

Exploring the Botanical, Medicinal and Economical Potential of Sapodilla (Manilkara Zapota).

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ABSTRACT:

Sapodilla (Manilkara zapota) is a tropical evergreen tree known for its delicious fruit and versatile applications in various industries. This review explores the botanical, medicinal, and economic potential of Sapodilla. Sapodilla has a long history of traditional use in folk medicine for treating various ailments. Its parts, including the fruit, leaves, and bark, are reported to possess pharmacological properties with potential therapeutic benefits. These include antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities, among others. Beyond its value as a fresh fruit, Sapodilla derivatives such as chicle gum, extracted from its latex, have been historically important in industries like chewing gum production. Moreover, the growing interest in natural products and traditional medicine has created new opportunities for the commercialization of Sapodilla-based products, ranging from dietary supplements to cosmetics. Sapodilla leaves, rich in antioxidants and nutrients, are gaining traction in cosmetics. With potential benefits ranging from skin hydration to anti-aging properties, Sapodilla leaf extracts are increasingly utilized in skincare formulations, promising natural solutions for healthier, more radiant skin.

KEYWORDS: Sapodilla, anti-aging, antimicrobial, anti-inflammatory, antioxidant, moisturizing.

I. INTRODUCTION:

Sapodilla (Manilkara zapota), a member of the Sapotaceae family, is a tropical evergreen tree native to Central America but now widely cultivated in tropical regions worldwide. Famous for its deliciously sweet and aromatic fruits,

Sapodilla holds a rich botanical, cultural, and economic significance. Sapodilla has been an integral part of traditional medicine systems for centuries, owing to the therapeutic properties of various parts of the tree, particularly its leaves. The leaves of Sapodilla contain phytochemicals including alkaloids, flavonoids, tannins, and phenolics, which contribute to its diverse medicinal potential. Extracts from Sapodilla leaves have been traditionally utilized to treat ailments such as gastrointestinal disorders, respiratory issues, skin diseases etc.. Sapodilla holds considerable economic value beyond its fruit production. The timber from Sapodilla trees is prized for its durability and is used in construction, furniture making, and boat building. Additionally, the latex extracted from the tree is utilized in the production of chewing gum. The leaves of Sapodilla also find applications in various industries, including herbal medicine, cosmetics, and culinary arts. In this comprehensive review, we delve into the multifaceted aspects of Sapodilla leaves, exploring their botanical characteristics, medicinal properties, ecological significance, and economic importance.

Importance and origin of Sapodilla tree: Sapodilla trees (Manilkara zapota) hold significant importance both culturally and economically. Revered for their delicious fruits and durable timber, Sapodilla trees play a vital role in local economies, providing sustenance, income, and raw materials for various industries. The white gummy latex from Manilkara zapota is used as the principle component of chewing gum which is produced on a large scale in various countries like Venezuela etc. Due to their adaptability to diverse climates and soils, Sapodilla trees are cultivated in tropical and subtropical regions worldwide. Originating in the

tropical regions of Central and South America, sapodilla has a long history of cultivation by indigenous peoples such as the Maya. The sapodilla tree is native to Central and South America, but it has spread to other tropical regions of the world, such as parts of Asia and Africa. In 1898, sapodilla was introduced to India when it was first planted in the Maharashtra village of Gholwad. Since then, it has flourished under the loving care of Maharashtra's committed farmers. India ranks amongst the top producers of Sapota in the world. India exports about 2,039 metric tonnes of sapota which values around 35.3 million rupees. Currently, about 35 different types of sapota are cultivated commercially in India. There are many other countries like Thailand, Sri Lanka, Vietnam, Bangladesh, Maldives, Indonesia, Malaysia etc which grow the Manilkarazapota as they have a suitable climate for its growth.

BOTANICAL DESCRIPTION :

Tree :



The sapodilla tree (Manilkarazapota) is a medium-sized large tree with numerous branches. These trees grow slowly yet after many years they might get as tall as 20 to 30 meters. These trees typically reach 30-40 meters in height. The branches of the tree are horizontal. The tree's branches are often covered with a white gummy latex when injured. Every component of the tree releases a milky latex called "chicle".

Leaves:



The leaves of sapodilla are simple, alternate and elliptical in shape. They are glossy, dark green and have a leathery texture. The size of the leaves ranges from 5 to 15 cm in length and they are arranged spirally around the branches. The leaves are pinkish brown when they are newly emerged and it turns to light green to dark green when they are matured. The leaves of the sapodilla tree contain alkaloids which are nitrogenous organic compounds, tannins which are polyphenolic compounds, flavonoids which are the plant pigments with antioxidant and anti-inflammatory properties and fixed oils.

Fruit:



The fruit of the sapodilla tree is commonly known as 'chiku'. It is round, oblate or oval in shape. The fruit measures 5 to 10 cm in diameter. It has rough and sandy brown to grayish skin which has a granular appearance or sometimes smooth. The fruit contains black, shiny, flat seeds in the center. Sapodilla is known for its sweet taste when ripe.

Root: The roots of sapodilla trees are shallow rooted and widespread. They form a network close to the surface, this makes the tree susceptible to wind damage. More than 80% of the roots are located at the top i.e. close to the surface. Well draining soil and support during severe weather is essential to ensure the stability and health of the sapodilla tree's root.

Growth habit and environmental requirements: The growth habit and environmental requirements of Sapodilla (Manilkarazapota) play a crucial role in determining its successful cultivation and productivity. Sapodilla trees are characterized by their evergreen nature, moderate growth rate, and relatively small size compared to other tropical fruit trees. A sapodilla tree needs five to eight years to reach bearing age. Although the fruit tree can tolerate most circumstances, it does best in a sunny, warm, and frost-free spot with well-drained soil.

Environmental Requirements:

Climate: Sapodilla trees thrive in diverse climatic conditions, ranging from humid tropics to cooler and dried subtropical regions. Sapodilla trees thrive in warm, tropical climates with temperatures ranging from 20°C to 35°C. Areas with an annual rainfall of 125-250 cm are highly suitable. They are sensitive to frost and cold temperatures.

Sunlight: Sapodilla trees require full sun exposure for optimal growth and fruit development. They should be planted in locations where they receive at least 6 to 8 hours of direct sunlight daily. Insufficient sunlight can result in poor fruit set, reduced yields, and increased susceptibility to diseases.

Soil: Sapodilla trees prefer well-drained, sandy or loamy soils with a slightly acidic to neutral pH range of 6.0 to 7.5. They are moderately tolerant of saline soils but perform best in soils with good drainage.

Water: While Sapodilla trees are drought-tolerant, regular watering is essential, especially during periods of flowering, fruit development. Proper drainage system is very important. However, excessive watering should be avoided to prevent waterlogging.

Irrigation requirement : Drip irrigation is often recommended for orchards as it delivers water directly to the root zone, minimizing water wastage and reducing the risk of fungal diseases. The dripper discharges the water at 4 liters per hour rate.

PHARMACOGNOSY:

● **Binomial name:**

Manilkarazapota

● **Synonyms:**

Achraszapota L

Achraslucuma Blanco

Manilkarazapotilla (Jacq.) Gilly

ManilkaraAchras L

SapotaAchras Mill Lucumazapota (L.) etc.

● **Family:**

Sapotaceae

● **Active constituents :**

Herbal drug	Active constituent
Manilkarazapota (Sapodilla)	Alkaloids, Carbohydrates, Glycosides, Tannins, Triterpenes and Flavonoids, Vitamin C, Amino acids. Minerals like copper, iron, zinc, calcium , potassium.

TAXONOMICAL HIERARCHY:

Taxonomical hierarchy of the Manilkarazapota plant is shown in the below table:

Kingdom	Plantae - This is the highest taxonomic rank and includes all plants.
Class	Magnoliopsida - This class includes plants with true flowers and seeds enclosed in a fruit.
Family	Sapotaceae - This family includes trees and shrubs, many of which produce edible fruits, including the sapodilla.
Genus	Manilkara - This genus includes around 85 species of trees and shrubs, many of which are native to tropical regions.
Species	Manilkarazapota - This is the specific species to which the sapodilla plant belongs.

NUTRITIONAL CONTENT:

The nutritional content of Manilkarazapota (Sapodilla) can vary slightly depending on factors such as ripeness, variety, and growing conditions. However, Sapodilla is generally known to be a good source of several essential nutrients. Here's an overview of the typical nutritional composition of Sapodilla fruit:

Carbohydrates: Sapodilla fruit is rich in carbohydrates, Carbohydrates provide energy and are the predominant macronutrient in Sapodilla.

Dietary Fiber: Like many plant leaves, Sapodilla leaves likely contain dietary fiber, which is

important for digestive health and may help regulate cholesterol levels and blood sugar levels

Vitamin: The Manilkarazapota leaves contain Vitamin C which is a potent antioxidant that helps protect cells from oxidative damage caused by free radicals. Vitamin C is also known for its ability to brighten the skin and improve complexion by reducing the appearance of dark spots.

Minerals: Sapodilla provides various minerals that are important for overall health including:

- Potassium: Important for heart health, blood pressure regulation, and muscle function.
- Magnesium: Supports muscle and nerve function, blood sugar regulation, and bone health.
- Iron: Necessary for oxygen transport in the blood and energy production.
- Copper: Found in small amounts in Sapodilla, supports red blood cell formation, immune function, and collagen production for skin health.

Manilkarazapota, or Sapodilla, provides minimal protein and fat content in its fruit, primarily consisting of carbohydrates. Pantothenic acid, a B vitamin, may be present in trace amounts in Sapodilla, contributing to energy metabolism and skin health.

In just one sapodilla, weighing approximately 170 grams, you'll find a treasure of nutrients to support your health.

Nourishing your body with a single sapodilla provides:

- Satisfying calorie content: Each fruit carries around 140 calories.
- Abundant Dietary Fiber: With 9 grams of fiber, a sapodilla helps in digestion and promotes a healthy gut.
- Essential Minerals: This fruit has a good mineral profile, including 36 milligrams of calcium, vital for bone health, 20 milligrams of magnesium for muscle and nerve function, and 328 milligrams of potassium, crucial for regulating blood pressure and supporting heart health.
- Vitamins: You'll also find a variety of vitamins, including 25 milligrams of vitamin C, supporting immunity and skin health, as well as 24 micrograms of folate, important for cell division and DNA synthesis.
- Vitamin B5: A source of pantothenic acid, with 0.4 milligrams per fruit, contributing to energy metabolism and hormone synthesis.

- Iron: 1.4 milligram of iron content for the formation of hemoglobin which transports oxygen in the blood.

MEDICINAL PROPERTIES:

Sapodilla (Manilkarazapota) has a long history of traditional medicinal use across various cultures due to its perceived health benefits and medicinal properties. Both the leaves and fruits of the Sapodilla tree have been utilized in traditional medicine practices for centuries, offering a wide range of therapeutic applications.

Sapodilla Leaves:

Antidiarrheal: In traditional medicine systems, Sapodilla leaves are commonly used as a remedy for diarrhea. The leaves are believed to possess astringent properties that help reduce intestinal inflammation and alleviate symptoms of diarrhea.

Anti-inflammatory: Sapodilla leaves are also used topically to soothe skin irritation and minor wounds. The anti-inflammatory properties of the leaves are believed to help reduce redness, swelling, and discomfort associated with various skin conditions.

Antimicrobial: The antimicrobial properties of Sapodilla leaves have been traditionally employed to treat microbial infections, including bacterial and fungal infections. Sapodilla leaves are applied to wounds and skin infections to promote healing and prevent microbial growth.

Antioxidant: Sapodilla leaves are rich in antioxidants, which help neutralize harmful free radicals and reduce oxidative stress in the body. Traditional medicine practitioners utilize Sapodilla leaf extracts as a natural remedy to support overall health and well-being.

Sapodilla Fruit:

Digestive Health: Sapodilla fruit is valued in traditional medicine for its beneficial effects on digestive health. The fruit is believed to help in digestion and relieving constipation.

Respiratory Health: In some traditional medicine practices, Sapodilla fruit is used to alleviate respiratory ailments such as coughs and bronchitis. The fruit's expectorant properties are thought to help loosen phlegm and ease respiratory congestion.

Antioxidant: Similar to Sapodilla leaves, the fruit is rich in antioxidants, including vitamin C. This antioxidant helps to protect cells from oxidative

damage and may reduce the risk of chronic diseases such as heart disease and cancer.

Energy Booster: Sapodilla fruit is valued for its high carbohydrate content, providing a quick source of energy. In traditional medicine, it is consumed to combat fatigue .

Skin Health: Some traditional medicine practices use Sapodilla fruit topically to promote skin health. The fruit's moisturizing properties are believed to hydrate and nourish the skin, improving its appearance and texture.

Anti bacterial: The Sapodilla fruit extract shows good antibacterial activity . The antibacterial activity of the Sapodilla fruit extract may be due to the phytoconstituents present in them like tannins, glycosides, terpenoids etc.

Anti Diabetic activities : Extracts from the seeds, leaves, and roots of Manilkarazapota, commonly known as sapodilla, have demonstrated hypoglycemic activity. Among the different types of active compounds found in sapodilla plants, saponins shows their recognized ability to lower blood sugar levels, making them particularly promising in managing diabetes.

PHARMACOLOGICAL STUDIES ON THERAPEUTIC PROPERTIES OF MANILKARA ZAPOTA:

Pharmacological studies investigating the therapeutic properties of Manilkarazapota, commonly known as Sapodilla have revealed a diverse range of potential health benefits associated with this plant. Sapodilla has a long history of traditional medicinal use across various cultures, and modern scientific research .

Antidiarrheal Activity: Several pharmacological studies have investigated the antidiarrheal properties of Sapodilla. Extracts from Sapodilla leaves and fruits have demonstrated significant inhibitory effects against diarrhea. These studies suggest that Sapodilla may exert its antidiarrheal effects through mechanisms such as reducing intestinal motility, enhancing water and electrolyte absorption.

Anti-inflammatory Effects: Sapodilla extracts have been shown to possess anti-inflammatory properties in both in vivo and in vitro studies.

Antimicrobial Activity: Pharmacological investigations have demonstrated the antimicrobial activity of Sapodilla extracts against a wide range of bacterial and fungal pathogens. Sapodilla extracts have shown inhibitory effects against clinically important pathogens such as *Staphylococcus aureus*, *E.coli* etc.

Antioxidant Properties: Sapodilla is rich in antioxidants, including vitamin C and phenolic compounds, which contribute to its activity against free radicals and reactive oxygen species. Sapodilla extracts, which may help protect cells from oxidative damage and reduce the risk of chronic diseases such as cardiovascular disease and cancer.

Wound Healing: Sapodilla extracts have shown potential wound healing properties. These extracts promote wound closure, tissue regeneration etc.

INDUSTRIAL APPLICATIONS OF MANILKARA ZAPOTA:

Culinary Use: Sapodilla fruits are consumed fresh and are also used in various culinary preparations. They have a sweet flavor and are used in desserts, smoothies, jams, and ice creams.

Traditional Medicine: Sapodilla has a long history of traditional medicinal use in various cultures. Both the leaves and fruits of the Sapodilla tree are utilized in traditional medicine practices to treat a wide range of ailments, including diarrhea, respiratory disorders, skin conditions, and digestive issues. Pharmacological studies have investigated its potential therapeutic properties, including antidiarrheal, anti-inflammatory, antimicrobial, antioxidant, and gastroprotective effects.

Building structures: Sapodilla wood is known for its durability and strength, making it suitable for construction purposes. It has been used in building structures such as the ancient Maya temples.

Latex Production: Sapodilla trees produce latex, which can be harvested and processed into chicle, a natural gum traditionally used in the production of chewing gum. The tree's trunk can be tapped every few years to extract latex containing 20-40% gum.

COSMETIC APPLICATION OF SAPODILLA LEAVES EXTRACT :

1. Skincare: Sapodilla leaf extracts are increasingly incorporated into skincare products for their moisturizing, antioxidant, and anti-inflammatory properties. These extracts help hydrate the skin, protect against environmental damage, and reduce inflammation, making them suitable for sensitive or irritated skin. Additionally, sapodilla leaf extracts may help improve skin texture, tone, and elasticity, contributing to a youthful complexion.
2. Anti-Aging: The antioxidant properties of sapodilla leaves make them valuable ingredients in anti-aging skincare products. By neutralizing free radicals and reducing

oxidative stress, sapodilla leaf extracts help minimize the signs of aging, including wrinkles, fine lines, and age spots. Regular use of skincare products containing sapodilla leaf extracts can promote a more youthful and radiant complexion.

3. **Natural Ingredients:** Sapodilla leaves offer a natural alternative to synthetic ingredients commonly found in cosmetic formulations. Their botanical extracts are gentle yet effective, suitable for all skin types, including sensitive or environmentally stressed skin. Incorporating sapodilla leaf extracts into cosmetic products aligns with the growing consumer demand for natural, sustainable

ECOLOGICAL SIGNIFICANCE:

Role of Sapodilla tree in ecosystem :

The Sapodilla tree (*Manilkarazapota*) plays a crucial role in ecosystem dynamics and functioning, contributing to biodiversity, soil health, carbon sequestration, and water regulation.

Habitat Provider: Sapodilla trees serve as important habitat providers, offering shelter, nesting sites, and food sources for a variety of wildlife species. The tree creates habitat for birds, insects, and small mammals, supporting biodiversity within the ecosystem.

Food Source: The fruits of the Sapodilla tree are a valuable food source for numerous wildlife species, including birds, bats, and insects. By producing nutritious fruits, Sapodilla trees contribute to the food web.

Carbon Sequestration: Like all trees, Sapodilla trees absorb carbon dioxide from the atmosphere during photosynthesis and store carbon in their biomass. This process, known as carbon sequestration, is significant and contributes to mitigating climate change by absorbing carbon dioxide (CO₂) from the atmosphere during photosynthesis. During photosynthesis, trees absorb CO₂ and convert it into organic carbon compounds, storing carbon in their biomass, including leaves, branches, trunk, and roots. Sapodilla trees, with their large canopy and dense wood, are particularly effective at sequestering carbon. As they grow, they continue to absorb CO₂, thereby removing it from the atmosphere and storing it in their tissues.

II. CONCLUSION:

The leaves and fruits of the *Manilkarazapota* plant highlight its enormous

potential in a variety of fields, from traditional medicine to delectable cuisine. We have explored the various applications and characteristics of the fruits and leaves, emphasizing their nutrients, therapeutic qualities etc. As we've seen, the sapodilla tree's components provide many kinds of advantages, including wonderful flavors and textures as well as antibacterial and antioxidant qualities.

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