

Studies on Nutritional, Pharmacological and Health Importance of “Chikoo” (Manilkara Zapota L.)

Pooja Singh^{1*}, Mamta Rathore², H. G. Prakash³

^{1,2,3}Directorate of Research, C.S. Azad University of Agriculture & Technology, Kanpur (U.P.) India

*Corresponding Email: [ps794743\[at\]gmail.com](mailto:ps794743[at]gmail.com)

Abstract: *Zapota, Sapota, Chico, Naseberry or sapodilla generally known as chikoo (Manilkara zapota). It has denominating a popular tropical evergreen fruit which native to Central America and the Caribbean islands. Today, sapotas major commercial crop spread and grown all over in India, Sri Lanka, Indonesia and Malaysia. Sapodilla appears dull, grey or brown, sandy and similar to kiwi-like fruit. It is a sweet taste and high calorie fruit same as that of calories in sweet potato and banana. Sapotas fruit content with potent antiviral, antibacterial as well as anti-inflammatory properties. Chikoo fruits can helps to boost our immunity as content good vitamin C and iron as well as a rich source of antioxidants called tannins. And also excellent source of dietary fiber. Sapodilla fruit is a good source of minerals like-potassium, copper, iron and vitamins such as folate, niacin and pantothenic acid. Its regular consumption is also believed to protect our body from harmful free radical which damage and reduce oxidative stress. Due to content of saponins, it may cause a dry mouth sensation. So that sapodilla (chikoo) has several wonderful health benefits for the digestive, cardiovascular and immune system.*

Keywords: chickoos, sapodilla, nutrients, saponins, antiviral, antibacterial, anti-inflammatory

1. Introduction

Sapota (*Manilkara Zapota L.*) is one of the major tropical fruit crops in India and belongs to sapotaceae family. This crop originated from tropical South America and it has also habituate in the coastal tropics of India which sometimes is considered to be an indigenous crop to this country (Shirol *et al.*, 2009). Sapota is a very familiar amazing fruit. It is also called as Naseberry, Mud Apples, and Sapodilla Plum (Gilly, in 1943). The texture of chikoo has rough and black bean-shaped seeds. Chikoo grows in a hot climate and takes about 5-8 years to mature. In the U.S., the name derived from the Sapota is commonly known as sapodilla which represent Spanish word *zapotilla*, meaning “small sapote” (Mickelbart, 1996).”

Chikoo is most familiare and generic name, *Manilkara*, is derived from *manil-kara*, a indigenous name for *M. kauki* in Malayalam (Umberto, 2000). Today, Sapota has attained prominent part of commercial crop in many states of Maharashtra occupied the first place both in area and production with Karnataka, Gujarat and Tamil Nadu (NHB, 2011). The Chikoo fruit is a delicate brown fruit which tastes very sweet and yummy. The growth of Chikoo is also popularized in Thailand, Vietnam, Pakistan, Maldives, Sri Lanka, Bangladesh, Indonesia, Belize, and the Caribbean (Schroeder, 1958). In Mexico, White latex from the trunk of chikoo tree is the source of ‘chicle’, which is used for making chewing gum. White latex (milky latex) generally disappears and its white flesh turns brown with ripening stage.

The production and yield of chickoo obtained two or more times growing in a year. It has a surprising number of health benefits, pharmaceutical uses and is very nutritious fruit.

Botanical description-

Kingdom: Plantae
Family: Sapotaceae

Genus: Manilkara
Species: Manilkara Zapota

Sapota is the fruit of the plant family Sapotaceae which is generally available from May-September. Unripe fruits retain white, hard, inedible pulp that secretes sticky latex which toxic substance called saponin. Sapodilla is thin skinned, sweet in taste and musky flavor. Fruits has pale yellow-brown colour with grainy texture and shaped like cryptic, egg shaped or ellipsoid. It contains about 3 to 10 black, smooth, shiny biconvex shaped seeds of ¾ inch in length located at its centre. The fruit come in variety of sizes ranging from 3/8-inch (9.5 mm) in diameter and weighs about 150 gm. This fruit is favourite in the American tropics.

Flowering Time

Under tropical conditions, Sapota flowering almost throughout the year but there are two or three main seasons of peak flowering (Hayes, 1975; Srivastava, 1990). The three seasons of flowering are June-August, October-December and March (Sunderarajan, 1960). Varieties, climatic and soil moisture conditions affects the season of flowering (Sunderarajan, 1960 and Madhava Rao and Abdul Khader, 1961).

Sapodilla (*Manilkara zapota*): Fresh nutritive value per 100 gm-



Nenow.in

Volume 10 Issue 3, March 2021

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

Nutrients	Nutrients value (mg/gm)	Percentage of RDA
Energy	83 Kcal	4%
Carbohydrates	19.9 gm	15%
Protein	0.44 g	<1%
Total Fat	1.10 g	3.50%
Cholesterol	0 mg	0 &
Dietary Fiber	5.3 g	14%
Vitamins		
Folates	14 µg	3.50%
Niacin	0.200 mg	1%
Vitamin A	60 IU	2%
Vitamin C	14.7 mg	24.50%
Electrolytes		
Sodium	12 mg	1%
Potassium	193 mg	4%
Minerals		
Calcium	21 mg	2%
Copper	0.086 mg	9%
Potassium	193 mg	4%
Iron	0.80 mg	10%
Magnesium	12 mg	3%
Phosphorus	12 mg	2%
Zinc	0.10 mg	1%

*Source: USDA National Nutrient data base

Improved varieties of sapotas (chikoo)-

Many cultivars of sapodilla are grown worldwide, described as below-

1) Brown Sugar variety

It is a superior variety and originated in Homestead, Florida. Its tree is tall, bushy, regular and high yielder. Fruit are medium to small, 2 to 2-1/2 inches long. Skin is light and scruffy brown. Flesh pale brown, fragrant, juicy, and very sweet granular texture, quality is superb. It has a good storage-ability (Anon., 2012a; Morton, 1987).

2) Prolific

This cultivar was originated as a seedling grown at the Agricultural Research and Education Center, Homestead, Florida and released in 1941. It has a cone shape, skin is brown in colour and pinkish inside. It has a sweet taste and fragrance. The quality of prolific is termed as good. The skin is lighter as compared to ‘Russell’ and tends to lose much of the scurf as it ripens (Anon., 2012a; Morton, 1987).

3) Russell

It was named and propagated by R.H. Fitzpatrick. The fruit is of high quality with nearly round, large, brown-scurfy with gray patches with reddish flesh. It is not a dependable bearer (Morton, 1987).



Stusrtxchange.com

4) Tikal

This variety was one of the first superior commercial varieties planted in Florida and United states. Tikal is a special variety smaller than other types and ripens fast from December to March (Anon. 2012a; Morton, 1987).

Table 2: Sapota cultivars grown in different states of India

S. No	State	Cultivars
1	Andhra Pradesh	‘Pala’, ‘Kirtibarathi’, ‘Singapore’, ‘Cricket Ball’, ‘Dwarapudi’, ‘Guthi’, ‘Jonravalasa’, ‘Bangalore’.
2	Gujarat	‘Kalipatti’, ‘Bhuripatti’, ‘Pilipatti’, ‘Dhola’, ‘Diwani’, ‘Jhumakhia’, ‘Cricket ball’.
3	Maharashtra	‘Kalipatti’, ‘Cricket Ball’, ‘Morabba’.
4	Karnataka	‘Kalipatti’, ‘Cricket Ball’, ‘Pala’, ‘Kirtibarathi’, ‘DHS-1’, ‘DHS-2’.
5	Tamil Nadu	‘Guthi’, ‘Kirtibarathi’, ‘Pala’, ‘CO-1’, ‘CO-2’, ‘PKM-1’.
6	Assam	Cricket Ball’, ‘Barmasi’, ‘Oval’, ‘Co.1’.
7	West Bengal, Bihar	Cricket Ball’, ‘Calcutta Round’, ‘Large Calcutta’,
8	Uttar Pradesh	‘Baramasi’, ‘Oval’, ‘Kalipatti’.

*Source: NHB (2011) and ASFAC (2012)

Climate and Soil-

Calcareous soils (pH 6-8) give good crops of Sapota. Deep Sandy loams or alluvial soils or medium black soils are best. Sapota can be grown in a wide variety of soils. Dry and strong winds also damage Sapota. High temperature 410 C causes drying of stigmatic surface. Temperature range is 11C to 34 degree C. Annual rainfalls 125-250cm are best. But at higher altitudes and in subtropics it produces only one crop an year with reduction in quality and quantity. Sapota is a tropical fruit and can be grown up to 1200m.

Health benefits of Sapota

Sapodilla is one of the high calorie fruits (100gm provides 83 calories) also similar calories in sweet potato and banana. In addition, it is an excellent source of dietary fiber (5.6 g/100 g) which provides relief from constipation. The people of India used it for anti-bacterial and anti-viral properties. It maintains the overall health as it is loaded with various nutrients. Along with the fruit, other parts are also used to treat colds and cough because it contains antidiarrheal, diuretic, antihyperglycemic, antibiotic and hypercholesteraemic effects. People don’t ignore to include this fruit in your diet. There are abundant health benefits so

people should be consume not just for it's taste but also health point of view.

Helps in digestion

Sapota has a high amount of dietary fiber (5.6/100g), which makes for an excellent bulk laxative. The body which relief from many health conditions such as colon cancer, diverticulitis and inflammatory bowel.

Perfect anti-inflammatory agent

The high content of tannins makes sapota or chikoo an important anti-inflammatory agent (According to *International Journal of Food Science and Nutrition*). It helps in improving the problem of digestive tract. It also reduces inflammation by lessen the problem of swelling and joint pain.

Cures cold and cough

It has also been found that sapota fruit is effective in keeping congestion and chronic coughs at bay by removing the phlegm and mucus from the nasal passage and respiratory tract.

Keeps always bones healthy

Minerals act as powerhouse due to rich amounts of calcium, phosphorus and iron are required by bones to increase their endurance. Being rich in calcium, iron and phosphorus, sapota fruit greatly helps in enhancing and strengthening the bones. Copper is essential for the growth of bones, connective tissue and muscles. The deficiency of copper increases the chances of osteoporosis, muscle weakness, low strength, breakage, weak joints etc. The studies show that the intake of copper with manganese, zinc, calcium slows the loss of bone in older women.

Acts as an Antioxidant

Chikoo strengthens the intestines as well as boost immunity. Also prevents various bacterial infections due to prominent source of antioxidant. Chikoo is a storehouse being rich in nutrients of Vitamin E, A and C. Vitamin C could be found in Sapodilla by 39.33%. All of which are great for skin health and has astounding moisturizing properties. Sapodilla seed oils also help in treating hair fall.

Relieves stress

Chickoo boost immunity and prevents various bacterial infections due to the presence of vitamin C, that improves the overall health.

Prevention of certain cancers

The Vitamins A and B present in abundant amount of this fruits and known to offer protection from lungs and cavity cancers. And it also essential for maintaining healthy mucosa and skin.

Other health benefits

Fresh ripe sapodilla is also good source of minerals like potassium, copper, iron and vitamins like-folate, niacin and pantothenic acid. These compounds are essential and worked as cofactors in various metabolic processes in the body. It's also good to treat anaemia. Therefore mostly children and menopausal women should consume this

amazing fruit. Chikoo is beneficial especially for pregnant and lactating mothers due to presence of high amount of carbohydrates and essential nutrients.

Sapota herb is beneficial in reducing bleeding in case of piles and injuries and can be applied as a paste for relieving stings and insect bites. So this fruit is performed as 'haemostatic properties' i.e. stopping blood loss. This fruit has a big role as a 'anti viral and anti-parasitic and anti-bacterial properties.' According to International Journal of Food Science and Nutrition, regarded as an anti-diarrheal properties. A wonderful decoction is prepared from this fruit which can cure diarrhoea. And also helps in piles and dysentery. A person who suffering from insomnia, anxiety and depression, this fruit is helpful to keep mental health strong. Sapota fruit helps in weight loss by regulating the secretion of gastric enzymes and prevent obesity. Sapota acts as a diuretic agent by removing waste material from the body and prevents oedemas or water retention also. Due to the present of high latex content, this fruit can be used to decay tooth cavities. It also slows down the aging process such as dark spots and wrinkles. The recent studies show that Vitamin B5 accelerates the healing process by improving the multiplication of cells. In short, eating sapota or chikoo fruit helps in developing body resistance against many infectious diseases.

Traditional uses

The decoction of this fruit is useful to treat diarrhoea. The infusion of the young fruits and flowers helps to soothe the pulmonary ailments. The seed of this fruit contains quercetin and saponins which are used as aperient, febrifuge, diuretic and tonic. The compressed seeds are used to eradicate the bladder and kidney stones. The decoction of old, yellowed leaves is effective for colds, coughs and diarrhoea. The daily intake of decoction made from the Schum elude leaves and Sapodilla helps to reduce the blood pressure. In the tropics, the latex is used for tooth cavities. The decoction of bark is useful to cure diarrhoea, dysentery and paludism. The flowers are used in Indonesia as an ingredient of a powder which is rubbed on the woman's body after childbirth. The fever and diarrhoea are treated in Cambodia with the bark as it possesses tannin.

Value added products from Saptas

Fresh sapota are a great addition to fruit salad. In Asia, Chikoo milkshake smoothie is a favorite drink. Sapodilla is consumed raw by scooping the flesh out or made jam or sherbet. It is also added to the pancakes and cakes. In India, these are a large scope to produce value added products in food industries as well as markets and also found in the form of custard, juice, ice creams or milkshakes, fruit jam, jellies, squashes etc.

Preparation and serving method

Firstly wash the sandy scruff and fresh sapodilla should be eaten in soft stage. After buying, it is best to consume chikoos within 3-4 days. Cut the fruit into two halves, then scoop the flesh using a spoon and throwing away the seeds. It should be enjoyed and experience its unique flavor.

Selection and storage

Sapodillas can be available all around the season in the markets. Always select fresh and ripened chikoos. The ripeness of chikoos can be tested by pressing it gently with fingers. Always select chikoos which are in good shape and color. Avoid rotten, hard and spotted, cuts/cracks or bruises/wrinkles of chikoos. Harvesting process is same as done by plucking each fruit gently. This fruit can be stored at room temperature for a few days. Firm ripe sapodillas can be store for several days in the home refrigerator at 35⁰ F and also can be kept for upto six months. Raw chikoos, when stored in a rice of bag for two days, can be ripened

Pests and Diseases of sapotas-

Stem borer (Isocrata tetraonis)- The grub of this small beetle bores into bark of the Sapota trunk and feeds on the living tissue inside the bark. The chewed bark is seen on the hole.

Control measures- 1. Kill the insect by thrusting a stiff wire into the tunnel. 2. Plug the hole with a wad of cotton in kerosene at 0.1 percent and plaster with wet mud. This treatment creates suffocation inside the hole or tunnel which results in death of the insect inside.

Fruit borer (Virachola isocrates)- Borer attacks on fruits and sometimes buds which can easily be detected by seeing the latex which comes out on the surface of the infested fruits, the latex later crystallizes.

Control measures

- 1) Spray 0.05 Malathion
- 2) Spray 0.01% Fenvalerate/0.01% endosulfan.

Disease of sapota- Leafspot (Phoecophleospora indica)

The causal fungus results in dark brown, the adjacent spots on leaves. When infection is severe, the adjacent spots become large irregular whitish patches. In severe cases, the defoliation of leaves may be noticed.

Control measures-

- 1) Spray -78 @0.2% at an interval of 30 days.
- 2) Grow resistant varieties like Co-1, Cricket Ball. The varieties Co-2 & Kalipatti are torerant, but Calcutta round are susceptible.

2. Conclusion

Sapodilla is a moderately nutritious fruit with a high antioxidant content. It is a potent anti-inflammatory and antiviral agent with immune system boosting properties and beneficial effects on digestive and cardiovascular health. Sapota is supposed to be medicinal also seeds as diuretic, bark as tonic, antipyretic, febrifuge and in curing biliousness and febrile attacks. In countries (Indonesia) young leafy shoots are used in salads or as vegetable. Fruits can be dried and made into nutritious powder which can be used in Milk shakes and sweets. The latex from stems and immature fruits is used in the preparation of chewing gum. Sapota is a delicious dessert fruit. Sapota is good source of sugars, protein, fat, fiber and minerals (Ca, P, Fe). It has a soothing

action on the stomach lining and a good overall vitamin and mineral content, although eating too much may not be good for gastritis sufferers who should limit their fiber intake.

3. Acknowledgements

This research was conducted at Directorate of Research, the C.S. Azad University of Agriculture & Technology, Kanpur under NAHEP Centre for Advanced Agricultural Science & Technology on Nutritional Crops Sponsored by ICAR, New Delhi. The financial assistance is duly acknowledged and thanks for Director Research of the University for providing me with the research support.

References

- [1] Fayek NM, Monem AR, Mossa MY, Meselhy MR, Shazly AH. "Chemical and biological study of *Manilkara zapota* (L.) Van Royen leaves (Sapotaceae) cultivated in Egypt. Pharmacognosy Research. 2012; 4(2):85-91. doi:10.4103/0974-8490.94723. PMC 3326762. PMID 22518080.
- [2] Morton J. Sapodilla. In Julia F. Morton. Fruits of Warm Climates. Florida Flair Books, Miami, FL, 1987, 393-398.
- [3] Manilkara Zapota. Germplasm Resources Information Network (GRIN). Agricultural Research Service (ARS), United States Department of Agriculture (USDA). Retrieved, 2010-04-30.
- [4] Mitra, J.N. 1964. *An introduction to systematic Botany and ecology*, World Press Pvt.Ltd., Calcutta, pp. 368.
- [5] Morton, J. 1987. *Sapodilla. In: Fruits of warm climates*. Julia F. Morton, Miami, FL.p. 393-398.
- [6] Mulla, A.L. and Desle, G.L. 1990. Pollination studies in sapota cultivars. *J. Maharashtra Agric. Univ.*, 15(2): 266-268.
- [7] *Manilkara zapota* Sapotaceae (L.) van Royen, Orwa C, Mutua A, Kindt R, Jamnadass R, *et al.* Agroforestry Database:a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/af/treedb/>), 2009.
- [8] Nagargoje, B. S.; Kachave, D. B.; Shinde Mark McGinley, C.Michael Hogan & C. Cleveland. Petenes mangroves. Encyclopedia of Earth. National Council for Science and the Environment. Washington DC Archived 2016-10-15 at the Wayback Machine, 2010.
- [9] Nalawadi, U., Dasappa, G. and Sulikeri, G.S. 1977. Floral biology of some varieties of sapota (*Achras zapota* L.). *Progr. Hortic.*, 9(1): 27-32.
- [10] NHB, 2011, Sapota has attained prominent part of commercial crop in many states of Maharashtra occupied the first place both in area and production with Karnataka, Gujarat and Tamil Nadu. College of Tropical Agriculture and Human Resources. Received on 2011/03/26.
- [11] Sapodilla Fruit Facts, California Rare Fruit Growers. Retrieved on 2009/03/26
- [12] Shirol *et al.*, 2009, this crop originated from tropical South America and it has also habituate in the coastal tropics of India which sometimes is considered to be an indigenous crop to this country.

- [13] Gilly, 18 Oct,1943. Sapota is a very familiar amazing fruit. It is also called as Naseberry, Mud Apples, and Sapodilla Plum. A working list of all plant Species.
- [14] Ten Tropical Fruits of Potential Value for Crop Diversification in Hawaii, College of Tropical Agriculture and Human Resources. Retrieved on 2009/03/26.
- [15] Kothari V, Seshadri S. *In vitro* antibacterial activity in seed extracts of Manilkara zapota, Anona squamosa, and Tamarindus Indica. Biol. Res. 2010; 43(2):165-8. doi:10. 4067/S0716-97602010000200003. PMID 21031260.