INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Article

Therapeutic Potential and Pharmacognostic Review of *Benincasa hispida*

Shagufta Farooqui*[1], Sayyed Javvad Ali[2], S. A. Tekale[3], V. N. Gunjkar[4], Shaikh Etesam[5]

[1,3,.4,5] *Nanded Pharmacy College, Nanded, Maharashtra, India.*
[2] *Kandhar College of pharmacy.*

ARTICLE INFO

Published: 25 Aug 2025
Keywords:
Benincasa hispida ,
Physicochemical analysis,
Pharmacological properties
DOI:
10.5281/zenodo.16940616

ABSTRACT

Benincasa hispida is a Traditional medicinal plant used for many purposes. The present review study is about the natural herb, Benincasa hispida also known as Ash gourd, Family: Cucurbitaceae It is widely grown throughout south and southeast Asia, places where it is thought to have originated. It was popular vegetable widely used for nutritional and medicinal purposes. All parts of the fruit can be used as medicine. Physicochemical analysis showed that the major constitute of Benincasa hispida fruits are volatile oils, flavonoids, proteins, carotenes, minerals, vitamin, glycosides, uronic acid. It also possesses many Pharmacological properties like Anti-asthmatic, Nootropic activity, Hypoglycemic activity, antimicrobial action etc.

INTRODUCTION

Benincasa hispida which belongs to the family Cucurbitaceae commonly called wax gourd, ash gourd, winter melon. Wax gourd has been used as a food and medicine for thousands of years in east Asia. All parts of the plant are used medicinally. It is also called as Ash gourd, green pumpkin, White gourd. It is cultivated through India including tribal village and settlements and on the hills up to 1200 m altitude, as a vegetable. This plant grows annually. The Red Data Book of India has 427 entries of endangered species of which 28 are considered extinct, 124 endangered, 81 vulnerable, 100 rare and 34 insufficiently known species [1].

Syn: *Benincasa hispida* (Thunb) Cogn, **Family:** Cucurbitaceae is a widely used vegetable in India and other tropical countries. It is also called as winter melon, white gourd, ash gourd, or "fuzzy melon" and is a vine grown for its very large fruit, eaten as a vegetable when mature.

It is the only member of the genus Benincasa and has been the subject of many investigations for its biologically active components [2].

***Corresponding Author:** Shagufta Farooqui
Address: *Nanded Pharmacy College, Nanded, Maharashtra, India.*
Email : shaguftafarooqui95@gmail.com
Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

This plant is a creeping with branched tendrils that can climb over with the help of some support, cover fences or sprawl along the ground. Stems are thick, hairy, grooved conspicuously and lined with sharp bristles. Leaves are round, kidney shaped with upper rough surface. These have beautiful flower of golden yellow colour. Fruits contain numerous white coloured embedded seeds. In ayurvedic medicines, seeds are used in the treatment of antihelmintic, anti-inflammatory demulcent, diuretic, expectorant, laxative and tonic. Fruit are diuretic, laxative, tonic. It is used in ayurvedic medicine in the treatment of epilepsy, lung disease, asthma. It was preferred as a cooked vegetable, boiled alone, boiled with meat, or included in a variety of dishes. Also, it was used raw like sliced cucumbers [3].

However, the plant was used medicinally in various complains such as gastrointestinal problems, respiratory disease, heart diseases, diabetes mellitus and urinary disease.

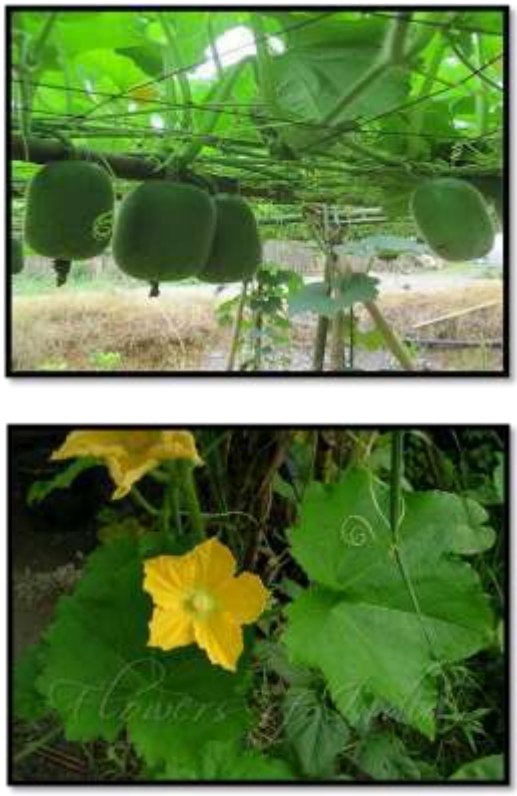

Fig no.01- *Benincasa hispida* plant

Phytochemicals of *Benincasa hispida* plant:

Sr. No.	Plant part	Chemical constituents
1	Seeds	Saponin, urea, citrulline, linoleic acid, oleic acid and fatty, triterpenoid known as isomultiflorenol, proteins such as trigonelline, coffearin, and osmotin, steroids such as beta sitosterol and stigmast-5-ene-3-beta-ol, alkaloids such as 5-methylcytosine, and triterpenoids such as cucurbitacin[3].
2	Fruits	Triterpenoids, flavonoids, glycosides, saccharides, carotenes, vitamins, β sitosterin [4].
3	Leaves	uronic acid alnusenol, multiflorenol, isomultiflorenol; flavone: iso-vitexin; and sterols: lupeol, lupeol acetate, and beta-sitosterol [5].

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 contained high amount of fatty acids 24.3% , saturated fatty acids represented 75.38% and unsaturated fatty acids (75.38%), it was apparent that linoleic and oleic are the principal fatty acid components in the seed's extracts[6].

The seeds revealed that the total dietary fiber was 58.43% of the seed. The seed crude fat and crude protein were found to be 20.70 and 11.63% respectively. It appeared that the extracted seed oil was mainly consisted of linoleic acid accounting for 67.37% of the total fatty acids. However,

palmitic, oleic, and stearic acids represented 17.11, 10.21 and 4.83% respectively. [7].

Synonyms:[8]

Sr. No.	Vernacular name	*Benincasa hispida*
1	Marathi	Bhopla, Kohla
2	Hindi	Petha
3	English	Wax gourd, Ash gourd
4	Sanskrit	Ghrinavasa, Karkaru
5	Tamil	NeerPoosanikai
6	Chalkumra, Kumra	Bengali
7	Telugu	Boodida Gummadkaaya

Taxonomical Classification:[9]

Sr. No	Kingdom	Plantae
2	Division	Eudicots
3	Subclass	Tracheobionta
4	Order	Cucurbitales
5	Family	Cucurbitaceae
6	Subfamily	Cucurbitoideae
7	Tribe	Benincaseae
8	Subtribe	Benincasinae
9	Genus	Benincasa
10	Species	*B. hispida*

Traditional uses of *Benincasa hispida* :

Sr. No.	Edible Uses	Medicinal Uses:
1	The fruit can be eaten when it is young or old and raw or cooked[10]	The wax gourd has been used as a food and medicine for thousands of years[14]
2	Young leaves and flower buds are steamed and eaten as a vegetable [11]	An infusion of the root is used in the treatment of gonorrhea [14].
3	Added as a flavouring to soups [12]	Fruit is used in ayurvedic medicine in the treatment of epilepsy, lung diseases, asthma, coughs, etc. [15]
4	It is used as a vegetable, and in pickles, curries and preserves[13]	It is taken internally in the treatment of urinary dysfunction, summer fevers [16].

Fig no.02- Health Benefits of *Benincasa hispida* plant

Pharmacological Activities of *Benincasa hispida* L.

1. Antioxidant effect:

The antioxidant activity and phenolic content of *Benincasa hispida* Seeds extract were investigated using conventional Soxhlet extraction and DPPH Tests. The ethanolic extract gave the highest total phenolic content 11.34+- 1.3 Mg and Antioxidant Activity. Followed by ethyl acetate and n – hexane extract.

The antioxidant capacity of skin, pulp and seed of wax gourd extracts were measured by three different assays such as scavenging activity, ferric reducing activity. Antioxidants scavenge the free radicals that are produced in the body and their

levels are depleted. *Benincasa hispida* fruit extracts inhibited super oxide anion radicals compared to other radicals[17].

2. Antiulcer activity:

This study was undertaken to determine the healing of ulcers induced by indomethacin due to antioxidant role of fruit extract of *Benincasa hispida* (Ash gourd) on ulcers in rats. On induction of gastric ulcer, there was significant increase in SOD in RBC and homogenate levels and vitamin C in plasma. There was an apparent decrease in ulcer index in animals treated with fruit extract. There was significant decrease in MDA with concomitant decrease in SOD and vitamin C levels in the treated rats when compared to those not treated with fruit extract. *Benincasa hispida* has been shown to contain certain active principles like terpenes, flavonoid C – glycosides and sterols which have antioxidant effects. These probably inhibit gastric mucosal injury by scavenging the free radicals and repress production of SOD and vitamin C [18].

3. Central nervous effects:

The anxiolytic effects of alcoholic extract of B. hispida were evaluated in mice using elevated plus maze and light-dark transition test and spontaneous motor activity measured by actophotometer. The oral administration of the extract increased the percentage of time spent and the percentage of open arm entries in the elevated plus maze, as well as increase the time spent in the illuminated side of the light-dark test. The same extract was not able to modify the spontaneous motor activity measured in actophotometer [2]. The methanolic extract of *Benincasa hispida* exhibited significant anti-compulsive effect in marble-burying behaviour test in mice, the effect which may be attributed to the enhancement of serotonergic function [10]. The methanolic extract of fruit of *Benincasa hispida* caused reduction in spontaneous motor activity with no muscle relaxant activity. It also significantly potentiated the barbiturate induced hypnosis, and showed significant antihistaminic activity [20].

The anticonvulsant properties of alcoholic extract of *Benincasa hispida* were studied on maximal electroshock test (MEST), pentylenetetrazole and strychnine-induced seizures model in mice. The alcoholic extract of *Benincasa hispida* protected animals against maximal electroshock-induced convulsion and reduced the mean recovery time from convulsion. It also showed anticonvulsant activity against pentylenetetrazole-induced convulsion and protected mice against strychnine-induced convulsions[21].

The antidepressant activity of the methanolic extract (50, 100, and 200 mg/kg, administered orally for 14 successive days) was tested in Swiss male albino mice in comparison with classical antidepressant drugs (imipramine 15 mg/kg, fluoxetine 20 mg/kg, and phenelzine 20 mg/kg). The methanolic extract of B. hispida showed significant antidepressant-like activity in mice probably by inhibiting MAO-A, and through interaction with dopaminergic, α1- adrenergic, serotoninergic, and GABAergic systems[22].

4. Effects on gastrointestinal system:

The free radical scavenging and antiulcer potential of the methanol extract of *Benincasa hispida* seeds was evaluated by DPPH method for antioxidant effect and by using pyloric ligation, water immersion stress and indomethacin induced gastric ulcer model for antiulcer effects in rats. The methanolic extract showed concentration dependent DPPH radical scavenging activity. It was also inhibited gastric ulceration by decreasing the gastric volume and free and total acidity. The high dose (300 mg/kg bw) showed significant

reduction in the above parameters which was comparable to the standard drug ranitidine ($p< 0.05$) in all the models (ethanol-induced gastric mucosal damage, pylorus ligated ulcer model, cold and restraint stress-induced gastric ulcer model), and the results were comparable with that of omeprazole treated group. Furthermore, a significant reduction in vascular permeability ($P < 0.05$) was also observed. However, in cold and restraint stress-induced gastric ulcer model, MDA content was significantly reduced along with increase in CAT levels as compared to control group[23]. The fruit peel ethanolic extracts of the *Benincasa hispida* displayed a significant anthelmintic activity mouse with 0.2, 0.6 and 1 g/kg was 27%, 38% and 54% respectively. The 4 hours gastric emptying was not significantly influenced by MEBH when compared to control. It was postulated that the anorectic activity of *Benincasa hispida* was mediated through the central nervous system without affecting the gastric emptying[24].

5. Anti- asthmatic effects:

Two triterpenes, namely alonusenol and multiflorenol extracted from the methanolic extract of B. hispida fruit exhibited mast cell stabilizing effect and found to have potential inhibitory effect on the histamine release induced by antigen antibody reaction [25]. Methanol extract of *Benincasa hispida* (MEBH) showed excellent protection in guinea pigs against the histamine-induced bronchospasm even at a very low dose, 50 mg/kg orally. However, even at a higher dose level 400 mg/kg, MEBH did not significant protect against acetylcholine- induced bronchospasm. The results suggest that the protective effect against bronchospasm induced by histamine aerosol may be mediated by antihistaminic activity (H1 receptor antagonism [26].

6. Anti – inflammatory and analgesic effects:

The methanolic extract of *Benincasa hispida* at doses of 250 and 500 mg| kg significantly increased the antinociceptive effective in a dose dependant manner in rats (as determined by analgesiometer which exerts force at a constantly increasing rate on the rat paw.)

The preliminary investigations of aqueous extract of *Benincasa hispida* showed that it exhibits anti-inflammatory activity. Petroleum ether and methanolic extract of *Benincasa hispida* fruit, at the dose of 300mg| kg body weight, produced dose dependant and significant inhibition of carrageenan induced paw edema, histamine induced paw edema[27].

7. Hypoglycaemic and hypolipidemic effects:

The stem chloroform extract of *Benincasa hispida* has significant hypoglycaemic activity in normal male Wistar rats. The maximum reduction in blood glucose levels with stem extract of *Benincasa hispida* was recorded at a dose of 200 mg/kg bw. Salad was prepared by using 100gm of ash gourd (*Benincasa hispida*) and one gram of curry leaves (10 curry leaves) and five grams of skimmed milk powder (made into curd) and pepper and salt are added for taste. This salad was freshly prepared every day and given to hyperlipidaemic diabetic patients in mid-morning for a period of three months to find out the therapeutic effect of supplementation of ash gourd and curry leaves. Supplementation of ash gourd and curry leaves had significant hypoglycaemic and hypolipemic effect and it reduced the blood glucose level (both fasting and post prandial), within the period of three months. *Benincasa hispida* in a dose of 250 and 500 mg/kg in mice induced dose dependent decrease in glucose, triglyceride and insulin levels in plasma. It was also increased the glucose uptake from hemidiaphragm [28].

8. Antimicrobial effects:

The antibacterial activity of seed oil of B. hispida was tested against selected pathogens (gram positive, M. luteus, S. aureus and B. subtilis; and gram negative, E. coli, P. multocida and P. aeruginosa). Maximum mean zone of inhibition was observed against B. subtilis (16mm) and the minimum against Micrococcus luteus (11mm)P (39)P. However, the antibacterial activity of methanolic extract of *Benincasa hispida* was studied against three-gram positive bacteria Staphylococcus aureus, Staphylococcus epidermidis and Bacillus subtilis and three-gram negative bacteria Escherichia coli, Pseudomonas aeruginosa and Klebsiella pneumonia, and the antifungal activity was studied against *Candida albicans* and *Aspergillus niger*. The methanolic extract of *Benincasa hispida* showed no antibacterial activity, but it caused significant zone of inhibition against Candida albicans at the concentration of 30 mg/ml, while, it caused no inhibition against Aspergillus Niger[29]

9. Nootropic activity:-

The objective of this study was to investigate the cognitive function enhancing effect of methanol extract of fruit Benincasa hisp. Cogn in mice using Y maze and elevated plus maze. Spatial working memory in mice was evaluated using Y maze and long-term memory was evaluated by latency test using elevated plus maze. In Y maze test, MEBH (0.6-1 g/kg) produced significant reduction in number of entries and increase in percentage of alteration. In latency test, MEBH 0.6 and 0.8 g/kg significantly reduced the latency period. In both the models, MEBH was significantly able to antagonize the amnesic effect of scopolamine. In Conclusion the MEBH exhibited prominent nootropic effect and anti-amnesic effect in both models of memory[30].

CONTRAINDICATION AND SIDE EFFECTS:

In acute toxicity study in rats, the aqueous and ethanolic extract of *Benincasa hispida* (Thunb.) COGN. were found to be safe and no mortality was observed at a dose as high as 5 g/kg bw [31,32].

The chloroform extract was tested for its acute toxicity in albino rats (0.25 g/kg, 0.5 g/kg, 0.75 g/kg and 1 g/kg). The parameters which were observed were hyperactivity, sedation, loss of righting reflex, respiratory rate and convulsions. No toxic effects and mortality were recorded[33].

CONCLUSION:

The present review showed the information regarding phytochemistry, pharmacology and medicinal uses of *Benincasa hispida* . On the basis of investigations *Benincasa hispida* shows antioxidant activity, Nootropic activity, Central nervous system activity, anti-inflammatory activity, it shows antimicrobial effect, analgesic effect. There is increasing demand for the herbal medicinal plants all over the world because the fact that the allopathic drugs are having more side effects and this is one of the herbal drugs having numerous actions to cure differing types of diseases. *Benincasa hispida* used in GIT Problems like dyspepsia, burning sensation, heart disease, diabetes, and urinary disease.

REFERENCES

1. Thomas J., Medicinal and aromatic plants research in India. In UNDP, 1997.
2. Available from URL: http://en.wikipedia.org/wiki/winter_melon.
3. Nimbal SK, Venkatrao N, Ladde S and Pujar B. Anxiolytic evaluation of *Benincasa hispida* (Thunb) Cogn. fruit extracts. International Journal of Pharmacy and Pharmaceutical Science Research 2011; 1 (3) 93-97

4. Zaini NAM, Anwar F, Abdul Hamid A and Saari N. Kundur [*Benincasa hispida* (Thunb.) Cogn.]: A potential source for valuable nutrients and functional foods. Food Res Int 2011; 44:2368-2376.
5. Wu CM, Liou SE, Chang YH and Chiang W. Volatile compounds of the wax gourd (*Benincasa hispida* , Cogn) and a wax guard beverage. J Food Sci 1987;52:132-4
6. Mandana, B, Russly AR, Farah ST, Noranizan MA, Zaidul IS and Ali G. Antioxidant activity of winter melon (*Benincasa hispida*) seeds using conventional soxhlet extraction technique. International Food Research Journal 2012;19(1): 229-234.
7. Sew CC, Zaini NAM, Anwar F, Hamid AA and Saari N. Nutritional . composition and oil fatty acids of Kundur [*Benincasa hispida* (Thunb) Cogn]. Pak J Bot 2010; 42(5): 3247-3255
8. Ali Esmail Al – snafi pharmacological importance of *Benincasa hispida* cogn. International journal of pharma sciences and researches 2013.
9. Dr. Vijitha Vijayan, Dr. Neethu p. Dr Arathi Rajesh a review on kushmanda (*Benincasa hispida*) with special reference to vishachikista. The pharma Innovation Journal 2018. Pp 245 – 248.
10. Brooklyn Botanic Garden, Oriental Herbs and Vegetables, 1986; 39: 2.
11. Chittendon F. RHS Dictionary of Plants plus Supplement. 1956, Oxford University Press, 1951.
12. Hedrick. U. P. Sturtevant's Edible Plants of the World. Dover Publications 1972, ISBN 0-486-20459-6.
13. Vilmorin. A. The Vegetable Garden. Ten Speeds Press 0 ISBN 0- 89815-041-8
14. Duke J. A. and Ayensu E. S. Medicinal Plants of China Reference Publications, Inc. 1985 ISBN 0-917256-20-4.
15. Bown D. Encyclopaedia of Herbs and their Uses. Dorling Kindersley, London. 1995 ISBN 0-7513-020-31.
16. Chevallier. A. The Encyclopedia of Medicinal Plants Dorling Kindersley. London 1996 ISBN 9-780751-303148.
17. Acharya Pv sharma, Dhan wantari Nigantu, chaukhambhaOrientalia, 49 -50.
18. Shetty Beena V., Arjuman A., et al. Effect of extract of *Benincasa hispida* on oxidative stress in rats with indomethacine induced gastric ulcers. Indian J Pharmacol, 2008; 52 (2): 178– 182.
19. Girdhar S, Wanjari M, Prajapati SK and Girahar A. Evaluation of anti-compulsive effect of methanolic extract of *Benincasa hispida* Cogn. fruit in mice. Acta Poloniae Pharmaceutica n Drug Research 2010; 67(4): 417-421.
20. Babu1 SC, Ilavarasan R, Thambi Refai MACS, Thameemul – Ansari LH, and Kumar DA. Preliminary pharmacological screening of *Benincasa hispida* Cogn. Journal of natural Remdies 2003;3(2); 143 – 147'
21. Nimbal SK, Venkatrao N, Pujar B, Shalam , Ladde S. Evaluation of anticonvulsant activity of alcoholic extract of *Benincasa hispida* (Thunb) Cogn. fruit extracts. International Research Journal of Pharmacy 2011; 2(12):166-168
22. Dhingra D and Joshi P. Antidepressant-like activity of *Benincasa hispida* fruits in mice: Possible involvement of monoaminergic and GABAergic systems. Journal of Pharmacology and Pharmacotherapeutics 2012 ; 3(1): 60-61
23. Rachchh MA and Jain SM. Gastroprotective effect of *Benincasa hispida* fruit extract. Indian J Pharmacol 2008; 40(6):271-275.
24. Kumar A and Vimalavathini R. Possible anorectic effect of methanol extract of *Benincasa hispida* (Thunb). Cogn, fruit. Indian J Pharmacol 2004; 36 (6):348-350.

25. Yoshizumia S, Murakami T, Kadoya M, Matsuda H, Yamahara J, Joshikawa M. Medicinal food stuffs. XI. Histamine release inhibitors from wax gourd, fruits of *Benincasa hispida* Cogn. J Pharm Soc Japan 1998; 118(5):188-192
26. Kumar A and Ramu P.Effect of methanolic extract of *Benincasa hispida* against histamine and acetylcholine induced bronchospasm in Guinea pigs . Indian Journal of Pharmacology 2002; 34: 365-366.
27. Rachchh MA, Chchh A, Yadav PN, Gokani RH and Jain SM. Anti-inflammatory activity of *Benincasa hispida* fruit. International Journal of Pharma and Bio Sciences 2011; 2(3): P98-P106.
28. Moon MK, Kang DG, Lee Yj, Kim JS and Lee HS. Effect of *Benincasa hispida* Cogniaux on high glucose-induced vascular inflammation of human umbilical vein endothelial cells . Vascular Pharmacology2009;50(3-4):116-122.
29. Qadrie ZL, Tayebhawisan N , Alikhan MW, Samuel M and Anandan R. Antinociceptive and anti-pyretic activity of *Benincasa hispida* (Thunb) Cogn. in Wistar albino rats. Pak J Pharm Sci 2009;22(3):287-290.
30. Kumar A., Nirmala V., Nootropic activity of methanol extract of *Benincasa hispida* fruit. Indian Journal of Pharmacol. 2003; 35: 128-136.
31. Qadrie ZL, Tayebhawisan N , Alikhan MW, Samuel M and Anandan R. Antinociceptive and anti-pyretic activity of *Benincasa hispida* (Thunb) Cogn. in Wistar albino rats. Pak J Pharm Sci 2009;22(3):287-290.
32. Jayasree T, Kishore KK, Vinay M, Vasavi P, Dixit R, Rajanikanth M and Manohar VS. Diuretic effect of the chloroform extract of the *Benincasa hispida* rind (Pericarp) extract in Sprague – Dawley rats. International Journal of Applied Biology and Pharmaceutical Technology 2011; 2(2) : 94-99.
33. Jayasree T, Kishore K, Vinay M, Vasavi P, Chandrasekhar N, Manohar VS and Dixit R. Evaluation of the Diuretic effect of the chloroform extract of the *Benincasa hispida* rind (Pericarp) Extract in Guinea-pigs. Journal of Clinical and Diagnostic Research 2011 ;5(3): 578-582.

HOW TO CITE: Shagufta Farooqui, Sayyed Javvad Ali, S. A. Tekale, V. N. Gunjkar, Shaikh Etesam, Therapeutic Potential and Pharmacognostic Review of Benincasa hispida, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 8, 2678-2685. https://doi.org/10.5281/zenodo.16940616