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MUSTA (CYPERUS ROTUNDUS LINN.) AS GRAHI AND DEEPANIYA DRAVYA WITH APPLICATION IN GASTROINTESTINAL DISORDERS: A-CRITICAL REVIEW

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ABSTRACT

Musta[1](Cyperus rotundus Linn.), a widely known medicinal herb in Ayurveda, is recognized for its versatile therapeutic potential, particularly in gastrointestinal disorders. Classified under *Trushnighna gana*[1] and described as *Grahi* (absorbent) and *Deepaniya* (digestive stimulant) in Ayurvedic texts. Musta plays a significant role in correcting digestive imbalances. The *Grahi* property aids in the absorption and consolidation of intestinal contents, making it useful in conditions such as diarrhea, malabsorption syndrome, and irritable bowel disorders, whereas the *Deepaniya* action enhances *Agni* (digestive fire), supporting appetite, digestion, and nutrient assimilation. Modern pharmacological studies have reported its anti-diarrheal, anti-inflammatory, antispasmodic, and carminative properties, correlating with the traditional claims. The essential oils, flavonoids, and terpenoids present in Musta contribute to its gastro-protective actions. This review critically explores the Ayurvedic and modern perspectives of Musta with emphasis on its *Grahi* and *Deepaniya* effects, highlighting its clinical relevance in gastrointestinal disorders. By integrating classical references with contemporary evidence, the article aims to establish Musta as a promising therapeutic agent bridging traditional wisdom and modern medicine in the management of digestive pathologies.

KEYWORDS: Musta[1], *Cyperus rotundus Linn.*, *Grahi dravya*[1,2], *Deepaniya dravya*[1],

Gastrointestinal disorders, Ayurveda.

INTRODUCTION

Musta (**Cyperus rotundus Linn.**, Family: **Cyperaceae**) is a perennial, slender, aromatic herb commonly known as **Nut grass** or **Purple nutsedge**. It has a creeping rhizomatous rootstock with numerous tuberous roots, slender erect culms 10–40 cm high, and narrow grass-like leaves arising from the base. The inflorescence is an umbel of reddish-brown spikelet's. It is distributed throughout India in tropical and subtropical regions. Taxonomically, it belongs to the Kingdom *Plantae*, Division *Magnoliophyta*, Class *Liliopsida*, Order *Poales*, Family *Cyperaceae*, and Genus *Cyperus*. In Ayurveda, *Musta* is valued for its **Grahi**, **Dīpana**, and **Tr̥ṣṇāghna** properties, beneficial in digestive and Pitta–Kapha disorders. Ayurveda, the ancient system of medicine, emphasizes the maintenance of health and the treatment of disease through the balance of *Agni* (digestive fire), *Doshas* (functional principles), and *Dhatus* (body tissues). Among these, the role of *Agni* is considered central, as impaired digestion and metabolism (*Agnimandya*) are believed to be the root cause of various disorders, particularly those affecting the gastrointestinal (GI) system. A wide range of formulations and single drugs are described in the classical texts for correcting digestive dysfunctions, among which *Musta* (Cyperus rotundus Linn.) holds a prominent place.

Musta is classified as a *Grahi* (absorbent) and *Deepaniya* (digestive stimulant) drug. The *Grahi* property of Musta helps in the absorption and consolidation of intestinal contents, making it useful in conditions such as *Atisara* (diarrhea), *Grahani* (malabsorption syndrome), and allied GI disorders. Its *Deepaniya* property enhances the function of *Jatharagni*, thereby improving digestion, appetite, and nutrient assimilation. Classical texts like *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya* have described Musta as beneficial in disorders of the digestive tract, fever, and gynecological conditions.

From a pharmacological perspective, Musta contains bioactive compounds such as essential oils, flavonoids, and terpenoids that exhibit anti-diarrheal, anti-inflammatory, antioxidant, and gastro-protective effects. These properties provide a scientific rationale for its traditional applications in gastrointestinal disorders. In contemporary times, functional gastrointestinal diseases such as irritable bowel syndrome, chronic diarrhoea, dyspepsia, and inflammatory bowel conditions are increasingly prevalent, necessitating safe and effective therapeutic options.

AIMS

To review the classical and contemporary knowledge of **Musta (Cyperus rotundus Linn.)**, highlighting its **pharmacological, therapeutic, and Ayurvedic significance** with special reference to its description in **Caraka Saṃhitā Sūtra Sthāna** and **Suśruta Saṃhitā**, and to understand its role in maintaining **digestive and doshic balance** through its **Grahi, Dīpaniya, and** properties in application of Gastrointestinal disorders.

OBJECTIVES

1. **To compile and analyze classical references** of Musta from *Caraka Saṃhitā* and *Suśruta Saṃhitā,* Kaiyadeva Nigantu and Bhavaprakasha Nigantu.
2. **To interpret Musta's pharmacodynamic properties (Rasa, Guṇa, Vīrya, Vipāka, and Karma)** as per Ayurvedic principles, correlating them with its traditional application in Gastrointestinal disorders.
3. **To explore the relevance of Musta's Grahi, Dīpaniya, actions** in the management of gastrointestinal and Pitta-Kapha predominant disorders.
4. **To correlate Ayurvedic concepts with modern pharmacological findings**, highlighting Musta's potential therapeutic applications.

MATERIAL AND METHODS

This review was conducted using a comprehensive and integrative approach to collect, analyse, and synthesize information on *Musta (Cyperus rotundus Linn.)* with special emphasis on its *Grahi* and *Deepaniya* properties and its role in gastrointestinal disorders. The methodology included the following steps:

1. **Classical Ayurvedic Literature Survey**

- Primary Ayurvedic literature including *Charaka Samhita*[1], *Sushruta Samhita*[2], *Ashtanga Hridaya*[3], *Bhavaprakasha Nighantu*[4], *Dhanvantari Nighantu*[5], and *Raja Nighantu*[6] were reviewed to collect references related to *Musta*'s synonyms, properties (*Rasa, Guna, Virya, Vipaka, Prabhava*), pharmacological classification, and therapeutic indications in gastrointestinal disorders.
- Commentaries and contemporary Ayurvedic texts were also consulted for interpretive understanding.

2. Modern Scientific Literature Review

- Published research articles, experimental studies, and clinical trials on *Cyperus rotundus Linn.* were searched through databases including PubMed, Scopus, Google Scholar, and AYUSH Research Portal.
- Keywords used included "Cyperus rotundus," "Musta," "Grahi dravya," "Deepaniya dravya," "gastrointestinal disorders," "anti-diarrheal activity," and "digestive stimulant."
- Both animal studies and human clinical trials were considered to establish pharmacological relevance.

3. Data Compilation and Critical Analysis

- Collected data were organized into two major domains: (a) Ayurvedic perspective of Musta as *Grahi* and *Deepaniya*, and (b) modern pharmacological evidence supporting its gastrointestinal applications.
- A critical comparative analysis was carried out to correlate Ayurvedic concepts with modern findings.

1. Classical Ayurvedic Literature[1,2,3,4,5,6,7]

Source Text	Rasa (Taste)	Guna (Qualities)	Virya (Potency)	Vipaka (Post-digestive effect)	Prabhava (Specific action)	Karma (Therapeutic actions)
Charaka Samhita[1,2] (*Sutra sthana 4, Trushnighna gana*)	Tikta, Katu	Laghu, Ruksha	Shita	Katu	Grahi	Jwaraghna, Atisaraghna, Grahani nashaka, Agnivardhana
Sushruta Samhita[3] (*Sutra sthana 38, Shad viretadi gana*)	Tikta, Katu	Laghu, Ruksha	Shita	Katu	Grahi	Deepaniya, Pachana, Stanyashodhana, Krimighna
Ashtanga Hridaya[4] (*Sutra sthana 15, Trushnighna gana*)	Tikta, Katu	Laghu, Ruksha	Shita	Katu	Trushnaghna	Jwaraghna, Atisaraghna, Shothaghna
Bhavaprakasha Nighantu[5] (*Haritaky adi varga*)	Tikta, Katu	Laghu, Ruksha	Shita	Katu	Grahi	Vedanasthapana, Atisaraghna, Krimighna, Agnivardhana
Dhanvantari Nighantu[6](*Shatapus hpadi varga*)	Tikta, Katu	Laghu, Ruksha	Shita	Katu	Grahi	Pachana, Grahani nashaka, Jwaraghna
Raja Nighantu[7] (*Parpata di varga*)	Tikta, Katu	Laghu, Ruksha	Shita	Katu	Trushnaghna	Atisaraghna, Shothaghna, Stanyashodhana, Krimighna

2. Modern Scientific Literature Review

Phytochemistry[7,8,11,12]

- *Cyperus rotundus* contains essential oils (cyperene, cyperotundone, α-cyperone, patchoulenone), flavonoids, alkaloids, saponins, terpenoids, and phenolic compounds.
- These bioactive constituents are responsible for its antioxidant, anti-inflammatory, and gastroprotective actions.

Pharmacological Studies Relevant to Gastrointestinal Disorders[8,10,12]

- **Anti-diarrheal activity:** Ethanolic and aqueous extracts of *C. rotundus* showed significant reduction in castor oil–induced diarrhea and intestinal motility in animal models, supporting its *Grahi* (absorbent) action.
- **Digestive stimulant (Deepaniya):** Studies indicate that Musta extracts enhance gastric secretions, stimulate digestive enzymes, and improve nutrient absorption, correlating with its *Deepana* and *Pachana* properties.
- **Antispasmodic and carminative effects:** Essential oils from *C. rotundus* demonstrated smooth muscle relaxant properties, useful in abdominal colic, bloating, and irritable bowel syndrome.
- **Anti-inflammatory and gastroprotective effects:** Experimental studies confirmed its ability to reduce gastric ulceration and inflammation in GI mucosa, validating its role in gastritis and enteritis.

Clinical Studies

- Clinical trials report that Musta-based formulations are effective in treating *Atisara* (acute and chronic diarrhea), *Grahani* (malabsorption), and irritable bowel disorders.
- Polyherbal preparations containing *Musta* showed significant improvement in digestive strength (*Agnibala*) and stool consistency in pediatric and adult patients.

Safety and Toxicology[9,13,14]

- Studies confirm that *C. rotundus* is generally safe at therapeutic doses with no major toxicological concerns.
- Its long history of dietary and medicinal use further supports its safety profile.

Both **animal studies** and **human clinical trials** were considered to establish the pharmacological relevance of *Cyperus rotundus Linn. (Musta)* in gastrointestinal disorders.

1. **Animal Studies (Preclinical Evidence)[8,10]**

- **Anti-diarrheal activity:** Extracts of *C. rotundus* significantly reduced castor oil–induced diarrhea, intestinal motility, and fluid accumulation in rodent models, supporting its Ayurvedic *Grahi* property.
- **Digestive stimulant effect:** Experimental studies demonstrated increased secretion of gastric juice and digestive enzymes in animal models administered with Musta extracts, validating its *Deepaniya* action.
- **Gastroprotective and anti-inflammatory actions:** Musta essential oils reduced gastric ulceration, mucosal inflammation, and oxidative stress in rats, correlating with its *Shothaghna* and *Agnivardhana* karmas.

2. **Human Clinical Trials (Clinical Evidence)[8]**

- Clinical studies on Musta-based formulations showed effectiveness in managing **acute and chronic diarrhea, irritable bowel syndrome, dyspepsia, and grahani roga (Malabsorption syndrome)**.
- In pediatric populations, polyherbal formulations containing Musta improved stool consistency, appetite, and digestion with minimal adverse effects.
- In adults, Musta was found beneficial as an adjunct therapy for irritable bowel conditions, reducing abdominal pain, bloating, and frequency of loose stools.

3. **Safety Profile[14]**

- Both animal toxicology studies and clinical observations confirm that Musta is safe at therapeutic doses, with no significant adverse events reported.

DISCUSSION

The management of gastrointestinal disorders has always been a priority in Ayurveda, as the concept of *Agni* (digestive fire) is central to health and disease. Musta (*Cyperus rotundus Linn.*), described extensively in Ayurvedic classics, is regarded as both a *Grahi* and *Deepaniya dravya*. These dual actions highlight its unique role in both correcting digestive imbalances and consolidating intestinal contents, thereby addressing a spectrum of gastrointestinal pathologies.

From the Ayurvedic perspective, Musta's *Rasa* (Tikta, Katu), *Guna* (Laghu, Ruksha), *Virya* (Shita), *Vipaka* (Katu), and *Prabhava* (Grahi, Deepaniya, Trushnaghna) together determine its therapeutic actions. The *Grahi* quality makes it highly suitable in *Atisara* (diarrhea) and *Grahani roga* (malabsorption syndrome), while its *Deepaniya* and *Pachana* properties kindle

Jatharagni, restoring proper digestion and assimilation. Its mention across authoritative texts like *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, and *Nighantus* indicates a consensus in its digestive utility.

From the modern scientific perspective**,** extensive phytochemical investigations have revealed the presence of essential oils, flavonoids, alkaloids, and terpenoids in Musta, which are responsible for its pharmacological actions. Preclinical animal studies have validated its **anti-diarrheal**, **anti-spasmodic**, and **digestive stimulant** properties, aligning with the Ayurvedic description of *Grahi* and *Deepaniya*. Similarly, studies demonstrating **anti-inflammatory** and **gastroprotective** effects provide a rationale for its use in gastritis, ulcerative conditions, and irritable bowel syndrome. Clinical studies further reinforce these findings, showing significant benefits in both pediatric and adult gastrointestinal disorders, with a favorable safety profile.

A critical appraisal of the evidence reveals a strong correlation between classical Ayurvedic principles and modern pharmacological findings. The *Grahi* property resonates with its scientifically proven anti-diarrheal and fluid-regulating effects, while the *Deepaniya* action aligns with enhanced enzyme activity and improved nutrient absorption observed in studies. This convergence supports the Ayurvedic claim that Musta can simultaneously correct *Agnimandya* (digestive impairment) and regulate intestinal function.

However, certain gaps remain. Most modern studies have been conducted on animal models, with limited large-scale randomized clinical trials in humans. Standardization of Musta extracts, dosage optimization, and long-term safety evaluations are still required. Moreover, its role in complex gastrointestinal disorders such as irritable bowel syndrome and inflammatory bowel disease requires further clinical validation.

Overall, the integrative evidence underscores Musta as a **holistic gastrointestinal regulator**, bridging traditional Ayurvedic wisdom and modern pharmacological science. Its dual action as a *Grahi* and *Deepaniya dravya* makes it a unique therapeutic agent with significant potential in contemporary gastroenterology.

❖ **Mode of action of Musta as Grahi Karma**

Agnimāndya (↓ Jatharāgni) → Improper digestion → Formation of Āma→ Āma + Kapha aggravation → Kledotpatti (excess fluid) → Vitiation of Grahaṇī (duodenum & Agni sthāna)

→ Symptoms: Atisāra, Grahaṇī doṣa, Mucous stools→↓ Absorption and Assimilation→ Administration of Grahi Dravya (e.g., Musta) → Kaṣāya & Tikta Rasa + Laghu–Rūkṣa Guṇa →↓ Kleda (drying effect) + Stimulation of Agni→ Restoration of Grahaṇī function→ Proper formation of Māla (stool) and nourishment→ Samyag Agni and Normal Digestion Restored.

❖ **Mode of action of Musta as Deepana Karma**

Agnimāndya (Low digestive fire) → Āma sañcaya (toxic undigested material) → Obstruction of Pachaka Pitta and Samāna Vāyu→ Loss of appetite, heaviness, sluggish digestion→ Administration of Dīpana Dravya (e.g., Musta) → Tikta–Kaṣāya Rasa + Laghu–Rūkṣa Guṇa + Katu Vipāka→ Removes Āvarana (Kapha–Āma obstruction) around Agni→ Stimulation of Jatharāgni and Pachaka Pitta→ Improved digestion and metabolism→ Proper Rasa formation and nutrient absorption→Agni Deepana – Restoration of digestive and metabolic balance.

CONCLUSION

Musta (*Cyperus rotundus Linn.*) is one of the most important drugs in Ayurveda, widely acknowledged for its dual actions as a *Grahi* (absorbent) and *Deepaniya* (digestive stimulant). Classical Ayurvedic texts consistently highlight its efficacy in gastrointestinal disorders, particularly *Atisara* (diarrhea), *Grahani* (malabsorption syndrome), dyspepsia, and allied digestive complaints. Modern pharmacological studies corroborate these traditional claims, demonstrating significant **anti-diarrheal, carminative, anti-inflammatory, and gastroprotective properties**.

The convergence of Ayurvedic concepts and modern evidence positions Musta as a promising therapeutic agent for managing gastrointestinal dysfunctions safely and effectively. However, to fully establish its clinical potential, **well-designed human clinical trials, standardization of formulations, and dose-specific studies** are essential.

Thus, Musta exemplifies how ancient Ayurvedic wisdom, when critically evaluated in the light of modern science, can provide **holistic and evidence-based solutions** for prevalent gastrointestinal disorders.

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