to 5 cm thick flat legumes with hairy texture at young stage. Also, seeds are 25 to 40 mm long, 15 to 25 mm wide and 1.5 to 2 mm thick where two cotyledons are enclosed by reddish brown seed coat (Rana et al., 2012). Flowers are 2 to 4 cm in diameter of bright orange red color with large and rigid racemes. The staggering flower cluster is often seen from the month February to April, which appears like dense flame from the distance. Thus, the tree is also known as “Flame of Forest” (Chokchaisiri et al., 2009).

*Chemical composition:* Going through several research papers, different parts of *B. monosperma* are found to be composed of different chemical components. Phytochemical analysis conducted during the research, BMSE (*B. monosperma* seed Extract) reported the presence of sterols, flavonoids, polyphenols, saponins and ascorbic acid (Bavarva & Narashimhacharya, 2008). The pods contain an imide (Guha et al., 1989). Chokchaisiri et al. (2009) reported the presence of flavonoids; butin, butein, palasitrin, coreopsin, butrin, isobutrin, isocoreopsin, sulphuresin, monospermoside and isomonospermoside in flowers. Gallic acid and tannic acid are highly present in stem bark. Similarly, another new lipid derivative and new euphane was obtained from the bark (Mishra et al., 2000). Roots are found with the presence of glucose, glycosides, glycine and several aromatic compounds (Rana et al., 2012). Components of soft resin were reported by Singh et al. in 1974. Four of the essentially pure acid esters that they separated made up the majority of



the soft resin when combined. They were known as laccijalaric ester-I, laccijalaric ester-II, jalaric ester-I, and jalaric ester-II, respectively (Singh et al., 1974).

*Propagation:* In spite of regular flowering season, *B. monosperma* trees are not supposed to flower every year. Purple sunbird (*Nectarinia asiatica*) and three striped squirrel (*Funambulus tristriatus*) plays vital role in pollination. At room temperature, pollen viability dropped to roughly 45% after 24 hours and 30% after 48 hours (Tandon et al., 2003). The breeding system isn't well-defined. Pods should be collected at suitable time and seed must be sown before the onset of rain. Also freely produced root sucker aids in natural vegetative propagation (Rana et al., 2012). Plantation can be nursed on dry as well as irrigated land. It prefers open grasslands for the pleasant growth while they are found mostly scattered and isolate growth in mixed forest types (Burli & Khade, 2007).

*Traditional medicinal value:* Using various portions of floral species as natural cures for human sickness has been practiced since ancient times (Pandey et al., 2013). *B. monosperma* has been utilized in medicine in different forms. Worms, constipation, piles, diabetes, and a clogged throat have all been treated with *B. monosperma* in the past in Pakistan (Iqbal et al., 2006). A report by Bandara et al. (1989) recorded the use of bark for the treatment of diarrhea, dysentery, ulcers, sore throat, diabetes, polypus in nose and snake bite. Also, round worms are treated with *B. monosperma* pods (Rajbhandari et al., 2000). The majority of women in Nepal's Kalikot district trust in traditional medicine to treat uterine prolapse. According to a local healer, Mango bark and *B. monosperma* are pulverized and boiled in water, and liquid is taken twice daily for three months (Puri, 2011). *B. monosperma* is consumed to treat worm infestation, cuts, wounds, urinary problem and as tonic by the Brahmin, Chhetri, Rai, Limbu, Tamang and Magar community of Eastern Nepal (Oli et al., 2005). Similarly, flowers of *B. monosperma* are used as anthelmintic, against diarrhea and dysentery by the Chepang community of Nepal (Tamang et al., 2017).

*Pharmacology:* According to multiple studies and reviews, *B. monosperma* has a wide range of therapeutic benefit when treated with various extracts. Iqbal et al (2006) employed 20 sheep infected with gastrointestinal nematodes, aged less than a year and weighing 18-24 kg, to show that crude powder of *B monosperma* seed had dose and time dependent anthelmintic activity in sheep. In pregnant rats, butine isolated from *B. monosperma* seed has postictal anti-implantation and anti-conceptive effects (Bhargava, 1986).

When given at 600 and 800 mg/kg doses, methanolic extract of *B. monosperma* (MEBM) flowers demonstrated considerable anti-inflammatory efficacy. MEBM may help to lower the risk of inflammatory diseases (Shahavi & Desai, 2007). Another study found that when ethanolic extract of *B. monosperma* flowers was administered in a single dose (200 mg/kg), glucose tolerance was enhanced and blood glucose levels were reduced in alloxan-induced diabetic rats. Two weeks of oral therapy lowered blood glucose, serum cholesterol, and enhanced HDL-cholesterol and albumin levels (Somani et al., 2005). Also, in non-insulin-dependent diabetes mellitus rats, oral treatment of an ethanolic extract of *B. monosperma* seed had anti-diabetic, hypolipemic, and anti-oxidative effects (Bavarva & Narasimhacharya, 2008). Only the acetone soluble portion of the



petroleum ether extract of *B. monosperma* flowers was anti-convulsant (Kasture et al., 1999). Skin irritation experiments on rabbit skin and healthy volunteers were used to investigate *B. monosperma* flowers and leaf extracts. According to the findings, the cream gel containing the *B. monosperma* extract could be used as a safe

topical preparation to treat various skin diseases or as a safe topical cosmetic (More et al., 2013).

Similarly, another study on three species of worms (earthworm, roundworm, and tapeworm) found that alcohol and ethyl acetate extracts of leaves, as well as ash values and extractive value on powdered medications, had considerable anthelmintic activity at high concentrations (100 mg/ml) (Borkar et al., 2010). Sahu & Padhy (2013) reported that the leaf extract mixed with hot water and ethanol demonstrated antibacterial action against all 12 gram positive and negative bacteria tested.

Spherical Ag nanoparticles were produced from a simple water extract of *B. monosperma* bark. The bacterial action of these manufactured nano particles was effective against Gram positive and negative bacteria. These nano particles also showed anti-cancer properties. Further research into this application could lead to lucrative discoveries in anticancer drugs and other medicinal applications (Pattanayak et al., 2015).

In albino Wistar rats, the flavonoid fraction of the ethanolic extract of *B. monosperma* stem demonstrated wound healing activity on three types of wounds (excision, incision, and dead space). The ethnomedicinal use of *B. monosperma* now has a scientific basis (Muralidhar et al., 2013). Likewise, in another experiment by Bandara et al (1989), petroleum and ethyl acetate extracts of *B. monosperma* stem, bark were found to be exhibiting anti-fungal action against *Cladosporium cladosporioides*. When taken as powder, *B. monosperma* seeds are likely to have a toxic effect (Donga et al., 2011). A spoonful of root powder diluted with water is consumed as a snake bite remedy (Burli & Khade, 2007).

In s diabetic rats, *B. monosperma* leaves and bark had no anti-hyperglycemic effect. In STZ-induced severely diabetic rats, both leaf and bark extracts did not boost insulin production or secretion, nor did they contribute to improving pancreatic architecture at the dosages studied (Ahmed et al., 2011). Up to a dose of 200 mg/kg, the acetone-soluble portion of the ethanolic extract of *B. monosperma* (ABM) was considered safe. Mice died when given 800 mg/kg of it. Pre-death symptoms typically included melancholy, prostration with limbs outstretched, decreased mobility, and tremors followed by violent convulsions (Kasture et al., 2000).

## CONCLUSION

Palash, Flame of the Forest, Bastard Teak, and Parrot Tree are all common names for *B. monosperma* with anti-inflammatory, anti-hepatoprotective, anti-helminthic, anti-tumor, anti-ulcer, and wound-healing properties. Several investigations on mammals such as rats and sheep have verified some of these properties, where others have yet to be proven. As a result, adequate management



plans, plantation, production, and management, as well as further scientific research on indigenous medicinal value, are required for further investigation of medicinal characteristics of *B. monosperma*. The extraction and synthesis of resin has a great potential in Nepalese community and its demands have been widely experienced in national as well as international markets. As practiced of pine and rubber species in Nepal, the extraction of *B. monosperma* resin should be initiated commercially which possess a great potential in income generation to poor

community. Research, study and chemical/medical experiments should be continued to explore the pharmacological and phytochemical values of this plant which surely will play significant role in future medicinal endeavors.

## DECLARATION OF CONFLICT OF INTEREST

There are no conflicts of interest declared by the author.

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