Exploring Chayote: An Underutilized Vegetable with Potential for Snack Food Industries

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Abstract

Chayote, an underutilized vegetable with immense potential, remains largely overlooked in the world of agriculture despite its nutritional benefits and versatility. This article explores the characteristics of chayote and its potential as a raw material for the snack food industry. Widely cultivated in India, particularly in the northeastern hill region, chayote offers various nutritional benefits, including vitamins, minerals, and dietary fibre. While the nutritional composition of its fruits is well-known, information about chayote roots and leaves is limited but promising. With its mild flavour, crunchy texture, and longer shelf life, chayote presents an ideal raw material for snack food production. Various snack applications, such as chayote chips, snack bars, crackers, and sweet snacks, highlight its versatility and potential to cater to diverse consumer preferences. Additionally, chayote cultivation offers environmental and economic benefits, contributing to food security and income generation for farmers. By harnessing the full potential of chayote as a raw material for the snack food industry, we can create healthier snack options and stimulate local economies, benefiting both consumers and agricultural communities

Introduction

In the world of agriculture, certain crops often go unnoticed despite their immense potential. One such underutilized vegetable is the chayote. While commonly consumed in some regions, chayote remains largely overlooked in others. However, this humble vegetable holds great promise, particularly as a raw material for the snack food industry. In this article, we will delve into the characteristics of chayote and explore its potential for snack food production.

Sechium edule, commonly known as chayote (Fig. 1a), mirliton, or chocho, belongs to the gourd family, Cucurbitaceae. It is a perennial vine cultivated primarily for its delicious fruits. While typically grown as an annual plant in temperate regions, chayote is known for its rapid growth and distinctive tendrils. The fruits are pear-shaped, green, and ridged, with tiny white flowers that are unisexual. Each fruit, ranging from 7.5 to 10 cm (3 to 4 inches) in length, contains a single seed within its green to green-white flesh. Certain varieties may have spines or hairs on the fruits. Despite containing sap that may irritate the skin of some individuals, the peel of chayote can be eaten raw. Additionally, the young tuberous roots (Fig.1b) of the plant can be prepared similarly to potatoes.

Fig: (1a) Chayote, (1b) Chayote Tuber

Chayote cultivation is widespread in India, particularly in the northeastern hill region, including states like Tamil Nadu, Karnataka, West Bengal, Himachal Pradesh, and Mizoram, which stands out as the top producer. Mizoram alone produces 10,985 metric tonnes of chayote from approximately 845 acres of land. In the northeastern states of Meghalaya, Mizoram, and Sikkim, chayote is grown in various

forms. Despite its widespread cultivation in India, chayote is believed to have originated from Guatemala and Mexico. Chayote goes by different regional names in India, including squash (Assamese), quash (Bengali), chow chow (Hindi), dashkush (Manipuri), seemakattirikkai (Tamil), seemebadane (Kannada), phuti kakudi (Oriya), and iskush (Sikkim).

Nutritional Profile of chayote, its tubers and edible leaves

Despite its understated reputation, chayote fruit, tuber and edible part of its leaves packs a nutritional punch. The fruit is low in calories and rich in dietary fiber, vitamins C and K, as well as minerals such as potassium and manganese. Moreover, chayote contains antioxidants and bioactive compounds that offer various health benefits, including improved digestion, enhanced immune function, and reduced risk of chronic diseases. Table 2 show the complete nutritional profile of Chayote fruit.

Table 2 Nutritional Profile of chayote fruit (Sanwal *et al.*, 2007)

Nutrient	Quantity (per 100g)
Moisture content % (w.b.)	94.240
Energy	80,000 kJ
Protein	0.820 g
Total Lipid	0.134 g
Ash	0.300 g
Carbohydrates (by difference)	4.510 g
Dietary fibre	1.700 g
Sugars (total)	1.660 g
Calcium	17,000 mg
Magnesium	12.0 mg
Phosphorus	18.0 mg
Potassium	125.0 mg
Vitamin C (total ascorbic acid)	7.7 mg

Information about the nutritional composition and uses of chayote roots is limited compared to that of chayote fruits. On average, 100 g of dried chayote root contains approximately 17.8–85.5g of carbohydrates, 13.6–72.8g of starch, 0.17–0.40g of fiber, 2.00–10.4g of protein, and 0.20–0.33g of lipids Starch, constituting around 67%, and total soluble sugars, about 2%, contribute to approximately 50 kcal/100g of available energy (Vieira et al., 2019).

The edible part of Chayote leaves contains notable amounts of protein (2.69–4.88 g/100 g), pectin (0.45 g/100 g), and lipids (0.40–2.32 g/100 g), with approximately 40.2% of the lipids being non-polar, 30.8% glycolipids, and 29.0% phospholipids. The primary fatty acids found in chayote leaves are linolenic (42.1–76.7%), palmitic (13.7–38.5%), and linoleic (5.7–15.3%) acids. Compared to fruits or seeds, chayote leaves have higher levels of amino acids, except for aspartic acid. Chayote stems contain fiber (1.20–21.70%), protein (4%), and are particularly rich in niacin (1.10 mg/100 g), vitamin A (615 UI/100 g), and vitamin E (90 mg/100 g) (Rao et al., 1990).

Potential for Snack Food Industries

A snack, also known as snack food, is a type of food that is not meant to be eaten as a primary meal such as breakfast, lunch, or dinner. Instead, snacks are consumed to satisfy hunger between these main meals and to provide the body with a rapid source of energy. Chayote has huge potential to be a raw material for snack food industry and converted to varies snack. The unique texture, mild flavour of chayote, longer shelf life and low cost of chayote fruit makes it an ideal raw material for snack food production (Pineda-Vargas et al., 2020). With the rising demand for healthier snack options, the snack food industry is constantly seeking innovative ingredients that offer nutritional value without compromising taste and texture. Chayote fits the bill perfectly, offering a crunchy, refreshing base for a variety of snack products.

Potential Snack Food Applications

Chayote can be transformed into a wide range of snack foods, catering to diverse consumer preferences. Thinly sliced and dehydrated and chayote chips (Raleng et al., 2021) offer a healthier alternative to traditional potato chips, boasting a satisfying crunch and subtle flavor. Chayote can also be incorporated into snack bars, Papad, crackers (Sakung et al., 2020), and savory granola mixes, adding nutritional value and textural interest. Furthermore, its neutral flavor makes chayote a versatile ingredient for sweet snacks such as Chayote Dodol (Arief et al., 2021), fruit crisps, muffins, and energy balls. The process flow chart for preparation of

some common snacks from chayote and its tuber is shown in fig. 2.

Fig 2: Process flow chart for Preparation of chayote chips, Dodol, Papad and Crackers

Sustainability and Economic Benefits

Beyond its culinary attributes, chayote cultivation offers environmental and economic benefits. The plant is relatively easy to grow, requiring minimal inputs and thriving in various soil and climate conditions. Its prolific yield potential and fast-growing nature make chayote a sustainable crop option for farmers, contributing to food security and income generation through value addition. Additionally, incorporating chayote into snack food production can create new market opportunities for farmers and stimulate local economies.

Conclusion

Chayote represents a hidden gem in the world of agriculture, offering immense potential for the snack food industry. With its nutritional benefits, versatility, and sustainability credentials, chayote is poised to become a sought-after ingredient for healthy snack products. By raising awareness of its culinary possibilities and investing in research and development, we can unlock the full potential of chayote as a raw material for snack food industries, benefiting both consumers and agricultural communities alike.

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