

A Comprehensive Review on Phytochemistry and Pharmacological Activities of *Cyperus Rotundus* L.

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ABSTRACT

The important aromatic plant *Nagarmotha* (*Cyperus rotundas*), also referred to as nutgrass, is prized for its essential oil, which finds extensive use in a variety of industries and has a wide range of medical significance. Due to the exponential growth of medicinal and aromatic products worldwide, the chromatic pharmaceutical industries are currently investigating manufacturing accessories for their potential medical benefits. Since these plants contain physiologically active compounds that have exhibited a range of therapeutic effects, it has recently been established that plant-derived oils are more advantageous than synthetic goods in the pharmaceutical sector. To emphasize the medicinal advantages of plant extracts, a thorough investigation has been conducted. Anti-hyperglycemic, anti-nociceptive, hepatoprotective, anti-fungal, plant growth regulator (PGR), insecticidal, and ovicidal compounds are just a few of the many uses for *C. scariosus* extracts. The Indian medicinal plant *C. scariosus*, commonly referred to as "*Nagarmotha*," has been demonstrated to have numerous health benefits.

Keywords: *Cyperus rotundas*, *Nagarmotha*, Phytochemistry, Pharmacological activities

INTRODUCTION

The important aromatic plant *Cyperus rotundas* which is belonging to family *Cyperaceae*. Other names for it

include *Koraikkilangu* in Tamil, *Lawalain* in Marathi, *Nagarmotha* in Hindi, *Nagar Musta* in Sanskrit, and *xiangfu/xiangfuzi* in Chinese.¹⁻³



Fig: *Cyperus Rotundus* L. Herb

Tropical, subtropical, and temperate regions are often ideal for this plant's growth. Since ancient times, traditional medication systems have utilized this Indian medicinal manufacturer, which has been shown to offer numerous health benefits, to treat a variety of affectional disorders. Terpenoids, sesquiterpenes, hydrocarbons, steroidal saponins, flavonoids, ketones, and essential oil painting are all

present⁴ An overview of accomplishment, production, post-harvesting, and root rhizome is given in the continuous review composition. Evaluation of distilled material/oil painting quality and applications in addition to being a significant source of naturally occurring organic chemicals, medicinal and aromatic plants are utilized extensively in medicine. Even if they are acknowledged as an alternative medical

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system, traditional medical practices continue to be crucial in meeting the fundamental medical needs of developing nations. Medicinal plants are used to cure a variety of illnesses because they have less adverse effects than manufactured medications⁵⁻⁶ Natural products serve as lead molecules with an infinite variety of chemical structures, whose activities can be improved through de novo synthesis or chemical manipulation. Essential oils and various plant extracts are examples of naturally occurring biologically active substances that are less harmful and offer a wealth of potential disease-control agents.⁷

1. Geographical distribution:

Numerous aromatic and other therapeutic plants in the Cyperaceae family contain chemical compounds with biologically significant characteristics. With over 3700 species spread across 70 genera, *Cyperus scariosus* is a remarkable multipurpose medicinal herb belonging to a broad, international family of monocotyledons⁸⁻⁹



Fig: Tubers of Cyperus Rotundas L.

Although it grows in sandy and loamy soil moist fields, especially in Pacific Islands and along coastal regions, the plant needs sun and moisture. With its tangle of roots and rhizomes that grow 3–4 cm deep

in the soil and have a pleasant, aromatic scent, *C. Scariosus* grows quickly and fills the soil. Its essential oil is primarily used as an anti-inflammatory, anti-microbial, and antifungal agent and is also one of the ingredients in several ayurvedic formulations.¹⁰⁻¹²

Table No.1: Geographical Distribution of Cyperus Species: -

Plant species	region	Parts to be used	Traditional use	Instruction
Cyperus rotundus L.	North west, Himalayas /India	Roots	Skin problems	Decoction of fresh leaves are used
	India/Pakistan	Tubers	Diabetes mellitus	powder of tubers about 10-12g daily
	India	Whole plant	Menstruation realated problems	30g dried powder or 100ml citrus juice taken once daily for a week
	Tamil Nadu	Tubers	Snake bite	Paste of leave is applied on bite area
	India	Roots /tubers	Kidney stone	decoction of plant
	India	Whole plant	epilepsy	Plant decoction with Honey
	India	Roots	Cholera	Roots boiled with equal amount of mint
	India	Roots	Pimples	Root with Turmeric and Curd
	India	Roots	In lactation problem	Root paste applied on breast
	Norrth West Himalaya	Roots	In fevers	Decoction of root

	India	Tubers and Leaves	Skin problems like Dermatitis	Decoction of root and leaves taken orally
	India	Tubers	diarrhoea	Use orally diarrhoea
	India	Tubers	Stomach Pain and Indigestion	10-12g powder taken orally
	India	Tubers	Vaginal Discharge	tuber powder with cuminum seed
	India	Whole plant	Loss of libido in men	Extract of whole plant mainly leaves
	india	Tubers	Constipation	Macerated juice about ½ cup daily
	India	Tubers	Jaundice / hepatitis	Juice of fresh rhizome
	India	Tubers /leaves	Bronchial spasm /Bronchitis	Powder of tubers or leaves are taken orally for 30 days
	China, Rarotonga	Tubers	Cough or sore throat	Crush tuber powder in water treatment last for 3 days
Cyperus monocephalus Roxb.	Philippines	Tubers	Dermatosis	tuberous root decoction
	Tami Islands	Tubers	wormicidal Ringworm	Tuber decoction with added lime
Cyperus Compressus L.	India	Roots	Helminthiasis	Administer orally roots powder
Cyperus pedunculatus	West Africa	Leaves and Roots	Kidney diseases, Pain and Inflammation	Extract of whole plant is used

2. Taxonomy:¹³

The following is the categorization for C. Rotundas



Fig: Style of Cyperus Rotundas L.

Table no.2: Taxonomical Categorization: -

Taxonomic Rank	Taxon
Phylum	Angiosperm
Kingdom	Planta
Sub-kingdom	Trichophytes
Class	Liliopsida
Subclass	Commelinidae
Order	Poales (Cyperales)
Family	Cyperaceae
Genus	Cyperus
Species	Scariosus
Super division	Spermatophyte
Division	Magnoliophyte

3. Phytochemical investigation:¹⁴⁻¹⁸

Sesquiterpenes, including cyperene, rotundene, rotundenol, isopatchoula-3,5-diene, isopatchoul-3-ene, β -selinene, isopatchoulene, and scariodione, make up the majority of the essential oil of *C. Scariosus*. According to phytochemical research, this herb's main chemical constituents are polyphenol, flavonol, glycoside, alkaloid, saponins, and sesquiterpenoids.

3.1 Essential oil

Here are key essential-oil compounds reported from *Cyperus rotundus* (commonly known as Nagarmotha):

Major compounds

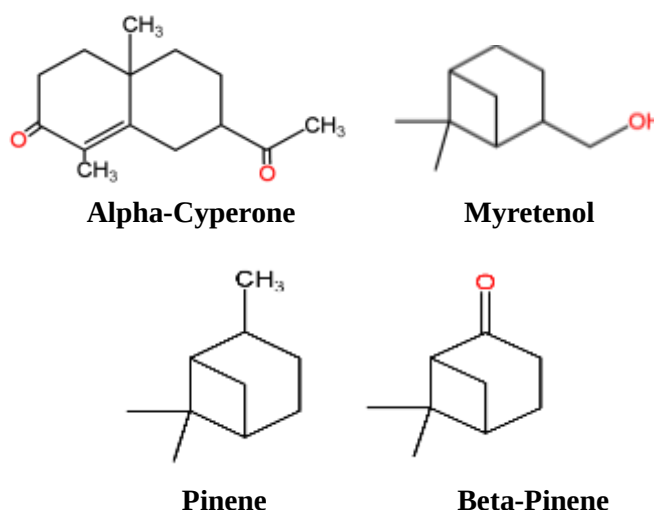
α -Cyperone: - identified as a major sesquiterpene ketone. For example, in one study of rhizome oils: " α -cyperone (11.0%)

β -Pinene & α -Pinene: -monoterpenes seen in some samples: e.g., " β -pinene (11.3%), α -pinene (10.8%) ..." in one oil sample.

Caryophyllene oxide: -another sesquiterpenoid present as a significant component.

Cyperene & Cyperotundone: -in oils from some regions: "cyperene (19.2-30.9%) and α -cyperone (4.5-25.2%)

Other sesquiterpenes such as β -selinene, α -selinene, humulene epoxide etc. For example: " α -humulene (14.3%), caryophyllene oxide (12.3%), humulene-1,2-epoxide (9.1%), valencene (8.2%), β -selinene (7.9%) ..." from a study in Nigeria.³¹



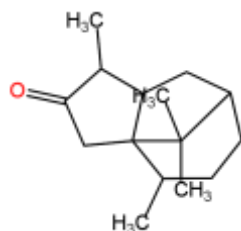
3.2 Sesquiterpines:

Following are the sesquiterpene present in *Cyperus rotundus* (Nagarmutha)

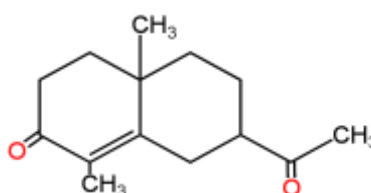
Table No 3: - Sesquiterpines in *C. Rotundus*

Sr No.	Compound (Sesquiterpines)	Type	Reference
1	α -Cyperone	Oxygenated sesquiterpene ketone	<i>Singh et al., Journal of Essential Oil Research, 2002; PMID: PMC6254851</i>
2	Cyperotundone	Oxygenated sesquiterpene	<i>Kim et al., Molecules, 2018; PMID: PMC6254851</i>
3	Cyperene	Hydrocarbon sesquiterpene	<i>Ahmad et al., Molecules, 2023; PMID: PMC10183317</i>
4	β -Caryophyllene	Sesquiterpene hydrocarbon	<i>Singh et al., Flavour and Fragrance Journal, 2002; PMID: PMC6254851</i>
5	Caryophyllene oxide	Oxygenated sesquiterpene	<i>Bhattacharyya et al., Current Science, 2019; Current Sci. 2019, 57</i>
6	α -Humulene	Sesquiterpene hydrocarbon	<i>Bhattacharyya et al., Current Science, 2019</i>

7	β -Selinene	Hydrocarbon sesquiterpene	Ahmad et al., <i>Molecules</i> , 2023
8	α -Selinene	Hydrocarbon sesquiterpene	Singh et al., <i>J. Essential Oil Res.</i> , 2002
9	Humulene epoxide I & II	Oxygenated sesquiterpenes	Ahmad et al., <i>Molecules</i> , 2023
10	Valencene	Hydrocarbon sesquiterpene	Bhattacharyya et al., <i>Current Science</i> , 2019
11	Patchoulone	Oxygenated sesquiterpene	Kim et al., <i>Molecules</i> , 2018
12	Rotundene	Hydrocarbon sesquiterpene	Ahmad et al., <i>Molecules</i> , 2023
13	Cyperolone	Oxygenated sesquiterpene	Singh et al., <i>Journal of Essential Oil Research</i> , 2002
14	Isocyperol alcohol	Oxygenated sesquiterpene	Ahmad et al., <i>Molecules</i> , 2023
15	Mustakone	Sesquiterpene ketone	Singh et al., <i>Flavour and Fragrance Journal</i> , 2002



Cyperotundone

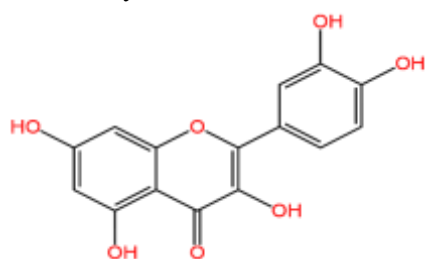


Alpha-Cyperone

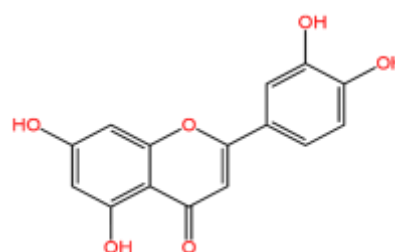
3.3 Flavonoids:

Examples of flavonoids include orientin and vitexin. Quercetin 3-O- β -D-glucopyranoside, cinnaroside, Myrcetin 3-O- β -D-glucopyranoside, isnagin, Tricin, isorhamnetin, ammiol, khellin, and luteolin Luteolin 7, 3'-dimethyl ether, 3'-methyl ether, Luteolin 5, 3'-

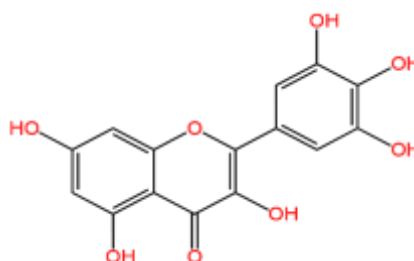
dimethyl ether, luteolin 4'-glucoside, Tricin 5-glucoside, luteolin 7-diglucoside, Cyperus rotundus contains kaempferol. This shows that flavonol has a unique derivative. The plant is called cyperafloside, which is myricetin 3,3',5'-(Trimethyl ether 7-O- β -D-glucopyranoside)²⁰⁻²¹



Quercetin



Luteolin

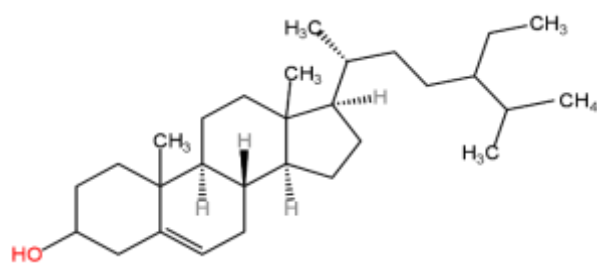


Myricetin

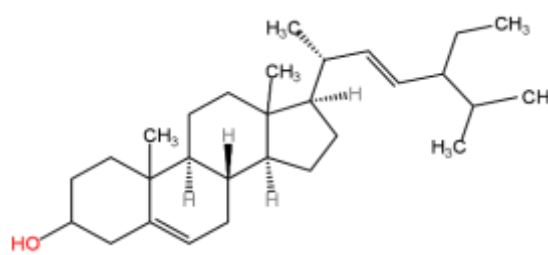
3.4 Steroid:

Among the well-known steroids found in Cyperus rotundus are steroidal glycoside, sitosteryl-(6'-

hentriacontanoyl)- β -D-galactopyranoside, sitosterol, stigmasterol, sitosterol glucoside, stigmasterol glucoside, chrysoeriol, kaempferol, luteolin, quercetin, rutin, and khellol-D-glucopyranoside²²⁻²³



Sitosterol

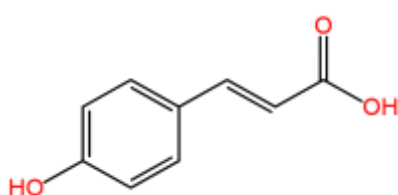


Stigmasterol

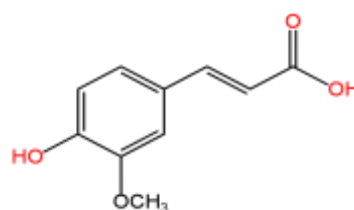
3.5 Phenylpropanoid:

P-Coumaric acid, ferulic acid, isoaragosome, chionoside A, and helioside C are among the

phenylpropanoid chemicals found in *Cyperus rotundus* tubers and rhizomes²⁴⁻²⁵



P-Coumaric acid

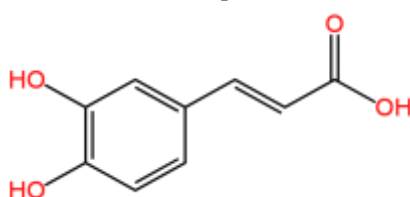


Ferulic acid

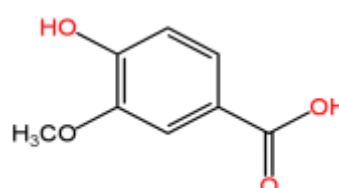
3.6 Phenolic Substances:

Among the recognized phenolic chemicals found in *Cyperus rotundus* tubers and aerial parts are P-

hydroxybenzoic acid, protocatechuic acid, vanillic acid, ellagic acid, salicylic acid, protocatechuic acid, caffeic acid, and p coumaric acid.²⁶⁻²⁷



Caffeic acid



Vanillic acid

3. 7 Iridoides, Benzodihydrofurans, and other compounds:

6-O-p-Coumaroylgenipin gentiobioside

Rotunduside A & Rotunduside B. These substances are all classified as phytochemical²⁸⁻³⁰

4. Pharmacological Activities:

Activities related to pharmacology Many workers have studied and reported that *Cyperus* contains a variety of chemical compounds, including notably sesquiterpenoids, the majority of which may exhibit pharmacological activity³¹

4.1 Anti-Diarrheal:

Uddin et al. Used castor oil-induced diarrhea in rat models to examine *Cyperus rotundus*'s anti-diarrheal properties. According to the study, oral methanolic extract administration at 250 and 500 mg/kg b.w. showed potent anti-diarrheal effects. The antibacterial qualities of *Cyperus rotundus* were studied by Jabier et al. Both gram-positive and gram-negative bacteria are among the kinds they use. For instance, compared to gram-negative bacteria, *Cyperus rotundus* oil exhibited the strongest inhibitory effects on gram-positive bacteria. Pharmacological activities³²

4.2 Anti-Obesity:

Rats' obesity was lessened by the lipolytic action of *C. Rotundus* preparations (powder in fine suspension,

aqueous and alcoholic extracts), which mobilized fat from their adipose tissues. Pharmacological action ³³

4.3 Insect Repellent Activity:

Insect-related behavior: The phytochemical screening and insecticidal testing of *C. Rotundus* were evaluated in a research. It works almost as well as organophosphate and is more effective than carbamate. Based on the findings, *C. Rotundus* came in first since all test subjects (ants) perished in 10 seconds or less (10). Organophosphate came in second place with nine kills. Carbamate came in last, with seven ants dying after twelve seconds, while the other ants perished in ten seconds.³⁴

4.4 Activity for Wound Healing:

The goal of this study was to see if extracts from tuber segments of *C. Rotundus* could help wounds heal. The ability of an alcoholic extract of *C. Rotundus* tuber components, which is used as an ointment, was evaluated for its capacity to Treat wounds using rat models of excision, incision, and dead space wounds. In each of the Compared to previously published wound models in, the extract ointments demonstrated notable differences. response in terms of tension to the common nitrofurazone ointment (0.2% w/w NFZ) wound closure length, strength, and ability to contract ³⁵

4.5 Ovicidal and Larvicidal Activity:

Essential oils derived from tubers of *C. Rotundus* have ovicidal and larvicidal effects. tested on fourth-instar larvae and eggs of *Aedes albopictus*. After exposing the larvae and eggs They were watched for the entire day at a variety of oil concentrations, ranging from 5 to 150 ppm. The oils had LC₅₀ and LC₉₀ concentrations of less than 20 ppm and EC₅₀ values of less than 5 ppm, suggesting that they were effective. possess significant larvicidal and ovicidal properties. The essential oils of were found to be larvicidal and ovicidal in the study. Certain *Cyperus* species may provide a natural source of compounds that kill insects.³⁶

4.6 Antiplatelet Activity:

C. Rotundus is a well-known traditional oriental treatment with a wide range of biological effects. The

circulatory system is one of several systems that have demonstrated broad-spectrum activity. Its However, the antiplatelet action is unknown. The goal of this research was to ascertain the The antiplatelet effects of CRE and its constituents. Bleeding times in rat platelets and mouse tails In vitro and ex vivo aggregation assays were used to assess the antiplatelet properties of CRE and its components. eight unique items. Results: The in vitro platelet aggregation test revealed that CRE induced platelet aggregation. Lowered platelet aggregation, collagen, and/or thrombin in a concentration-dependent manner, and in a way that is statistically important.³⁷

4.7 Antimalarial Activity:

Compounds such as were discovered by activity-guided investigation of *C. Rotundus* tubers. Patchoulone, caryophyllene oxide, 10,12-peroxycalamenene, and 4,7-dimethyl-1-tetralone. These compounds possess antimalarial characteristics. Activity in the 10-4-10-6 MHz range of the EC₅₀. The book endoperoxide sesquiterpene 10,12-peroxycalamenene is one of theme³⁸

4.8 Antioxidant:

C. Scariosus plants grown in 50% methanol have demonstrated a potentially important ability to scavenge radicals and stop oxidative DNA damage. U937 cells were not harmed by the *C. Scariosus* extracts. To better understand the basis of their antioxidant properties, TPC, TFC, and ASC were identified. The antioxidant qualities of the extract are supported by its notably high TPC and TFC contents ^{39,40}

4.9 Hepatoprotective Activity:

The hepatoprotective effect of can be demonstrated by giving rats carbon tetrachloride, which causes liver injury two crude fractions from the rhizomes, solvent ether and ethyl acetate, and an ethyl acetate extract of *C. Rotundus* (Cyperaceae) was examined. The ethyl acetate extract significantly lowered glutamic pyruvic transaminase, glutamic oxaloacetic transaminase, and alkaline serum concentrations total bilirubin and phosphatase at an oral dose of 100 mg/kg. Histopathological examination of The biochemical findings were corroborated by sections of the liver.

Furthermore, silymarin was employed as a positive regulation. The brain the raw enzyme Na⁺/K⁺-ATP-ase found in rat brains showed a notable increase in activity. an extract from *C. Rotundus* that inhibits Na⁺/K⁺ ATP-ase^{41,42}

4.10 Anti-cancer Activity:

C. Rotundus ethanolic extract demonstrated only low to moderate anticancer activity (LC₅₀=2.528-4.939 mg/ml estimated from dose-dependent cell death) in a study that used neuro-2a cells to assess plants for tumoricidal activities. In another investigation, it was discovered that *C. Rotundus* essential oil was very effective against L1210 leukemia cell lines. This result was strongly associated with increased fragmentation of apoptotic DNA.^{43,44}

4.11 Hemodynamic Hypotensive Activity:

C. Rotundus's alcoholic extract raised sweating and led to a gradual and consistent decrease in blood pressure. The extract partially inhibited the effects of histamine but did not alter the effects of acetylcholine or adrenaline on blood pressure.⁴⁵

4.12 Cytoprotective Affect:

As evidenced by the following examples of cytoprotection, *C. Rotundus* rhizome decoctions demonstrated cytoprotective effects, or ulcer inhibitory efficacy, against stomach injury caused by ethanol. Impacts. Rats should be administered 1.25, 2.5, or 4.0 g/kg of crude drug orally 30 minutes before getting 10 mL/kg of 40% ethanol, which has the following effects: may prevent ulcers, depending on the dosage. Additionally, subcutaneous injection of the decoction (0.3–0.6 g/kg) had a similar effect, with systemic effects shielding the stomach. When the ethanol decoction was given orally (2.5–4.0 g/kg) or subcutaneously (0.3 g/kg) to rats, the stomach motility was significantly reduced when compared to the controls. Indomethacin pre-treatment (5 mg/kg) markedly decreased the stomach-protective impact of *Candida rotundus*.⁴⁶

4.13 Anticonvulsant Activity:

Anticonvulsant activity was shown in mice that had been given an ethanolic extract of *C. Rotundus* prior to the experiment. a strong protection against seizures

brought on by strychnine and leptazol. The duration of the rhizome ethanol extract significantly decreased hind limb extension and seizure activity. The dose of 100 mg/kg given orally (p.o.) to animals was comparable to the norm ($p < 0.001$). Diazepam (4 mg/kg, i.p.; Indian Pharmacopoeia) and phenytoin (25 mg/kg, i.p.;) are the medications used. Indian Pharmacopoeia), respectively. These findings imply that the ethanol extract of the The rhizome is useful for producing a powerful phytoconstituent that can cure epilepsy, and the extract's Its flavonoids may be responsible for its anticonvulsant properties.^{47,48}

4.14 Nociceptive Inhibition:

Investigated the anti-nociceptive properties of a methanol extract of *C. Scariosus* leaves [2]. Five sets of seven mice each were created from the animals. Group I was used as a control (10 mg/kg body weight, 1% Tween 80 in water). Group-II mice received 200 milligrams of aspirin per kilogram of body weight. 30 minutes prior to the acetic acid injection, groups III through V received oral doses of the extract at 50, 100, and 200 mg/kg body weight, respectively. A dose of 10 ml/kg body weight of 1% acetic acid was administered intraperitoneally to all groups to cause pain. Each animal was given five minutes, after which the number of writhings was counted for ten minutes.⁴⁹

4.15 Spasmolytic and Hypotensive Effects:

Hydro-methanolic extract of IV administered at concentrations of 3–10 mg/kg, *Cyperus scariosus* had hypotensive and Bradycardia-inducing consequences. In spite of therapy, these effects persisted. Atropinized animals demonstrating the cardiovascular consequences of the plant extract does not work by activating Muscarinic receptors. In vitro experiments, it inhibited the rat uterus, guinea pig paired atria's spontaneous contractions as well as rabbit jejunum at concentrations ranging from 0.1 to 1.0. in a manner similar to mg/mL. Additionally, it prevented the release of histamine and acetylcholine induced contractions of guinea pig ileum, which suggests non-spasmolytic effect. It blocked rabbit aorta at a certain point induced by K⁺ (80 mM) and norepinephrine (10 pM) concentrations of contractions were similar, ranging from 0.1 to 1 mg/ml. The evidence suggests that *Cyperus scariosus*

possesses a Ca^{2+} channel blocker. The general spasmolytic action of, and the in vivo effect seen in folkloric application in diarrhea may be explained by the plant⁵⁰

4.16 Antidepressants Activity:

Mice treated with an n-hexane extract of *C. Scariosus* oil showed antidepressant effects. Antidepressant activity was assessed in mice using the forced swim test and tail suspension test at two dose levels of 100 and 200 mg/kg. The outcomes were contrasted with those of the conventional medication, imipramine, at 15 mg/kg. Similar to the common medication imipramine, *C. Scariosus* n-hexane extract oil considerably ($p < 0.001$) decreased⁵¹

4.17 Hypolipidemic Activity:

the effects of a hydroalcoholic extract of *Cyperus scoparius* Linn. Root (HCS) on guinea pigs given a diet high in cholesterol in terms of its lipid-lowering and antioxidant properties. *Cyperus scariosus* hydroalcoholic extract reduced the serum lipid profile and atherogenic indices at both doses ($P < 0.05$).

Additionally, serum AST, ALP, and LDH levels were decreased by the greater dose of hydroalcoholic extract, while rosuvastatin raised AST and ALP levels ($P < 0.05$). The antioxidant activity of the extract's phenolic components may be the cause of the treated animals' improved hepatocytes and reduced fat buildup on liver histology.⁵²

5. Applications of Ethnopharmacology:^{53,54}

A component of Musta Indication

- **Tubers:** fever, diarrhea, dysentery, dyspepsia, Cholera, Vomiting.
- **Fresh tuber:** Paste is used as galactogog is used to treat spreading ulcers and scorpion stings.
- **Root:** leprosy, thirst, fever, blood illness, Dysentery, pruritus, discomfort, vomiting, biliousness, Erysipelas, ophthalmia, and epilepsy.
- **Bulbous root:** Dysentery, stomach problems, Intestinal Problem.

Table No.4: Chemical Constituent and Pharmacological Activities

Sr. No.	Class of Substance	Chemical Entity	Pharmacological activity	Reference
1	Essential Oil	Cyperone	Anti-inflammatory, Neuroprotective, Dysentery ⁵⁶	Bingxu Huang et-al
		Myretenol	Anti-inflammatory, Antioxidant, Antibacterial, Anxiolytic ⁵⁷	Shengming Huang et-al
		Beta-pinene	Antimicrobial, Woody Scent perfume, Airfreshner ⁵⁵	Adama Ndao et-al
		Pinene	Fragrances, Antimicrobial, potential antitumor action ⁵⁵	Adam Nao et-al
2.	sesquiterpenes	Cyperone	Anti-inflammatory, Neuroprotective, Dysentery	Bingxu Huang et-al
		cyperotundone	Digestive disorder, Diarrhoea ⁵⁸	Muhammad said Hamid Akas et-al
3	Flavonoids	Quercetin	Antioxidant, Anticancer, Anti-inflammatory, Arthritis, CVS Disorder ⁶⁰	Samaria Krishna et-al
		Luteolin	Anti-inflammatory, Antioxidant, Anticancer ⁵⁹	Samaria Krishna et-al
		Myrecetin	Antioxidant Anticancer, Myocardial Dysfunction, anti-inflammatory, Antiplatelet action ⁵⁹	Samaria Krishna et-al
4	Steroid	Beta-sitosterol	Hypolipidemic action, Anticancer, Antidiabetic action, Antioxidant, Immunomodulatory activities ⁶¹	Jill A Makossa et-al
		Stigmesterol	Hypolipidemic action, Anticancer, Antidiabetic action, Antioxidant, Immunomodulatory activities ⁶	Jasmine Chaudhary et-al

5	Phenylprop anoid	P-coumeric Acid	Antioxidant, Antidiabetic action, Antimellanogetic Action ⁵⁸	<i>Young Chool Boo et- al</i>
		Ferulic Acid	Antioxidant, Antidiabetic, Vanillin Precursor, Cosmetic and Anticancer ⁵⁸	<i>Young Choo Boo</i>
6	Phenolic Substance	Caffeic Acid	Antioxidant, Anticancer, Obesity, Metabolic syndrome, Neuroprotective, Antiviral ⁶²	<i>Neal pavlova Et-al</i>
		Vanillin Acid	Sedative, Antidepressant, Nociceptive Inhibition, Hepatoprotective, Antihypertensive, Wound Healing, Antifungal ⁶³	<i>Nares Kumar et-al</i>
7	Other Substance	Rotund side A&B	Anti-inflammatory, sedative, Anxiolytic, Antimicrobial, Antidiabetic ⁵⁸	<i>Muhammad said Hamid Akas et-al</i>

RESULT:

The review comprehensively established that *Cyperus rotundus* L. (Nagarmotha) possesses a rich and diverse phytochemical profile, primarily composed of sesquiterpenes, flavonoids, phenolic acids, steroids, and essential oils. Major bioactive constituents such as α -cyperone, cyperotundone, cyperene, β -caryophyllene, luteolin, quercetin, and sitosterol have been identified as responsible for the plant's multiple pharmacological properties. Experimental findings reported in various studies demonstrated that extracts of *C. rotundus* exhibit significant anti-inflammatory, antioxidant, hepatoprotective, antidiarrheal, antiplatelet, antimalarial, antinociceptive, anticonvulsant, and anticancer activities. Essential oils from the rhizomes showed potent insecticidal, ovicidal, and larvicidal effects, while methanolic and ethanolic extracts revealed marked wound-healing, cytoprotective, and antidiabetic actions. Additionally, biochemical and histopathological studies confirmed that *C. rotundus* extracts reduce elevated liver enzyme levels, inhibit oxidative stress, and protect cellular structures from damage. The plant also exhibited hypolipidemic and antidepressant properties in preclinical models, demonstrating its potential as a broad-spectrum therapeutic agent derived from natural sources.

CONCLUSION

Cyperus rotundus L. is a pharmacologically potent medicinal herb endowed with numerous bioactive constituents that contribute to its wide therapeutic applications. Its essential oils and extracts exhibit substantial biological activities including antioxidant, anti-inflammatory, hepatoprotective, antimicrobial, antidiabetic, and anticancer effects, validating its

long-standing traditional uses in Ayurveda and other ethnomedicinal systems. The broad range of secondary metabolites—particularly sesquiterpenes, flavonoids, and phenolic compounds—illustrates the plant's potential as a source of natural drug leads for managing various pathological conditions. However, despite extensive preclinical evidence, further pharmacokinetic, toxicological, and clinical investigations are necessary to confirm its safety, efficacy, and dosage standardization for therapeutic use. Overall, *Cyperus rotundus* stands out as a valuable medicinal and aromatic plant with significant potential for development into modern herbal formulations and phytopharmaceutical products.

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