

CHAPTER 9

Houttuynia cordata: Unlocking its Medicinal Secrets

Preeti Singh Parihar Gupta, Arti Sharma, Vimala, J. Jeline Rani, Smita Tarun Raut, Sanjeet Kumar and Rajkumari Supriya Devi✉

Abstract: *Houttuynia cordata* Thunb. (Saururaceae) also known as Chameleon plant is a perennial aromatic herb native to East and Southeast Asia, including Northeast India. It grows in moist, shaded habitats such as wetlands and forest margins and is valued for both culinary and medicinal uses. Traditionally, its leaves and rhizomes are employed to manage fever, infections, liver disorders, respiratory ailments and gastrointestinal diseases, while decoctions act as immune boosters. Phytochemical studies reveal flavonoids, polyphenols, volatile oils, alkaloids, polysaccharides, sterols, and terpenoids, conferring antioxidant, anti-inflammatory, antiviral, hepatoprotective, and immunomodulatory activities. Ecologically, the species stabilizes soil, supports nutrient cycling, and enhances biodiversity in riparian and wetland ecosystems. Integrating traditional knowledge with pharmacological evidence demonstrates the need for clinical validation, mechanistic studies and sustainable cultivation strategies to optimize its use in modern phytomedicine.

Gupta PSP, Dept. of Botany, Govt. Rajmata Vijaya Raje Sindhiya Kanya Mahavidyalaya, Kawardha Professor Colony, Kabirdham Chhattisgarh, India

Sharma A, Dept. of Botany, Freedom Fighter Pandit Susheel Rattan Government Degree College, Jawalamukhi, District Kangra, Himachal Pradesh, India

Vimala, Dept. of Botany, Multanmal Bhikh Chand Chajjer Govt. Girls College Barmer Rajasthan, India

Rani JJ, Dept. of Botany, Bishop Heber College, Tiruchirappalli, Tamil Nadu, India

Raut ST, Rashtrapita Mahatma Gandhi Arts Commerce and Science College, Saoli, Chandrapur, Maharashtra, India

Kumar S, Biodiversity and Conservation Lab., Ambika Prasad Research Foundation, Odisha, India

Devi RS✉, Biodiversity and Conservation Lab., Ambika Prasad Research Foundation, Odisha, India

© The author(s), under exclusive license to APRF, India

ISBN: 978-81-985655-7-0

Hossain E, Kumar S and Devi RS (2025) (eds.) Aquatic & Wetland Medicinal Plants of India

Key words: Toningkok, wetland, ethnobotany, respiratory diseases and salad

INTRODUCTION

Houttuynia cordata Thunb., commonly known as Chameleon plant is a perennial aromatic herb of the family Saururaceae native to East and Southeast Asia and widely found in China, Japan, Korea, Thailand, Vietnam, Bhutan, Nepal and the North-Eastern states of India (Fu *et al.*, 2013; Wu *et al.*, 2021; Dagawal *et al.*, 2023). It usually grows in moist and shady habitats such as wetlands, stream sides, and forest margins and is well adapted to temperate conditions (Li *et al.*, 2021). In Manipur and other parts of North-East India, the plant holds both culinary and medicinal significance. Its leaves and roots are eaten as a condiments or salad (Figure 1; Devi *et al.*, 2014), while infusions and decoctions are used in traditional medicine for the treatment of fever, dysentery, diarrhea, skin diseases, respiratory infections, urinary ailments and liver disorders (Khuraijam and Goel 2014; Rath *et al.*, 2013; Sharma *et al.*, 2015; Thokchom *et al.*, 2018). Indigenous communities like Meitei community and Chothe tribes of Manipur, as well as in other ethnic communities of the region use the plant as a staple in ethnomedicinal practices (Yuhlung and Bhattacharyya 2014). Beyond India, *H. cordata* has long been valued in Chinese and Southeast Asian systems of medicine for detoxification, respiratory health, and as an immune booster (Yang and Jiang, 2009; Wu *et al.*, 2021). Phytochemical studies have revealed that the plant contains a wide

range of bioactive compounds including flavonoids such as quercetin, rutin, and hyperoside, essential oils such as methyl-n-nonyl ketone and decanoyl acetaldehyde, along with alkaloids, polysaccharides, and polyphenols (Yang and Jiang 2009; Fu *et al.*, 2013; Kumar *et al.*, 2014). These metabolites account for its diverse therapeutic properties and have also inspired the development of standardized extract formulations for medicinal use (Sriya *et al.*, 2011). Pharmacological investigations have established *H. cordata* as a plant of multiple bioactivities. It is also traditionally used for liver protection and detoxification, its hepatoprotective role continues to be validated by ethnopharmacological surveys and pharmacological studies (Thokchom *et al.*, 2018; Sharma *et al.*, 2023).

During the COVID-19 pandemic, *H. cordata* drew renewed global attention due to its antiviral potential, leading to a surge in scientific studies exploring its role in respiratory and immune health (Deo *et al.*, 2023). Ecological studies further reveal that its growth and antioxidant responses are sensitive to temperature conditions, knowledge that is important for its cultivation and conservation (Li *et al.*, 2021). Altogether, *H. cordata* represents a unique medicinal herb that bridges traditional ethnomedicine and modern pharmacological research (Fu *et al.*, 2013; Wu *et al.*, 2021; Jamir *et al.*, 2023). With its wide range of

therapeutic uses, from inflammation and infections to cancer and liver health, and its increasing role in herbal formulations, the plant has become the subject of growing scientific and commercial interest (Sharma *et al.*, 2023). Current studies emphasize on

the review of ethnobotany, phytochemical constituents, clinical validation and sustainable harvesting to ensure that this valuable species can be effectively integrated into modern phytomedicine while preserving its traditional significance.



Figure 1: *H. cordata* in its habitat

METHODOLOGY

The review was carried out through a systematic examination of published literature using electronic databases such as PubMed, Scopus, Web of Science and Google Scholar, focusing on ethnobotany and phytochemical constituents. Additional sources were identified by screening relevant books, reports, and reference lists of selected articles. Studies were included if they

reported information on traditional uses, phytochemical profiles and ecological roles of *H. cordata*, while duplicates and irrelevant works were excluded. Data from eligible studies were extracted on plant parts used, medicinal and bioactive compounds, ecological functions and socio-economic importance and were subsequently synthesized thematically (Kumar 2025).

RESULT AND DISCUSSION

Ethnobotany

H. cordata is an ethnomedicinal herb widely used in Asia, especially in Northeast India, China, Korea and Japan, for both dietary and therapeutic purposes. In Manipur, it is locally known as Toningkok and leaves and rhizomes are consumed raw as chutneys or condiments and are traditionally employed to treat fever, cough, dysentery, urinary infections, skin diseases and liver disorders (Khuraijam and Goel 2014; Rath *et al.*, 2013; Yuhlung and Bhattacharyya 2014; Thokchom *et al.*, 2018). Ethnobotanical practices also include using its decoctions for blood

purification, detoxification, and as an immune booster (Sharma *et al.*, 2015; Sharma *et al.*, 2023). Its characteristic fish-like aroma, medicinal versatility, and applications in treating inflammation, respiratory ailments, and gastrointestinal disorders highlight its cultural and pharmacological significance (Choi *et al.*, 2010; Wu *et al.*, 2021). Recent interest during the COVID-19 pandemic further underscores the plant's enduring role as a bridge between traditional medicine and modern pharmacological research (Deo *et al.*, 2023; Hung *et al.*, 2023). The plant is commonly sold in the local market of Imphal, Manipur and many households cultivate it for their routine consumption in their diets (Dagawal *et al.*, 2023).

Table 1: Ethnobotanical uses of *H. cordata*

Plant part(s) used	Ethnobotanical Use(s)	Source(s)
Leaves and rhizomes	Leaves and rhizomes eaten raw, as salad, chutney and condiment.	Khuraijam and Goel (2014); Devi <i>et al.</i> , (2014)
Leaves and rhizome	Decoctions taken for blood purification, detoxification and to improve digestion.	Sharma <i>et al.</i> , (2015); Yang and Jiang (2009)
Leaves and rhizome	Used in treatment of cough, fever, asthma and other respiratory disorders.	Rathi <i>et al.</i> , (2013); Wu <i>et al.</i> , (2021)
Leaves	Decoctions prepared for dysentery, stomach pain, diarrhea and liver disorders.	Thokchom <i>et al.</i> , (2018); Yuhlung and Bhattacharyya (2014)

Leaves	Employed in folk medicine for urinary tract ailments.	Khuraijam and Goel (2014); Rathi <i>et al.</i> , (2013)
Leaves	Fresh leaves applied externally to cuts, wounds and skin infections due to antimicrobial/ anti-inflammatory effects.	Choi <i>et al.</i> , (2010); Yubin <i>et al.</i> , (2017)
Leaves and rhizome	Widely used as an immune booster and detoxifier; traditional use reinforced during COVID-19 pandemic.	Deo <i>et al.</i> , (2023); Sharma <i>et al.</i> , (2023)
Whole plant	Helps to treat insomnia	Dagawal <i>et al.</i> , (2023)
Whole plant	Reduces Blood sugar	Dagawal <i>et al.</i> , (2023)



Figure 2: *H. cordata* leaves and rhizome sold in local market of Imphal, Manipur

Phytochemical constituents

H. cordata contains diverse phytochemical constituents that support its ethnomedicinal and pharmacological importance. Flavonoids such as quercetin, quercitrin, rutin and hyperin show antioxidant, anti-inflammatory and

hepatoprotective effects, making them useful in treating liver disorders, cardiovascular diseases and inflammation (Fu *et al.*, 2013; Hung *et al.*, 2023; Thokchom *et al.*, 2018). Polyphenols and phenolic acids including chlorogenic and caffeic acid, contribute strong antioxidant and anticancer properties, protecting

against oxidative stress and degenerative conditions (Li *et al.*, 2021; Sharma *et al.*, 2023; Wu *et al.*, 2021). Volatile oils such as methyl n-nonyl ketone and decanoyl acetaldehyde along with arylketones are reported for their antimicrobial and antiviral actions, traditionally used in respiratory infections like cough, cold and pneumonia and were particularly accentuated during COVID-19 studies (Choi *et al.*, 2010; Deo *et al.*, 2023; Yang and Jiang, 2009; Jamir *et al.*, 2023). Alkaloids and essential oils contribute antibacterial, antifungal and skin-protective effects (Rathi *et al.*,

2013; Yubin *et al.*, 2017; Khuraijam and Goel 2014), while polysaccharides play important immunostimulatory and antiviral roles (Kumar *et al.*, 2014; Wu *et al.*, 2021). Sterols and terpenoids add further anti-inflammatory, anticancer and cardioprotective properties (Fu *et al.*, 2013; Sharma *et al.*, 2023). All together, these bioactive compounds validate the traditional use of *H. cordata* for managing infections, liver and gastrointestinal ailments, respiratory disorders and chronic diseases, while also providing a scientific basis for its therapeutic potential (Table 2).

Table 2: Phytochemical constituents present in *H. cordata* and related ailments

Phytochemical Constituents	Therapeutic potential	Source(s)
Flavonoids like quercetin, quercitrin, rutin and hyperin	Antioxidant, anti-inflammatory, hepatoprotective; used in treatment of liver disorders, cardiovascular diseases, and inflammation.	Fu et al. (2013); Hung et al. (2023); Thokchom et al. (2018)
Polyphenols	Immunomodulatory, anticancer, and protective against oxidative stress-related disorders.	Wu et al. (2021); Sharma HD et al. (2023)
Volatile oils like methyl n-nonyl ketone and decanoyl acetaldehyde	Antimicrobial, antiviral, respiratory infections (cough, cold, pneumonia); also active during COVID-19 studies.	Deo et al. (2023); Jamir et al. (2023); Yang & Jiang (2009)
Alkaloids	Antibacterial, antifungal, useful in gastrointestinal infections and skin diseases.	Rathi et al. (2013); Wu et al. (2021)
Polysaccharides	Immunostimulatory, antiviral, supports recovery	Kumar et al. (2014); Wu et al. (2021)

	from respiratory infections and strengthens immunity.	
Sterols and Terpenoids	Anti-inflammatory, anticancer, anti-hypertensive; protective in cardiovascular disorders.	Fu et al. (2013); Sharma HD et al. (2023)
Essential oils and aromatic compounds	Used for aromatic therapy, antimicrobial, and detoxification; employed in treatment of skin infections and fever.	Devi et al. (2014); Khurajam & Goel (2014); Yubin et al. (2017)
Phenolic acids like chlorogenic acid and caffeic acid	Antioxidant, anti-aging, protective against degenerative and metabolic diseases.	Li et al. (2021); Sharma HD et al. (2023)
Arylketones	Reported to show antibacterial and antiviral properties, particularly effective in traditional treatment of pneumonia and viral fevers.	Choi et al. (2010); Wu et al. (2021)

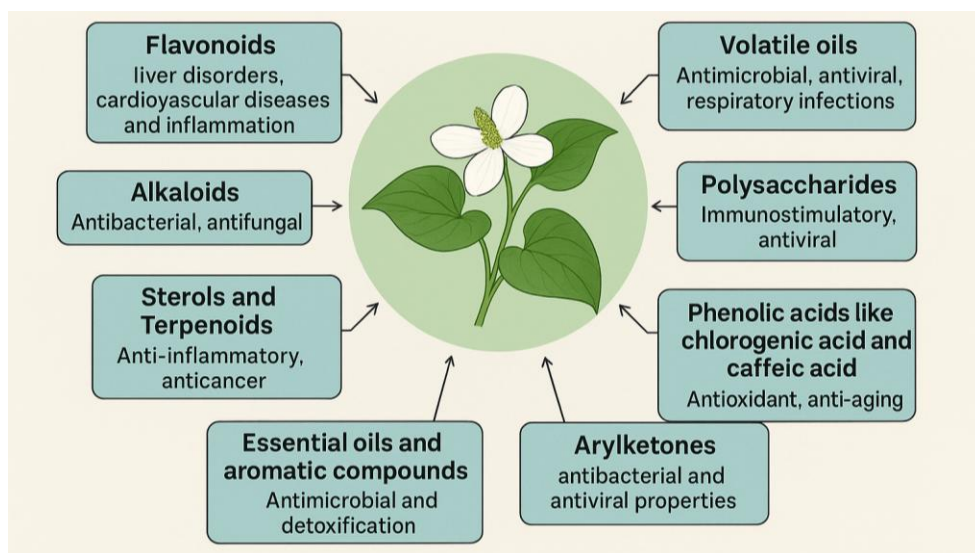


Figure 3: Phytochemicals and therapeutic targets of *H. cordat*

Ecological significance

H. cordata plays a significant ecological role in wetland and riparian ecosystems. Its extensive rhizome system helps stabilize soil and prevent erosion along riverbanks and marshy areas, while its growth in wetlands contributes to water purification by absorbing excess nutrients and pollutants. Dense mats of the plant provide habitat and shelter for insects, invertebrates and microorganisms, supporting local biodiversity. The decomposition of its leaves and stems enriches soil organic matter, enhancing nutrient cycling and soil fertility. Additionally, *H. cordata* can influence surrounding plant communities through allelopathic interactions and often serves as an indicator of healthy, moist, and undisturbed ecosystems (Choi et al., 2010; Deo et al., 2012; Chen et al., 2018).

CONCLUSION

H. cordata is a perennial medicinal herb with significant ethnobotanical, pharmacological and ecological relevance. Its diverse bioactive compounds including flavonoids, polyphenols, volatile oils, and polysaccharides exhibit antioxidant, anti-inflammatory, antiviral, hepatoprotective and immunomodulatory activities, supporting its traditional uses in managing infections, liver disorders and respiratory ailments. Ecologically, it contributes to soil stabilization, nutrient cycling and biodiversity in

wetland and riparian habitats. Future research should prioritize clinical validation of its bioactivities, mechanistic studies, sustainable cultivation and conservation strategies, alongside exploration of novel therapeutic applications to integrate this species effectively into modern phytomedicine.

REFERENCES

- Choi JY, lee JA, Lee JB, Yun SJ and Lee SC. (2010). Anti-inflammatory activity of *Houttuynia cordata* against lipoteichoic acid-induced inflammation in human dermal fibroblasts. Chonnam Medical Journal. 46(3): 140-147.
- Dagawal MJ, Saradar B, Chavan RT, Rani M, Devi RS and Kumar SK. (2023): *Houttuynia cordata* Thunb.: A potential nutraceutical herb. Medico-Biowealth of India, Volume IX. APRF Publisher, India.
- Deo PS, Kharumnuid SA, Naga MM and Hangsing P. (2023). Is COVID-19 Related to the Recent Surge in Research on *Houttuynia cordata* (Thunb)? Pharmacognosy Research. 15(4): 693-704.
- Devi AD, Devi OI, Singh TC and Singh EJ. (2014). A Study of Aromatic Plant Species Especially in Thoubal District, Manipur, North East India. International Journal of Scientific and Research Publications. 4(6): 1-12.

- Fu J, Dai L, Lin Z and Lu H. (2013). *Houttuynia cordata* Thunb: A Review of Phytochemistry and Pharmacology and Quality Control. Chinese Medicine. 4: 101-123.
- Hung TV, Thang PNT, Phuong NTT, Pham DT, Hien HM and Huynh DTM. (2023). Anticancer and immunostimulatory activities of *Houttuynia cordata* Thunb. Extract and the isolated flavonoids: An *in vitro/in vivo* investigation. Journal of Applied Pharmaceutical Science. 13(11):178-187.
- Jamir AR, Rio N and Intimongla. (2023). The chameleon plant (*Houttuynia cordata* Thunb.): A multifaceted medicinal herb. 3(8): 87-90.
- Khuraijam JS and Goel AK. (2014). Ethnobotanical uses of *Houttuynia cordata* by Meitei community of Manipur, India. Ethnobotany. 26: 106-110.
- Kumar M, Prasad SK and Hemalatha S. (2014). A current update on the phytopharmacological aspects of *Houttuynia cordata* Thunb. Pharmacognosy Reviews. 8(15):22-35.
- Kumar S. (2025). Data collection from literature for biological sciences, medicinal plants research, ethnobotany, and pharmacology: a methodological overview. Journal of Biodiversity and Conservation. 9(2): 167-169.
- Li YS, Lin KH, Wu CW and Chang YS. (2021). Effects of temperature on growth, physiological and antioxidant characteristics in *Houttuynia cordata*. Notulae Botanicae Horti Agrobotanici Cluj-Napoca. 49(4): 1-14.
- Rathi RS, Roy S, Mishra AK and Singh SK. (2013). Ethnobotanical notes on *Houttuynia cordata* Thunb. in North-eastern region of India. Indian Journal of Natural Products and Resources. 4(4): 432-435.
- Sharma HD, Lamichhane J, Gurung S and Oliya B. (2023). Ethnobotanical and Phytochemical Study of *Houttuynia cordata* Thunb: A Review. BMC Journal of scientific research A multidisciplinary Peer Review Journal. 6: 55-62.
- Sharma LD, Devi LS, Singh LB and Singh TC. (2015). Medicinal plants found in Imphal valley used in treatments of various ailments. 4(12): 282-286.
- Sriya O, Sirimontree I, Panthuvanich S and Kittipongpatana N. (2011). Formulation of *Houttuynia cordata* Standardized Extract Tablets. Chiang Mai University Journal of Natural Sciences. 10(2): 227-240.
- Thokchom AD, Talukdar AD, Chingakhom BS, Ningthoujam SS and Choudhury MD. (2018). Traditional Usage of Ethnomedicinal Plants in Treating Liver Disorders at Manipur, North

- East India. *European Journal of Medicinal Plants* 23(3): 1-10.
- Wu Z, Deng X, Hu Q, Xiao X, Jiang J, Ma X and Wu M. (2021) *Houttuynia cordata* Thunb: An ethnopharmacological review. *Frontiers in Pharmacology*. 12:714694. DOI: 10.3389/fphar.2021.714694.
- Yang Li and Jiang JG. (2009). Bioactive components and functional properties of *Hottuynia cordata* and its applications. 47(12): 1154-1161.
- Yubin J, Junjun Y, Miao Y, Yue C, Shizhen G, Anna Q. (2017). Antibacterial Activity of *Houttuynia cordata*. *IOP Conf. Series: Earth and Environmental Science* 100:1-4.
- Yuhlung CC and Bhattacharyya M. (2014). Practice of Ethno-medicine among the Chothe Tribe of Manipur, North-East India. *International Journal of Pharmaceutical and Biological Archives*. 5(3): 138 – 149.