Research Article

Another Look On: *Benincasa hispida*

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ABSTRACT

Benincasa hispida, (Synonym- *Benincasa cerifera*) commonly known as golkaddu belong to family Cucurbitaceae. It is a perennial, large trailing gourd climbing with tendrils and resembles the pumpkin in appearance. So many commercial varieties of *Benincasa hispida* developed by the different agriculture university of India. CO1 and CO2 most popular commercial varieties of *Benincasa hispida* developed by Tamil Nadu Agricultural University. It is a rich source of energy vitamin and dietary fibre. It contains Warer, Protein, Fat, Carbohydrate, Fibre, Minerals. Other than it also contain different Phytoconstituent like resin, triterpenoids, flavanoids, glycoside. It is used by the vadiya and traditional practitioners in treatment of disease like urinary dysfunction, vaginal discharge, summer fever, cough. Pharmacological plant shows different activities such as Anticonvulsant, anxiolytic, gastroprotective, antinociceptive, antipyretic, antihistaminic, anti-inflammatory, analgesic, antioxidant, antidiarrhoeal, anorectic angiogenic, anthelmentic. In India plant used in various recipe.

Keywords: *Benincasa hispida,* Cucurbitaceae, Phytoconstituent, Pharmacological activity.

INTRODUCTION

Benincasa hispida, (Synonym- *Benincasa cerifera*) commonly known as golkaddu belong to family Cucurbitaceae[1]. *Benincasa hispida* native of Malaysia but it is believed that originated in java, Indonesia. Now cultivated in all the tropical world. It is oblong in shape and covered with wax. B.hispida also used as a vegetable. Due to the diversity of the fruit it knows by their different name like in Polynesian it is small in shape, round, hard shell fruit and use to store coconut oil in Samoa. In tonga island called as Fangu and used to store scanted coconut oil. In Taiti known as Hue and used to store sweet scanted oil[2, 3].

It is a perennial, large trailing gourd climbing with tendrils and resembles the pumpkin in appearance. Leaves are simple, alternate, large, with numerous hairs; flowers yellow large and unisexual; fruits cylindrical, hairy, and covered with ashy powder throughout. Fruits contain numerous white coloured embedded seeds[4, 5].

It is warm season crop growing up to six meter the seeds are sow in the month of march and they are germinated within three month, flower formation take place in the month of July to September and the seed ripe from August to November. Both male and female flower found in same plant. And these pollinated by bees. In some cases plant is self fertile. Soil for this plant should be sandy, lomy and clay. Soil ph will be acidic (5.8-6.8) and soil can tolerate the draught. The ideal temperature for growth and production is 24-30oC. We can cooked the raw food and used as different food preparation like vegetable, pickles and curries. Always drink the fresh juice when the fruit is young. Due to the waxy coating it is kept for several months as long as one year. A mature fruit vary in weight from 2kg to 50 kg. y steamed leaves and young flower eaten as vegetable and in some cases it is used as a flavouring soup. It is the rich source of oil and protein[6].

Last two thousand year B. hispida cultivated by Chinese. First use of B. hispida come in the light in 659 AD Materia medica, in urinary dysfunction rind used as medicine and in vaginal discharge the seed used as the medicine. Sometimes the fruit is used to treat the summer fever. In Ayurveda B.hispida used to treat various diseases like epilepsy, lung cancer, cough, asthma, urine retention and internal haemorrhage[7].

Some improve verities of B. hispida are as fallows[8]

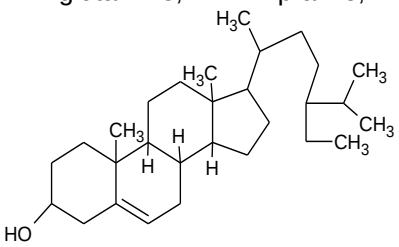
Developing Institution	1		2		3	4	5
	Kerala Agricultural University, Thrissur.		Tamil Nadu Agricultural University.		APAU, Hyderabad.	UAS, Bangalore.	IIVR, Varanasi.
Variety	KAU Local	Indu	CO.1	CO.2	APAU Shakthi	"Karikumbala"	IVAG.502
Special features	Medium sized oval to oblong fruits with high flesh thickness, fruit length 45-55 cm. Length: Breadth ratio 2.05, fruit weight 6.1-8.1 kg,	Medium sized round fruits, tolerant to mosaic disease, av. fruit length 24.3 cm.	Fruits round, av. fruit weight 5-6 kg. Duration 140 days.	Fruits small and long spherical, av. fruit weight 3.0 kg.	Fruits long and cylindrical, yield 30-35 t/ha in 140-150 days.	Local cultivar where the fruits are covered with ashy coat.	Fruits oblong with average weight of 12-13 kg. Yield 30-35 t/ha.

Local Name of *Benincasa hispida*

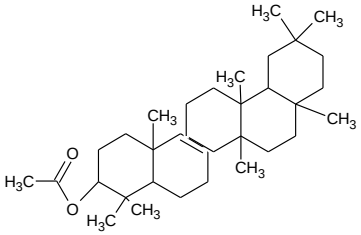
Hindi	Pethakaddu, Petha
English	Wax gourd, Ash gourd, White gourd melon
Sanskrit	Gramyakarkati, Ghrinavasa, Brihatphala, Karkaru
Bengali	Chalkumra, Kumra
Kannada	Boodu Gumbala, Budekumbalakayi
Malayalam	Kumbalam, Kumbalanga,
Manipuri	Torobot
Marathi	Kohla
Nepali	Kubindo
Others	White Gourd,Winter Melon, Kohala, Ash Gourd, Wax Gourd,
Tamil	Neer Poosanikai
Telugu	Boodida Gummadikaaya

Phytoconstituent from *Benincasa hispida*

It contains cucuribitine a bitter resin, myosin, vitelin, sugar etc. The seeds contain stable oil and fruits 96% moisture. Detection of sitosterol, lupeol, triacontanol, mannitol, arginine, aspartic acid, glutamic acid, asparagines, glutamine, praline, hydroxyproline, isoleucine, cysteine, L-leucine, glucose and rhamnose in fruits by TLC. The major constituents of this fruits are triterpenoids, flavanoids, glycosides, saccharides, carotenes, vitamins, β sitosterin, uronic acid, ß-sitosterol, n-triacontanol and several amino acids [9-13].



β – Sitosterol



Isomultiflorenyl acetate

Each 100gm of fruit contain 13 calories, warer (96.1%) Protein: 0.4g; Fat: 0.2g; Carbohydrate: 3g; Fibre: 0.5g; Ash: 0.3g; Minerals - Calcium: 19mg; Phosphorus: 19mg; Iron: 0.4mg; Magnesium: 0mg; Sodium: 6mg; Potassium: 111mg; Zinc: 0mg; Vitamins - A: 0mg; Thiamine (B1): 4mg; Riboflavin (B2): 0.11mg; Niacin: 0.4mg; B6: 0mg; C: 13mg[6,]

Cultivation and Propagation

Propagations can be start in late winter season with the help of polyhouse technology. Seed sown in the small polythene bags in December month. After two to three months at the end of winter season (February) it transferred in to the pits. Important varieties of CO1 and CO2 is suitable for commercial production. Temperature for proper growth is 73-82^{0}F. for complete maturity plant need time approximately 5 month. Plant is draught tolerant. Due to large weight and size it require flat space other wise it can be climb on fences[47].

Traditional benefits of Binincasa hispida for health

Seeds, deprived of the outer covering, used as vermifuge against tapeworm. Juice of leaves effective in dry skin. Fever will be reduce by intake of its seed. Developed fruit of B.hispida balance the three doshas. Pulp and seed can be used in kidney stones . In Indo-China, leaves and seeds used as purgative. Fruit rind is diuretic; ashes applied to painful wounds. Fruit is used to treat the insomnia and improve the memory. Fruit provide strength to the lungs and effective in tuberculosis of lungs. Preserve used for piles and dyspepsia as anti bilious food. Fresh fruit also used for hemoptysis and other hemorrhages of the internal organs. Used as antidote for various vegetable poisons, mercurial and alcoholic poisoning. Reduce the burning sensation and irritation when fruit pulp of B.hispida applied on burn. To relieve the constipation, ripe fruit's pulp boils in water, till they are half cooked. Use this water as soups and consume the cooked fruit. In China, popular for its dermatologic and cosmetic applications - for facial blemishes; moisturizing and skin softening use; anti-wrinkle and anti-aging skin properties; preventing sun damage. In India, used for treatment of peptic ulcer: Juice is squeezed out of grated gourd, equal amounts of water is added, taken daily on an empty stomach, with no food intake for 2 to 3 hours. In Ayurveda, used for coughs, epilepsy, asthma, peptic ulcers. It is also the main ingredient in "Kusumanda Lehyam", used as tonic and for various conditions like epilepsy, constipation, hemorrhoids, dyspepsia, syphilis and diabetes[1, 13, 14].

Pharmacology of *Benincasa hispida*

1. The methanolic extract from fruit was taken and its CNS activity was measured by open field behaviour model. Anticonvulsant activity of methanolic extract of *Benincasa hispida* [MEBH] (300 mg/kg p.o., 1000 mg/kg p.o.) was measured by supramaximal electric shock induced convulsion using phenytoin (100 mg/kg p.o.) as a refrence standard. MEBH showed significant reduction in duration of tonic flexion and tonic extension as compared to control group[15].
2. The fruit extract of *Benincasa hispida* evaluated for the gastroprotective effect in rats against ethanol induced gastric mucosal damage, pyrolus ligated (PL) gastric ulcers and cold restraint stress induced gastric ulcer models. Methanolic and petroleum ether extract showed significant reduction in ulcer index and vascular permeabilit[16].
3. The ethanolic extract *Benincasa hispida* (Thunb.) cogn evaluated for the antinociceptive and antipyretic activity in wistar albino rats. At doses of 250 and 500 mg/kg body weight the extract reduced yeast induced pyrexia and increased the antinociceptive effect in a dose dependent manner[17].
4. The methanolic extract of *Benincasa hispida* [MEBH] studied against histamine and acetylcholine induced bronchospasm in guinea pig. MEBH showed excellent protection against the histamine induced bronchospasm even at very low doses i.e. 50 mg/kg p.o. but not any significant protection against acetylcholine challenge even at higher doses. Thus it can be concluded that *Benincasa hispida* plant produces protective effect mediated by antihistaminic activity (H_1 receptor antagonism)[18]
5. The anticonvulsant activity was evaluate by methanolic extract of *Benincasa hispida* fruit using PTZ, strychnine and picrotoxin and MES model in mice. The extract inhibited the hind limb extension and increased the latency of convulsion and death induced by PTZ and strychnine respectively[19].
6. Various extract from *Benincasa hispida* studied in prevention of experimental ulcers. The anti

ulcerogenic effect was dose dependent in stress induced model of ulcer and has CNS component in prevention. Chronic toxicity studies also showed no deleterious effect of fresh juice of *Benincasa hispida* on various haematological and biochemical parameters studied[20]

7. Evaluate free radical scavenging, anti-inflammatory and analgesic potential of *Benincasa hispida* methanolic seed extract. The highest radial scavenging activity was found to be 79.8% at concentration of 300 ng/ml. Anti inflammatory activity was evaluated using carrageenan induced paw edema in rats. Analgesic activity was evaluated by tail immersion and tail flick method in mice. Thus MEBH may be useful as natural antioxidant in treatment of inflammation and pain[21].
8. The effect of extract of *Benincasa hispida* was studies in oxidative stress in rats with indomethacin induced gastic ulcers. The extract showed the ulcer healing effect due to antioxidant role of fruit extract due to the presence of active principles like terpenes, flavanoids, c-glycosides and sterols. The extract also inhibited the gastric mucosal injury by scavenging free radicals and repressing production of SOD and vitamin C in these rats[22].
9. The antidiarrhoeal effect of *Benincasa hispida* methanolic fruit extract [BHMFE] in animal model. The animals showed significant inhibitory activity against castor oil induced diarrhoea and inhibited PGE_2 induced enter pooling in rats[23].
10. The anorectic effect of the methanolic extract of *Benincasa hispida* [MEBH] in swis albino mice. On the basis of the study it was concluded that *Benincasa hispida* has significant anorectic potential, the action being mediated through the CNs without affecting the gastric emptying. They reduced the cumulative food intake over a 7 hour period in a dose dependent manner[2024].
11. The anti angiogenic effect of seed extract of *Benincasa hispida* cogniaux. It decreased the basic fibroblast growth factor (bFGF) a potent angiogenic factor and inhibits the proliferation of endothelial cells induced by b FGF[25].
12. The juice of *Benincasa hispida* showed significant activity against symptoms of morphine withdrawal. Results suggest a potential for *Benincasa hispida* in preventing the development of morphine addiction and suppression of opioid withdrawal in animals[26].
13. Pulp extract of *Benincasa hispida* markedly decreased lipid peroxidation level, significantly increased superoxide dismutase, CAT and reduced glutathione level in different parts of the brain. This Study showed the antioxidant property of *Benincasa hispida* may be beneficial in the management of colchicene-induced rat model of Alzheimer's disease[27].
14. *Benincasa hispida* effective in hypoglycaemia in STZ-induced diabetic rats. It showed a possible therapeutic use of wax gourd in diabetes mellitus[28].
15. Treatment with the extract of Benincasa cerifera prevented renal damage induced by ischemia/reperfusion injury in hyperlipidemic rats through decreasing of lipid peroxidation and increased antioxidant enzyme activities[29].
16. Methanol extract of fruit showed no inhibition on bacterial strains tested but showed significant inhibition against Candida albicans[30].
17. Methanolic and petroleum ether extracts of fruit of *Benincasa hispida* produced dose-dependent and significant inhibition of carrageenan-induced paw edema, histamine induced paw edema and cotton pellet-induced granuloma in a rat model[31]
18. Ethanol extract of seeds of *Benincasa hispida* showed the ameliorating effect in hyperoxaluria and renal cell injury. Results showed an anti-urolithiatic effect with reduction in stone forming constituents in the urine and decreased kidney retention that reduced the solubility product of crystallizing salts[32].
19. Protective role of an aqueous extract of pulps on diclofenac sodium-induced hepatotoxicity model in adult albino rats. In this restoration of biochemical changes produce by diclofenac to normal. The significant hepatoprotective effect was through the modulation of antioxidant-mediated mechanism[33].
20. anthelmintic activity using Pheretima posthuma as test worm showed an extract of fresh leaves with significant activity compared with standard Piperazine citrate group[1734].

21. Methanol extract of fruit showed potential anticonvulsant activity with significant inhibition of hind limb extension induced by MES and increased latency of convulsion induced by pentylenetetrazole and strychnine[35].
22. Different extracts of *Benincasa hispida* showed decreased locomotor activity and exploratory behavior. There was significant prolongation of haloperidol induced catalepsy in mice and increased analgesic activity in hot plate method. Concluded the potential anxiolytic, analgesic and nootropic activity[36].
23. Aqueous extract of stem of *Benincasa hispida* showed hypoglycemic effect in alloxan-induced diabetic rabbits and the results showed significant dose-dependent reduction in blood glucose levels[37].
24. Seed oil of *Benincasa hispida* showed inhibition of testosterone-induced hyperplasia in rats, and suggests studies to evaluate its effect in human benign prostatic hyperplasia[38].
25. Aqueous extract of pulps of *Benincasa hispida* showed significant effect in nimesulide-induced hepatotoxicity model in adult albino rats[39].
26. Root extract of *Benincasa hispida* showed significant anthelmintic activity against *Pheretima posthuma* compared to standard Piperazine citrate[40.]
27. Water extract of *Benincasa hispida* pulp showed a protective effect on colchicene induced experimental rat model of Alzheimer's disease[41].
28. Various solvents extract of fruit Showed the efficiencies of solvents for antioxidant extraction were: methanol > ethyl acetate > hexane. The phenolic content ranged between 3 mg/l to 12 mg/l. Methanol showed to be the most effective solvent for extraction[42].
29. Fixed oil of seeds of B. hispida and N. sativa showed good activity against all the gram positive and gram negative bacteria i.e., M. luteus, C. coli, S. aureus, P. multocida, P. aeruginosa and B. subtilis[43].
30. Fruit extract of *Benincasa hispida* successful evaluated for the hair growth promoting activity on androgen induced alopecia in animal models[44].

Recipe Thoughts

Edible Parts: Flowers, Fruit, Leaves, Seed.

Raw

- To make a healthy, refreshing **cold soup,** blend an even ratio of cucumber to raw chopped ash gourd. Separately, grind cashews into a fine powder. Blend the pulverized nuts to the vegetable concoction to add creaminess, and throw in minced garlic, salt, lemon juice, and a pinch of cumin for taste.
- Make a **salad** of ash gourd by shredding the vegetable, draining it of its water, and then combining with a soy yogurt or cashew curd. Add shredded carrots and beetroot, raisins or grapes, walnuts, and a pinch of mustard.

Cooked savoury

- To get acquainted with ash gourd's subtle taste, make a simple **mash:** boil in shallow water or pressure cook for about 15 minutes, until the vegetable has become tender. Mash into a slightly chunky puree. Separately, heat oil, mustard seeds, and onion, garlic, and chili. Once tempered, add the mashed gourd to the spice pan and mix thoroughly.
- To make an easy ash gourd **fry,** heat mustard seeds, garlic, and coconut oil until the seeds pop. Add chopped gourd, and cover for 10 minutes until soft. Do not add water, as the gourd's is sufficient. Once soft, add grated coconut and dal. Mix for another few minutes, and then serve.

Cooked sweet

- Make sweet **halva** by grating the ash gourd flesh and simmering until its water evaporates. It is important to ensure most of the liquid is gone from the mix; else the halva will be too runny. Also stir frequently to avoid burning the gourd. Add palm sugar, reduce the heat, and stir until the concoction is golden brown. Separately, heat oil and sauté raisins and almonds until lightly fried. Combine the gourd with the mix, and combine cinnamon, cardamom, and anise.
- Ash gourd is the principle ingredient in a famous Agra sweet known as **petha.** To make this translucent **soft candy**, cut the ash gourd into cubes, slake in lime, and then simmer the chunks in sugary syrup for 15 minutes[45,46].



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