



# IJRASET

International Journal For Research in  
Applied Science and Engineering Technology



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 12    **Issue:** X    **Month of publication:** October 2024

**DOI:** <https://doi.org/10.22214/ijraset.2024.64706>

[www.ijraset.com](http://www.ijraset.com)

Call:  08813907089

E-mail ID: [ijraset@gmail.com](mailto:ijraset@gmail.com)

# A Brief Review: C. Rotundus of Phytochemical and Pharmacological Study

Akshada Varatha<sup>1</sup>, Komal Bhoir<sup>2</sup>, Leena Tamnar<sup>3</sup>, Rahul Jagdale<sup>4</sup>

Matoshri Institute Of Pharmacy, Yeola, Maharashtra India

**Abstract:** This article's goal is to investigate and confirm the therapeutic benefits and safety margins of traditional medicines use by the tribal community to treat a range of illnesses as detailed in our nation's ancient literature. For thousands of years, herbs have significantly improved the quality of human life. The old and most popular of medicine in the world today is herbal medicine. Flavors, cosmetics, colors, and medications. Natural-source drugs are pharmacologically effective and have little side effects, making them ideal for preventative medicine. *Cyperus rotundus L.* Is also known as moth or in regional languages. It is available across the country. Natural-source drugs are pharmacologically effective and have little side effects, making them ideal for preventative medicine. *Cyperus rotundus L.* Is also known as moth or in regional languages. It is available across the country.

**Keyword:** Ayurveda, Nutgrass, *Cyperus rotundus*, Purple nutsedge, Medicinal plant, Antrolepis, pharmacological activity.

## I. INTRODUCTION

Products comes from plants are also crucial to the health care systems of the 20% of the population lives in developed nations. About 25% of prescriptions filled at community pharmacies in the US between 1959 and 1980 included plant extracts or active ingredients obtained from the highest plants, according to an analysis of the information. At least 122 compounds that are now used in more countries as significant medications are comes from 94 different plant species [1]. At least 25% of medications in current pharmacopoeias are still sourced from plants, while the majority of other pharmaceuticals are synthetic analogues based on plant-comes prototype chemicals[2].

The rhizomes of *C. rotundus* have been extensively studied since they are utilized as traditional medicines in Asian nations to treat inflammatory illnesses, stomach and intestinal problems, and other conditions [3-4].



Figure 1: Natural c.rotundus

## II. TAXANOMICAL CLASSIFICATION

Kingdom: Planta

Botanical name of plant: *L. Asp era* ( wild )

Family of the plant: Lauraceae

Super - division of plant: Spermatocyte

Sub-kingdom of the plant: Tachobionta

Division: Angiosperm Class: Dicotyledons

Sub-class of the plant: Gamopetalae

Order: Labials

Genus: Lucas

Species: *Asp era*[5]

### III. DISCRPTION

These are either annual or perennial plants that grow up to 0.5 meters (20 inches) deep in still or slowly flowing water. They are primarily aquatic. The species' heights vary widely; Some are just 5 centimeters (2 inches) tall, while others can grow up to 5 meters (16 feet). Papyrus edges, flat edges, umbrella edges, nuts edges, and galingales are some common names. With the thin, grass-leaves at the base of the plant at the top of the blooming stems, the stems are typically leafless for the majority of their length and have a circular or triangular cross-section. Clusters of wind-pollinated, greenish blooms are developed among the apical leaves. It is a little nut let seed. [6][7 ][8]

### IV. HISTORY

Pliocene hominins may have eaten the starchy tuberous edges that *C. Rotundus* possessed.[9] Biomarkers and microscopic evidence of *C. rotundus* have been discovered in human dental calculus from the Al Kiddy archeological complex in central Sudan, which dates from before 6700 BC to the Meroitic pre-Islamic Kingdom between 300 and 400 AD. *C. Rotundus* likely to have contributed to the Meroitic people of Al Kiddy's relatively low prevalence of tooth caries because it inhibits *Streptococcus mutans*.[9] *C. Rotundus* belonged to a group of starchy tuberous edges that Pliocene hominins might have consumed. [9] Human dental calculus from the Al Khiday archaeological complex in central Sudan, which dates from before 6700 BC to the Meroitic pre-Islamic Kingdom of 300?400 AD, contains biomarkers and microscopic evidence of *C. rotundus* . Because *C. rotundus* inhibits *Streptococcus mutans*, it is hypothesized that its use may have contributed to the Meroitic people of Al Khiday 's relatively low occurrence of dental caries.[9]

### V. PHYTOCHEMISY

The primary phytochemicals of *C. rotundus* include essential oils, flavonoids, terpenoids, sesquiterpenes, sitoflavone, cyperene, cyperol, nootkatone, and valencene [10,11]. Sesquiterpene alkaloids, such as rotundines A, B, and C, were discovered in *C. rotundus* [12]. Chen et al. [13] investigated the active ingredients of *C. rotundus* using GC-MS and discovered the presence of  $\alpha$ cyperone. Phenolics and flavonoids are secondary metabolites that have the ability to scavenge free radicals and act as antioxidants. HK, among others, and HKandikattu. *Cyprus Rotundas: An Ancient Weed to Modern Life Elixir*. PBR. 2021; 7(4):221-250 223 October 2021, Volume 7, Issue 4 [14]. *C. rotundus* contains phenolic compounds, including ferulic acid, galloylquinic acid, and 3-hydroxy-4-methoxy-benzoic acid [15].

### VI. PHARMACOLOGICAL ACTIVITY

#### A. Anti-Alzheimer Properties

antiAlzheimer properties of *c.rotundus* antiAlzheimer properties of *c. rotundus* Alzheimer's disease (AD) is a degenerative, irreversible illness that impairs cognition and causes neurodegeneration. In the brains of AD patients, amyloid plaques, microtubule fibers , and neurofibrillary tangles are seen. It is well recognized that oxidative stress is a major factor in the etiology of AD [16]. Following rats treated with amyloid ? Peptide ( At ) to cause memory impairment, the hydroalcoholic fraction of *C. rotundus* reduced learning impairment. One of the main ingredients in *C. rotundus* , Chaperone , interacts and binds to tubulin, destabilizing microtubule polymerization and reducing inflammation linked to AD. In a mouse model assessed by a variety of behavioral tests, our team showed that a hydroalcoholic extract of *C. rotundus* has anxiolytic effects. In a prior work, Sunil et al. also showed that the TOF fraction of *C. rotundus* reduced the neurological impairments against cerebral ischemia-re perfusion injury and restored the anxiogenic behavior in rats.[17,18].

#### B. Anti-diabetic Property

Diabetes is a chronic disease that is caused by a malfunction in the pancreatic production of insulin, which results in abnormal carbohydrate metabolism and elevated glucose levels. Kerala et al. [19] recommend a number of herbal remedies to treat this condition. Rats with alloxan-induced diabetes showed a significant reduction in blood glucose levels when given 500 mg/kg of the extract orally once daily for seven days in a row. Since *C. rotundus* demonstrated a potent 1,1- diphenyl-2-picrylhydrazyl (DPPH) radical scavenging action in vitro, the researchers deduced that this antihyperglycemic action can be ascribed to its antioxidant activity. These findings are consistent with *C. rotundas*' capacity to inhibit protein oxidation and AGE production in a fructose-mediated protein glycoxidation model. Researchers came to the conclusion that *C. rotundus* would be a good option for treating diabetic problems because non-enzymatic glycation has been demonstrated to connect with the severity of diabetes and its complications [20,21].

### C. Anti-Tumor Properties

Uncontrolled cell division and tissue destruction are hallmarks of cancer. A number of vitamins and herbs are used as natural cancer treatments. Milan-Jair and associates [22] In a study that used neuron 2a cells to screen for plants with tumoricidal effects, the ethanol extracts of *C. rotundus* was found to have only weak to moderate anticancer activity ( $LC_{50}=2.528-4.939$  mg/ml calculated from dose-dependent cell death) [23]. According to a different study, *C. rotundus* essential oil was highly effective against the leukemia cell line L1210. This result correlated with significantly increased apoptotic DNA fragmentation [24].

### D. Anti-Parkinson Properties

The degradation of dopaminergic neurons in the brain is a major cause of neurodegeneration in Parkinson's disease, a degenerative neurological disorder. Lee et al. [25] reported the neuroprotective effects of *Cyprus* water extract in an in vitro model of PC12 cells. The scientists claim that 50 and 100 kg/mL dosages of the extract recovered 50% of the cell death brought on by 6 hydroxydopamine, which causes oxidative damage and exhibits symptoms similar to Parkinson's disease. The extract successfully reduced the generation of reactive oxygen species (ROS), nitric oxide (NO), and dissipated mitochondrial membrane potential (MMP). Tyrosine hydroxylase immunostaining, a hallmark of neurodegeneration, also showed that the extract effectively repaired the dopaminergic neuronal damage, suggesting that it may have neuroprotective properties. Additionally, it decreased the expression of caspase-3, a marker of death.

### E. Gastroprotective Property

Gastroprotective drugs protect the stomach and gastric system from various types of ulcers and gastric tissue injuries. Guilder & Associates [26] In rats, *C. rotundus* extract reduced ischemia and reperfusion-induced stomach mucosal injury. Rats administered 200 and 100 mg/kg *C. rotundus* exhibited a significantly lower mean ulcer index than the control group. Treatment of *C. rotundus* significantly increased glutathione peroxidase and malondialdehyde activity [27]. *C. Rotundus* has also been proven to have cytoprotective effects in rats suffering from ethanol-induced stomach damage. Rats given oral decoctions of Rhizome Capers (1.25, 2.5, and 4.0 g crude drug/kg) 30 minutes before ethanol demonstrated a dosedependent ulcer-inhibiting action. The stomach-protective action of *C. Rotundus* in rats that had received indomethacin (5 mg/kg) beforehand, *rotundus* were significantly reduced. The authors claim that it is connected to the gastroprotective qualities of *C. rotundus*. [ 28]

### F. Anti -Histamine Properties

Exocytosis causes mast cells to release histamine during allergic or inflammatory responses. The combination of antigen and cell-fixed IgE antibodies, as well as C3a and C5a that interact with certain surface receptors, are stimuli. [29] At a dose of 0.001 g/ml, a dried rhizome ethanol/water (1:1) extract was effective in guinea pigs [30].

## VII. FINAL THOUGHTS AND PROSPECTIVE VIEWS

The prevalent neurological conditions that impact individuals worldwide include ischaemia, epilepsy, Parkinson's disease, Alzheimer's disease, and the neurodegeneration that is linked to cognitive loss. Although *C. rotundus* is a weed, it has been shown to have a number of pharmacological characteristics, including neuropharmacological ones. Nutraceuticals and pharmaceutical products have been developed using the plant's roots, which have also been widely utilised as traditional medicine to treat a variety of illnesses. Many in vitro and in vivo preclinical animal models, along with the development of scientific methodology, have established the pleiotropic properties of *mustaka* and its constituents as an ethnomedical treatment. While many of *C. rotundus*'s metabolites have been identified, only a small number of them have had their molecular mechanism and mode of action fully examined. It is important to consider the documented cytotoxic and toxicological effects of *C. rotundus*. The pharmacokinetic and pharmacodynamic characteristics of *mustaka* and its chemical constituents have, however, been the subject of some research. Additionally, this plant will be more useful in the years to come and has a lot of potential for usage in the pharmaceutical sector. Based on its cultivation in diverse agro-climatic zones, the phytochemistry of *C. rotundus*'s biochemical contents by numerous researchers worldwide using a variety of analytical methodologies revealed the plant's genetic diversity. Furthermore, to establish the phytochemicals responsible for different pharmacological effects, pharmacokinetic, pharmacodynamic, bioavailability, and pharmacognosy investigations are necessary clinical safety in humans, as well as their mechanism and mode of action at the molecular and cellular level.

## REFERENCES

- [1] Farnsworth NR, Akerelo O, Bingel AS, Soejarto DD, Guo Z. Medicinal plants in therapy. Bull World Health Organ 1985;63(6):965-81.
- [2] Ramawat SK, Shanna MC. Therapeutic potential of medicinal plants: An introduction. In: Ramawat KG, editor. Biotechnology of Medicinal Plants, Vitalizer and Therapeutics. USA: Science Publisher, Inc.; 2004. p. 1-18.5.
- [3] Dang GK, Parekar RR, Kamat SK, Scindia AM, Rege NN., Antiinflammatory activity of Phyllanthus emblica, Plumbago zeylanica and Cyperus rotundus in acute models of inflammation., Phytoter Res. 2011Jun;25(6):904-8. doi: 10.1002/ptr.3345. Epub 2010 Dec 3.
- [4] Won-Gil Seo, Hyun-Ock Pae, Gi-Su Oh, Kyu-Yun Chai, Tae-Oh Kwon, Young-Gab Yun, Na-Young Kim, Hun-Taeg Chung, Inhibitory effects of methanol extract of Cyperus rotundus rhizomes on nitric oxide and superoxide productions by murine macrophage cell line, RAW 264.7 cells, Journal of Ethnopharmacology, Volume 76, Issue 1, June 2001, Pages 59–67.
- [5] Prajapati MS, Patel JB, Modi K, Shah MB. Leucas : A review. Pharmacognosy Reviews. 2010, 4 (7): 85-8 7.
- [6] Gordon C. Tucker; Brian G. Marcks; J. Richard Carter (2003). "Cyperus Linnaeus, Sp. Pl. 1: 44. 1753; Gen. Pl. ed. 5, 26. 1754". In Flora of North America Committee (ed.). Magnoliophyta: Commelinidae (in part): Cyperaceae. Flora of North America. Vol. 23. Oxford University Press. pp. 141–191
- [7] C. D. Adams (1994). "5. Cyperus L.". In G. Davidse; M. Sousa Sánchez; A. O. Chater (eds.). Flora Mesoamericana. Vol. 6. Mexico City: Universidad Nacional Autónoma de México. pp. 423–440.
- [8] G. E. Schatz, S. Andriambololona, Andrianarivelo, M. W. Callmander, Faranirina, P. P. Lowry, P. B. Phillipson, Rabarimanarivo, J. I. Raharilala, Rajaonary, Rakotonirina, R. H. Ramananjahary, B. Ramandimbisoa, A. Randrianasolo, N. Ravololomanana, Z. S. Rogers, C. M. Taylor & G. A. Wahlert (2011). Catalogue of the Vascular Plants of Madagascar. Monographs in Systematic Botany. Missouri Botanical Garden.
- [9] Buckley, Stephen; Usai, Donatella; Jakob, Tina; Radini, Anita; Hardy, Karen (2014). "Dental Calculus Reveals Unique Insights into Food Items, Cooking and Plant Processing in Prehistoric Central Sudan". PLoS ONE. 9 (7): e100808. Bibcode:2014PLoSO...9j0808B. doi:10.1371/journal.pone.0100808. PMC 4100759. PMID 25028938.
- [10] Tsoyi K, Jang HJ, Lee YS, Kim YM, Kim HJ, Seo HG, et al. (+)-Nootkatone and (+)-valencene from rhizomes of Cyperus rotundus increase survival rates in septic mice due to heme oxygenase-1 induction. J Ethnopharmacol. 2011; 137(3):1311-7. [DOI:10.1016/j.jep.2011.07.062] [PMID]
- [11] Venuprasad MP, Hemanth Kumar K, Khanum F. Neuroprotective effects of hydroalcoholic extract of ocimum sanctum against H2O2 induced neuronal cell damage in SH-SY5Y cells via its antioxidative defence mechanism. Neurochem Res. 2013; 38(10):2190-200. [DOI:10.1007/s11064-013-1128-7] [PMID] [13] Kandikattu HK, Rachitha P, Krupashree K, Jayashree GV, Abhishek V, Khanum F. LC-ESI-MS/MS analysis of total oligomeric avonoid fraction of Cyperus rotundus and its anti-oxidant, macromolecule damage protective and antihemolytic.
- [12] Jayashree G, Kumar KH, Krupashree K, Rachitha P, Khanum F. LC-ESI-MS/MS analysis of Asparagus racemosus willd. roots and its protective effects against t-BHP induced oxidative stress in rats. Ind Crops Prod. 2015; 78:102-9.[DOI:10.1016/j.indcrop.2015.10.024]
- [13] Cheignon C, Tomas M, Bonnefont-Rousselot D, Faller P, Hureau C, Collin F. Oxidative stress and the amyloid beta peptide in alzheimer's disease. Redox Biol. 2018; 14:450-64. [DOI:10.1016/j.redox.2017.10.014] [PMID] [PMCID].
- [14] Mehdizadeh M, Hashem Dabaghian F, Shojaee A, Molavi N, Taslimi Z, Shabani R, et al. [Protective effects of Cyperus rotundus extract on amyloid  $\beta$ -peptide (1-40)-induced memory impairment in male rats: A behavioral study (Persian)]. Basic Clin Neurosci. 2017; 8(3):249-54. [DOI:10.18869/nirp.bcn.8.3.249] [PMID] [PMCID].
- [15] Azimi A, Ghaffari SM, Riazi GH, Arab SS, Tavakol MM, Pooyan S. A-cyperone of Cyperus rotundus is an effective candidate for reduction of inflammation by destabilization of microtubule fibers in brain. J Ethnopharmacol. 2016; 194:219- 27. [DOI:10.1016/j.jep.2016.06.058] [PMID].
- [16] Venuprasad MP, Kandikattu HK, Razack S, Khanum F. Phytochemical analysis of ocimum gratissimum by LC-ESI-MS/MS and its antioxidant and anxiolytic effects. S Afr J Bot. 2014; 92:151[DOI:10.1016/j.sajb.2014.02.010].
- [17] Razack S, Kandikattu HK, Venuprasad MP, Amruta N, Khanum F, Chuttani K, et al. Anxiolytic actions of nardostachys jatamansi via GABA benzodiazepine channel complex mechanism and its biodistribution studies. Metab Brain Dis. 2018; 33(5):1533-49. [DOI:10.1007/s11011-018-0261-z] [PMID].
- [18] Kakarla L, Katragadda SB, Tiwari AK, Kotamraju KS, Madhusudana K, Kumar DA, et al. Free radical scavenging,  $\alpha$ -glucosidase inhibitory and anti-inflammatory constituents from Indian sedges, Cyperus scariosus R.Br and Cyperus rotundus L. Pharmacogn Mag. 2016; 12(Suppl 4):S488-S96. [DOI:10.4103/0973-1296.191467] [PMID] [PMCID].
- [19] Raut, N.A.; Gaikwad, N.J. Antidiabetic activity of hydro-ethanolic extract of Cyperus rotundus in alloxan induced diabetes in rats. Fitoterapia 2006, 77, 585–588.
- [20] Ardestani A and Yazdanparast R, Cyperus rotundus suppresses AGE formation and protein oxidation in a model of fructose-mediated protein glycoxidation, Int J Biol Macromol , 2007, 41(5), 572-578.
- [21] Kilani-Jaziri S, Neffati A, Limem I, Boubaker J, Skandrani I, Sghair MB, et al. Relationship correlation of antioxidant and antiproliferative capacity of Cyperus rotundus products towards K562 erythroleukemia cells. Chem Biol Interact. 2009; 181(1):85-94. [DOI:10.1016/j.cbi.2009.04.014] [PMID].
- [22] Kakarla L, Katragadda SB, Tiwari AK, Kotamraju KS, Madhusudana K, Kumar DA, et al. Free radical scavenging,  $\alpha$ -glucosidase inhibitory and anti-inflammatory constituents from Indian sedges, Cyperus scariosus R.Br and Cyperus rotundus L. Pharmacogn Mag. 2016; 12(Suppl 4):S488-S96. [DOI:10.4103/0973-1296.191467] [PMID] [PMCID].
- [23] Mazzi E A and Soliman K F A, In vitro screening for the tumoricidal properties of international medicinal herbs, Phytoter Res,2009, 23(3), 385-398.
- [24] Kilani, S.; Ledauphin, J.; Bouhlel, I.; Ben Sghaier, M.; Boubaker, J.; Skandrani, I.; Mosrati, R.; Ghedira, K.; Barillier, D.; Chekir-Ghedira L. Comparative study of Cyperus rotundus essential oil by a modified GC/MS analysis method. Evaluation of its antioxidant, cytotoxic, and apoptotic effects. Chem. Biodivers. 2008, 5, 729-742.
- [25] Lee CH, Hwang DS, Kim HG, Oh H, Park H, Cho JH, et al. Protective effect of cyperi rhizoma against 6-hydroxydopamine-induced neuronal damage. J Med Food. 2010; 13(3):564-71. [DOI:10.1089/jmf.2009.1252] [PMID].
- [26] Muhammet EG, Ozgönül A, Kilic IH, Sögüt O, Ozaşlan M, Bitiren M, et al. Gastroprotective effect Of Cyperus rotundus extract against gastric mucosal injury induced by ischemia and reperfusion in rats. International Journal of Pharmacology. 2010; 6:(2)104-10. [DOI:10.3923/ijp.2010.104.110].
- [27] Santhosh Kumari, Govindasamy, Sukumarb. Lipid lowering activity of Eclipta prostrata in experimental hyperlipidemia. Journal of Ethnopharmacology 2006; 105: 332–335. 65.



- [28] Zhu M, Luk HH, Fung HS, Luk CT. Cytoprotective effects of *Cyperus rotundus* Linn. against ethanol induced gastric ulceration in rats. *Phytother Res* 1997; 11(5): 392-94 .
- [29] Dr.. Manjunatha P. Mudagal and Dr. Udaya Raj Sharma, A text book of pharmacology 2 , published by Nirali Prakashan , page no. 12.2-12.3.
- [30] Saxena RC. *Cyperus rotundus* in conjunctivitis. *J Res Ayurveda Siddha* 1980;1(1):115-20.



10.22214/IJRASET



45.98



IMPACT FACTOR:  
7.129



IMPACT FACTOR:  
7.429



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24\*7 Support on Whatsapp)