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*Original Article*

# Sapotaceae Family as A Source of Natural Therapeutics: A Review on Bioactive Compounds and Medicinal Potential

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## ABSTRACT

The Sapotaceae family, comprising around 1250 species across 53 genera. This review focuses on the extensive medicinal properties of Sapotaceae species, detailing their traditional applications, bioactive compounds and pharmacological effects. Notable species such as Madhuca longifolia, Chrysophyllum cainto, Pouteria mammosa, Manilkara zapota and Mimusops elengi are examined for their therapeutic benefits, which include antioxidant, antimicrobial, anti-inflammatory, antidiabetic and anticancer properties. The presence of bioactive compounds such as triterpenoid saponins, flavonoids, phenolics and alkaloids enhances their medicinal value. This review emphasizes the importance as a promising source of natural therapeutics and calls for further pharmacological research and application.

**Keywords:** Bioactive compounds, therapeutic value, medicinal plants

## INTRODUCTION

The Sapotaceae family comprises flowering plants that are classified under the order *Ericales.* This family is divided into five tribes, encompassing 53 genera and approximately 1250 Species. Members of this family are primarily trees or shrubs, exhibiting a global distribution; however, the greatest diversity of species is observed in the tropical and subtropical areas of Asia and south America (Baky *et al*., 2016). Several species yield valuable timber, such *seietenia macrophylla* (asmahogany) and sapota (*Manikara zapota L.*). The Sapotaceace family of flowering plants is noted for its abundance of triterpenoid saponins, the sapotaceace family also known as the Miracle berry family is a group of tropical trees and shrubs that are ecologically and economically important. The family name is derived from zapote, a Mexican vernacular name for one of the plants (in turn derived from the nahuti tzapotl) and latinised by Linnaeus as sapota, a name now treated as a synonym of manilkara (also formerly known by the invalid name achras), latex of sapotaceae is a source of gutta-percha balata and chicle, either pure trans-polysioprene polymers or a mixture of cis and trans constituent (Britannica). The sapotaceae family is among the most abundant families in terms of triterpenoidal saponins, featuring compounds such as protobassic acid,16-α-hydroxyprotobassic acid aglycone, and various derivatives of oleanolic acid aglycone (Baky *et al*.,2022). The family is extensively distributed across tropical regions and includes species of significant economic value. *Manilkara zapota* yield chicle, which is utilized in the production of chewing gum, while several other species produce edible fruits, such as *Chrysophyllum cainito* (star-apple), *Pouteria mimosa* (mamey), and *P. campechiana* (canistel or egg-fruit). The mature fruits of certain sideroxylon species are also consumable, although they have not yet been economically utilized. Additonally, *Chrysophyllum oliviforme* and *mimusops elengi* are attractive tress frequently cultivated for ornamentals purposes (Bano, M., & Ahmed, B., 2017)

### Traditional uses

***1.Madhuca longifolia* L.**

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Native; found largely in the central southern, North Indian plains & forest.
Uses: The bark of Madhuca Longifolia is utilized in the treatment of rheumatism and chronic bronchitis, and it is also prepared as a decoction to address issues such as rheumatism, bleeding and spongy gums.The seed cake is utilized for its anti-inflammatory properties, its ability to prevent ulcers and its role in lowering blood sugar levels (Verma et al., 2014).

**2.*Chrysophyllum cainto* L.**



Native: West Indies
Uses: Extracts derived from the leaves, stem, bark, fruits, peel, pulp or seeds of *C. cainito* show potential as traditional medicinal agents for the treatment of diabetes and for combating bacterial, fungal, and viral infections (Doan, H. V & Le, T. P. 2020).

***3.Pouteria mammosa* I.**



Native: it is native to the Caribbean specially to the Greater Antilles and the Lesser Antilles, and can also be found in the world, including Central and south America and West Africa.
Uses: This fruit has a long-standing history of being utilized for its therapeutic benefits, particularly in treating fever, inflammation, skin rashes, ulcers, nausea, vomiting and diabetes, in addition to being a valuable source of nutrients. In Cuba, the milky sap from the bark has been employed since at least 1864 for the removal of warts, while the seed extract serves as an emollient for painful skin conditions. Furthermore, seed infusions are used to alleviate cough and bronchitis not only in Cuba but also in Costa Rica (Dutok et al., 2015).

***4.Manilkara zapota* L.**



Native: To be native to Mexico, the Caribbean and Central America.
Uses: all parts of this species is used as traditionally. Bark decoction is used for fever and diarrhea. Leaf decoction can be treatment of fever, bleeding, wounds and ulcer (bano *et al*., 2017).

**5.*Mimusops elengi* L.**



Native: In tropical forest in south Asia Southeast Asia and northern Australia.
Uses: The bark, flower, fruit and seeds are highly regarded for their therapeutic benefits in addressing a

range of health issues. Its noted that Mimusopa elengi (bakul) exhibits astringent, cooling, anthelmintic, tonic and febrifuge qualities (Baliga et al., 2011).

**Phytochemicals:**

**1.*Madhuca longifolia*:**

The medicinal efficacy of the plant is contingent upon the active compounds found within its various parts, which can exist in either minimal or substantial amounts (Bina S Siddique *et al*., 2010). The leaves of the Madhuca tree are known to contain saponin, an alkaloid, and glucoside. The seeds are rich in sapogenin and other basic acids. Various photochemical investigations on Mahua have focused on the characterization of sapogenin, triterpenoids, steroids, saponin flavonoids, and glycosides. Notably, new components with medicinal properties have been identified, including madhucic acid (a pentacyclic triterpenoid), madhushazone, four novel oleanane-type triterpene glycosides, and madhucosides A and B (Siddiqui *et al*., 2010). The fresh flowers of Mahua contain 2-acetyl-1-pyrroline, a molecule responsible for its aroma. Additionally, they possess polysaccharides that, upon hydrolysis, yield D-galactose, D-glucose, L-arabinose, L-rhamnose, D-xylose, and D-glucuronic acid (Miller Lucinda G., 2005). The process of determining the pharmacological activity of a specific crude drug is referred to as pharmacological screening, which is essential for predicting its efficacy (Ansari, 2007).

**Active constituents found in various parts of *Madhuca indica* are summarized as follows:** (Ansari, 2007)

| Plant part | Phytoconstituents |
|---|---|
| Bark | Flavonoids, Triterpene, Sterol |
| Latex | Soluble Resin, Insoluble Resin |
| Leaf | Moisture,Organic Matter, Minerals, Potas (K2O)Phosphoric Acid (P2O2) Silica, Alkaloids, Flavonoids, Protobasic Acid |
| Flower | Carotene, Ascobic Acid, Thamine, Riboflavine, Niacine, Folic Acid, Biotine, Insoluble |
| Ripe Seed | Moisture, Protein, Fat, Carbohydrates, Minerals, Calcium, Phosphorus, iron, Carotine, Ascorbic Acid, Tannins |

**2. *Chrysophyllum cainito*:**

The primary, secondary metabolites present in *C. cainito* include alkaloids, tannins, flavonoids, phenols, sterols, coumarins and triterpenes, all of which contribute to its pharmacological advantages.

**3.*Pouteria mammosa*:**

Chemical compounds that have been extensively extracted from the Pouteria genus encompass phenolic acids, various non-flavonoid phenolics, flavonoids, and derivatives of terpenoids. Among these, terpenoid derivatives are the most frequently documented chemical constituents of Pouteria (Fitriansyah *et al*., 2021).

***4.Manilkara zapota L.:***

The primary components of Manilkara zapota L., predominantly phenolic compounds, are primarily located in its fruit, which includes various phenolic acids and flavonoids. The fruit of the Manilkara zapota plant is known to contain substances such as 4-O-galloyl chlorogenate 4-O-galloyl chlorogenic acid methy chlorogenate, dihydromyricetin, quercitrin, myricitrin epicatechin gallocatechin, and gallic acid. Additionally, the fruit pulp reveals the presence of protocatechuic acid, resorcinol 4-hydroxybenzoic acid, vanillic acid caffeic acid syringic acid coumaric acid, and ferulic acid. As noted by (Shafii *et al*., 2017) protocatechuic acid is identified as the most abundant phenolic compound in the fruit of Manilkara zapota followed by gallic acid and quercetin (Alamgir *et at*., 2024).

***Mimusops elengi* L.**

A diverse range of phytochemicals has been extracted and identified from various parts of M. elengi. Phytochemical investigations of M. elengi have confirmed the existence of tannins, alkaloids,

saponins, cardiac glycosides, steroids, flavonoids and reducing sugars (Gupta, P. C., 2013).

**2.4 Pharmacological Activity:**

**Species**

**1. *Madhuca longifolia l.***

**Analgesic activity:** *Madhuca longifolia* flower extracts, both alcoholic and aqueous, had analgesic properties. Chemical, hot plate, and tail flick screening were used to determine the analgesic effect. In all three nociceptive methods tested on rats or mice, graded doses of *Madhuca longifolia* aqueous and alcoholic extract (4.0 to 64.0 mg/kg, i.m. for 3 days) demonstrated a dose-dependent analgesic effect (Chandra Dinesh *et al*., 2001).

**Antidiabetic and antihyperglycemic activity**: The methanolic extract of Madhuca indica demonstrates considerable anti-diabetic effects in Wistar rats subjected to diabetic models induced by streptozotocin and a combination of streptozotocin and nicotinamide (Akash P. Dahake *et al*., 2010).

**Antioxidant activity**: The ethanolic extract derived from the leaves of *Madhuca longifolia* exhibits antioxidant properties at two dosage levels, specifically 500 mg/kg and 750 mg/kg of body weight, in the context of Acetaminophen-induced toxicity in rats. Additionally, the antioxidant activity of a 70% ethanolic extract from the bark of *Madhuca longifolia* was investigated. The evaluation of the ethanolic extract involved in vitro assessments using reducing power and models for scavenging free radicals, including hydroxyl and superoxide radicals. Furthermore, the in vivo antioxidant efficacy was determined by measuring tissue levels of glutathione (GSH) and lipid peroxidation (S palani *et al*., 2010).

**Wound healing**: The research conducted by Sharma *et al*.,2010 revealed that Madhuca exhibits significant wound healing capabilities when compared to the standard treatment of betadin.

**2. *Chrysophyllum cainito***

**Antidiabetic***: C. cainito* is a tropical fruit tree that offers numerous advantages in alleviating the symptoms of various diseases, including diabetes. Diabetes mellitus ranks among the most prevalent metabolic disorders globally. To attain effective glycemic control in diabetes it is recommended to integrate lifestyle modifications with pharmacological interventions (Marin- penalver J J *et al*., 2016)

**Antimicrobial and Antiviral**: The antimicrobial properties of the pulp and seeds of *C. cainito* were evaluated through agar well diffusion methods. Both the seeds and pulp demonstrated varying degrees of antibacterial and antifungal activities against several clinical isolates, including *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Candida albicans*, *Aspergillus*, and *Penicillium ascomycetous* fungi. The extract showed heightened sensitivity towards *Staphylococcus, Pseudomonas*, and *Salmonella* at concentrations of 250 mg/ml, 250 mg/ml, and 31.25 mg/ml, respectively, with inhibition zones measuring between 1 mm and 10 mm (oranusi S. U *et al*., 2015).

**Anti-inflammatory**: The antihypersensitivity and anti-inflammatory properties of crude methanolic extract (CME), its fractions, and two isolated triterpenes (Lup-20(29)-en-3β-O-hexanoate and 3β-Lup-20(29)-en-3-yl acetate) derived from the leaves of *C. cainito* were evaluated in mice subjected to carrageenan induced hypersensitivity and paw edema (Meria N. A *et al*., 2014).

**3. *Manilkara zapota L.***

**Antioxidant Activity:** The antioxidant potential of various extracts from Manilkara zapota fruits and leaves was assessed using ferric thiocyanate assays, hydrogen peroxide scavenging assays, and xanthine oxidase assays. The hydroalcoholic extracts obtained from Manilkara zapota leaves and fruits displayed a significant dose-dependent scavenging effect in the hydrogen peroxide scavenging assay. Furthermore, the hydroalcoholic extracts of MZ fruits and leaves showed considerable antioxidant activity in both the ferric thiocyanate and xanthine oxidase scavenging assays (A.Rani *et al*, 2023)**.**

**Anti-diabetic activities:** Numerous phytochemicals found in the roots, seeds, and leaves of *M. zapota* have demonstrated hypoglycemic effects (Barbalho *et al.*, 2015).

**Anti-microbial Activities:** Comprehensive studies have investigated the potential of *Manilkara zapota* leaf extract as a natural source of antibacterial compounds, resulting in noteworthy discoveries. The antibacterial properties of the *Manilkara zapota* leaf extracts were assessed against a range of gram-positive and gram-negative bacteria using the agar well diffusion method. Remarkably, the water and acetone extract of *Manilkara zapota* demonstrated superior inhibitory effects on all examined gram-positive and gram-negative bacteria, with the exceptions of *C. freundii* and *E. aerogenes* (Yong, K. Y., Chin, J. H., & Shukkoor, M. S. A. 2020).

**Anticancer activity:** Shaniba *et al*., 2019 developed silver nanoparticles (AgNPs) using leaf extracts from *Manilkara zapota L*. The cytotoxic effects of the synthesized MZLAgNPs (Manilkara zapota Silver nanoparticles) were assessed on three human cancer cell lines: HCT 116, A549, and HeLa, employing the MTT assay. The biogenic AgNPs showed the highestcytotoxicity against HCT 116 cells, with IC50 values decreasing from 25 to 8 for treatments lasting 24 and 72 hours, respectively, in comparison to HeLa and A549 cells. The findings indicated that biogenic MZLAgNPs effectively inhibit cell migration and exhibit considerable cytotoxicity against colorectal cancer cells. Furthermore, they promote mitochondria-mediated apoptosis and induce cell cycle arrest, underscoring their therapeutic potential.

**4. *Mimosupa elengi***

Anthelmintic Activity: The bioassay was conducted using the methanolic extract and its fractions on adult Indian earthworms, *Pheretima posthuma*. The findings demonstrated that both the methanolic extract and the ethyl acetate fraction of the leaves displayed notable anthelmintic activity when compared to the standard and control groups. Albendazole served as the standard reference, while distilled water was utilized as the control (Jana GK *et al.*, 2010).

**Antioxidant Activity**

The chloroform extract derived from the bark was evaluated through the use of DPPH (1,1-diphenyl-2-picrylhydrazyl) radical, nitric oxide, ABTS radical, and hydroxyl radical the findings from this investigation clearly demonstrate that M. elengi possesses considerable potential as a natural antioxidant agent (purmina BC *et al.*, 2010).

**Anti-inflammatory, antipyretic activities, analgesic:**

The methanolic extract of the leaf was examined for its analgesic properties, specifically focusing on its anti-inflammatory and antipyretic activities. The evaluation of analgesic activity was conducted through the acetic acid-induced writhing test in white albino mice, as well as the hot plate test. In the hot plate test, the extract demonstrated a significant increase in the latency time response to the heat stimulus (Karnakar UK *et al.*, 2011).

**Antidiabetic effect**: The antidiabetic properties of polar and nonpolar solvent extracts from leaves were evaluated through experiments involving alloxan-induced hypoglycemic rats, focusing on both short-term and long-term treatment effects. The results indicated that both alcoholic and aqueous extracts exhibited notable antidiabetic activity in the studies conducted for both acute and prolonged treatment durations (Kadam, *et al*., 2012).

## CONCLUSION

The sapotaceae family represents a significant and varied group of flowering plant, comprising approximately 1250 species across 53 genera. Member of this family are primarily trees or shrubs, exhibiting a global distribution with greatest diversity in tropical and subtropical Asia and south America. The review highlights the importance of Sapotaceae species in traditional medicine and modern pharmacology, especially due to presence of triterpenoids, flavonoids and phenolic compounds. Despite their significance, many species remain underexplored, presenting ample opportunities for further research in areas such as conservation, phytochemical analysis, and drug discovery. A deeper understanding of their phytochemical diversity and biological activities can contribute meaningfully to sustainable utilization and the development of novel pharmaceuticals from this promising plant family.

## REFERENCE

1. Ansari SH. Essential of Pharmacognosy, Birla Publication, New Delhi, Edition. 2007
2. Alamgir, S. B., Khatun, A., & Nijhu, R. S. (2024). A Review on The Traditional Uses, Phytochemistry And Pharmacology of Manilkara Zapota Linn.
3. Akash P. Dahake, Chirantan S. Chakma, Rita C. Chakma, Prashant Bagherwal, Antihyperglycemic activity of methanolic extract of Madhuca longifolia bark, Diabetologia Croatica, 2010, 39(1),
4. A,Rani, T. Gupta, K. Kangra, V. Garg, R. Dutt Evaluation of Antioxidant, antibacterial and anticancer activity of fruit and leaf extracts of Manilkara zapota against A431 skin cancer cell linesSouth Afr. J. Bot., vol. 153 (2023), pp. 219-226.
5. Bina S Siddiqui, Shazia Khan, Nadeem Kardar M. A New Isoflavone from the Madhuca latifolia. Natural Product Research. 2010; 24:76-80.
6. Barbalho, S. M., Bueno, P. C. D. S., Delazari, D. S., Guiguer, E. L., Coqueiro, D. P., Araújo, A. C., ... & Groppo, M. (2015). Antidiabetic and antilipidemic effects of Manilkara zapota. Journal of medicinal food, 18(3), 385-391.
7. Baliga, M. S., Pai, R. J., Bhat, H. P., Palatty, P. L., & Boloor, R. (2011). Chemistry and medicinal properties of the Bakul (Mimusops elengi Linn): A review. Food Research International, 44(7), 1823-1829.
8. Bano, M., & Ahmed, B. (2017). Manilkara zapota (L.) P. Royen (Sapodilla): a review. International Journal of Advance Research, Ideas and Innovations in Technology, 3(6), 1364-1371.
9. Baky, M. H., Elsaid, M. B., & Farag, M. A. (2022). Phytochemical and biological diversity of triterpenoid saponins from family Sapotaceae: A comprehensive review. Phytochemistry, 202, 113345.
10. Baky, M. H., Kamal, A. M., Elgindi, M. R., & Haggag, E. G. (2016). A review on phenolic compounds from family Sapotaceae. Journal of Pharmacognosy and Phytochemistry, 5(2),
11. Chandra Dinesh analgesic effect of aqueous and alcoholic extracts of Madhuka longifolia (Koeing) Indian Journal of Pharmacology 2001; 33: 108-111.
12. Fitriansyah, S. N., Fidrianny, I., & Hartati, R. (2021). Pharmacological activities and phytochemical compounds: Overview of pouteria genus. Pharmacognosy Journal, 13(2).
13. Doan, H. V., & Le, T. P. (2020). Chrysophyllum cainito: a tropical fruit with multiple health benefits. Evidence-Based Complementary and Alternative Medicine, 2020(1), 7259267.
14. Dutok, C. M., Berenguer-Rivas, C. A., Rodríguez-Leblanch, E., Pérez-Jackson, L., Chil-Nuñez, I., Escalona-Arranz, J. C., ... & Queiroz, M. M. (2015). Acute toxicity and dermal and eye irritation of the aqueous and hydroalcoholic extracts of the seeds of "zapote" Pouteria mammosa (L.) Cronquist. The Scientific World Journal, 2015(1), 642906.
15. Gupta, P. C. (2013). Mimusops elengi Linn. (Bakul)-A potential medicinal plant: A review. Int J Pharm Phytopharmacol Res, 2(5), 332-339.
16. Jana GK, Dhanamjayarao M, Vani M. Evaluation of anthelmintic potential of Mimusops elengi linn. (Sapotaceae) leaf. J Pharm Res 2010; 3(10):2514 2515.
17. Karmakar UK, Sultana R, Biswas NN. Antioxidant, analgesic and cytotoxic activities of Mimusops elengi linn. Leaves. Ind j pharm sci Res 2011; 2(11):2791-2797.
18. Kadam, P. V., Yadav, K. N., Deoda, R. S., Shivatare, R. S., & Patil, M. J. (2012). Mimusops elengi: A review on ethnobotany, phytochemical and pharmacological profile. Journal of Pharmacognosy and Phytochemistry, 1(3), 64-74.
19. Miller Lucinda G, Herbal Medicinal. A Clinicians guide, Viva Book private Limited, New Delhi, Edition 2005; 1(2-3).
20. Marín-Peñalver J. J., Martín-Timón I., Sevillano-Collantes C., and Del Cañizo-Gómez F. J., Update on the treatment of type 2 diabetes mellitus, World Journal of Diabetes. (2016) 7, no. 17, 354–395.
21. Meira N. A., KleinL. C.Jr., Rocha L. W. et al., Anti-inflammatory and anti-hypersensitive effects of the crude extract, fractions and triterpenes obtained from Chrysophyllum cainito leaves in mice, Journal of Ethnopharmacology. (2014) 151, no. 2, 975–983.
22. Oranusi S. U., Braide W., and Umeze R. U., Antimicrobial activities and chemical compositions of Chrysophyllum cainito (star

apple) fruit, Microbiology Research International. (2015) 3, no. 3, 41–50.
23. Purnima BC, Koti AH, Thippeswamy MS, Jaji AH, Swamy YV, Kurhe AJ et al. Antiinflammatory, analgesic and antipyretic activities of Mimusops elengi linn. Ind j pharm sci 2010; 72(4):480-485.
24. S. Palani, S. Raja, S.Karthi, Selvi Archana, B. Senthil Kumar, In vivo analysis of nephro & hepato protective effects and antioxidant activity of Madhuca longifolia against acetaminophen-induced toxicity & oxidative stress, Journal of Pharmacy Research, 2010, 3(1), 9-16.
25. Shaniba, V. S., Aziz, A. A., Jayasree, P. R., & Kumar, P. M. (2019). Manilkara zapota (L.) P. Royen leaf extract derived silver nanoparticles induce apoptosis in human colorectal carcinoma cells without affecting human lymphocytes or erythrocytes. Biological Trace Element Research, 192, 160-174.
26. Shafii ZA, Basri M, Malek EA, Ismail M. (2017). Phytochemical and antioxidant properties of Manilkara zapota (L.) P. royen fruit extracts and its formulation for cosmeceutical application. Asian Journal of Plant Science and Research, 7(3): 29 -41.
27. Sharma S, Sharma MC, Kohli DV. 2010. Wound healing activity and formulation of ether-benzene-95% ethanol extract of herbal drug Madhuca longifolia leaves in albino rats. Journal of Optoelectronics and Biomedical Materials, 1(1):13-5.
28. Verma, N., Jha, K. K., Kumar, U., Deepak, K., Singh, N. K., Singh, A. K., & Sharma, R. (2014). Biological properties, phytochemistry and traditional uses of Mahua (Madhuca longifolia): A review. Int J Adv Res Innov, 2(3), 630-638.
29. Yong, K. Y., Chin, J. H., & Shukkoor, M. S. A. (2020). Evaluation of acute toxicity of Manilkara zapota extracts. Materials Today: Proceedings, 29, 26-29.

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