Review Article

Butea monosperma as a collective phytomedicine and environmentally sustainable, conservative, and beneficial plant

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How to cite this article: **Hiremath KY, Veeranagoudar DK, Bojja KS. *Butea monosperma* as a collective phytomedicine and environmentally sustainable, conservative, and beneficial plant. Archives of Razi Institute Journal. 2024;79(3):465-474.** DOI: 10.32592/ARI.2024.79.3.465

ABSTRACT

Nature is a valuable resource, supplying remedies for the treatment of all diseases. Plant kingdom stands for a plethora of natural compounds that are well known for their utilization in therapeutic applications. They may pave the way for the development of new mediators with appropriate efficacy in many pathological disorders in the future. In India and throughout the world, herbs have become a principle and popular medicine. Recognized green medicines are better than synthetic ones and have fewer side effects. Since ancient times, plants have been intended for their medicinal properties for treating various diseases owing to their fewer side effects, availability of the agent, cost-efficiency, and potential effectiveness. The medicinal value of plants stems from various vegetative parts of the plant, including flowers, fruit, bark, roots, leaves, seeds, and its modified parts. The Indian forests are the major repository of remedial and aromatic medicinal plants, which can be used for the production of a plethora of remedies against various diseases. *Butea monosperma* is one of the traditional Ayurvedic medicinal plants considered a rich source of ingredients that can be used in drug development as home remedies to treat various diseases, such as diarrhea, constipation, hypertension, dehydration, bronchial asthma, leucorrhea, cancer, infection, as well as liver and stomach disorders. The seed powder is known for its notable medicinal, pharmaceutical, and insecticidal activities. This study highlights the traditional Ayurvedic importance of an eminent medicinal plant, *B. monosperma*, with its active chemical constituents, as well as pharmacological, environmental, ecological, economical, and agricultural significance. This plant can be planted everywhere to take advantage of its versatile applications.

Keywords: Butea monosperma, Phytomedicine, conservative, anticancer

Article Info:
Received: 5 November 2023
Accepted: 26 November 2023
Published: 30 June 2024

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1. Introduction

In the traditional medicine of Ayurveda, several natural medicines have demonstrated significant promising potential for the treatment of numerous diseases and disorders. Many herbal medications are being developed using flowers and seeds and are marketed today (1). *Butea monosperma* (Family Fabaceae) is one of the traditionally famous medicinal plants commonly known as palash, dhak, flame of the forest, bastard teak, bijasneha, khakara, chichara, and Bengal kino. *Butea monosperma,* comprising 630 genera and 1,800 species, is widely distributed throughout India, Ceylon, and Burma. *Butea* plants grow well in subtropical alkaline, dry, and sunny locations and can be easily cultivated from seeds. Each part of this plant has both medicinal and economic importance (2). From ancient times, this plant has been extensively used in the treatment of a wide array of diseases. Within the scope of knowledge, plant remedies are more beneficial and less harmful than synthetic ones. Crude extracts from distinct sources of the plant are known as remedies for the ailment of wounds, skin diseases, cancer, ulcers, and piles (3). This plant is widely used in Ayurveda and modern medicine in the treatment of diseases, such as krimi roga (4). *Butea monosperma* is a plant with high tolerance to adverse environmental conditions by maintaining its physiological parameters, indicating alterations in metabolic functions, enzyme activities, antioxidant productions, and membrane damage due to pollution stress (5). *Butea* plant is also known for its plethora of applications in maintaining green forestry due to its massive potential in preserving soil fertility, restoring water capacity, and being a source of income, as well as contributing to ecological and environmental development (6). The b*utea* plant is also known for attracting specific birds and acts as a guarding avian sanctuary. In this review, we are highlighting the plethora of medicinal importance of *B. monosperma*, including its tolerance to adverse environmental conditions, as well as its ecological and agricultural importance.

2. Description of the plant

Butea monosperma is a moderate-sized leguminous deciduous plant that is found all over India and grows well in fully sunny locations. In mythological history, *B. monosperma* is known as a kind of Agnidev, a God in the form of fire, and the result of punishment given by Goddess Parvati. The height of the tree grows to 50 feet with bunches of red-colored flowers. *Butea,* with each vegetative part, has unique chemical components and medicinal significance (7). The plant comprises three leaflets with leaf shapes varying from ovoid to ovate. The leaf size varies from 15-20 cm wide and 10-15 cm in length. The leaves are shed in winter and reappear in spring. This plant starts flowering from February to the end of April. The flowers are 2-4 cm wide and are made of exquisite orange and red colors. *Butea* is a leguminous plant that bears a flat legume and its pods are stalked with thick structures. Young pods are hairy with soft velvet covering. The seeds are flat with 2 mm thickness, 25-40 mm length, and 15-25 mm width. The seed has two cotyledons with a creamy yellow color and a wrinkled reddish brown seed coat. The root tip is dense and covered with long sideway roots. The plant bark color varies from gray to light brown with fibers, as injected, leaking a cherry red color extract identified as resin or Bengal kino (8).

3. *Butea monosperma* resistance against biotic and abiotic stress

Butea is a medicinal plant known for its widespread application as a home remedy for the treatment of various diseases in numerous regions across the globe. Under adverse environmental conditions, plants generate stress by synthesizing species-specific secondary metabolites under sudden changes in rain, drought, humidity, temperature, and infections by phytopathogens, such as viruses, nematodes, bacteria, protozoa, and fungi (9). The secondary metabolites released by medicinal plants against various phytopathogens in agricultural crops are a promising application in the control of pests, pathogens, and herbivores. *Butea* plants produce a variety of defensive compounds, such as phenols, flavonoids, alkaloids, lectins, phytoalexins, glucosinolates, salicylic acid, and methyl jasmonate. The biochemistry of these metabolites, derived from shikimic acid or aromatic amino acids, is compared and contrasted. Many of these compounds have interesting defense mechanisms and are produced after infection, wounding, or herbivory induction. The speed of production and its effect is different from resistance to susceptibility (5). *Butea monosperma* demonstrated a high tolerance by synthesizing phenolic compounds as a primary metabolite against pollutants to protect this plant under stress caused by air pollutants and varied climatic conditions (10). Plants exhibit and develop different patterns of response against environmental pollutants and seasonal variations. In adverse environmental conditions, the *Butea* plant experiences an elevation in reactive oxygen species (ROS), triggering the activation of its initial defense mechanism through the production of superoxide dismutase enzyme in response to stress. This leads to an increase in enzyme activity and the synthesis of secondary messengers, initiating a defense pathway in coal mine areas (5, 11, 12). *Butea* seed has been used as a home remedy in the treatment of stomach pain in children, as well as in the production of cosmetics due to its pleasant smell. Protease inhibitors have been isolated, purified, and explored using seed powder for their insecticidal properties in *Helicoverpa armigera* (13). *Butea* is a leguminous plant containing higher concentrations of lectins in seeds. Lectins are defined as "Carbohydrate binding proteins of non-immune origin that agglutinate cells and glycoconjugates and exhibit a specific and reversible noncovalent binding activity to carbohydrates and sugar-containing substances whether free in solution or on cell surfaces without altering the covalent structure of any glycosyl ligand" (14). *Butea* seeds contain the highest concentration of lectin specific to Tn antigen (N-Acetylgalactose amine), galactose, lactose, and D-Fucose. *Butea monosperma* seed lectins as carbohydrate-specific proteins can be used in agriculture. Based on the known carbohydrate specificity of lectin to help the plant deal with particular stress conditions, it can be used for the purification and characterization of other plants that lack this type of lectin gene expression (15). Using genetic engineering approaches, lectin gene expression can be altered by overexpression, suppression, and silencing, or a new lectin gene can be introduced (16). *Butea monosperma* is identified for its anticancer activity. The lectin derived from *the Butea* plant seed has displayed the highest specificity for malignancy-associated altered glycan chains of Alpa Fetoprotein (17). *Butea monosperma* seed lectin has anticancer properties against hepatocellular Hep G2 cancer cell lines in a dose-dependent manner (18).

4. Ecological importance of *Butea monosperma* plant

Butea can be used in wasteland reclamation, prevention of soil erosion, enhancement of water holding capacity, stabilization of habitation, and establishment of forests due to its antioxidant properties. This plant grows under stress-sustainable situations (19) in poor black cotton soil wetlands with saline water conditions (20, 21). *Butea* leaf turnover and nutrient-rich decomposition increase soil fertility. *Butea* leaf duct is characterized by the removal of mercury II from the solution. The plant has distinct eco-physiological flexibility owing to its good efficiency in using water to adapt to diverse environmental conditions. As a result, *Butea* is the right tree for the reappearance of deforested areas and deserts. It is also useful for fueling wood and fodder production, also known as agro-forestry since its scattered growth pattern supplies adequate light for the underneath-growing species. *Butea monosperma* produces attractive Indian red-orange-colored flowers known as the flame of the forest. For Lac cultivation, *B. monosperma* is one of the potential host plants. The common insect for Lac cultivation is *Kerria lacca,* which nurtures on velvety parts of host plants, such as *Butea*, intensifying the interactions between plant and insect. Lac insect secrets a resinous material on the host plant that can be harvested, processed, and used in seedlac, lacquerware, skin cosmetics, wood finishing, hepatoprotective and antiobesity drugs, juices, carbonated drinks, wine, jam, sauce, and candy (22). Insect cultivation is another alternative source of income for a large number of people, particularly in various regions of the country, including Jharkhand, Chhattisgarh, Odisha, Bihar, Maharashtra, Gujarat, Andhra Pradesh, and Himalayan. For the economic development of rural areas, the cultivation of insects generates a high income that gives promising prospects for employment in farming services. The profit from insect cultivation depends on the number of host plants, including *B. monosperma.* The production of this essential product as a lac resin is on the decline due to environmental changes, deforestation, a lack of a systemic methodology for insect cultivation, and a deficiency in logical marketing methods. For tribal people, insect cultivation is one of the main sources of income from 4-5 Lakh ha^{-1} of farming. The lac cultivation using *B. monosperma* generates high employment. Participation of villagers in both agriculture and lac cultivation sectors can provide job opportunities and income security for years. Conservation and promotion of suitable habitats for host plants, such as *Butea*, can increase lac production several-fold higher than worldwide requirement by utilizing resources, resulting in a marked increase in employment and rural financial conditions for the purpose of a 'Self-dependent India' (23). Moreover, 31 families of avian species use *B. monosperma* for feeding, roosting, and nesting purposes. These features, combined with industrialization, have led to a decrease in the present inhabitants of *B. monosperma*. Currently, 5% of lac host plants are existing for lac cultivation. *Butea monosperma* is one of the potential lac hosts; nonetheless, lac production using this host is not optimized due to the lack of knowledge, financial support, and scientific attempts (23).

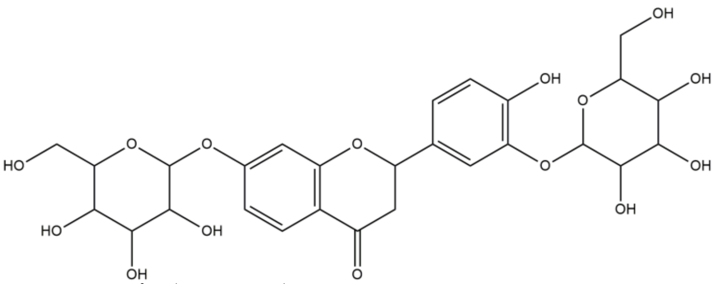
5. Extraction, isolation, and spectroscopic characterization of active constituents from *Butea monosperma* plant sources

Butea monosperma is a medicinal plant with various pharmacological and pharmacognostic features and therapeutic applications. The extraction of *B. monosperma* flower was performed using ethyl acetate, methanol, butanol, and acetone, and then with water for 48 h at room temperature, with periodic stirring. The sample was filtered using a muslin cloth and was lyophilized until further use. It was subjected to HPLC using 0.1 N phosphoric acid and 0.1 N acetonitrile with water as mobile phases. The active constituents, butrin and butein, were analyzed using an A-I detector at 380 nm. *Butea monosperma* flowers were extracted by maceration in 80% ethanol at room temperature for seven days and then filtered through a filter paper. A rotary evaporator was used to evaporate the obtained filtrate to produce the concentrated isolate. The isolate was utilized for antioxidant and antidiabetic activity on male albino winstar rats (24). Flower extracts of *B. monosperma* were analyzed by high-performance liquid chromatography, demonstrating the presence of an elevated amount of butein and butrin. Butrin is known for hepatoprotective and cytoprotective effects (25). Methanolic extract of *B. monosperma* flower has cytotoxic impacts on human triple-negative MDA-MB-23, MDA-MB-453, and MCF-7 breast cancer cells by MTT assay. Chemopreventive ability by modulation has antiangiogenic and antimetastatic activities (26). Peptidase inhibitors from seed powder were isolated by fat-free seed flour, and pigments were subjected to several washes by chilled acetone and hexane. The mixture was then incubated for 6 h with occasional stirring and treated with 0.1 M sodium phosphate buffer in a 1:10 ratio. The resultant homogenate was separated by centrifugation at 12,000 rpm for 20 min at 4ºC. In addition, phenolic content was separated by 1% polyvinylpyrrolidone. Supernatant inhibitory activity was determined to contain heat-stable protein.The resultant pellet was resuspended in a small volume of buffer after extensive dialysis and lyophilized following uniform conditions. In each fraction, proteinase activity and protein content were measured; a 30%-65% fraction showed the highest trypsin activity subjected to the Sephadex G-75 column. Equilibration was performed by 0.01 M phosphate buffer of pH 7.6. The fractions of 4.5 ml were compiled at the flow rate of 0.3 ml/min. The concentration of protein was examined using a JASCO V-550 spectrophotometer at 280 nm. The active fraction from 42nd to 56th tubes was collected, followed by dialysis and solidification of the sample. In addition, the lyophilized sample was loaded on a Sepharose CL-4B column with trypsin for affinity chromatography. The column was pre-equilibrated with 0.1 M Tris-HCl buffer (pH 7.6), 5 mM $CaCl_2$, and 0.1 M NaCl. The bound proteins were eluted by 100 mM HCl solution at the flow rate of 30 ml/h. The eluted anti-tryptic peak fraction was collected and solidified for future analysis. To check the affinity homogeneity, the purified sample was loaded on 12% SDS-PAGE, and the extracted protein showed a molecular weight of 14 kDa (14). The purified peptidase inhibitor was checked for its insecticidal properties against *Helicoverpa armigera*. The results demonstrated that peptidase inhibitors significantly inhibited larval growth and development, highlighting the use of peptidase inhibitors in the control of food product pests. The seed lectin from *B. monosperma* was isolated by delipidation to remove the lipid content and prevent its interference in further purification by extracting pet-ether in 1:10 dilution using powdered seeds. The delipidated seed powder was air dried and finely powdered in mortar and pestle. The finely powdered seed sample was subjected to 0%-80% ammonium sulfate precipitation. The precipitated sample was subjected to centrifugation at 10,000 rpm for 20 min. The resultant sample was solubilized in a small fraction of phosphate buffer saline (PBS), followed by extensive dialysis with PBS. The dialyzed sample was passed on to lactose coupled with a Sepharose-4B affinity column, and the column was pre-equilibrated with similar buffer conditions. The bound seed lectin was eluted by 50 mM lactose using the same buffer. Haemagglutination assay was performed throughout the lectin, and all the experiments were conducted at 4ºC. To check the purity of lectin, To assess the purity of the lectin, purified seed lectin was subjected to SDS-PAGE analysis, revealing a main band with a molecular weight of 67 kDa and two heterodimers with molecular weights of 34 and 32 kDa. The purified seed lectin was checked for its anticancer properties against hepatocellular and colon cancer cell lines (18). The active constituent of the stem bark of *Butea* was medicarpin, which was isolated by bioassay-monitored chromatographic fractionation and exhibited significant antifungal activity against *Cladosporium cladosporioides* compared to Benlate. The hot water and ethanol extraction of leaves from *Butea* displayed strong antibacterial activity against clinically isolated multidrug-resistant bacteria. Ethanolic extract of *Butea* flowers was used for the evaluation of their total phenolic groups by spectrophotometric methods using high-performance liquid chromatography analysis, and microwave plasma-atomic emission spectrometry was used to analyze mineral content. The key compound identified in ethanolic flower extract was flavonoid luteolin-7-O-glucoside. *Butea* infusions contain syringic and salicylic acids; the central microelement is iron, and the major elements are potassium and calcium. The extracts of this flower showed a promising source of elevated levels of essential compounds with enzyme inhibitors and antioxidant properties (27).

6. Chemistry of Active Principle

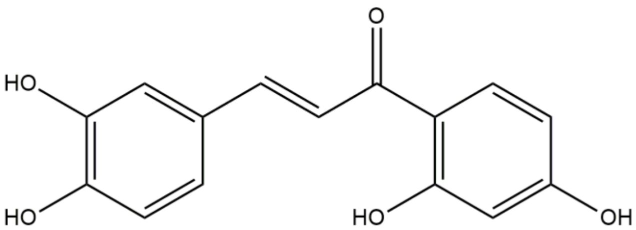
6.1. Butrin ($C_{27}H_{32}O_{15}$)

Butrin, which is a flavanone glycoside derived from butin, acts as an anti-inflammatory agent. The sodium salt of butrin from *B. monosperma* flower extract induces apoptosis in colorectal cancer SW480 cells by decreasing the expression of SIRT1 and Aurora B-kinase, which facilitate cell death by Wnt signaling down-regulation (25).



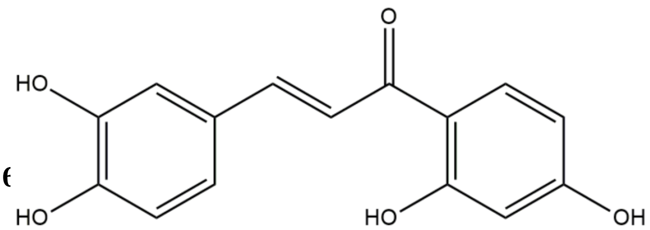
6.2. Butein ($C_{15}H_{12}O_5$)

Butein has been shown to be preclinically effective against various long-term diseases owing to a diverse array of biological effects, including neuroprotective, antioxidant, anti-inflammatory, antidiabetic, antihypertensive, and anticancer properties. It involves many molecular targets and a major transcription factor, Nf-κB, similar to other downstream molecules. Furthermore, with effects on several pathways, the possibility of passive and resistance expansion is degraded, sustaining the use of butein as an alternative ideal medicine (28, 29).

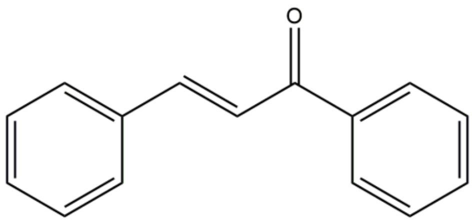


6.3. Isobutrin ($C_{27}H_{32}O_{15}$)

Isobutrin is a plant metabolite and a constituent of the class of chalcone. It is well known for its hepatoprotective and anti-inflammatory activities. Butrin and isobutrin from *B. monosperma* extract are effective chemopreventive agents that suppress 2-AAF-induced hepatic carcinogenesis and oxidative damage in Wistar rats (30).

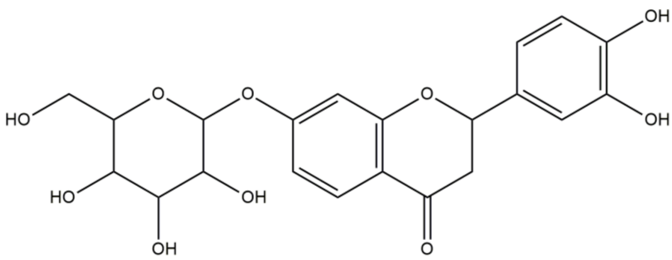


Chalcones are α,β-unsaturated ketones (trans-1,3-diaryl-2-propen-1-ones) consisting of A and B as two aromatic rings joined by α,β-unsaturated carbonyl system with a number of substituents. The plant synthesizes this biosynthetic component by the shikimate pathway. Chalcones are identified as promising bioactive platforms of significant therapeutic value due to their plentiful pharmacological and biological activities. They are well known for their anticancer, anti-microbial, antioxidant, anti-tuberculosis, antiviral, anti-inflammatory, anti-leishmanial, and important biological controlling effects (31).



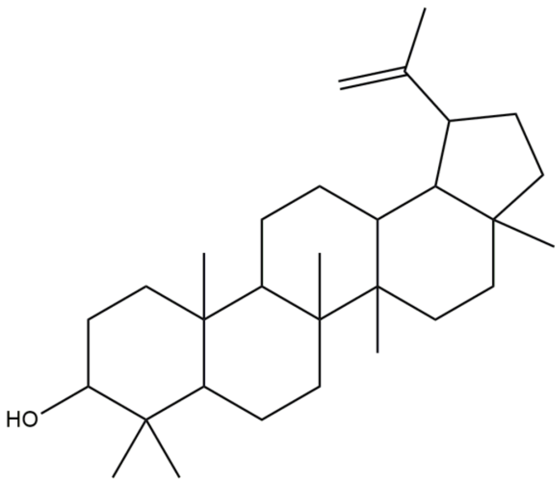
6.5. Isocoreopsin ($C_{21}H_{22}O_{10}$)

A flavonoid from n-butanol extract of *B. monosperma* showed significantly better efficiency in cell growth inhibition on liver cancer and colon cancer cell lines (50 μg/ml in HT-29 and 100 μg/ml in HepG2) as compared to butrin and isobutrin, illustrating significant anticancer effect on HCT-116 human colon cancer cells (25, 32, 33).



6.6. Lupeol ($C_{30}H_{50}O$)

It is a triterpene isolated from the methanolic extract from the *B. monosperma* stem as a bioactive component analyzed by MASS spectral data analysis. Lupeol and its constituents possess a promising ability as antiproliferative, antiangiogenic, antidiabetic, anti-inflammatory, anti-invasive, anti-microbial, anti-protozoal, and cholesterol-reducing mediators. Furthermore, it has demonstrated a significant effect on A427 lung cancer cells and normal MRC-5 cells. Lupeol and its ester derivative have been used in reducing the hypercholesterolemia level in rats by decreasing the activity of enzymes, namely K+, Na+, Mg2+, ATPase, and Ca+ ATPase. Lupeol also has cytoprotective activity against free radical-induced damage by reducing calcium oxalate in the kidney (34).



7. Reactions of Active constituents

7.1. Antibacterial

Ethanol and water extract have significant antibacterial activity. Silver-conjugated lectin nanoparticles from *B. monosperma* showed high anti-microbial intensity with low resistance and less toxicity with the potential to defeat biomolecular interference to enhance conjugated lectins in exploring infectious pathogens (35).

7.2. Antiviral

The flavonoid glycoside isolated from *B. monosperma* seeds has a potential antiviral activity with the structure 5,2'-dihydroxy-3,6,7-trimethoxyflavone-5-O-beta-D-xylopyranosyl-(1→4)-O-beta-D-glucopyranoside was determined by several spectroscopic studies and chemical degradation process (36).

7.3. Anticancer

Biosynthesized nanoparticles from flower extract of *B. monosperma* has anticancer properties, indicating the development of future nanomedicine for the treatment of cancer therapy. The active constituent of flower extract of *B. monosperma* displayed significant anticancer properties against colorectal cancer. Lectin from *B. monosperma* seeds showed cancer cell growth inhibition on colon cancer SW620 and hepatocellular HepG2 cell lines in a dose-dependent manner at 50 and 500 µg/ml, respectively (18). The n-Butanol flower extract from *Butea* showed three active compounds: butrin, isobutrin, and isotretinoin. Every compound displayed chemopreventive activities in colon cancer, and isocorioprin can be considered a novel, promising drug (32). The plant extract is a butein that has an antiproliferative effect on a wide range of human tumor cells, including colon cancer, acute myelogenous, lymphoma, breast cancer, leukemia, hepatic stellate cells, and melanoma. Leaf extract of *Butea* used in the biosynthesis of nanoparticles from gold and silver showed an inhibitory effect on cancer cell proliferation (B16F10, MCF-7), indicating that in the near future, biosynthesized nanomedicine can be used for the development of cancer therapy. Hematite from the extract of *B. monosperma* flowers showed antiproliferation in a dose-dependent manner with an increased cytotoxic effect on the MCF-7 cell line in a dose-dependent manner by producing ROS and increasing intracellular Ca^{2+} ions (37-39).

7.4. Anti-inflammatory

Butea flower extracts showed inflammation and membrane-stabilizing activities (40). Hydroethanolic extract of *B. monosperma* flowers, butrin, and isobutyric displayed significant anti-inflammatory properties in normal human keratinocytes, involved in skin inflammation by decreasing proinflammatory cytokines, interleukin (IL)-8, IL-1β, and IL-6. Methanolic extracts from *Butea* revealed anti-inflammatory properties against carragenin, which made paw edema and cotton pellet granuloma in albino rats (41). Ethanolic extract of bark from *Butea* showed significant anti-inflammatory activities compared to control indomethacin as a standard drug (42).

7.5. Anti-oxidative

In-vivo studies showed strong anti-oxidative and antidiabetic activities by lowering blood glucose levels and increasing insulin secretion. The stem bark of *Butea* isolate showed a potential source of natural hepatoprotective and nephroprotective properties that can be ascribed to the antioxidant potential of *B. monosperma* (43).

8. Miscellaneous activities

Butea monosperma flower extract has hepatoprotective activities. Methanolic extracts of leaves from *Butea* showed anti-thrombosis activities in humans (40). Peptidase inhibitor from seed powder has potential insecticidal effects against *Helicoverpa armigera* (13). Flower and leaf extracts showed antifungal activity against *Candida albicans*, *Saccharomyces cerevisiae*, and *Fusarium solani*. Methanolic extracts of seed showed significant anthelmintic activities (44). Aqueous flower extract of *B. monosperma* showed potential antidiabetic activity on yeast cells; therefore, it is a safe, potential candidate for the development of antidiabetic phytomedicine. Bioactive compound lupeol isolated from methanolic extract of stem bark of *Butea* was beneficial in the treatment of convulsion or epilepsy. Ethanolic extracts of *B. monosperma* showed nephroprotective effects on albino wistar rats due to the antioxidant activity of phytoconstituents, such as flavonoids, phenolics, and alkaloids. Butein from flower extracts of *Butea* showed apoptotic cell death by free radical scavenging activity, protecting hepatic cells from oxidative injury (32). In addition, stem bark powder is used to stupefy fishes. Bark fibers are used to make cordages. Green leaves are used as fodder for domestic animals. Flowers are boiled and cooked to get dye. Flowers and fruits were used by tribes as vegetables. Leaves are used to make ghongda (Ghongda means a blanket is made from leaves to protect from rain during rainy seasons) to protect it from rain. Fresh leaves are used in making dining plates and bowls (45).

9. Toxicity studies

The *in-vivo* studies on albino rats showed the toxic effect of seed powder from *B. monosperma* when administered in powder form. Hematite (α-Fe_2O_3), a flower extract from *B. monosperma*, showed cytotoxicity against breast cancer cell line in a dose-dependent manner through triggering ROS production and increasing intracellular Ca ions with IC_{50} 52 µg/ml (39).

10. Conclusion

Medicinal plants have been long recognized as a major source of bioactive molecules for developing novel agents for the prevention and treatment of various diseases, including cancer (25). *Butea monosperma* is a good example. The major secondary metabolites are flavonoids, such as butrin, isobutrin, butein, isocoreopsin, and chalcone, which impart valuable medicinal properties to this plant. Although these metabolites have demonstrated antiproliferative activity, immunomodulatory effects, and modulation of cell signaling, their full mechanism of action stands to be evaluated. Methanolic extract of *B. monosperma* flowers induces a discriminating cytotoxic effect on estrogen-positive breast MCF-7 cancer cells. It inhibits the growth of mammary carcinoma *in-vivo*, suggesting its chemopreventive effects through a mechanism of modulation in estrogen and progesterone receptors by inducing apoptosis, anti-angiogenesis, and antimetastatic activities. Hematite (α-Fe_2O_3) from *B. monosperma* flower extract may be a potential therapeutic remedy for human breast cancer treatment (39). The butein content of *B. monosperma* is crucial for its favorable effects against hepatic illnesses. Butrin and isobutrin have anti-inflammatory properties through the mechanism of metalloproteinases' inhibitory activities, which will furnish anti-aging properties to *B. monosperma* (46). Apart from this, *B. monosperma* can be cultivated anywhere else owing to its strong water-holding capacity with environmentally sustainable plants. The resources of *Butea* can be used for lac production and can improve economic conditions to global requirements, including rural financial developments and employment, making a great contribution to 'self-sustaining India' (23). *Butea* plant is resistant to drastic environmental stress conditions with good water holding capacity and is known as an ecologically valuable, sustainable, preserved plant for future use. Recently, it has become a challenge for researchers to afford a cost-effective, promising, and safe drug. In these circumstances, *B. monosperma* can be a complete medicine that is widely available all over the world. This study specifies the diverse pharmacological, therapeutic, and economical use of this plant for the treatment of numerous diseases among rural and tribal people. *Butea monosperma* has an efficient indigenous origin and extraordinary research potential. It has consequently suitable documentation of pharmaceutical plants to identify their promising ability for the development of health and disinfection through the ecological green system. The present study explained countless conventional, remedial, economic, and socioeconomic values of this plant. It highlights the traditional Ayurvedic importance of an eminent medicinal plant, *B. monosperma*, with its active chemical constituents, as well as pharmacological, environmental, ecological, economic, and agricultural significance. This plant can be cultivated everywhere to take advantage of its versatile applications.

Acknowledgment

The authors would like to thank the Rajiv Gandhi National Fellowship for Students with Disabilities under UGC (No. F./2015-16/R GNF-2015-17-KAR -1523).

Authors' Contribution

Study concept and design: KYH, KSB and DKV
Acquisition of data: KYH
Analysis and interpretation of data: KYH, KSB and DKV
Drafting of the manuscript: KYH
Critical revision of the manuscript: KYH, KSB and DKV

Ethics

Not applicable.

Conflict of Interest

The authors declare that they have no conflict of interest.

Data Availability

The data that support the findings of this study are available on request from the corresponding author.

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