A Comprehensive Review on *Cucumis Maderaspatanus* Linn.

Astellakshmi N*1, Premkumar N2, Sakthi P3, Kaviya K4, Pravin Kumar K5, Sakthi E6, Surendra Kumar M7

1,2,3,4,5,6,7 Sengundhar college of Pharmacy, Tiruchengode, Namakkal, India

*Corresponding author’s: Dr. N. Astalakshmi, Department of Pharmaceutical Chemistry, Senghundhar college of Pharmacy, Tiruchengode.

### Article History

- Received: 06 June 2023
- Revised: 05 Sept 2023
- Accepted: 30 Nov 2023

### Abstract

*Cucumis maderaspatanus* L., commonly known as Madras Thorn or Maderaspatna cucumber, is a lesser-known plant species with significant botanical, ecological, and medicinal importance. This comprehensive review explores the taxonomic classification, Phytochemistry and Pharmacological review of *Cucumis maderaspatanus*. The taxonomy and morphology section elucidates the botanical characteristics of *C. maderaspatanus*, highlighting its unique traits and distinguishing it from related species within the *Cucumis* genus. The geographical distribution and habitat preferences of this plant are discussed, shedding light on its ecological significance, such as its role as a food source for wildlife and its potential in habitat restoration. Furthermore, this review provides an in-depth analysis of the traditional uses of *Cucumis maderaspatanus* in various cultures, emphasizing its value in folk medicine for treating a range of ailments.

Recent scientific studies on its bioactive compounds, pharmacological properties, and potential applications in modern medicine are also discussed. These findings underscore the need for further research to harness the therapeutic potential of this under-studied plant.

**Keywords:** *Cucumis maderaspatanus*, madaras pea pumpkin, Madras Thorn, taxonomical classification, Phytochemistry, Pharmacology review.

### 1. INTRODUCTION

*Cucumis maderaspatanus* Linn. belongs to the family of Cucurbitaceae, known as the gourd family or by the popular name cucubitis (Kerje, T.et al., 2000.). The plants are long, trailing, annual or perennial herbs, with angular or lobed leaves, simple tendrils, and branched, hirsute stems. They are mostly monoecious, but dioecious and andromonoecious forms also occur. The yellow flowers are fascicled or solitary and usually trimerous, rarely pentamerous, and often borne at every node (Robinson et al.,1974). The wild species are found in arid or semi-arid regions of Africa, while many of the wild forms of the cultivated species are distributed over the Middle East, Turkey and India (Dane, F. E. N. N. Y.,1991). The present review focus on some of the important activities of *Cucumis maderaspatanus* Linn. for the several studies like anticancer studies, Insecticides, repellent and phytoconstituents studies. An extensive literature survey was collected using various search engines like PubMed, Web of Science, Scopus, SciFinder, Google Scholar, etc.

### 2. TAXONOMICAL CLASSIFICATION:

![Plant Profile of Cucumis maderaspatanus Linn.](image1)

**Figure No. 1** Plant Profile of *Cucumis maderaspatanus* Linn.
Taxonomical classification of *Cucumis maderaspatanus* L. are

- **Kingdom**: Plantae
- **Division**: Spermatophyta
- **Sub-division**: Angiospermae
- **Class**: Dioscolyledonae
- **Sub-class**: Polypetale
- **Series**: Calyiflorae
- **Order**: Passiflorales
- **Family**: Cucurbitaceae
- **Genus**: cucumis
- **Species**: maderaspatanus

3. **BOTANICAL DESCRIPTION**: (Rahman A.H.M.M et al., 2006), (Asha K. Rajan et al., 2016).

‘Madars Pea Pumpkin’ also known as *Cucumis maderaspatanus* L., is the popular name for Musumusukkai.

**LEAVES**
- Deltoid-ovate form.
- Completely angular or 3-5 lobed, acute or sub acuminate.
- Coarsely dentate-serrate, scabrous on the dorsal and ventral surfaces with very little hairs.
- ovate leaves, typically have sagittate, and acuminate margins.

**FLOWERS**
- Blossom has a yellowish colour.
- Flowers are unisexual, regular, 5-merous, and bright yellow. Male flowers have a short pedicel, 3 stamens, and a Pistilode. Female flowers are subsessile with an inferior, ovoid ovary that is densely covered in very long, thin, soft hairs.

**FRUIT**
- Ripe fruits are spherical, lustrous, and red in colour.
- A globose, 5–13 mm in diameter, fuggiiwe-haired fruit with 4–8 seeds that is initially green with faint longitudinal lines. Oval-oblong, 3.5–5 mm 2-3 mm 1-2 mm and margined seeds.

**STEM**
- Herbaceous, Monoeccious, Perennial scrambler or climber with a stem up to 4 metres long.
- Finely grooved and covered in Erecto-patent hairs.

![Figure No.2 Botanical Description of Cucumis maderaspatanus L.](image-url)

4. **GEOGRAPHICAL SOURCE**:

Unforested areas of West Africa as well as tropical Africa, Asia, and Australia.
5. TRADITIONAL USES: (Adam, et al., 1966)

<table>
<thead>
<tr>
<th>Country</th>
<th>Uses</th>
</tr>
</thead>
</table>
| Nigeria    | - The root is eaten to treat toothaches and other pains, while in, a decoction of the root is used to treat flatulence and toothaches.  
           | - Decoction of young shoots and leaves is used as an aperient, particularly for kids.  
           | - Seeds are used as a decoction or when chewed to induce sweating. |
| Cayor      | - Treating mental health issues                                      |
| Senegal    | - Utilise the fruit as poison-antidotes because they believe it has magical characteristics  
           | - The fruit is employed as a vermifuge.  
           | - Treating mental health issues                                      |
| India      | - The bitter leaves and sensitive shoots are also used as an aperient to treat vertigo and biliousness.  
           | - The plant is reported to contain expectorant characteristics.      |
| Tanganyika | - Plant ash in castor oil is used to scarifications and the temples for headache relief.  
           | - Leaf sap is applied to wounds as a dressing, leaves are used as a poultice for burns, and sap is given to young children for Amoebiasis. |

Table No.1. Traditional uses of *Cucumis maderaspatanus* Linn.

6. PHYTOCHEMISTRY OF *CUCUMIS MADERASPATANUS* LINN.

The qualitative phytochemical screening of *cucumis maderaspatanus* Linn. shows the presence of Carbohydrates, protein, alkaloid, tannin, saponins, steroids and glycosides in the ethanolic extraction. Compounds like alkaloids and flavonoids are present in the aqueous extract of stem and leaves of *cucumis maderaspatanus* Linn. (Kavitha M et al., 2013).

7. PHARAMCOLOGICAL ACTIVITY OF *Cucumis maderaspatanus* Linn.

The phytoconstituents in *Cucumis maderaspatanus* Linn. has high potential curing tendency for disorders such as asthma, histamine, bronchitis, chronic obstructive lung disorder, high fever, flu and also in the treatment of Rheumatoid arthritis, hypertension. It also reported that fruits of *Cucumis maderaspatanus* Linn. used in treatment of piles, polyuria, dysuria, tuberculosis. Fruit has been prepared as lehium and consumed for treatment of naso-bronchial disorders, and also reduces pain during urination.

**Antioxidant activity:**

The *Cucumis maderaspatanus* Linn. leaves fresh, Sun dried and dehydrated of ethanolic shows antioxidant activity. (D. Amirtham et al., 2019). Free radical scavenging assay, aqueous extract of leaves from *Cucumis maderaspatanus* Linn. was tested for in vitro antioxidant activity.

**Antihyperlipidemic activity:**

The present study investigates the hypolipidemic effect of aqueous extract of whole Plant of *cucumis maderaspatanus* in high fat diet fed rats. Treatment with *Cucumis maderaspatanus* extract had shows significant deceased the lipid level in high fat diet fed animals. The whole Plant exhibited significantly hypolipidemic activity comparable with the navaka Guggulu (400mg kg⁻¹) in high fat diet induced rats. In histological evaluation in liver of rats Were observed. Then the, treatment with the aqueous extract of *Cucumis maderaspatanus* And Navaka guggulu illustrate, striking micro vesicular fatty changes with control and Reference drug navaka guggulu in rat’s liver. (D Pandey et al., 2010).
Anxiolytic activity:

The *Cucumis maderaspatanus* leaves of hydro-alcoholic extract shows anxiolytic activity. It was tested on experimental Wister albino rats by using an elevated plus maze test and by using mice in a socio-behavioral deficit test. The result indicates that the hydro-alcoholic extract of *Cucumis maderaspatanus* exhibited a significant increase in anxiolytic activity in the maze test and reduced the attempts made at the mice in the deficit test and compared with the standard diazepam drug. (Sampath et al., 2012).

Bioflavonoids like quercetin and catechin of polyphenolic compounds possess free radical scavenging and anti-inflammatory activity. (Moyeenudin H.M & Vijayalakshmi S, 2019). Oxidative stress is an imbalance between pro-oxidants and antioxidants. Oxidative stress leads the body to disease such as cancer and obesity. Compounds present in curcubits such as cucurbitacin B and E, belonging to family of tannins exhibits antioxidant activity and also possess free radical scavenging tendency . (Agata Rolnik MSc & Beata Olas PhD, 2020).

Catalytic activity:

The *Cucumis maderaspatanus* L of leaves aqueous extract was used to synthesize silver nanoparticles. The study was determined the catalytic activity on *Cucumis maderaspatanus* L of leaves aqueous extract was used to synthesize silver nanoparticles. The SNP were analysed confirmed by using UV–vis, XRD, FE-SEM, FT-IR, XPS, TEM with EDAX, zeta potential, TGA, and BET analysis. And also evaluated the efficacy of SNPs was tested on the reduction of different aromatic Nitroarenes using different concentration of sodium borohydride. It used for catalytic activity for eliminate the harmful pollutant. (Sampath et al., 2012)

Antidiabetic activity:

*Cucumis maderapatanus* L. (Cucurbitaceae) extract and phenolics such as quercetin and phloroglucinol are investigated for their *In vitro* antidiabetic activity. Quercetin, phloroglucinol, and methanol extract of the dried whole Plant (0.25 and 0.5 mg/ml) were studied for the inhibition of gluconeogenesis in rat liver slices and glucose uptake in isolated rat hemi-diaphragm (50 and 100 mg/ml). Phenolics of *Cucumis maderapatanus* were analyzed by HPLC. Phloroglucinol inhibited 100% glucose production with or without insulin. Cucumis (0.25 mg/ml) inhibited gluconeogenesis (0.65 mg/g/h) by 45%, and with insulin, Inhibition increased to 50%. At 0.5 mg/ml, glucose production was stimulated by 1.2-fold, but with insulin it was inhibited by 89% (0.13 mg/g/h glucose). Mukia had no effect on glucose uptake, but potentiated the action of insulin mediated glucose uptake (152.82 –13.30 mg/dl/g/30 min) compared with insulin control (112.41 –9.14 mg/dl/g/30 min). HPLC analysis by proved the presence of phenolics in cucumis madaraspatanus L. (Srilatha.B.R, et al., 2014).

The promotion of the extract on insulin secretion was confirmed by incubating β-cell of pancreatic islets and INS-1E insulinoma cells with the extract (1-1000 µg/mL). and compare the mice of untreated group. (Balaraman AK et al., 2011).

*Cucumis melo var agrestis* belonging to Cucurbitaceae family possess antidiabetic potential, the hydroalcoholic leaf extract of *Cucumis melo varagrestis* inhibits movement of glucose across membrane (Sengottuvel T & Sanish Devan V, 2020).

Antihyperglycemic activity was proved by the ethanolic and aqueous extract of whole plant of *cucumis maderaspatanus* L. Ergosterol is an active compound extracted from the methanolic extraction of whole plant of *cucumis maderaspatanus* exhibits antidiabetic activity (Jamuna S et al., 2015).

Antineoplastic activity:

The present investigation reveals the *in vitro* cytotoxic effect of the biosynthesised metal nanoparticles on the MCF 7 Breast cancer cell lines. The gold and silver nanoparticles were synthesised through an environmentally admissible route using the *cucumis Maderaspatanus* L. plant extract. The Reaction parameters were optimised to control the size of nanoparticles which were confirmed by UV visible spectroscopy. Various instrumental techniques used to characterise the synthesised gold and Silver nanoparticles. The synthesised gold and silver nanoparticles were found to be 20–50 nm and were of different shapes including spherical, triangle and hexagonal. MTT and dual staining assays were carried out with different concentrations (1, 10, 25, 50 and 100 µg/ml) of gold and silver nanoparticles. The results show that the nanoparticles exhibited significant Cytotoxic effects with IC 50 value of 44.8 µg/g for gold nanoparticles and 51.3 µg/g for silver nanoparticles.
Antimicrobial activity:
The study was carried highlights the potential of methanol extract *Cucumis maderaspatanus* L. against 9 human pathogenic bacteria organisms followed by chloroform, ethyl acetate, hexane and aqueous extract. This work also provides additional information about the activity of methanolic callus extract against the organisms used, though the level of activity was found to be very moderate. Hence, the present work proves that *Cucumis* showed a platform for further isolation of potential antimicrobial compounds against the microorganisms. (Nanjian Raaman, et al., 2013).

Immunomodulatory activity:
In *in-vitro* study the extract shows anti-complement effect in both classical and alternate pathways of complement system in human. Luminol-induced chemiluminescence is inhibited in dose-dependent manner by aqueous extract. In human immune system the outcome of whole plant by aqueous extract is examined (Petrus A J A, 2013).

Anaesthetic activity
In *in-vivo* study the ethyl alcohol extracts of leaves of *cucumis maderaspatanus* L.proves maximum potential as local anaesthesia in both sex of healthy frogs. In tested groups the effect of anaesthesia by extract last longer and exhibits its maximum activity. (Petrus A J A, 2013).

Anti-wart property
Warts are infectious disease among cattle that spread by direct contiguity with infected animals. Cutaneous warts appear as single or multiple, brown or black. Warts commonly occur in skin of udder, neck, shoulder, inner ear. Warts present in udder and teats results in mastitis. Homeopathic drug is unsatisfactory due to reoccurrence of warts, and drugs from medicinal herbs were used due to high effective and low in price. The ethanolic and aqueous extract shows the presence of tannins, terpenoids, glycosides, flavonoids, saponins, alkaloids responsible for anti-wart property. Eugenol is a constituent in *Cucumis maderaspatanans* Linn. possessing fly repellent activity. White soft paraffin bases is used for preparation of ointment. The *Cucumis maderaspatanans* Linn. ointment results significant healing on wart at 10% w/w strength. Drug shows 80% healing of warts located other than udder and teats (Raja MJ & Jagadeswaran A, 2021).

Hepatoprotective activity
Albino rat liver is protected from carbontetrachloride (CCI4)-induced damages by aqueous extract of aerial parts of *C.maderaspatanus* Linn. Histopathology reports significant improvement in CCI4-mediated liver, and also maintained the levels of alanine aminotransferase (serum glutamic pyruvic transaminase-SGPT), aspartate aminotransferase (serum glutamic oxaloacetic transaminase-SGOT), alkaline phosphatase-ALP, Aniline hydroxylase activities by *C.maderaspatanus* Linn. extract. Levels of serum glutamic pyruvic transaminise, serum glutamic oxaloacetic transaminase and alkaline phosphatase is reduced by aqueous extracts of *C.maderaspatanus* Linn. in rats induced with streptozotocin. Methanolic root extract shows significant decrease in levels of -SGOT, -SGPT AND -ALP in diabetic rats at (500 mg/kg) (Petrus A J A, 2013).

Antimitotic activity:
In this study to evaluate the Mitotic activity of various leaf extract acetone of *Cucumis maderaspatanus* L. on meristematic cells of root tips of *Allium cepa*. Locally available *Allium cepa* bulbs were grown in 50 ml of water for 48 hours for root sprouting and then they were exposed to 10 mg/ml concentration of each extract separately for 48 hours. Tap water was used as control and cytotoxic drug methotrexate (1mg/ml) severd as standard. The result shows that mitotic index and root growth rate of *A.cepa* were considerably decreased in treated in compared to control. Also the most effective extract was acetone which decreases the mitotic index significantly. It EC50 was found to be 10 mg/ml. Further, it was able to inhibits a high DNA fragmentation followed by leaf ethanol extract in *Allium cepa* root tip cells. (M. kavitha et al., 2014).

Larvicidal activity:
A study was made to monitor the effect of plant extract, *Heliotropium indicum* and *Cucumis maderaspatanus* L. on different larval instars and pupae of mosquito vector of A. aegypti. Bio-assay was performed using the solvent acetone to find out the median lethal concentration. The study indicated that essential compounds were the only chemical used for the control of mosquito larvae while extract was used as the control of adult mosquitoes. The results suggest a potential utilization of the extracts of these two plant species for the control of A. aegypti. (Ramamurthy V et al., 2014).
8. CONCLUSION
In this article, we clearly explain the botanical description, geographical source, phytochemistry and pharmacological activity of Cucumis maderaspatanus L. It provides various activities of Cucumis maderaspatanus L such as Antioxidant Activity, Anti Hyper-Lipidemic Activity, Catalytic Activity, Anxiolytic Activity, Antidiabetic Activity, Antineoplastic Activity, Antimicrobial Activity, Larvicidal Activity etc. In conclusion, Cucumis maderaspatanus L is a plant with various cultural and traditional significance. This review will be helpful to the researchers who are all conducting pharmacological activity studies.

9. REFERENCES:


Sujata, M. P. "Mukia maderaspatana (L.) M. Roem., a weed used as traditional medicine in different taluks of Bidar District, Karnataka, India." Indian Horticulture Journal 10.3 and 4 (2020)