

## A Comprehensive Review on *Cucumis Maderaspatanus* Linn.

Astalakshmi N<sup>1\*</sup>, Premkumar N<sup>2</sup>, Sakthi P<sup>3</sup>, Kaviya K<sup>4</sup>, Pravin Kumar K<sup>5</sup>,  
Sakthi E<sup>6</sup>, Surendra Kumar M<sup>7</sup>

<sup>1,2,3,4,5,6,7</sup> Senghundhar college of Pharmacy, Tiruchengode, Namakkal, India

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

| Article History  | Abstract   |
|--|--|
| <p>Received: 06 June 2023<br/>Revised: 05 Sept 2023<br/>Accepted: 30 Nov 2023</p> <p><b>CC License</b><br/>CC-BY-NC-SA 4.0</p> | <p><i>Cucumis maderaspatanus</i> 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 <i>Cucumis maderaspatanus</i>. The taxonomy and morphology section elucidates the botanical characteristics of <i>C. maderaspatanus</i>, highlighting its unique traits and distinguishing it from related species within the <i>Cucumis</i> 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 <i>Cucumis maderaspatanus</i> 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.</p> <p><b>Keywords:</b> <i>Cucumis maderaspatanus</i>, madaras pea pumkin, Madras Thorn, taxonomical classification, Phytochemistry, Pharmacology review.</p> |

### 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:



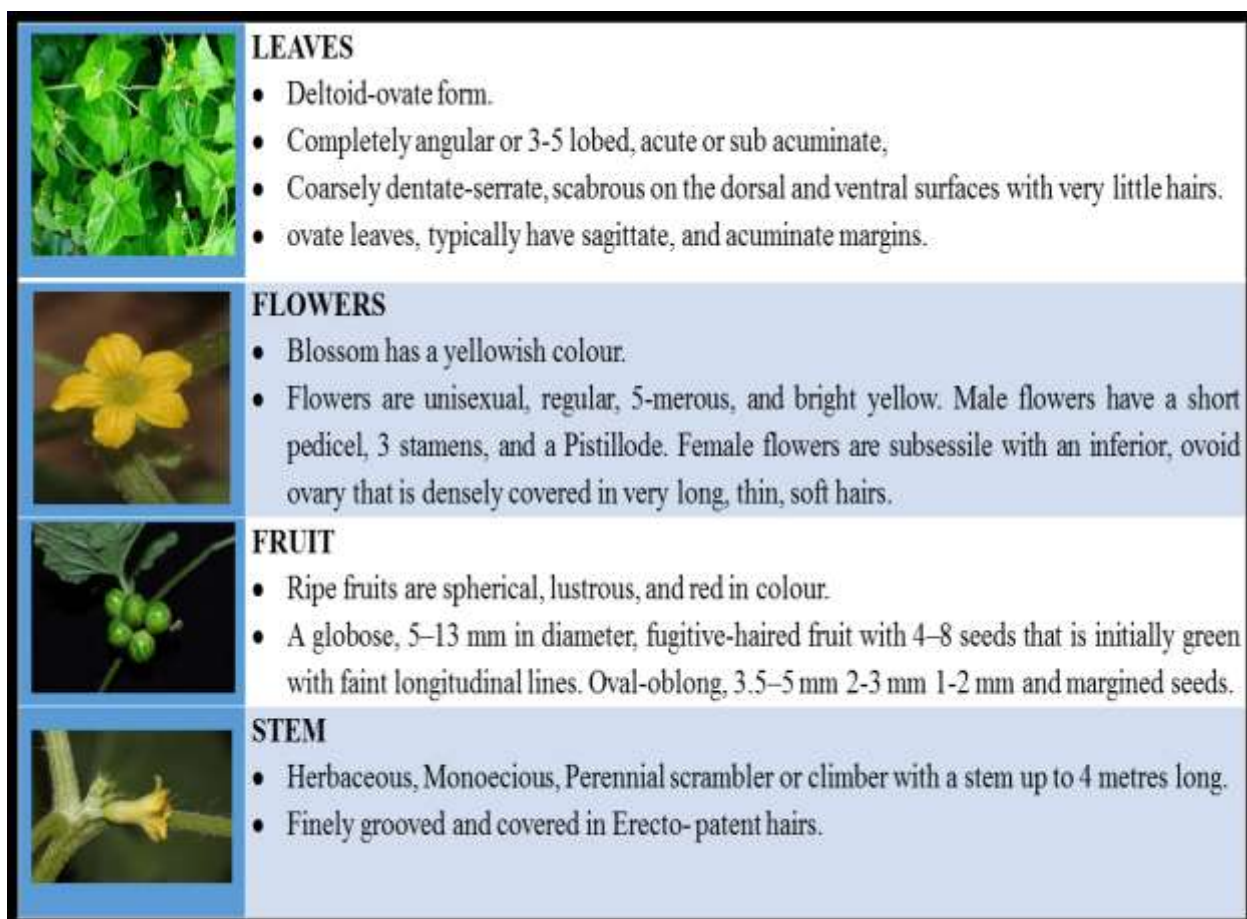
**Figure No. 1 Plant Profile of *Cucumis maderaspatanus* Linn.**

Taxonomical classification of *Cucumis maderaspatanus* L. are

- **Kingdom:** Plantae
- **Division:** Sermatophyta
- **Sub-division:** Angiospermae
- **Class:** Dicotyledonae
- **Sub-class:** Polypetalae
- **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.



**Figure No.2 Botanical Description of *Cucumis maderaspatanus* L.**

**4. GEOGRAPHICAL SOURCE:**

Unforested areas of West Africa as well as tropical Africa, Asia, and Australia.

**5. TRADITIONAL USES: (Adam, et al., 1966)**

|                   |   |
|-------------------|---|
| <b>Nigeria</b>    | <ul style="list-style-type: none"> <li>• The root is eaten to treat toothaches and other pains, while in, a decoction of the root is used to treat flatulence and toothaches.</li> <li>• Decoction of young shoots and leaves is used as an aperient, particularly for kids.</li> <li>• Seeds are used as a decoction or when chewed to induce sweating.</li> </ul> |
| <b>Cayor</b>      | <ul style="list-style-type: none"> <li>• Treating mental health issues</li> </ul>   |
| <b>Senegal</b>    | <ul style="list-style-type: none"> <li>• Utilise the fruit as poison-antidotes because they believe it has magical characteristics</li> <li>• The fruit is employed as a vermifuge.</li> <li>• Treating mental health issues</li> </ul>   |
| <b>India</b>      | <ul style="list-style-type: none"> <li>• The bitter leaves and sensitive shoots are also used as an aperient to treat vertigo and biliousness.</li> <li>• The plant is reported to contain expectorant characteristics.</li> </ul>  |
| <b>Tanganyika</b> | <ul style="list-style-type: none"> <li>• Plant ash in castor oil is used to scarifications and the temples for headache relief.</li> <li>• 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.</li> </ul>  |

**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 maderaspatanaus* 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 Wistar 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 cucurbits such as cucurbitacins B and E, belonging to the family of tannins exhibit 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 determined the catalytic activity on *Cucumis maderaspatanus* L of leaves aqueous extract was used to synthesize silver nanoparticles. The SNPs 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 maderaspatanus* 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 maderaspatanus* 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). Mucia 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 proved the presence of phenolics in *cucumis maderaspatanus* L. (Srilatha.B.R, *et al.*, 2014)

The promotion of the extract on insulin secretion was confirmed by incubating  $\beta$ -cell of pancreatic islets and INS-1E insulinoma cells with the extract (1-1000  $\mu$ g/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 var agrestis* 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  $\mu$ g/ml) of gold and silver nanoparticles. The results show that the nanoparticles exhibited significant Cytotoxic effects with IC 50 value of 44.8  $\mu$ g/g for gold nanoparticles and 51.3  $\mu$ g/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 maderaspatanaus* Linn. possessing fly repellent activity. White soft paraffin bases is used for preparation of ointment. The *Cucumis maderaspatanaus* 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 (CCl<sub>4</sub>)-induced damages by aqueous extract of aerial parts of *C.maderaspatanus* Linn. Histopathology reports significant improvement in CCl<sub>4</sub>-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 transaminase, 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 EC<sub>50</sub> 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 *cumis 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:

- B. R. Srilatha & S. Ananda., 2014. Antidiabetic effects of *Mukia Maderaspatana* and its phenolics: An in vitro study on gluconeogenesis and glucose uptake in Rat tissues, *Pharmaceutical Biology*, 52:5, 597-602.
- Balaraman AK, Singh J, Maity TK, Selvan VT, Babu S, Palanisamy SB, 2011. Ethanol extract of *Melothria Maderaspatana* inhibits glucose absorption and stimulates insulin secretion in male C57BL/6 Mice. *IPCBE Proc.*5:429-33.
- Baskaran, P, P. Velayutham, and N. Jayabalan. "In vitro regeneration of *Melothria maderaspatana* via indirect organogenesis." *In Vitro Cellular & Developmental Biology-Plant* 45 (2009).
- D. Amirtham, J. Aswini Nivedida, K. Dhivya, S. Ganapathy, and C. Indurani, 2019. "Evaluation of dehydrated *Mukia maderaspatana* leaves as a potent source of dietary antioxidants." *International Journal of Research –Granthaalayah*, 7(6), 27-36. <https://doi.org/10.5281/zenodo.3262114>.
- Dane, F. E. N. N. Y. "Cytogenetics of the genus *Cucumis*." *Chromosome engineering in plants: genetics, breeding, evolution* 1 (1991): 201-214.
- Devi GK, Sathishkumar K, 2017. Synthesis of gold and silver nanoparticles using *Mukia maderaspatana* plant extract and its anticancer activity. *IET nanobiotechnology*. Mar;11(2):143-51.
- G. Gomathy, D. Venkatesan & S. Palani (2015). Gastroprotective potentials of the ethanolic extract of *Mukia maderaspatana* against indomethacin-induced gastric ulcer in rats, *Natural Product Research*, 29:22, 2107-2111.
- Jamuna S, Karthika K, Paulsamy S., 2015. Phytochemical and Pharmacological properties of certain medicinally important species of Cucurbitaceae family- A review. *Journal of Research In Biology*. 5(6): 1835-1849
- Kavitha M, Dr. Srinivasan P.T, Lakshmi Priya S, Jayakumar L.V., 2013. Evaluation of Nutrient Composition and antibacterial Potential of Leaf and stem of *Mukia maderaspatana* I. *International Journal of Pharmaceutical research & Allied Sciences*. 2(3): 68-76.
- Kerje, T. and Grum, M., 2000. The origin of melon, *cucumis melo*: A review of the Literature. *Acta Hort.* 510, 37-44 DOI: 10.17660/ActaHortic.2000.510.5.
- M. Sivagami, I.V. Asharani, 2023. Catalytic reduction of nitroarenes by *Cucumis maderaspatanus L.* leaves Extract mediated silver nanoparticles., *Journal of the Taiwan Institute of Chemical Engineers*; (1-13) doi.org/10.1016/j.jtice.2023.104981.
- Manoharan A, Manjula M, Mubarak H, Chitti C.V, Babu., 2015. Hypolipidaemic activity of the siddha medicinal plants, *International Journal of Pharmacognosy*. 2(4): 145-154.
- Moyeenudin H.M, Vijayalakshmi S., 2019. The Antihypertensive Effect from Aqueous Extract of *Oxalis corniculata* by In Vitro Antihypertensive Activity Assay. *Research Journal of Pharmacy and Technology*. 12(6): 2981-2986.
- Nanjian Raaman, Balan Leeba, Swaminathan Amutha, Mahalingam Amsaveni and Chandrasekaran Sriram. "In vitro callus induction and comparative antimicrobial activity of wild plant and callus of a medicinal plant *Mukia maderaspatana (L.) Cogn.*" *Medicinal Plants-International Journal of Phytomedicines and Related Industries* 5.3 (2013)
- Pandey D, Pandey S, Hemalatha S, 2010. Hypolipidemic activity of aqueous extract of *Melothria maderaspatana*. *Pharmacologyonline*.3:76-83.
- Petrus A J A., 2013. Ethnobotanical and pharmacological profile with propagation strategies of *Mukia maderaspatana (L.) M. Roem.*- A concise overview. *Indian journal of Natural Products and Resources*. 4(1): 9-26.
- Rahman A.H.M.M, Anisuzzaman M, Alam M.Z, Islam A.K.M.R, Zaman A.T.M.N., 2006. Taxonomic Studies of the Cucurbits grown in the Northern Parts of Bangladesh. *Research Journal of Agriculture and Biological Sciences*. 2(6): 299-302
- Raja MJ, Jagadeswaran A., 2021. Exploration of *Mukia maderaspatana* as promising topical herbal preparation for cutaneous warts in cattle. *The Pharma Innovation Journal*. 10(5): 653-659.
- Raja, Boobalan, and Kodukkur Viswanathan Pugalendi. "Evaluation of antioxidant activity of *Melothria maderaspatana* in vitro." *Central European Journal of Biology* 5 (2010)
- Ramamurthy V, Krishnaveni S, 2014. Larvicidal efficacy of leaf extracts of *Heliotropium Indicum* and *Mukia maderaspatana* against the dengue fever mosquito vector *Aedes aegypti*. *Journal of Entomology and Zoology Studies*, 2(5):39-44.
- Robinson, Richard W., and Thomas W. Whitaker, 1974. "Cucumis." *Handbook of Genetics: Plants, Plant Viruses, and Protists*. Boston, MA: Springer US, 1974. 145-150.

- Sameer J. Nadaf, Namdeo R. Jadhav, Heena S. Naikwadi, Pranav L. Savekar, Isha D. Sapkal, Mugdha M. Kambli, Indrajeet A. Desai, 2022. Green synthesis of gold and silver nanoparticles: Updates on research, patents, and future prospects, *Open Nano*, Volume 8.
- Sampath, Saravanan; Sellimuthu, Manokaran; Salahudheen, Chand. Anxiolytic activity of hydro-alcoholic extract of *Mukia maderaspatana* Linn. Leaves on experimental animals. *Jordan Journal of Pharmaceutical Sciences*; 5 (1): 43-50.
- 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* 10.3and4 (2020)
- V. Subha, S. Kirubanandan, S. Renganathan. Green Synthesis of Silver Nanoparticles from a Novel Medicinal Plant Source Roots Extract of *Mukia maderaspatana*. *Colloid and Surface Science*. Vol. 1, No. 1, 2016, pp. 14-17.