

CHAPTER 3

HEALTH BENEFITS OF CHAYA MANSA

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INTRODUCTION

Chaya (*Cnidoscolous chayamansa*), also known as spinach tree, is a common leafy vegetable domesticated in pre-Columbian times. This crop has been used mainly for food and medicine purposes by Mayan civilization and other Mesoamerican cultures. Chaya Mansa is also known as the *king of green leafy vegetables*. Chaya mansa is a very popular green leafy shrub from Mexico. It belongs to *Cnidoscolous Chayamansa* family. It is also called as Mayan Spinach because this plant was most popular among Mayan tribes.



Figure 1. Cnidoscolous chayamansa

(Source: <https://www.ebay.com/itm/264792266104>)

Chaya is an easy to grow plant. It grows up to 12” which grows well in all climate and soil type. It is advisable to start harvesting Chaya after one year of planting. This shrub does not need constant attention and it grows fast. Its usage in south eastern México and Central

America for the preparation of food has been documented, especially in Yucatán, Chiapas, Belize, and Guatemala, where Chaya has been considered part of the daily diet. Young Chaya leaves and the thick, tender stem tips are cut and boiled as a spinach. (Kuti & Torres, 1996)

NUTRITIONAL FACTS

Chaya excels more than other leafy vegetables like spinach or lettuce nutritionally. The chaya leaves are highly rich in calcium, iron, carotene, and vitamins. The amino acids are also balanced which plays an important role and mandatory in a diet. During preparation Vitamin C drains out into the water so if one could drink the broth in extra to the leaves, then from 25gms of chaya leaves an adult can meet the daily requirements for Vitamin C. The following Table I shows the nutrient composition of Chaya Mansa as stated by Kuti & Torres (1996) and Mohan (2021).

Table 1

NUTRIENT COMPOSITION OF CHAYA MANSA

COMPONENTS	PER 100 GRAM WEIGHT
Water	85.3
Protein	5.7
Fat%	0.4
Crude fibre	1.4
Carbohydrates	4.2
Calcium mg/100g	199.4
Potassium mg/100g	217.2
Iron mg/100 g	11.4
Vitamin C mg/100 g:	164.7
Carotenoids mg/100g	0.085

Iwuji et al. (2018) stated that the energy yield of the Chaya leaves as 258 ± 4.5 kcal/100 mg. Chaya leaves were found to contain substantially greater amounts of nutrients than the spinach leaves. The chaya leaf is especially high in protein (5.7%), crude fiber (1.9%), calcium (199.4 mg/100 g), potassium (217.2 mg/100 g), iron (11.4 mg/100 g), vitamin C (164.7 mg/100 g), and carotene (0.085 mg/100 g). The levels of chaya leaf nutrients, in this study, agree with published reports (Martin and Ruberte, 1978; Munsell et al., 1949; Booth et al., 1992) and are two to threefold greater than most edible leafy green vegetables. In terms of the average nutritive value, chaya leaves [14.9] is by far superior to other leafy green vegetables such as spinach [6.4], amaranth [11.3], Chinese cabbage [7.0], and lettuce [5.4] (Grubben, 1978).

While some edible leafy green vegetables are usually good sources of mineral macronutrients chaya leaf furnishes appreciable quantities of several of the essential mineral macronutrients necessary for human health maintenance. For example, potassium has been shown to be an important mineral nutrient in the control of hypertension and in the reduction of risks of stroke, calcium is important for ossification and iron is necessary for normal hematopoiesis. Brise and Hallberg (1962) reported that vegetables, such as chaya, with high vitamin C content may enhance absorption of non heme iron.

Analysis of raw and cooked samples of chaya leaves revealed that cooking may increase the relative composition of carbohydrate and fat and decrease relative composition of crude fiber and protein. On the other hand, cooked samples of chaya leaves were considerably higher in calcium, phosphorus and iron while the potassium content was relatively lower than in the raw samples. The increase in some of the mineral nutrients may be due to the cooking process, which allows extraction of the nutrients from the tissues, therefore increasing the percentage of mineral elements while decreasing moisture content (Booth et al., 1992).

LEAF PROTEIN CONCENTRATES

Recently, plant-based proteins have been studied for partial or total substitution of animal proteins from both nutritional and techno-functional point of view. The use of green leaves for leaf protein concentrates (LPC) has been suggested, not only because this protein is one of the most plentiful on earth but also because of its high biological value. Currently, LPCs are produced for animal feed, commonly manufactured from by-products from alfalfa, beet-root, and tobacco leaves. Some green proteins from Moringa leaves are being commercialized for human consumption due to its nutritional value. RuBisCO enzyme (Ribulose 1,5-Bisphosphate Carboxylase/Oxygenase) is one of the main proteins in leaves and has

demonstrated to be a high biological value protein for its content profile of essential amino acids (Edelman & Colt, 2016).

Although this crop has been studied for its biological activity and toxicity, Chaya LPC has been used mainly for animal feeding. The knowledge regarding Chaya leaves may be widened by exploring the potential applicability of protein and polyphenol nutritional compounds to encourage the development of functional food products. Thus, Chaya leaves are appreciated for their nutritional properties, especially their protein content and bioactive compounds, mainly polyphenols. Chaya polyphenols have a growing interest due to their antioxidant capacity and their potential to prevent diseases due to bioactivities such as hepatoprotective, anti-inflammatory, and biological activity against cancer and liver problems (Haque et al., 2016).

MEDICINAL PROPERTIES

Many people believe that this plant can cure almost 100 diseases due to its numerous health benefits to the body. Chaya can dissolve cyst, cancer, and numerous types of diseases, that's why it is called a "gift of God". It can treat asthma, anaemia, sore throat, infections, headaches, kidney and liver diseases. It can prevent haemorrhoids, varicose veins, anaemia, osteoporosis, and other serious diseases due to ageing and environmental effect. It can also regulate cholesterol levels, uric acid, blood sugar levels, balance metabolic system, and helps children growth. Chaya leaves can also enhance the health of the eye, cognitive ability, boost the immune system and other health benefits (Jay Nelz, 2016)

A wide variety of claims have been made as to the medical efficacy of chaya as a treatment for numerous ailments, ranging from the ability to strengthen fingernails and darken greying hair to its use as a cure for alcoholism, insomnia, venereal disease, gout, scorpion stings, and as an improvement of brain function and memory.

Medicinally, Chaya leaves are prepared and used often in a manner similar to when normally eaten. It is quite commonly advised to prepare the leaves simply by boiling, and the method of administration is usually cited as "oral". Apart from merely eating cooked leaves, infusions or teas are occasionally made from the leaves, and to treat diabetes and kidney problems the ground or blended leaves are often made into a shake, many times with other. Sometimes the roots of wild or cultivated Chaya are to be crushed and poultice or taken orally (pers. obs.) to treat kidney disorders and back pain.

In the case of gum disease and skin disorders, the sap of the plant is sometimes applied directly to the affected part, though other authors prescribe the use of the leaves locally. Simply eating the leaves is claimed to improve vision, but Anderson (unpubl. data) notes that the water in which the leaves were boiled is used directly as an eyewash to treat vision disorders or discomfort. Roys (1976) recommended the administration of “grated *Jatropha aconitifolia* Mill. (Chaya) with horse-dung and honey and *Capsicum annum* L.” to new mothers in the case of a retarded afterbirth, adding that the concoction “be drunk warm”. Another use of chaya is to treat muscle disorders, fatigue, and even rheumatism or arthritis, for which it is often prescribed to rub or beat the affected part with the stems or leaves of the plant; the painful stinging caused by the trichomes or spines supposedly revives disabled muscles or joints.

In the treatment of kidney disorders, treatment of kidney stones is overwhelmingly the most commonly cited medicinal use of Chaya. The only published study on its antidiabetic properties indeed found a significant drop in blood sugar levels in diabetic rabbits fed increasingly higher quantities of Chaya (Kuti and Torres, 1996).

In a recent study of the use of Chaya leaf meal as a potential feed source for broiler chicks, chicks fed diets high in Chaya leaf meal, though significantly lower in overall mass, experienced a significant increase in absolute heart mass, liver mass, red blood cell count, and a significant reduction in mortality. Though this cannot be directly extended to medicinal effects in humans, it certainly merits further investigation. These two studies, unfortunately, are the only of their kind with respect to chaya, though a few other species of *Cnidioscolus* have been evaluated for potentially bioactive compounds to no avail.

CHAYA CAPSULES

In addition to pure plant material, chaya is occasionally sold in nutrition and health food stores as part of various herbal remedies. In such stores, one can even purchase capsules of “purified” Chaya extract—evidence enough that the medicinal use of Chaya continues to be popular even today. Most of its medicinal properties have never been experimentally tested, and it is unknown what the actual efficacy of Chaya is in curing many ailments.

CHAYA TOXICITY

Like most food plants such as lima beans, cassava, and many leafy vegetables, the Chaya leaves contain hydrocyanic glycosides, a toxic compound easily destroyed by cooking. Even though some people tend to eat raw chaya leaves, it is risky to do so. These leaves can be both added to salads, soups, or used as a tea. Chaya can be only consumed cooked or boiled but never consume it raw. To be eaten safely, the required cooking time is 5–15 minutes, with 20 minutes being recommended most often in recipes, and it should not be cooked in aluminium cookware as it causes diarrhoea (Grubben, 2004).

Chaya leaves showed a HCN concentration of 2.37 mg/100 g of dry sample by the acidic titration method and 4.25 mg/100 g by the alkaline titration method. These values are very far from the normal level (200–300 mg/100 g) reported in plant foods such as lima beans, cassava and other green leafy species; they are below the maximum (20 mg/100 g) allowed by the FDA in foods. This might confer some trust for consuming the plant in salads or as a raw vegetable. However, hydrolysis of cyanogenic glycosides and elimination of HCN is easily achieved by boiling leaves in water for at least 5 min; after which there is no detectable presence of the undesirable components. Other heat treatments such as sun drying during four days, soaking in water at 20 ° C (60 min) or 70 ° C (30 min) were negative in removing and degrading cyanogenic derivatives (Gonzalez-Laredo et al., 2003).

The leaves and root bark extracts have low toxicity than other plant parts. The total cyanogen content in fresh leaf tissue is lower when compared to frozen tree spinach. The increased cyanogenic content in freeze product may be due to the freeze induced damage. Freezing can impact on the changes in lipid membrane, intercellular concentration of carbohydrate and even the protein synthesis in plant cell. High temperature usually lower the cyanogenic content of the leaves of tree spinach.

Research is being conducted on genetic improvement, propagation, field production, potential for processing and marketing of chaya and its products in south Texas (Kutti and Torres, 1996).

CONCLUSION

The potential of Chayamansa for human food and health has a significant implication for the plant as a drought resistant horticultural crop. Although the exposure to medicinal effects of Chaya is limited, its demand has recently increased. The plant has the potential to make a significant nutritional contribution to the vegetable diet as well, because of its high nutrient content. The development of chaya as a new horticultural crop would transcend the ethnic popularity and create a worldwide market for the plant and its products, whether as a leafy green vegetable and/or as a therapeutic herbal tea.

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