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**A concise review on Benincasa hispida (Thunb.) Cogn. Plant**

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**Abstract**---Benincasa hispida (Thunb.) Cogn. which belongs to Cucurbitaceae family, is annual climbing plant, fruits are commonly called as winter melon or ash melon. It is a popular vegetable crop, which is especially available among Asian communities both for nutritional and medicinal purposes. It was probably native in both Japan and Java, cultivated more or less throughout the India and also in warm countries. It has been used as a medicinal plant by Ayurvedic treatment and Sri Lankan traditional physicians since antiquity. It is used singly or in various formulations in the combination with different types of medicaments in Ayurveda and traditional medicine both. The fruits, pericarp, seeds, stems, roots and leaves of this plant are used in various types of preparations like vegetable, and in pickles, curries and preserves. It is used in the internal treatment for the urinary disorders such as calculi, dysuria, pain in pelvis and
genitals, disorders like gastritis, gastric ulcers, worm infestation, hyperdipsea, anaemia, jaundice, diabetes mellitus, piles, fever, internal haemorrhages, hemoptysis, general debility, epilepsy, cough, hoarseness, all kinds of the asthma, bronchitis, tuberculosis, ulceration of the lungs, heart diseases, testosterone-induced prostatic hypertrophy and especially in the vitiated condition of the Pitta Dosha. Externally, it is showed such a anti-inflammatory, anti-asthmatic and antimicrobial effects. Rejuvenate, antioxidant, anti-ageing, nutritive, tonic, diuretic, aphrodisiac, nephron protective, styptic, vermin fugue, antidiabetic, hyperlipidemic, anxiolytic, muscle relaxant property, antidepressant and antimicrobial in the properties of Benincasa hispida are significant and scientifically proven. It is concluded that Benincasa hispida is with the multi-faceted medicinal values. Fruits were traditionally used as a laxative, diuretic, tonic, aphrodisiac, cardiotonic, urinary calculi, blood disease, insanity, epilepsy, schizophrenia and other psychologic disorders, jaundice, dyspepsia, fever, and menstrual disorders etc. The major chemical constituents of Benincasa hispida fruits are likes volatile oils, flavonoids, glycosides, saccharides, proteins, carotenes, vitamins, minerals, β-sitosterin and uronic acid. Benincasa hispida has been reported with the active principles such as terpenes, flavanoid, cardio glycosides and sterols which have antioxidant effects.

**Keywords**---benincasa hispida, phytoconstituents, taxonomy, therapeutuc uses, cultivation.

**Introduction**

Benincasa hispida (Thunb.) Cogn. which belongs to Cucurbitaceae family, is annual climbing plant, fruits are commonly called as winter melon, ash gourd, winter gourd, white pumpkin and wax gourd, white gourd, tallow gourd, gourd melon and Chinese watermelon. It was probably occurring in Japan and Java, cultivated more or less throughout India and in the warm countries. It is a very much popular vegetable crop, especially among in the Asian communities both for nutritional and pharmaceutical purposes. It was preferred as a cooked vegetable, boiled alone, boiled with meat, or included in enormous variety of dishes. It was also used as raw, like sliced cucumbers. However, the plant was used medicinally in various disorders such as gastrointestinal problems, respiratory disease, heart diseases, diabetes mellitus and urinary diseases. These fruits were also used as a laxative, diuretic, tonic, aphrodisiac, insanity, in epilepsy, cardiotonic, urinary calculi, various types of blood disease, dyspepsia, schizophrenia and other psychologic disorders, jaundice, fever, and menstrual disorders. The morphological characteristics of the B.hispida studied confirm to the existing information on the species.

Benincasa hispida is a monoecious climber with yellow flowers, hairy stem, petiole, leaf, petals and young fruits. The male flowers are solitary or in a slender-pedunculate racemes, fairly coaxillary with the female flowers. However, the majority of cucurbits such as Telfiaria esculenta, Citrullus lanatus Thunb and
Cucurbita pepo L. are dioecious, while some other species are hermaphroditic (Hutchinson and Dalziel, 1954). B. hispida exhibits similar characteristics with these species. This however supports the placement of these species in the Cucurbitaceae family.[1]

The major chemical constituents of the Benincasa hispida fruits were volatile oils, flavonoids, glycosides, saccharides, proteins, carotenes, vitamins, minerals, ß-sitosterin and uronic acid. Benincasa hispida seeds contained high number of fatty acids (24.3%), saturated fatty acids represented (75.38%) and unsaturated fatty acids (75.38%). It was apparent that linoleic and oleic acids are the principal fatty acid components in the extracts of seeds.[2] The fruits are can be eaten when it is young or old and raw or cooked. It is used as a vegetable, and in the pickles, curries and preserves etc. It can be picked as early as one week after the fertilization process. The wax gourd or winter melon has been used as a food and in medicine for thousands of years in the Orient. All parts of the fruit are used as medicinally. An infusion of the roots is used in the treatment of gonorrhea. Fruits is used in the ayurvedic medicine in the treatment of epilepsy, lung diseases, asthma, coughs etc. [3] It occurs in India to Japan, Malaya, Ceylon, Burma and Indonesia in general cultivation. Cultivated as a vegetable throughout India up to an altitude of 1200m. It is suited to warm lowland conditions. It does better in dry areas or drier seasons. Fruit, Seed, Seed Oil are used in the various types of pharmacological activities.

**Benincasa Hispida and its Profile**

**Plant name:** Benincasa hispida  
**Botanical name:** Benincasa hispida (Thunb.) Cogn.  
**Family:** Cucurbitaceae

![Benincasa hispida Leaves](image)

**Profile of Benincasa hispida**

Botanical source: It consists of dried fruit of **Benincasa hispida** (Thunb.) Cogn.  
Family: Cucurbitaceae
Synonyms: Benincasa cerifera, Cucurbita hispida, Benincasa cylindrica Ser., Cucurbita farinosa Blume, Cucurbita littoralis Hassk., Cucurbita pruriens Seem, Cucurbita villosa Blume.


Ayurvedic names: Brihatphala, Valliphala, Karkotika, Kushmanda, Kshirphala, Kushmandaki, Pushpaphala, Peetpushpa, Somaka.

Indian names: Petha, Kohala, Golkadu.

**Morphological Characteristics**

The morphological characteristics of the B. hispida studied confirm to the existing information on the species. An average fruit size and weight of two accessions of B. hispida is 55.5 cm x 24.7 cm and 11.7 kg for green winter melon and 48.9 cm x 22.1 cm and 6.1 kg for fuzzy white gourd. An average fruit weight is 3.06 kg to 13.67 kg and equatorial diameter of 52.99 cm to 80.11 cm in 34 accessions of B. hispida in India and in our study, we are recorded fruit size is 58.6 - 59.4 cm long, 14.0 - 15.5 cm wide and 8.5 - 9.0 kg. B. hispida is a monoecious climber with the yellow flowers, hairy stem, petiole, leaf, petals and young fruits. The male flowers are solitary or in a slender-pedunculate racemes, fairly coaxillary with female. However, the majority of cucurbits such as Telfiaria esculenta, Citrullus lanatus Thunb and Cucurbita pepo L. are dioecious. while some other species are hermaphroditic. B. hispida exhibits similar characteristics with these species. This however, supports in the placement of these species in the Cucurbitaceae.

Fruits and seeds of *B. hispida*: - a – c. young/immature fruits, d. mature fruits, e. hairy fruit-stalk, f. longitudinal view of the fruit, g. transvers view of the fruit, h. seeds
**Microscopical Characteristics**

Transverse Section of the fruit shows a single layer of epidermis, made up of rectangular shaped parenchyma cells which are covered by a waxy ash on outer surface, followed by the epidermis multiple layers of hypodermis composed of tangentially elongated, thin walled, parenchymatous cells and starch grains are seen embedded in these cells. Next to hypodermis, 4 to 6 layers of stone cells runs continuously in the mature stage of the fruits and found in patches in tender stage fruits. This is followed by mesocarp parenchyma cells which are of different sizes, the size of the cells increases from periphery region to inside mesocarp. The cells are thin walled and oval shaped and the mesocarp is very much watery. Interior to this seed is present which are arranged in the parietal placentation. T.S. of seed shows outer part of epidermis which is slimy in nature, next to this is outer sclereids which are thin walled in tender seeds. It is followed by the stone cells, perisperm, endosperm and collapsed cells layer and in the centre cotyledon portion which contains loosely arranged parenchyma cells in tender seeds and compactly arranged palisade parenchyma is present in the mature stage of seeds and these cells are containing starch grains.

<table>
<thead>
<tr>
<th>Tender stage</th>
<th>Middle stage</th>
<th>Mature stage</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="TS of tender stage fruit showing pericarp and bundles of stone cells. 10x X 10x" /></td>
<td><img src="image2" alt="TS of middle stage fruit showing pericarp and discontinuous layer of stone cells. 10x X 10x" /></td>
<td><img src="image3" alt="TS of mature stage fruit showing epidermis, starch grains in hypodermis and continuous layer of stone cells. 10x X 40x" /></td>
</tr>
<tr>
<td><img src="image4" alt="TS of tender stage fruit showing mesocarp and vascular bundle embedded in it. 10x X 10x" /></td>
<td><img src="image5" alt="TS showing annular and spiral xylem vessels in middle stage fruit. 10x X 40x" /></td>
<td><img src="image6" alt="TS showing group of xylem vessels in mature stage fruit. 10x X 40x" /></td>
</tr>
</tbody>
</table>
Phytochemical constituents of Benincasa Hispida

The major constituents of Benincasa hispida fruits were volatile oils, flavonoids, glycosides, saccharides, proteins, carotenes, vitamins, minerals, β-sitosterin and uronic acid. Chemical analysis showed that the main sugars in the Benincasa hispida peels were galactose, glucose, xylose and sorbose. The antioxidant activity and total phenolic content (TPC) of Benincasa hispida seeds extract was investigated using conventional Soxhlet extraction (CSE), and DPPH and ABTS scavenging activity tests. The ethanolic extract gave the highest total phenolic content 11.34 ± 1.3 mg GAE/g and antioxidant activity followed by ethyl acetate and n-hexane extract. Benincasa hispida seeds contains High number of fatty acids (24.3%), Saturated fatty acids represented (75.38%), Unsaturated fatty acids (75.38%). It was apparent that linoleic and oleic are the principal fatty acid components in the seed’s extracts. The seed also contains minute amounts of a triterpenoid known as iso-multiflorenol, proteins such as trigonelline, coffearin, and osmotin, steroids such as beta-sitosterol and stigmas-5-ene-3-beta-ol, alkaloids such as 5-methylcytosine, and triterpenoids such as cucurbitac. The major constituents of this fruits are triterpenoids, flavonoids, glycosides, saccharides, carotenes, vitamins, β-sitosterin, and uronic acid. Also shows the presence of triterpenes: alnusenol, multiflorenol, isomultiflorenol; flavone: isovitexin; and sterols: lupeol, lupeol acetate, and beta-sitosterol. The iodine and fluorine contents of ash gourd are reported to be 0.38 and 3.5 ppm of drug edible matter respectively. The calcium and phosphorus contents of ash gourd are found to be 821.4 and 544 mg % dry weight respectively. The zinc content is reposted to be 16.6 ppm of dry edible matter. It also has higher fibre content (0.8%) [7].

Chemical Constituents found in the whole plant of the Benincasa hispida plant:[8]

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Part of the Plant</th>
<th>Active Chemical Constituents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Root</td>
<td>Pentacyclic triterpene, Bryonolic acid.</td>
</tr>
<tr>
<td>2.</td>
<td>Fruit</td>
<td>Lupeol, β-sitosterol, cucurbitin, rhamnose, mannitol, triacontenol, alkali, fat, vitamin, glucose, trigonelline, histidine, triterpene, hexanal and pyrazine compounds.</td>
</tr>
</tbody>
</table>
Leaves

Flavonoids, glycosides, alkaloids, steroids and resins

Pharmacological and edible uses of **Benincasa Hispida**

**Pharmacological uses**

- **Fruit:**
  According to Ayurveda, fruit is used as a laxative, diuretic, tonic, aphrodisiac, Memory enhancer, tranquilizer, coagulative, spermatogenesis, restorative, anabolic, styptic, antidote for alcohol poisoning, brain tonic, antipyretic, anthelmintic and carminative. The fruit pulp is useful in urinary discharges, calculi, thirst, biliousness, blood and heart troubles, dyspepsia, constipation, schizophrenia, epilepsy, memory loss, bleeding piles due to its coagulative properties, abdominal colic, rakta-pitta, hematemesis, chest pain, cachexia, tuberculosis, bronchial asthma, cough, fever, epigastric burning, generalized debility, weakness and mercurial poisoning. In combination with Rheum palmatum it is used to treatment of intestinal abscesses. The ash of fruit rind is applied on painful swelling. According to Unani system of medicine, fruit is antiperiodic, cardiac and general tonic, aphrodisiac etc.

- **Seed:**
  Seeds have cooling effect and useful in dry cough, fever, urethral discharges, biliousness, thirst etc. Its oil is soporific, sweetish and good for brain and liver. The seeds are used as anthelmintic, anti-inflammatory, demulcent, diuretic, expectorant, febrifuge, laxative and tonic. Syrup of seeds and sweets prepared from the fruits are used to relieve the burning sensation and as well as fever. It is also used in the treatment of the chronic fever. The fruit pulp and seeds are used in nephritis, enuresis and renal calculi.

- **Root:**
  An infusion of the root is used in the treatment of gonorrhea.

<table>
<thead>
<tr>
<th>SL NO.</th>
<th>PHARMACOLOGICAL ACTIVITIES</th>
<th>PART OF PLANT USED</th>
<th>METHODS APPLIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Central nervous effects</td>
<td>Fruit (Alcoholic extract)</td>
<td>Maximal electroshock test (MEST) [9]</td>
</tr>
<tr>
<td></td>
<td>Anticonvulsant effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Antidepressant effects</td>
<td>Fruit (Methanolic extract)</td>
<td>Swimming test [10]</td>
</tr>
<tr>
<td>2.</td>
<td>Gastro-intestinal effect</td>
<td>Seeds (Methanolic extract)</td>
<td>DPPH Method [12]</td>
</tr>
<tr>
<td></td>
<td>Antioxidant effect</td>
<td></td>
<td>Indomethacin induced gastric ulcer model</td>
</tr>
<tr>
<td></td>
<td>Antiulcer effect</td>
<td>Seeds (Methanolic extract)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anthelmintic activity</td>
<td>Fruit peel (Ethanol extract)</td>
<td>Assay in vitro using adult earthworm [13]</td>
</tr>
<tr>
<td>3.</td>
<td>Antioxidant effect and total phenolic content</td>
<td>Fruit (Methanolic extract)</td>
<td>DPPPH and ABTS scavenging [14]</td>
</tr>
<tr>
<td>4.</td>
<td>Anti-inflammatory</td>
<td>Fruit (Petroleum ether and</td>
<td>Carragenan induced</td>
</tr>
<tr>
<td></td>
<td>and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>analgesic activity</td>
<td>methanolic) extract</td>
<td>method of paw oedema, histamine induced method of paw edoema, cotton pellet induced method of granuloma [15]</td>
<td></td>
</tr>
</tbody>
</table>

### Dose of various parts to be useful [5]

<table>
<thead>
<tr>
<th>Part</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit pulp</td>
<td>10 - 20g</td>
</tr>
<tr>
<td>Fresh Fruit juice</td>
<td>6 - 12 ml</td>
</tr>
<tr>
<td>Seed powder</td>
<td>0.5 - 1.5 gm</td>
</tr>
<tr>
<td>Beej churna</td>
<td>3 - 6 g</td>
</tr>
<tr>
<td>Beej tail</td>
<td>5 - 10 ml</td>
</tr>
</tbody>
</table>

### Popular Ayurvedic Formulations

The pulp of *Benincasa hispida* finds its use in Kushmandkhand, Kushmand Chuma, Kushmandgud, Kalyanak ghrita, Kushmandaka Rasayan, Kushmandghrita [6].

### Edible Uses

**Edible Parts mainly used:** Flowers, Fruit, Leaves, Seed.

**Fruit**

Fruits are mainly used as raw or cooked. It is used as a vegetable and in pickles, curries and preserves. The fruit that can be eaten when it is old or may be young and it can be picked as early as one week after the fertilization process. A juicy texture with a mild flavour. The flavour that is somewhat stronger in the younger fruits. Because of its waxy coating, it can be stored for several months, sometimes as long as a year. Mature fruits can be varying in the weight from 2 - 50 kg. The mature fruits are also be used to make an indigenous sweet which is called 'Morabba'. The fruits of petha are candied with sugar and used to prepare a popular sweet called “Petha”. In the Raipur, those confectioners are limited to the heart of city that is known as ‘Petha-line’ or lane. They sell it in the name of ‘Agre Ka Petha’ (Agra is a city in Northern India, famous for Taj Mahal), but infact they prepare it in Chhattisgarh. In case of natives, petha is just only a sweet dish, but for the traditional healers this is a most valuable medicinal preparation.

**Young leaves and flower buds:**

Steamed and eaten as a vegetable, or are added as a flavouring to soups.

**Seed:** It generally used cooked. Rich in oil and protein.

### Conclusion

*Benincasa hispida* (Ash gourd) is a commonly used as vegetable, which has found mention in ‘Charaka Samhita’ for its medicinal properties. This is employed as a main ingredient in kusmanda lehyam, in the Ayurvedic system of medicine. The
leyham is used as rejuvenate agent and also used in numerous nervous disorders. For thousands of years, the wax gourd or Benincasa hispida has been used as a traditional medicine in the Orient. Many empirical applications have been used in Indian centuries for various ailments like as GIT problems like dyspepsia, burning sensation, heart disease, vermifuge, diabetes, and urinary disease. A multitude of studies in the animals have been shown that the Pharmacological activities possessed by this herb are due to the major constituents of these fruits such as triterpenoids, flavanoids, glycosides, saccharides, carotenes, vitamins, β sitosterin, and uronic acid. Benincasa hispida leaves extract may give the wound healing activity due to its flavonoid content.

A large number of the medicinal plants and their purified constituents have been shown beneficial therapeutic potentials. In some cases, the crude extracts the medicinal plants may be used as medicaments. The isolation and identification of the active principles and elucidation of the mechanism of action of a drug is of paramount importance. Hence, works in both the mixture of traditional medicine and single active compounds are very important. Where the active molecules cannot be synthesized economically, the product must be obtained from the cultivation of plant material. About 121 (45 tropical and 76 subtropical) major medicinal plant drugs have been identified for which no synthetic one is currently available. Thus, the scientific study of the traditional medicines such as Benincasa hispida, derivation of drugs through bio-prospecting and systematic conservation of the concerned medicinal plants are of great importance.

References

8. Vinod Doharey, Manish Kumar, Sushil Kumar Upadhyay, Raj Singh and Beena Kumari, PHARMACOGNOSTICAL, PHYSICOCHEMICAL AND PHARMACEUTICAL PARADIGM OF ASH GOURD, BENINCASA HISPIDA (THUNB.) FRUIT, Vol. 21, Supplement 1, 2021 pp. 249-252


