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Benincasa hispida: Unlocking the therapeutic potential of an underutilized vegetable

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Abstract

Ash gourd (*Benincasa hispida*), a member of the Cucurbitaceae family, is an important vegetable crop widely cultivated across India and other parts of Asia, valued for its nutritional, medicinal and cultural significance. This review provides a comprehensive overview of its taxonomy, morphology, cultivation practices, varietal diversity and health-promoting properties. The plant is characterized by large, waxy fruits with white flesh, broad leaves and nutrient-rich seeds and thrives well in warm, humid tropical and subtropical climates. Traditionally used in Ayurveda and other indigenous systems of medicine, all parts of the plant possess therapeutic potential. The fruit is low in calories and rich in essential nutrients, making it beneficial for managing lifestyle disorders such as diabetes, obesity and gastrointestinal ailments. Bioactive compounds present in ash gourd exhibit antioxidant, anti-inflammatory, anticancer and neuroprotective activities. Ash gourd juice is particularly recognized for its detoxifying and cooling effects. Despite its wide range of benefits, the crop remains underutilized and certain indigenous varieties are facing decline. The review emphasizes the need for conservation of genetic resources, increased awareness and further scientific validation to promote ash gourd as a functional food and sustainable crop for future health and nutritional security.

Keywords: Ash gourd, *Benincasa hispida*, cucurbitaceae, functional food

Introduction

Ash gourd (*Benincasa hispida*), also known as wax gourd, winter melon, or white gourd, belongs to the family *Cucurbitaceae*. It is also referred to by its synonym *B. cerifera*. The crop is believed to have originated in Southeast Asia, with its wild forms first reported along coastal regions of Java. The Cucurbitaceae family is one of the most genetically diverse plant families, comprising drought-tolerant but frost-sensitive crops that are highly susceptible to waterlogging and poorly drained soils. Ash gourd is widely cultivated across South Asia, Southeast Asia and Japan due to its adaptability and multipurpose uses. The name “ash gourd” is derived from the ash-colored coating on the fruit surface, while “wax gourd” refers to the characteristic waxy bloom present on mature fruits Aggarwal *et al.* (2023) ^[1].



Despite its nutritional and medicinal value, ash gourd remains an underutilized vegetable crop. It is characterized by low caloric content (approximately 13 kcal per 100 g) and high moisture (about 92%), making it ideal for health-conscious diets. The fruit is rich in essential minerals such as iron, calcium, magnesium, zinc and copper, along with vitamins like vitamin C and riboflavin. It also contains bioactive compounds including triterpenoids, flavonoids, glycosides, carotenes and uronic acid, which contribute to its antioxidant and anti-inflammatory properties. Compared to

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other gourds, it contains lower amounts of protein and fat, but its high water and fibre content make it valuable for dietary and therapeutic purposes. Its adaptability, long shelf life and suitability for diverse culinary uses highlight its potential as a crop for nutritional security (Gupta *et al.*, 2021) ^[6].

Ash gourd has been extensively used in traditional medicinal systems such as Ayurveda and Siddha. It is considered a cooling and rejuvenating food and is commonly used as a tonic, laxative and remedy for various ailments. The fruit is known to aid digestion, improve immunity and help in managing respiratory conditions such as bronchospasm. Traditional practices also utilize ash gourd in the treatment of ulcers, diabetes and neurological disorders. Experimental studies have demonstrated its hypoglycemic effects in diabetic-induced animal models and its potential benefits in managing cognitive disorders such as Alzheimer's disease. The juice and extracts of ash gourd are valued for their detoxifying and therapeutic properties (Zaini *et al.*, 2011) ^[21].

In recent years, there has been increasing interest in functional foods and nutraceuticals, bringing attention to underutilized crops like ash gourd. Although several studies have reported its pharmacological properties, including antioxidant, anti-inflammatory, anti-ulcer and hypoglycemic activities, comprehensive research on its genetic variability, breeding potential and large-scale cultivation practices remains limited. Inconsistencies in reported nutritional values and lack of standardized cultivation and processing techniques indicate the need for systematic research. Additionally, its potential role in modern healthcare as a natural therapeutic agent necessitates further scientific validation. Therefore, a detailed review is essential to consolidate existing knowledge, identify research gaps and promote the crop's utilization in sustainable agriculture and health-based industries.

Botanical Description and Distribution



Ash gourd, botanically known as *Benincasa hispida* (synonym: *B. cerifera*), is a member of the Cucurbitaceae family, one of the largest and most diverse families of flowering plants. This family includes economically important crops such as cucumbers, pumpkins, melons and squashes. *Benincasa hispida* is the only species within the genus *Benincasa*, making it taxonomically distinct. The Cucurbitaceae family is characterized by fast-growing, herbaceous vines, unisexual flowers and fruit types known as pepos. These plants are typically drought-tolerant but sensitive to frost and excessive soil moisture, which influences their cultivation patterns (Chomicki *et al.*, 2020) ^[5].

The ash gourd plant is an annual, vigorous, trailing or climbing vine that spreads extensively with the help of coiled tendrils. The leaves are large, simple and palmately lobed with a rough texture due to the presence of fine hairs. The plant bears yellow, unisexual flowers (male and female flowers on the same plant),

typical of cucurbits. The fruit is one of the most distinctive features. It varies in size from medium to very large, with shapes ranging from round to oblong or cylindrical. When immature, the fruit surface is green and hairy, but as it matures, it develops a characteristic white, waxy coating that gives it an "ashy" appearance. This wax layer helps in reducing moisture loss, allowing the fruit to be stored for long periods. Internally, the fruit consists of white, juicy and spongy flesh with a high water content. Numerous flat, oval-shaped seeds are embedded within the central pulp. These seeds are smooth, cream-colored and rich in oils and nutrients and they are sometimes used in traditional remedies and culinary applications (Pagare *et al.*, 2011) ^[14].

Ash gourd is well adapted to tropical and subtropical climates, requiring warm temperatures ranging between 25–35°C for optimal growth. It is highly sensitive to frost and cannot tolerate cold conditions. The crop grows best in well-drained, fertile sandy loam soils with a neutral to slightly alkaline pH. Proper drainage is essential, as waterlogged conditions can adversely affect root development. The plant requires moderate irrigation and thrives under full sunlight. It is usually propagated through seeds, which are sown directly into the soil at shallow depths. The crop has a relatively longer growth cycle compared to other cucurbits like pumpkin (Swamy 2022) ^[20].

Ash gourd is widely cultivated across India, China, Bangladesh, Sri Lanka, Indonesia and Japan. In India, it is commonly grown in states such as Tamil Nadu, Karnataka, Uttar Pradesh and West Bengal. It is an important vegetable in Asian cuisine and is also cultivated for its medicinal and nutritional value. Due to its long shelf life, it plays a role in food security in some regions. Although ash gourd consists of a single species, significant intraspecific diversity exists. This diversity is reflected in variations in fruit size, shape, color, rind thickness, wax coating and yield potential. Fruits may be round, oval, or elongated and their weight can vary widely depending on the variety (Bairwa *et al.*, 2017) ^[4].

In India and other Asian countries, several improved varieties and hybrids have been developed through breeding programs to enhance yield, pest resistance and adaptability to different climatic conditions. Additionally, many traditional landraces are still cultivated locally, each adapted to specific regional environments and culinary preferences. Some varieties are preferred for fresh vegetable use, while others are specifically grown for processing into sweets, preserves, or medicinal preparations. This diversity highlights the crop's adaptability and its importance as both a nutritional and functional food source.

Nutritional Composition

Ash gourd is characterized by its exceptionally high moisture content, ranging from (96.1 to 96.5%), which makes it a highly hydrating vegetable. The carbohydrate content is relatively low, approximately 1.9-3.0 g per 100 g of edible portion, indicating its suitability for low-calorie diets. The fruit contains about 0.8-2.9 g of dietary fiber, contributing significantly to digestive health. Protein and fat contents are minimal, with approximately 0.4 g of protein and 0.1-0.2 g of fat per 100 g. The high fiber content, constituting nearly (27.5%) of dry weight, enhances its functional properties and supports gut health Islam *et al.* (2021) ^[8].

Ash gourd is a good source of essential vitamins and minerals. It contains vitamin C (ascorbic acid) ranging from 1 to 13 mg per 100 g, contributing to antioxidant activity and immune support. Among B-complex vitamins, riboflavin (vitamin B2) and thiamine (vitamin B1) are present in moderate amounts, although thiamine is relatively low (0.02-0.04 mg/100 g). The fruit also provides niacin, pantothenic acid and vitamin B6 in small

quantities.

In terms of minerals, potassium (K) and calcium (Ca) are the most abundant, with potassium ranging from 77-131 mg/100 g and calcium from 5-30 mg/100 g. These minerals play a crucial role in maintaining electrolyte balance and supporting bone health. Iron (Fe) is present in smaller amounts (0.4-0.8 mg/100 g), while other trace elements such as magnesium, phosphorus, zinc, copper, manganese and selenium are also found in minor quantities. Additionally, ash gourd contains bioactive compounds like triterpenoids, flavonoids, glycosides, β -sitosterol and uronic acids, which contribute to its antioxidant and anti-inflammatory properties Ayubkhan *et al.* (2019) [3].

Ash gourd is a low-calorie vegetable, providing only about 10-13 kcal per 100 g of edible portion. Its high water content and low fat levels make it ideal for weight management and hydration. The fruit's low sodium and relatively higher potassium content further enhance its role in maintaining fluid balance and cardiovascular health. Due to these properties, ash gourd is widely recommended in therapeutic diets, especially for individuals with metabolic disorders, digestive issues and lifestyle-related diseases (Pravalika and Poornima 2026) [17].



Table: Nutritional Composition of Ash Gourd (per 100 g edible portion)

Nutrient	Amount	Unit
Water	96.1	g
Energy	13	kcal
Carbohydrates	3.0	g
Protein	0.4	g
Total fat	0.2	g
Dietary fiber	2.9	g
Ash	0.3	g
Calcium (Ca)	19	mg
Iron (Fe)	0.4	mg
Magnesium (Mg)	10	mg
Phosphorus (P)	19	mg
Potassium (K)	77–131	mg
Sodium (Na)	111	mg
Zinc (Zn)	0.61	mg
Copper (Cu)	0.023	mg
Manganese (Mn)	0.058	mg
Selenium (Se)	0.2	µg
Vitamin C	13	mg
Thiamine (B1)	0.04	mg
Riboflavin (B2)	0.11	mg
Niacin (B3)	0.4	mg
Pantothenic acid	0.133	mg
Vitamin B6	0.035	mg
Folate	5	µg
Lysine	0.009	g
Methionine	0.003	g

Health Benefits of Ash Gourd (*Benincasa hispida*)

Ash gourd is widely recognized as a valuable medicinal plant in

traditional systems such as Ayurveda and Chinese medicine. Almost every part of the plant—including the fruit, peel, pulp, seeds, leaves, flowers and even the waxy outer coating (pruina) possesses therapeutic properties. Due to its high water content, low calorie value and cooling nature, it is commonly consumed in soups and juices, especially during summer, to reduce body heat and promote diuresis (Marr *et al.*, 2007) [12].

Medicinal Uses of Fruit

The fruit of ash gourd is known for its broad spectrum of health benefits. It is traditionally used in the management of:

- Respiratory conditions such as asthma, cough and catarrh
- Metabolic disorders like diabetes
- Internal bleeding conditions (haemorrhages and haemoptysis)
- Neurological disorders including epilepsy and nervous system imbalances
- Digestive issues such as dyspepsia, ulcers and acidity

In Ayurveda, fresh ash gourd juice is specifically recommended for treating internal bleeding and improving mental health conditions such as insanity and epilepsy. It is also considered a natural antidote for certain types of poisoning (vegetable, alcohol and mercury-related) Nimmy 2021) [13].

Therapeutic Uses of Seeds and Other Parts

- **Seeds:** Effective in treating dry cough, fever, urinary disorders, intestinal worms and bladder stones
- **Leaves:** Applied externally to heal bruises and inflammation
- **Whole plant:** Acts as a rejuvenating tonic, improving physical strength and cognitive function

General Health Benefits

Regular consumption of ash gourd offers multiple health advantages:

- Helps manage diabetes
- Supports weight loss due to low calorie content
- Maintains body cooling and hydration
- Relieves constipation and improves digestion
- Acts as a detoxifying agent
- Helps control cholesterol levels
- Enhances memory and brain function
- Supports blood clotting mechanisms
- Provides relief from cold and respiratory disorders

Additionally, it helps maintain water balance in the body, supports tissue growth (anabolic activity) and regulates acid–base balance.

Role in Modern and Traditional Medicine

Ash gourd is an important ingredient in Ayurvedic formulations such as *Kushmanda Rasayana*. It is known for:

- Anti-inflammatory and antioxidant properties
- Anti-cancer potential (inhibiting tumor growth via angiogenesis suppression)
- Kidney-protective effects
- Anti-ulcer activity due to acid-neutralizing properties

Recent studies also suggest its usefulness in treating nervous disorders, stress and even conditions like opioid withdrawal symptoms (Kirtikar and Basu 2006) [10].

Ash Gourd Juice Benefits

Ash gourd juice is considered highly beneficial when consumed

on an empty stomach:

- Acts as a natural detoxifier, flushing out toxins
- Improves digestion and relieves constipation
- Helps in cooling the body and boosting energy
- Supports tissue growth and metabolism
- May help manage eating disorders and underweight conditions
- Enhances mental clarity and cognitive performance

It is often consumed alone or mixed with ingredients like coconut milk, lime juice, or amla for enhanced benefits (Madhavi, 2021; Kapaleshwar, 2010) ^[11, 9].

Ethnic and Cultural Significance

Ash gourd holds cultural importance in many regions:

- In Kerala (India), it is known as *Kumbalanga* or *Kooshmandam*
- Traditionally used in rituals to ward off the “evil eye”
- Symbolically used in place of animal sacrifice in certain religious practices
- Considered to possess positive energy (pranic power) in naturopathy
- In Ayurveda, ash gourd is known as *Kushmanda* and is used as a rejuvenative tonic. It is beneficial in conditions such as internal bleeding, epilepsy, cough and digestive disorders. Ash gourd juice is particularly recommended for detoxification, improving digestion and enhancing overall vitality

Pharmacological Activities

Ash gourd (*Benincasa hispida*) is widely valued in traditional systems such as Ayurveda and Chinese medicine for its extensive therapeutic properties. Almost all parts of the plant, including fruit, seeds, peel and leaves, are used medicinally. Due to its high moisture content and low calorific value, it is commonly consumed as a cooling food that helps reduce body heat and promotes diuresis.

1. Antioxidant and Antimicrobial Activity

Ash gourd contains bioactive compounds such as flavonoids, triterpenoids and phenolics, which exhibit strong antioxidant properties. These compounds help neutralize free radicals and enhance antioxidant enzyme activity like superoxide dismutase. Additionally, extracts of *B. hispida* have shown antibacterial activity against pathogens such as *Staphylococcus aureus* and *Escherichia coli* (Huang *et al.*, 2004) ^[7].

2. Neuroprotective Effects



Studies indicate that ash gourd possesses significant effects on the central nervous system, including anxiolytic, antidepressant and

anticonvulsant activities. It influences neurotransmitters such as serotonin and dopamine, improving cognitive function and memory. It has also shown potential in reducing symptoms of morphine withdrawal and may have benefits in neurodegenerative disorders like Alzheimer’s disease (Nimmy 2021) ^[13].

3. Gastroprotective and Digestive Benefits

Ash gourd exhibits gastroprotective properties by reducing gastric acid secretion and protecting the mucosal lining, making it effective in treating ulcers and acidity. It also demonstrates antidiarrheal and anthelmintic activities, supporting overall digestive health (Rachchh, 2009; Palamthodi *et al.*, 2019) ^[18, 15].

4. Anti-inflammatory and Anti-asthmatic Properties

Extracts of *B. hispida* have shown significant anti-inflammatory effects in experimental models. It also provides protection against histamine-induced bronchospasm, indicating its usefulness in managing asthma and respiratory disorders (Mousumi, 2021).

5. Hypoglycemic and Hypolipidemic Effects

Ash gourd plays an important role in managing metabolic disorders. Studies have reported reductions in blood glucose, cholesterol and triglyceride levels in experimental models, supporting its use in diabetes and cardiovascular health management (Rahman *et al.*, 2008) ^[19].

6. Renal and Detoxifying Effects

The fruit exhibits diuretic activity, increasing urine output and aiding in toxin elimination. It also shows nephroprotective properties, helping to prevent kidney damage caused by toxic substances (Gupta *et al.*, 2021) ^[6].

Conclusion

Ash gourd (*Benincasa hispida*) is a nutritionally rich and medicinally important cucurbit that holds a prominent place in traditional systems such as Ayurveda and in Asian diets. The review highlights that all parts of the plant—fruit, seeds, peel and leaves—possess therapeutic value, with the fruit being especially valued for its low caloric content, high water composition and essential nutrients like vitamin C and minerals. Its diverse pharmacological properties, including antidiabetic, anti-inflammatory, antioxidant, neuroprotective and detoxifying effects, make it beneficial in managing a wide range of health conditions such as diabetes, obesity, gastrointestinal disorders, respiratory ailments and nervous system disorders. Traditional uses, particularly the consumption of ash gourd juice, further emphasize its role in detoxification and metabolic regulation. However, despite its extensive health benefits and cultural significance, the crop remains underutilized and indigenous varieties are gradually declining. Therefore, increased awareness, conservation of genetic diversity and further scientific validation of its medicinal properties are essential to fully exploit its potential as a functional food and promote its role in improving human health and sustainable agriculture.

References

1. Aggarwal A, Sharma L, Sharma D, Dhobale S, Deshmukh N, Barde L, *et al.* Nutritional significance of *Benincasa hispida*. International Journal of Pharmaceutical Quality Assurance. 2023;14(2):410-415.
2. Anonymous. Ash gourd. World Crops Database. 2021. <https://world-crops.com/ash-gourd>.
3. Ayubkhan N, George M, Joseph L, Sujith K. A review on pharmacological activity of *Benincasa hispida*. International

- Journal of Pharmaceutical and Biological Science Archive; 2019.
4. Bairwa MK, Dixit A, Sharma PK, Ananda A. Genetic variability in ash gourd [*Benincasa hispida* (Thunb.) Cogn.]. Trends in Biosciences. 2017;10:6889-6893.
 5. Chomicki G, Schaefer H, Renner SS. Origin and domestication of Cucurbitaceae crops: Insights from phylogenies, genomics and archaeology. New Phytologist. 2020;226:1240-1255.
 6. Gupta P, Chikkala S, Kundu P. Ash gourd and its applications in the food, pharmacological and biomedical industries. International Journal of Vegetable Science. 2021;27(1):44-53.
 7. Huang HY, Huang JJ, Tso TK, Tsai YC, Chang CK. Antioxidant and angiotensin-converting enzyme inhibition capacities of various parts of *Benincasa hispida* (wax gourd). Nahrung. 2004;48:230-233.
 8. Islam MT, *et al.* A literature-based update on *Benincasa hispida*: Traditional uses, nutraceutical and phytopharmacological profiles. Evidence-Based Complementary and Alternative Medicine. 2021.
 9. Kapaleshwar G. Standardization and characterization of value added ash gourd (*Benincasa hispida*) ready-to-serve beverage. MSc thesis. University of Agricultural Sciences, Dharwad; 2010.
 10. Kirtikar KR, Basu BD. Indian medicinal plants. Dehradun: International Book Distributors; 2006.
 11. Madhavi. Ash gourd juice (Safed Petha juice). 2021. <https://www.madhuseverydayindian.com/ash-gourd-juice-recipe>.
 12. Marr KL, Xia YM, Bhattarai NK. Allozymic, morphological, phenological, linguistic, plant use, and nutritional data of *Benincasa hispida* (Cucurbitaceae). Economic Botany. 2007;61:44-59.
 13. Nimmy VS. A comprehensive review on the nutritional and medicinal significance of Kushmanda or Ash Gourd as per Ayurveda. International Journal of Ayurveda and Pharma Research. 2021.
 14. Pagare MS, Patil L, Kadam VJ. *Benincasa hispida*: A natural medicine. Research Journal of Pharmacy and Technology. 2011;4(12):1941-1944.
 15. Palamthodi S, Kadam D, Lele SS. Physicochemical and functional properties of ash gourd/bottle gourd beverages blended with jamun. Journal of Food Science and Technology. 2019;56(1):472-482.
 16. Pandey S, Kumar S, Mishra U, Rai A, Singh M, Rai M. Genetic diversity in Indian ash gourd (*Benincasa hispida*) accessions as revealed by quantitative traits and RAPD markers. Scientia Horticulturae. 2008;118:80-86.
 17. Pravalika N, Poornima D. Ash gourd: A traditional functional food for sustainable nutrition. 2026.
 18. Rachchh MA, Jain SM. Gastroprotective effect of *Benincasa hispida* fruit extract. Indian Journal of Pharmaceutical Sciences. 2009;40(6):271-275.
 19. Rahman AHMM, Anisuzzaman M, Ahmed F, Islam AKMR, Naderuzzaman ATM. Study of nutritive value and medicinal uses of cultivated cucurbits. Journal of Applied Sciences. 2008.
 20. Swamy KRM. Origin, distribution, taxonomy, genetic diversity and genetic improvement of ash gourd [*Benincasa hispida* (Thunb.) Cogn.]. Vegetable Science. 2022;49(1):1-14.
 21. Zaini NA, Anwar F, Hamid AA, Saari N. Kundur [*Benincasa hispida* (Thunb.) Cogn.]: A potential source for valuable nutrients and functional foods. Food Research International. 2011;44(7):2368-2376.