ENGINEERING OF MORPHOLOGY, PHYTOCHEMICALS AND BENEFICIAL IMPACT OF Butea sp

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ABSTRACT

Butea are commonly known as flame of the forest or the flame tree belongs to the subfamily “Caesalpinioideae,” of family Fabaceae or Leguminosae. It grows all over India. Butea are commonly termed as Palash Tree in India. They are also rich source of minerals like iron, calcium, potassium and magnesium. The several states of India is not only a forest of natural rich state but also has a rich availability of Butea. It is used for timber, resin, fodder, medicine, and dye. The wood is dirty white and soft. Being durable under water, it is used for well-curbs and water scoops. Spoons and ladies made of this tree are used in various Hindu rituals to pour ghee into the fire. Good charcoal can be obtained from it. The leaves are usually very leathery and not eaten by cattle. The leaves were used by earlier generations of people to serve food instead of plastic plates. The gum is known as Bengal Kino and is considered valuable by druggists because of its astringent qualities and by leather workers because of its tannin. In context, it is used in certain food dishes. The flowers are mostly used to prepare traditional Holi colour called "Kesari". It is also used as a dye for fabric. The objective of this paper is to review the comprehensive study on morphological and phytochemical compounds present in Butea species.

INTRODUCTION

Butea are the most diligent plant ever in the world. The various parts of this plant such as flower, bark, leaf, and seed gum are used in traditional medicine. The significant impact of Butea on pharmacological activities such as anti-hyperglycemic, anti-tumorous, anti-cancerous, anti-oxidant, wound healing, antibacterial and antiviral activities (Kritikar et al. 2011, Dubey et al. 2012). The varied species of Butea in south-East Asia ranging from India, Bangladesh, Pakistan, Nepal, Sri Lanka, Myanmar, Indonesia, Malaysia, and Vietnam. In India, The plant observed in Assam, Maharashtra, Karnataka, Kerala, adjacent parts of Rajasthan, Gujarat and Chhattisgarh (Das et al. 2009). Much Indian culture associated with Butea on its bright orange flame-like flower to fire. The tree of Palash is associated with folk tradition in Jharkhand. Also widely used in ethnobotanical study (Kornkanok et al. 2003). Butea known as Bastard Teak, Parrot Tree (Eng.), Chichra tesu, desukajadh, dhaak, palaash, chalcha, kankrei (Hindi), PaLash (Marathi), Kesudo (Gujarati) Palashpapra (Urdu), Muthuga (Kannada),

Kinshuk, Polash, Bengali, Pauk (Burmese), Pola in Assamese, Porasum, Parasu (Tam.), Muriku, Shamata (Mal.), Modugu (Telugu), Khakda (Guj.), Kela (Sinh.) Ploso (Javanese), Palash (Odia), Semarkat Api (Malay).

The literacy in India symbolizes many folk on palash as the forest fire. The beauty of dry deciduous forests of Palash is found in several states like, Rajasthan, Chhattisgarh, Gujarat, Madhya Pradesh but it is called a State Flower of Jharkhand. The term is a form Agni based on the God of fire and war. The flowers are specially used in the worship of Lord Shiva on occasion of Shivaratri in Southern India which is commonly called Modugu chettu in Telangana district of Andhra Pradesh. The term plasu and chamata and vishalnarayan is used in Kerela. Chamata is widely used for their fire ritual. The ayurvedic formulations made from this plant are used to reduce the vāta and kapha among the tridoas.

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Survey and Collection of Specimen

The Specimen of *Buteaasp.* was collected from Khordha, Odisha. Khordha district come under the Indian state of Odisha, also known as the Hindu pilgrimage city of Puri. It is located at Latitude 20° 10' 57.65" N and Longitude 85° 36’ 58.64” E. Khordha is an administrative division of the state of Odisha, India. The capital city of Bhubaneswar is located in this district. Khurda is the most urbanized of all the districts of Odisha.

Seasonal Adaptation

The seasonal variation is most significant factors for plants to survive in land. The adaptation of plant *Butea* found in the areas should have the capacity for an annual rainfall of more than 35000mm (Das *et al.* 2009). The significant types of soils need for cultivation are black cotton soil, clay loam and shallow soil. The Plant gradually reproduces from seed. The adaptation of plant comes under a monsoon climate having an annual rainfall of more than 35000 mm. The rainy season is from June to September in the capital city of Bhubaneswar is located in this district. Khurda is the most urbanized of all the districts of Odisha.

Cultivation of Plant

To cultivate the plant, First of all the dispersing of ripe seeds was done during the rainy season. The regular interval of watering and weeding was carried out and the seedlings are transplanted during the rainy season after the stem is trimmed to 3 cm. Several workers reported that the growth of seedlings of *Butea* is observed better in pure black soil (Verma *et al.* 1998).

Classification

**Kingdom:** Plantae  
**Subkingdom:** Tracheobionta  
**Division:** Magnoliophyta  
**Class:** Magnoliopsida  
**Subclass:** Rosidae  
**Order:** Fabales  
**Family:** Fabaceae  
**Genus:** Butea  
**Species:** monosperma

Morphological Study

*Butea* classify into *Butea monosperma*, *Butea braamiana*, *Butea buteiformis* and *Butea superb*.

*Butea monosperma* belongs to the family Fabaceae or Leguminosae. The Sepal is uniseriate, multicellular trichomes and bunch of secretory canals present on lower surface, epidermis followed by three or four-layered, thin-walled, loosely arranged parenchymatous cells on both upper and lower surfaces. The middle part of the standard petal was 500 μm thick (Figure 2a). The leaves of *Butea monosperma* grow alternately on the stem (spirally arranged). The leaf is compound, trifoliate. The leaflets are dark green-coloured above and paler beneath (Figure 2b). The leaf is coriaceous and pubescent on both sides. The leaflets have a 0.8–1 cm long petiole. The leaflet of *Butea monosperma* is 8–12 cm long and 6–8 cm wide. The shape of the blade is ovate, the apex is acute, the base is cuneate or oblique and the margins are entire. The venation of the leaf is reticulate with a prominent midrib.

Flower is a unique character of plant identification, the petal arrangement in this plant plays a major role in identifying this plant. Even though Ayurvedic pharmacopoeia has included a monograph of this flower, an elaborate microscopic study of the flower is crucial as flower has been used in traditional medicine. Stamens are diadephous (Figure 2c). The petal was 500 μm thick in the middle and 150 μm thick along the margin, the marginal part was thick and bluntly conical. The middle part of the keel petal was curved, and it was estimated about 400 μm thick (Figure 2d). A complete mature plant is shown in Figure 2e. It has an average elevation of 36 metres (118 feet).

*Butea braamiana*

The plant is woody with climbing shrubs. The old branches are grayish brown. The young branchlets are blackish brown, velutinous, with whitish yellow hairs. The Petiole 10–13 cm; stipels subulate, ca. 3 mm, hairy; petiolules ca. 5 mm, like petiole densely velutinous with whitish yellow hairs; leaflets obovate-rhomboid, 6.8 × 4.65 cm, densely velutinous with whitish yellow hairs on both surfaces, especially on margin and abaxially, lateral veins 6–8 pairs, conspicuous on both surfaces, reticulate veins indistinct, areoles obscure abaxially, base rounded or broadly cuneate, apex emarginate or not; terminal leaflet (immature) ca. 6 cm from lateral ones. Racemes few flowered. Calyx are light green. The leaves are pinnate, with an 8–16 cm (3.1–6.3 in) petiole and three leaflets, each leaflet 10–20 cm (3.9–7.9 in) long. The flowers are 2.5 cm (0.98 in) long, bright orange-red, and produced in racemes up to 15 cm (5.9 in) long. The fruit is a pod 15–20 cm (5.9–7.9 in) long and 4–5 cm (1.6–2.0 in) broad.

*Butea buteiformis*

This type of *Butea* is found at average altitudes of 2000–2200 m North East India, Myanmar, Nepal and China. The flowering season occurs in April–August. This *Butea* is a shrub or perennial herb. Stems are erect, velvety with brownish hairs. Leaves are trifoliate, with stalks 10–20 cm long. Leaflets are broadly ovate-elliptic, 15.45 × 12–35 cm, silky with brownish hairs, lateral veins 10–12 pairs, base...
rounded or flat, tip pointed. Flowers are borne in many flowered racemes or panicles. Sepal cup is 6-8 mm, velvety with brownish hairs. Flowers are orange-red, pea-flower shaped. Standard petal is broadly elliptic, recurved, about 1.5 cm; wings are narrowly ovate, falcate, about 1.3 cm; keel ovate, about 1.7 cm. Pods are 6-10 cm long, 2-3 cm wide, velvety with brownish hairs.

**Butea superba** is a vining shrub native to Thailand, Vietnam, and India thought by locals to be an aphrodisiac among other effects. It is abundantly distributed in the Thai deciduous forest and has been popular among Thai males for its supposed effects on rejuvenation and sexual vigor. In English it has variously been called red kwao krua, creeping butea, butea gum tree, flame of the forest, and climbing palash.

**Figure 2 a** Sepals in healthy form

2b: A pair of Leaf of Butea sp.
2c: Some healthy pair of Stamens
2d: Petals of Butea sp.
2e: A complete flower of Butea sp.
2f: The mature tree of Butea sp.

**Composition of Minerals**

During present study, mineral elements in the dried flower powder were found produce significant therapeutic effects in the human body. Minerals are also responsible of imparting color to the natural products. Chromium imparts orange color, whereas Copper imparts red color and Manganese imparts orange yellow color. The present study has found the presence of mineral elements in the dried flower powder. Various studies have shown minerals as having therapeutic effects in the humans. Copper deficiency results in chronic or repeated diarrhea and low resistance to infection and anemia. Manganese is needed for hemoglobin development, reproduction, and skeleton growth in humans and to cure skin illnesses, scabies, piles, and rheumatism. Zinc is composed of many metalloenzymes and also is membrane stabilizer and stimulator of the immune response. Its deficiency leads to loss of appetite and weakens immune function and hair loss, delayed sexual maturation, impotence and hypogonadism in males, and eye and skin lesions. Chromium assists carbohydrate metabolism and supports transmission in the neuromuscular system its deficiency causes diabetes in humans (Table 1).

**Table 1 Showing the Organic Elements in different parts of Butea sp.**

<table>
<thead>
<tr>
<th>In Organic Elements</th>
<th>Plant Parts</th>
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<tbody>
<tr>
<td>Leaves</td>
<td>Stem</td>
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<tr>
<td>Zn</td>
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<td>Cr</td>
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<td>Pb</td>
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**Phytochemical compounds in different parts of Butea sp.**

In **Butea sp.**, the phytochemical compound plays a vital role to signify the pharmacological activity. The flower contain triterpenes and flavonoids (Figure 3a). The major glycoside of the flower is butrin. The bright color of the flower is due to the presence of chalcones and aurones (Madhavi et al. 2013). It also contains palsitrin, histidine, aspartic acid, alanine of phenyl-1-alanine, myricylalcohol, stearic, palmitic, arachidic and lignoceric acids, fructose, glucose, aspartic acid, alanine and phenylalanine and a new bioactive flavones glycoside(5,7-dihydroxy-3,6,4'-trimethoxyflavone-7-Oalpha-L-xylopyranosyl-(1-->3)-O-alpha-L-arabinopyranosyl-(1-->4)-O-beta-D-galactopyranoside) (Wagner et al. 1986).

**Figure 3 a** The Structure of triterpenes in Flower parts of Butea sp.

**Bark**

The bark is hard and woody in nature contains Kino-tannic acid and major glycosides like butrin, alanind, allophonic acid, butolic acid, cyaniding, histidin, lupenone and lupeol (Bandana et al. 1990) (Figure 3b)
**Leaf**

The leaves contain glucoside, kino-oil that contains palmitic acid, lignoceric acid, oleic and linoleic acid (Verma et al. 1998, Hazare et al. 2013) (Figure 3c).

**Seed**

The fresh seeds of *Butea* contain lipolytic and proteolytic enzymes (Acharya et al. 2009, Mishra et al. 2012, 2013). Fatty acids like myristic acid, palmitic acid, stearic acid, arachidic acid, oleic, linoleic acid and linolenic acid (Figure 3d).

**Stem**

The stem portion of *Butea* contains prunetin. In addition, four compounds isolated from the stem of *Butea monosperma* have been characterized as 3-methoxy-8,9-methylenedioxypterocarp-6-ene, 21-methylene-22-hydroxy-24-oxooctacosanoic acid Me ester, 4-pentacosanylphenol and pentacosanyl-β-D-glucopyranoside (Figure 3e).

**Resins**

The resins contain Z-amyrin, e-sitosterone glucoside and sucrose, lactone-nheneicosanoic acid-delta-lactone, laccijalaric esters I, II (Terpenic lac acid), jalaric esters I, II (Figure 3f).

**Roots**

The root of *Butea* contains glycine and an aromatic hydroxy compound (Figure 3g).

**CONCLUSION**

The plant of *Butea* is a traditional phenomenon, which needs a sophisticated documentation and having tremendous pharmacological aspects. The present overview becomes necessary to symbolize the presence of phytochemical compound such as flavonoids, alkaloids, triterpenes, Z-amyrine, lipids etc. The flower contains huge amount of flavonoids which enhanced the role as antiviral, antcancer,
anti-inflammatory agent. Thus, came to concluded that *Butea* has a diverse research in modern inventions not in Biodiversity impact but also emerges out the pharmacological studies to fight against pathetic disease.

**References**


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**How to cite this article:**


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