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Mini Review

Stuffing Cucumber: A Therapeutic Herb

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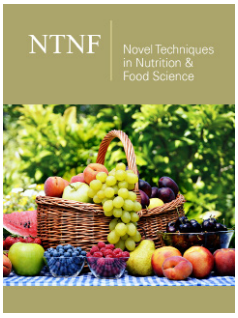
ISSN: 2640-9208



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Submission: November 04, 2024

Published: December 04, 2024

Volume 8 - Issue 1

How to cite this article: Kishor Varotariya* and Ajay Kumar. Stuffing Cucumber: A Therapeutic Herb. Nov Tech Nutri Food Sci. 8(1). NTNF. 000680. 2024. DOI: 10.31031/NTNF.2024.08.000680

Abstract

Stuffing cucumber is a unique vegetable native to South America, where it commonly grows wild. In Northwest India and Bhutan, it is cultivated for its edible fruits. The plant is characterized by its monoecious nature, featuring small flowers and large, deeply lobed leaves. The fruits are puffy, somewhat hollow and possess a tender texture. They are distinguished by soft spines, a tapered neck and black seeds. In Asian cuisine, stuffing cucumber is consumed both raw, as a substitute for traditional cucumbers and cooked, offering versatility in dishes. This crop is valued not only for its culinary uses but also for its nutritional benefits, which include vitamins, minerals and dietary fibre. By promoting the cultivation and consumption of stuffing cucumber, there is potential to enhance dietary diversity and nutrition in regions where it is grown, contributing to improved food security and health outcomes.

Keywords: Culinary uses; Dietary diversity; Food security; Nutritional benefits; Stuffing

Introduction

Figure 1: *Cyclanthera pedate.*

Stuffing cucumber (*Cyclanthera pedata*), belonging to the Cucurbitaceae family, is a tropical climbing herb that thrives in the Indian hills, particularly in regions such as Manali and Sikkim. Known locally as *meetha karela* in India and *Kichipoktho* in Bhutan, this versatile vegetable is also popular in the Andes, where it is referred to as *achojcha*. It goes by various names worldwide, including *caigua, grimpant* and *slipper gourd*. The fruit of stuffing cucumber is notable for its large cavity, which allows it to be easily stuffed, earning it the name Pepino de fill in South America [1] (Figure 1). The species has a rich history, with evidence of domestication dating back centuries, particularly in the mountainous regions of Peru. Ancient Peruvian ceramics depict this fruit, highlighting its significance in local diets. The stuffing cucumber is cultivated for both its edible and medicinal properties, contributing to its popularity in various countries, including India's northeastern states, Odisha, Bihar and West Bengal [2]. Additionally, this plant is valued for its utility as a natural fence, as it is tolerant to shade. The origin of stuffing cucumber traces back to Andean South America, where the genus *Cyclanthera*, comprising around 30 species, is native to warm-temperate and tropical regions. Initially believed to be domesticated in Peru, its cultivation spread throughout the Andean

countries before reaching Southeast Asia and Africa. In Africa, it is primarily grown in the highlands of East Africa. Its cultivation extends from Mexico to Peru and Ecuador and it is widely grown in the highlands of Colombia, the Caribbean Islands and Bolivia. This annual climber has also found a place in the mountainous regions of Bhutan, Nepal and northeastern India, serving both subsistence and commercial purposes [1,3]. The stuffing cucumber thus exemplifies a crop with a diverse cultural and agricultural significance across various regions.

Botany

Stuffing cucumber is a perennial climbing herb that typically reaches heights of 3.5 to 4.5 meters. The flowering period occurs between August and September, producing small, edible fruits widely cultivated as a vegetable. The leaves of this species are alternate, palmately lobed and measure 8 to 10cm in width, typically divided into 3 to 5 leaflets that are sinuate-serrate. Each leaf petiole ranges from 1 to 8cm in length, while the leaflets exhibit elliptical shapes with pronounced lobing [2]. As a monoecious plant, *C. pedata* features unisexual flowers that are regular and pentamerous, primarily pollinated by insects. Male flowers grow in axillary positions on panicles measuring 10 to 20cm long, whereas female flowers are solitary and sessile, lacking a stalk and possessing an inferior ovary with a single chamber (Figure 2). The fruit of the stuffing cucumber is a small, pale green, indehiscent berry, typically 10 to 15cm long and 5 to 8m wide. The fruits have a unique semi-flattened shape, often with soft spines and exhibit a curved base with a hollow interior. The endocarp has a spongy texture, while the mesocarp is juicy [4]. The seeds, which have a diameter of approximately 1.5cm, are black, square-shaped and wrinkled in appearance, exhibiting a parietal type of placentation where seeds are attached to the fruit's inner cavity morphological characteristics not only enhance the nutritional profile of *C. pedata* but also contribute to its ecological role and agricultural value.

Figure 2:

Species

(Figure 3) *Cyclanthera brachystachya* is an exotic species that is primarily distributed across South America and cultivated in temperate climates, particularly in the Himalayas of India. This species, known for its curiosity value, has also been reported as wild in various locations in Java, Indonesia; however, supporting evidence for its domestication outside of America is limited. The potential of *C. brachystachya* to enhance the genetic diversity within the Cucurbitaceae family in Indonesia warrants further investigation. This herbaceous vine produces edible fruits, such as those from the exploding cucumber (Cyclanthera explodens), which add to its significance as both a cultivated and wild species [5].

Figure 3:

Nutritional and Phytochemical

Stuffing cucumber is a nutrient-rich vegetable that provides an abundance of carbohydrates, calcium, phosphorus, vitamins A and C, as well as essential proteins, iron, thiamine, riboflavin and niacin. The fruits serve as an excellent energy source, making them a valuable addition to the diet [6] (Table 1). Culinarily, stuffing cucumber is primarily harvested in its immature state, commonly consumed raw or pickled in various regions. The tender fruits and vine tips are used in various dishes, while fresh leaves and young shoots are enjoyed as greens. Immature fruits are often prepared as stuffed peppers, filled with ingredients such as fish, meat, or cheese and subsequently baked. Mature fruits, after seed removal, can be boiled or cooked, similar to marrows and they exhibit a taste akin to cucumber. The fruits typically measure 7 to 16cm in length and 5cm in width and in northeastern India, they are frequently used to make pickles.

Table: 1

Composition	Content (mg/100g)
Water	94%
Carbohydrates	44
Proteins	0.7
Fat	0.1
Dietary Fibre	0.7
Calcium	13
Phosphorus	20
Iron	0.8
Vitamin A	15
Vitamin C	14
Thiamine	0.05
Riboflavin	0.04
Niacin	0.29
Ash	0.8
Energy	19

Therapeutic Value

It exhibits notable anti-inflammatory and hypocholesterolemia properties. Fruit juice is recognized for its ability to lower cholesterol levels, reduce blood pressure and promote arterial health, contributing to better cardiovascular function. Additionally, it aids in blood sugar regulation, increases urination, alleviates pain and mitigates hypertension, inflammation and digestive issues. The fruits and seeds are particularly beneficial for addressing gastrointestinal disorders, while the leaves possess hypoglycemic effects and are utilized in decoctions to manage diabetes. A tea made from the seeds is employed to help control high blood pressure. The fruits can also be boiled in milk and used as a gargle to prevent and treat tonsillitis [6]. Externally, a preparation of the boiled fruit and leaves in olive oil serves as a topical anti-inflammatory and analgesic ointment. The roots exhibit analgesic, antidiabetic, antiparasitic, hypotensive and hypoglycemic properties, making them useful for circulatory issues and dental hygiene. Furthermore, a decoction of the roots is utilized to alleviate gastrointestinal disorders, high cholesterol, intestinal parasites and elevated blood pressure, highlighting the comprehensive medicinal potential of this plant [1].

Horticultural Technology

It thrives under conditions similar to other cucurbits, requiring temperatures between 15 to 26 °C for optimal growth and a seed germination temperature of approximately 20 °C. It is best suited to elevations around 2000 meters above sea level and prefers warm, moist conditions with ample sunlight. Sandy loam soil rich in organic matter and a pH of 7 is ideal, though the plant can adapt to both acidic and alkaline soils.

Planting times are influenced by regional climate, with seeds sown between January and February for spring-summer crops and in early April to May for rainy season crops. A seeding rate of 3 to 4kg/ha is recommended, with seeds treated with thiram before planting. Direct sowing is the primary propagation method. Land preparation involves ploughing, harrowing and planking to achieve fine tilth, while nutrient requirements include 15t/ha of farmyard manure and NPK fertilizers at 180, 110 and 120kg/ha, respectively. Fertilizers should be applied basally and supplemented with side dressings [5]. Water management is crucial for high yields, requiring irrigation every 5-7 days during the spring-summer season and every 10-12 days in the rainy season. Regular hoeing is essential to maintain aeration and weed control. Staking enhances plant growth and facilitates harvest, while mulching with black polyethylene film conserves soil moisture and regulates temperature around the roots. Stuffing cucumber typically begins fruiting three months post-sowing, yielding between 8 to 20 fruits per plant, with overall yields ranging from 200 to 300q/ha. In India, no specific improved varieties exist; instead, growers rely on high-yield indigenous collections. Notable introduced varieties include *Cyclanthera brachystachya* (Fat Baby), characterized by solitary, spiny fruits and *Cyclanthera pedata* (Ladies Slippers), which produces clusters of smooth fruits ideal for stuffing. Varieties grown in controlled environments, such as greenhouses, demonstrate higher productivity compared to open-field cultivation [5]. After harvesting, stuffing cucumber fruits should be protected from direct sunlight to prevent bruising, which can lower their market value. Due to their short shelf life, they should be quickly sent to market. Damaged or deformed fruits are removed to prevent spoilage, while marketable fruits are carefully packed in ventilated boxes or plastic bags. Their shelf life can be extended to 2-3 weeks at temperatures between 10-13 °C and 85-90% relative humidity [4]. However, temperatures below 10 °C can cause chilling injury and temperatures above 13 °C can lead to yellowing and splitting.

Conclusion

Stuffing cucumber is a valuable vegetable with significant potential in regions like Northwest India and Bhutan. Its unique attributes, such as a monoecious growth habit and nutritional richness, including vitamins, minerals and dietary fibre, make it a versatile ingredient in both raw and cooked forms. The crop's

hollow, puffy fruits are not only culinary substitutes for traditional cucumbers but also contribute to improved dietary diversity. By promoting its cultivation and consumption, stuffing cucumber can enhance food security and health outcomes in regions where it is grown. Continued research into its cultivation practices, nutritional profile and potential health benefits will further solidify its role as an important food source.

Acknowledgment

The authors express their sincere gratitude to the ICAR-Indian Institute of Horticultural Research, Bangalore, for sharing the knowledge and support that enabled the successful execution of this review.

Conflict of interest

The authors declare no conflicts of interest.

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