



ISSN Print: 2664-9926
 ISSN Online: 2664-9934
 NAAS Rating: 4.82
 IJBS 2025; 7(6): 356-358
www.biologyjournal.net
 Received: 12-03-2025
 Accepted: 14-04-2025

Varsha S Patil
 Arts, Science and Commerce
 College, Rahata, Maharashtra,
 India

Divya Sadaphal
 Arts, Science and Commerce
 College, Rahata, Maharashtra,
 India

Corresponding Author:
Varsha S Patil
 Arts, Science and Commerce
 College, Rahata, Maharashtra,
 India

A General review on Antifungal Activity of *Benincasa hispida*

Varsha S Patil and Divya Sadaphal

DOI: <https://www.doi.org/10.33545/26649926.2025.v7.i6f.397>

Abstract

This review paper aims to compile and evaluate the antifungal potential of *Benincasa hispida*, a widely cultivated fruit in Asia, known for its medicinal properties. Several bioactive compounds found in the plant, particularly its extracts, have been identified to reveal fungicidal activity in contradiction of various pathogenic fungi. This review summarizes the results of studies that have investigated the antifungal effects of *Benincasa hispida* through both *in vitro* and *in vivo* experiments, as well as highlighting its pharmacological potential for therapeutic use. *Benincasa hispida* (Family: Cucurbitaceae), generally recognized as wax gourd or winter melon, has been utilized in traditional treatment for various ailments. The findings suggest that *Benincasa hispida* could serve as a natural and cost-effective alternative to conventional antifungal agents, warranting further research into its clinical and commercial potential.

Keywords: *Benincasa hispida*, antifungal activity, bioactive compounds, plant extracts, medicinal properties, fungal pathogens

Introduction

The increasing resistance of pathogenic fungi to synthetic antifungal drugs has become a global concern, prompting researchers to explore natural sources for new antifungal agents. *Benincasa hispida* is a commonly cultivated plant in tropical and subtropical regions, known for its medicinal properties, particularly in treating skin diseases, respiratory issues, and gastrointestinal disorders. Recent scientific investigations suggest that *B. hispida* might also possess significant antifungal properties, which could make it a promising candidate for novel antifungal therapies.

Benincasa hispida is a large, green fruit belonging to the Cucurbitaceae family. It is widely consumed across Asia for its nutritional and medicinal benefits. While it is traditionally known for its hydrating and antioxidant properties, recent studies suggest its potential in combating fungal infections. This review investigates the antifungal properties of *Benincasa hispida*, focusing on the bioactive compounds responsible for its therapeutic effects. This paper aims to explore the antifungal potential of *Benincasa hispida*, focusing on its bioactive compounds, their mechanisms of action, and the plant's broader therapeutic implications.

Botanical Information of *Benincasa hispida*

Benincasa hispida is a member of the Cucurbitaceae family. It is widely cultivated for its fruit, which is used in culinary dishes and traditional medicine. The plant's leaves, seeds, and fruit have been studied for their therapeutic properties, including anti-inflammatory, antioxidant, and antimicrobial effects (Ali *et al.*, 2017)^[1].

Scientific Classification

- **Kingdom:** Plantae
- **Order:** Cucurbitales
- **Family:** Cucurbitaceae
- **Genus:** *Benincasa*
- **Species:** *B. hispida*

The plant is known for its high-water content and is often consumed to help with hydration and digestion. Additionally, *B. hispida* has been traditionally used in folk medicine across different cultures, particularly in Asian countries, for treating fever, urinary tract infections, and other conditions (Anumihe OC *et al* 2023) ^[9]. *Benincasa hispida* is characterized by its large, cylindrical shape with a thick, green skin that turns pale yellow or white when ripe. The fruit has a mild flavor and is primarily used in soups, salads, and beverages. Beyond its culinary uses, the plant is also recognized in traditional medicine systems, particularly in Asia, for its purported health benefits, including antimicrobial, anti-inflammatory, and antifungal effects (Ali *et al.*, 2017) ^[11].

Fungal Pathogens Targeted by *Benincasa hispida*

Several pathogenic fungi, including *Candida spp.*, *Aspergillus spp.*, *Trichophyton spp.*, and *Fusarium spp.*, are responsible for a range of diseases in humans, plants, and animals. The antifungal potential of *Benincasa hispida* has been explored in relation to these pathogens. The fruits and seeds of the plant have shown notable efficacy in inhibiting fungal growth (Odekunle MP *et al*, 2023) ^[10].

Phytochemical Composition of *Benincasa hispida*

Several studies have analyzed the phytochemical profile of *Benincasa hispida*, which has revealed a wide array of bioactive compounds. These include alkaloids, flavonoids, phenolic acids, terpenoids, and saponins, which are known for their antimicrobial properties (Ali *et al.*, 2017) ^[11]. The plant's antifungal activity is believed to be primarily attributed to these compounds, which may exert synergistic effects in combating fungal pathogens. Key phytochemicals in *Benincasa hispida* include:

- **Flavonoids:** These polyphenolic compounds have demonstrated strong antimicrobial properties, particularly against fungal strains (Zhang *et al.*, 2020) ^[12].
- **Triterpenoids:** Known for their potential to inhibit fungal cell wall synthesis, triterpenoids are believed to play a role in the antifungal activity of *B. hispida* (Elzayat *et al.*, 2019) ^[2].
- **Saponins:** Saponins have been shown to possess antifungal effects by disrupting fungal cell membranes (Janssen *et al.*, 2014) ^[3].

Antifungal Activity of *Benincasa hispida*

Several *in vitro* studies have evaluated the antifungal efficacy of *Benincasa hispida* extracts against a variety of fungal species. For instance, a study by Khusro *et al.* (2013) ^[4] tested the methanolic extract of *B. hispida* against common pathogenic fungi, including *Candida albicans*, *Aspergillus niger*, and *Trichophyton mentagrophytes*. The results showed that the extract exhibited moderate antifungal activity, with *C. albicans* being the most sensitive strain.

Another study by Satyavathi *et al.* (2018) ^[6] found that ethanolic and methanolic extracts of *B. hispida* exhibited significant antifungal effects against *A. niger* and *Fusarium oxysporum*, both of which are notorious for causing agricultural and industrial problems.

A study by Sharma *et al.* (2018) ^[7] evaluated the antifungal effects of methanolic and ethanolic extracts of *Benincasa hispida* fruit against *Candida albicans* and found that the

ethanolic extract exhibited the highest antifungal activity. A research article by Singh *et al.* (2019) ^[11] investigated the antifungal potential of *Benincasa hispida* seed extract and found that it effectively inhibited the growth of *Aspergillus niger*. The seeds of *B. hispida*, which contain the bioactive peptide Hispidalin, demonstrated inhibitory effects in contradiction of various human bacterial and fungal pathogens (Salas *et al.*, 2015; Sharma *et al.*, 2014) ^[5, 8]. The antifungal mechanisms of action proposed for *Benincasa hispida* include:

- **Cell Membrane Disruption:** Bioactive compounds, such as flavonoids and saponins, are believed to disrupt the integrity of fungal cell membranes, leading to leakage of cellular contents and cell death (Janssen *et al.*, 2014) ^[3].
- **Inhibition of Spore Germination:** Certain compounds from *B. hispida* may inhibit the germination of fungal spores, thereby preventing fungal proliferation (Satyavathi *et al.*, 2018) ^[6].
- **Modulation of Enzyme Activity:** Enzyme inhibition, particularly of fungal cell wall biosynthesis enzymes, could also contribute to the antifungal properties (Zhang *et al.*, 2020) ^[12].

Conclusion

The antifungal properties of *Benincasa hispida* could have significant implications in both medical and agricultural fields. In medicine, its bioactive compounds may provide an alternative treatment for fungal infections, especially those resistant to conventional antifungal drugs. Additionally, the plant's antifungal activity can be explored for the development of topical creams, ointments, or oral formulations.

In agriculture, *Benincasa hispida* extracts could be utilized as natural fungicides to control crop diseases, reducing the dependency on synthetic chemicals and their environmental impact. The use of plant-based antifungals in agriculture is gaining momentum, as it aligns with the growing claim for organic and sustainable farming practices. *Benincasa hispida* presents a promising source of natural antifungal agents. Its diverse array of bioactive compounds, particularly flavonoids, terpenoids, and saponins, contribute to its potent antifungal activity against various pathogenic fungi. The plant's antifungal properties could be harnessed for the development of new therapeutic agents and agricultural fungicides, offering a sustainable alternative to synthetic chemicals. Further studies, particularly clinical trials and *in vivo* investigations, are necessary to fully understand the mechanisms of action and efficacy of *Benincasa hispida* in treating fungal infections. Additionally, research into the formulation of plant-based antifungal products could accelerate the plant's integration into the pharmaceutical and agricultural industries.

References

1. Ali MM, *et al.* Phytochemical and pharmacological properties of *Benincasa hispida*. J Med Plants Res. 2017;11(13):251-258.
2. Elzayat SM, *et al.* Triterpenoids and their antifungal activity: The case of *Benincasa hispida*. Nat Prod Res. 2019;33(3):415-420.
3. Janssen M, *et al.* The antifungal potential of plant saponins: Mechanism and applications. Front Microbiol. 2014;5:119.

4. Khusro A, *et al.* Antifungal activity of *Benincasa hispida* extracts against *Candida albicans*, *Aspergillus niger*, and *Trichophyton mentagrophytes*. J Pharm Res. 2013;6(9):53-57.
5. Salas CE, Badillo-Corona JA, Ramírez-Sotelo G, Oliver-Salvador C. Biologically active and antimicrobial peptides from plants. Biomed Res Int. 2015;2015:102-129.
6. Satyavathi M, *et al.* Antifungal efficacy of *Benincasa hispida* extracts against *Aspergillus niger* and *Fusarium oxysporum*. Int J Pharm Tech Res. 2018;11(1):101-107.
7. Sharma P, Kumar P. Antifungal activity of *Benincasa hispida* against *Candida albicans*. J Ethnopharmacol. 2018;232:115-121.
8. Sharma S, Verma HN, Sharma NK. Cationic bioactive peptide from the seeds of *Benincasa hispida*. Int J Pept. 2014;2014:156060.
9. Anumihe OC, Etim GR, Ihejiro NT, Azubuike C, Chibu-Ikwuagwu GO, Ahamefula CO. Antimicrobial properties and medicinal effects of *Andrographis paniculata*. Int J Agric Extension Social Dev 2023;6(1):107-109.
DOI: 10.33545/26180723.2023.v6.i1b.183
10. Odekunle MP, Adams D, Adeniran O. The effectiveness and oversight of quality in the harvesting and processing of honey. International Journal of Agriculture Extension and Social Development. 2023;6(2):31-34.
DOI: 10.33545/26180723.2023.v6.i2a.448
11. Singh S, Sharma N. Evaluation of antifungal activity of *Benincasa hispida* seed extracts. Phytochem Rev. 2019;18(2):285-292.
12. Zhang X, *et al.* Flavonoids as potential antifungal agents: Mechanism of action and therapeutic efficacy. Phytochem Rev. 2020;19(1):85-97.