Study On Macrophyte Diversity of Pitkata Beel with Special Reference to Medicinal Plants

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Abstract- This paper presents the medicinally important macrophytes of Pitkata beel a freshwater flood plain wetland. The Pitkata beel is located in Kamrup district of lower Assam. The Macrophyte community comprised of 25 species belong to19 families. The study showed 12 plant species have medicinal properties namely *Acorus calamus* L, *Eichhornia crassipes* (Mart.) Solms., *Hydrilla verticellata* (L.F.) Royle., *Ipomea aquatic* Forssk., *Lemna minor* L., *Ludwigia adscendens* L., *Mentha aquatica* L, *Nymphaea stellata, Polygonum amphibium* L., *Sagittaria sagittifolia* L, *Trapa bispinosa* L, *Typha latifolia* L, The study indicates the importance of conservations of aquatic vegetation of flood plain wetland in Assam. The conservation efforts of aquatic vegetation will facilitate the conservation of medicinal plants too.

Keywords: Pitkata Beel, Wetland, Macrophytes, Medicinal Plants, Assam

INTRODUCTION

Aquatic macrophytes are utmost ecological and economic importance in wetland ecosystem. From economical point of view the aquatic plants provide food, medicine, fibre, craft and animal fodder. Different studies have recorded that among the aquatic macrophytes, a considerable amount constitude medicinal plants. Rahman *et. al.,* 2001; Baral and Kurmi, 2006; Gyawali and Kim, 2009; Mohhamad *et. al*., 2011; Farheen *et al,* 2015; Rashid *et al*, 2019; Gunjal and Patil,2023 and Gupta and Sharma,2024 studied about the different aspects of medicinal plants relating to aquatic macrophytes. Since there are scanty reports on medicinal plants of flood plain wetlands, therefore the present study was undertaken to investigate the different medicinal plants in Pitkata beel, a freshwater perennial wetland in Kamrup district (Rural), Assam.

STUDY AREA

Pitkata beel ia a perennial wetland located in Hajo Revenue Circle of Kamrup district (Rural). It is a freshwater wetland and occupies an area of about 44 hectares and naturally fed by a channel locally known as Pitalar Jan which is connected with Puthimari river and this river is connected to Brahmaputra River. The beel is surrounded by PWD road in Northern side, Kumarpara village in Southern side, Potani village in Eastern boundary and Bishnupur in Western side. There are about 12,700 population living in surrounding villages of Pitkata beel. Most of the neighbouring people are dependent on beel resources directly or indirectly. The surrounding villages of the beel are directly dependent on beel resources specially on fising, agriculture, some edible and medicinal aquatic macrophytes.

Pitkata beel occupies an area of about 44 hectares during full storage level (Monsoon) but in winter season the water spread area of the beel is reduced and shallow area of the beel is encroached by farmers of neighbouring villages for paddy cultivation. According to village head (Gaon Burah) villagers encroached approximately 11 Hectares of beel area for agricultural practices.

MATERIALS AND METHODS

For the present study the beel area was arbitrarily divided into five zones (i.e. North, South, East, West, and Central) of Pitkata Beel. The investigation was carried out for a period of two years covering four seasons Pre Monsoon, Monsoon, Post Monsoon, and Winter seasons. The macrophyte species were collected by application of Quadrate method of random sampling (Ludwig and Reynold,1988). The species were identified following standard methods of Bursche (1991) and Cook (1996).

RESULTS AND DISCUSSION

The macrophyte community of Pitkata beel comprised of 19 families represented by 25 species occupying

emergent, submerged and floating habitat. Among Angiosperm 7 families of monocot were represented by 12 species while dicot composed of 8 families represented by 8 species. The pteridophytes comprised of 3 families with 4 species and algae constituted by single species of Characeae family. Out of 25 species 12 macrophyte species have medicinal property. These are -

1. *Acorus calamus* L.:

This species is perennial, semi aquatic and aromatic plant with creeping rhizome. The leaves of these perennial plants are long, slender, sword – shaped, smooth glossy and fresh green and the plants grow up to 1.5 m in length. The different plant parts of Acorus *calamus* are used for the treatment of different diseases such as mental ailments like epilepsy, schizophrenia, and memory disorders, chronic diarrhea and dysentery, intermittent fevers, colic, cough, asthma, and abdominal tumors (Kirtikar & Basu,1987; Anonymous,2001). According to Howes and Houghton, (2003) this plant species is used for the treatment of loss of consciousness, confusion of the mind, forgetfulness, anorexia and epilepsy.

2. Eichhornia Crassipes (Mart.) Solms:

Eichhornia crassipes is one of the world's most invasive aquatic plants and commonly known as water hyacinth. It is a free-floating perennial freshwater plant. The plant is characterized by its high growth, rapid and extensive spread. The plant possesses beautiful violet flowers, with broad, thick, glossy, oval leaves and it can rise up to 1 meter above the surface of the water. These plants have analgesic, anti-epileptic sedative, central nervous system depressant, anti-anxiety, anti-psychosis, anti-depressant and memory-improving properties Farheen e*t.al. (*2015). The stems and leaves of *E. crassipes* were used to treat swelling and wounds due to its anti-inflammatory activity Rorong *et.al*. (2012).

3. *Hydrilla verticillata* (L.F.) Royle

It is rooted submerged perennial aquatic plant and commonly known as hydrilla or water thyme. It has long stem and leaves are generally small. According to Pal *et.al*., (2006) the plant aqueous extract shown central nervous system depressant activity, also possess antitumor and antibacterial activity. These plants have antioxidant properties. The plant has been used in traditional medicine for the treatment of arthritis, rheumatism, and skin irritations. In some traditional medicinal practices, Hydrilla is used to promote urinary tract health and alleviate symptoms of urinary tract infections (UTIs). It is believed to have diuretic properties, promoting urine production and flushing out toxins from the urinary system. Its extracts have been used traditionally to treat infections, both internally and externally.

4. *Ipomea aquatic* Forssk.

It is a semi aquatic freshwater herbaceous floating plant and commonly known as water spinach or morning glory. The Stems of these plants are hollow, up to 3m long or more, rooting at all the nodes. The plant extract is used to treat high blood pressure and nose bleeding and floral buds are used as an anthelminthic. it is also effective against *Escherichia coli*, *Pseudomonas aeruginosa* and *Bacillus subtilis* infections Singh *et.al. (*2016).

5. *Lemna minor* L.

Lemna minor is an aquatic floating macrophyte, commonly known as common duckweed. It is a tiny plant and characterized by a simple, oval-shaped frond (modified stem). The whole plant was used as antipruritic, antiscorbutic, astringent, depurative, diuretic. It was also used in the treatment of colds, measles, oedema and difficulty in urination. In addition, it is used in the treatment of vitiligo, podagra, and upper respiratory tract inflammation.

6. *Ludwigia adscendens* L.

It is a perennial, creeping or floating aquatic herb commonly known as water primrose. They are found in both wet and submerged environments. Medicinally this plant is also used for its febrifugal and ant swelling properties. This plant is also used for various skin disorders and possess anti-inflammatory activity especially flower part. A decoction of the aerial parts is used as a treatment for dysentery, fever, cough, cystitis, dysuria, haematuria and haemorrhagic dysentery. According to Gupta & Sharma (2024) the plants have antioxidant, anti-inflammatory, antitumor activity, anti-diabetic activity and anti-microbial effect.

7. *Mentha aquatica* L.

Mentha aquatic is commonly known as water mint and it is an erect, herbaceous perennial aquatic plant. It forms a loose cluster of branched stems that can grow from 50 - 150cm tall. The plants have Antioxidant properties. The leaves are anodyne, antiseptic, antispasmodic, astringent, carminative, refrigerant, stimulant, stomachic.

8. *Nymphaea stellata*

It is an aquatic submerged macrophyte (commonly known as the star lotus or blue lotus) with a rhizomatous and perennial growth habit. It has a short, ovoid, and acute rootstock. The diameter of leaves is 12.5-20 cm. They are glabrous on both surfaces, sometimes blotched with purple underneath, and the petioles are long and slender. The flowers are showy with petals. The fruit is berry-like, many-seeded. It is well-known and prominent herb in Ayurveda and Siddha system of medicines with multiple medicinal properties. The different plant parts are used for the treatment of different disorders namely the whole plant is used for the treatment of liver disorders in Ayurveda. Leaves, roots and flowers are used for diabetes, bolled disorders, anti fertility, heart troubles, dysentery, eruptive fevers, indigestion, diuretic, narcotics, stimulant, and aphrodisiac. The flowers and roots have mild sedative properties, used for mind-altering purposes. The flowers have an acrid, bitter-sweet taste removes impurities from the blood, cools and alleviates cough and rootstock powder is used to treat dyspepsia, diarrhea and piles Root: The roots are also used as emollient, diuretics, infections of the urinary passage and infertility (Das *et. al.,*2012). According to Chowdhury *et.al*.,(2013) the whole plant is reported to possess pharmacological activity, flower showed hepatoprotective activity.

9. *Polygonum amphibium* L.

Polygonum amphibium is a perennial submerged aquatic plant and it has long stalked floating leaves bluntly tapering at the top, glossy, dark, green and leathery. The leaves are 1–30 cm long and can be oval, narrowly lanceolate, heart-shaped, broadly triangular or arrowhead-shaped. Fresh roots are applied directly to the blisters in the mouth. Infusion of dried, pounded roots or raw root eaten for chest cold.

10. *Sagittaria sagittifolia* L.

Sagittaria sagittifolia belongs to the family Alismataceae. It is a perennial emergent aquatic or semiaquatic plant which is commonly known as Arrowhead. The leaves are born on triangular stalks that vary in length with depth of the water. The leaves above water are arrowhead shaped and very glossy. The leaf blade 15-25 cm long and 10- 22 cm broad, on a long petiole holding the leaf up to the 45 cm above water level. The *Sagittaria sagittifolia* has several traditional uses, almost all the parts of this herb (stems, leaves, tubers, flowers, seeds). These parts have used for the treatment of inflammation and infectious human diseases like cardiac circulatory tonic and antiseptic. The tubers are stimulant, tonic and diuretic, antipyretic, anthelmintic, and also used as antiviral, anti-inflammatory, and analgesic. Sharma *et.al*., (1975); Gupta and Pandey (2014)

11. *Trapa bispinosa* Roxb.

Trapa bispinosa (Water Chestnut) is a perennial submerged, rooted aquatic macrophyte which belongs to the family Trapaceae. Its leaves are rosette of floating, fan-shaped, crowded on the upper part of the stem, rhomboid, toothed leaf blade, reddish-purple beneath. Flowers few, four-merous, small, auxiliary, solitary, pure white. Flowering typically in June whereas fruits and seed large drupe or nut obovoid, angular and two pseudo spines. The whole plant is used in gonorrhoea, menorrhagia, and other genital affections. It is useful in diarrhoea, dysentery, ophthalmopathy, ulcers, and wounds (Chatterjee and Prakash, 1995). These are used in pitta, burning sensation, dyspepsia, haemorrhage, haemoptysis, diarrhoea, dysentery, strangely, intermittent fever, leprosy, fatigue, inflammation, fractures, pharyngitis, bronchitis and general debility, and suppressing stomach and heart burning. (Rahman *et. al*. 2001). Water chestnut kernels were used to treat rabies, poisonous animal bites, diarrhoea, amoebic dysentery, and other conditions in the U.S.S.R. (Shishkin and Bobrov, 1974).

12. *Typha latifolia* L.

Typha is a member of the Typhaceae family and it is an erect, rhizomatous perennial aquatic plant. Leaves of the plant are long, linear, parallel-veined and green in color. Leaves originate from the base of the simple, slender stem. The flower shaped like an elongated cylinder. This species is used for the treatment of

various diseases. The female flowers are used externally to control bleeding, wound healing and burns. The lower stem has diuretic and astringent properties, and the leaves have analgesic, antioxidant, and diuretic properties. Pollens are stringent, desiccant, diuretic, haemostatic, and vulnerary. The roots have anti-inflammatory, antioxidant, astringent. (Rizwana Dilshad.*etal.,*2019) The pollen is astringent, diuretic, haemostatic, refrigerant, sedative Y. Birnin Yauri.*et,al*.,(2019).

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REFERENCE

[1] Anonymous (2001). The Wealth of India A Dictionary of Indian Raw Materials & Industrial Products: *First Supplement Series (Raw Materials).* Vol. I. New Delhi, India, National Institute of Science Communication., pp 28–30.

[2] Baral, S.R. and Kurmi, P.P. (2006). *A Compendium of Medicinal Plants in Nepal*, Kathmandu.

[3] Bursche, E. M. (1991). *A Hand Book of Water Plants*. Oriental Enterprise, Dehradun.

[4] Chowdhury, B. N., Haque, M. M., Sohrab, M. H., Afroz, F., Al-Mansur, M., Sultana, T., and Hasan, C. M. (2013). Steroids from the stem of Nymphaea stellata. *Journal of Bangladesh Academy of Sciences.*37. 109–113.

[5] Cook, C.D.K. (1996). *Aquatic and Wetland Plants of India*. Oxford University Press, New Delhi, India.

[6] Chatterjee, A. and Prakash, S. (1995). The Treatise on Indian Medicinal Plants. Vol. 4. *NISCAIR*, New Delhi, India.

[7] Das, D. R., Sachan, A. K., Mohd, S., and Gangwar, S. S. (2012). Nymphaea Stellata: a Potential Herb and Its Medicinal Importance. *Journal of Drug Delivery and Therapeutics,*2, 41–44.

[8] Farheen M., Arman S., Hussaini R., Kouser A., Pharm M. (2015). Phytochemical Evaluation and Pharmacological Screening of Ethanolic Leaf Extracts of *Eichhornia crassipes* and *Nelumbo nucifera* for Neuropharmacological Activity in Psychoneurosis Induced Mice. *World J. Pharm. Pharm. Sci.* 4 (12), 874–904.

[9] Gupta A, Pandey V.N. (2014). Herbal remedies of aquatic macrophyte of Gorakhpur district, Uttar Pradesh (India)., *International Journal of Pharma and Bio Sci*: Vol. 5(1): 300-308.

[10] Gupta,S. and Sharma, R. K. (2024). Ludwigia Adscendens: Exploring the Botanical and Pharmacological Aspects. *Afr.J.Bio.Sc*.6. (12) ISSN: 2663-2187 https://doi.org/10.48047/AFJBS.6.12.2024.485-495.

[11] Gunjal J. N. and Patil, M. S. (2023). Typha Species: An Overview of Pharmacognosy, *Department International Journal of Pharmaceutical research and Applications* Vol. 8(6), 1937-1942 www.ijprajournal.com ISSN: 2456-4494 DOI: 10.35629/7781-080619371942.

[12] Gyawali, R. and Kim, K.S. (2009). Volatile Organic Compounds of Medicinal values from Napalese Acorus calamus L. *Kathmandu University Journal of Science, Engineering and Technology*. Vol.5, No. II, pp – 51-65.

[13] Howes, M.R., Houghton, P.J. (2003). Plants used in Chinese and Indian traditional medicine for improvement of memory and cognitive function. *Pharmacology Biochemistry and Behavior,* 75, 513–527.

[14] Kirtikar, K.R. Basu, B.D. (1987). *Indian Medicinal Plants*. Vol. IV. Dehradun, India, M/s Bishen Sing, Mahendra Pal Sing Publishers, pp 1229–1230.

[15] Ludwig, J.A. and Reynold, J.E. (1988*). Statistica Ecology- A Premier on Methods and computing*. Wily Inter science Publications.

[16] Pal, D. K., and Nimse, S. B. (2006). Little known uses of common aquatic plant, hydrilla verticillata (Linn. f.) royle. *Indian Journal of Natural Products and Resources*,5,108–111.

[17] Mohammad, A.R., Mohammad, O.F., Mohammad, A.H., (2011). Environment friendly antibacterial activity of water chesnut fruits. *Journal of Biodoversity and Environmental Science*, ISSN – 2220 – 6663. Vol. 1: 26-34.

[18] Rahman, M.M., Wahed,M.I., Biswas,M.H., Sadik, Haque, M.E. (2001) : Invitro antibacterial

activity of Trapa bispinosa *Roxb. Science*.1 : 214 -246.

[19] Rashid, M.M., Hossain, M.S., Azad, M.A.K., Shaheen, S.M., Rashid, M.H., and Islam, M.A. (2019). A promising anti diarrhoel, antimicrobial, and anthelmintic effect of methanolic extract of Hygroryza aristata leaves.*Pharmacology online,* 2 ,294-302.

[20] Rizwana Dilshad, Kashif-ur-Rhizwan Khan *et.al*, (2022). Chemical Composition and Biological Evaluation of *Typha domingensis* Pers. to Ameliorate Health Pathologies: In Vitro and In Silico Approaches, *Biomed Research Journal*, doi: 10.1155/2022/8010395

[21] Rorong J. A., Sudiarso S., Prasetya B., Polii-Mandang J., Suryanto E. (2012). Phytochemical Analysis of Eceng Gondok (*Eichhornia crassipes* Solms) of Agricultural Waste as Biosensitizer for Ferri Photoreduction. Agrivita, J. Agric. Sci. 34 (2), 152–160. 10.17503/agrivita-2012-34-2-p152-160

[22] Sharma, S. C., Tandon,J. S., Dhar, M.M. (1975). Sagittariol, A new Diterpene from *Sagittaria sagitifolia* L. *Phytochemistry*, Vol. 14, 1055-1057.

[23] Shishkin, B. K. and E. G. Bobrov (eds.). (1974). Flora of the U.S.S.R. Volume XV. Malvales, Parietales, Myrtiflorae. Israel Program for Scientific Translations, Jerusalem.

[24] Singh, P. K., Tiwari, S. K., Rai, N., Rai, K., and Singh, M. (2016). Antioxidant and phytochemical levels and their interrelation in stem and leaf extract of water spinach (*Ipomea aquatica*). *Indian Journal of Agricultural Sciences*, 86, 347–354.

[25] Y. Birnin Yauri & Abdullahi, M.L., (2019). Ecology and control of Typha species in Hadejia Nguru Wetlands Typha Grass on Biodiversity Loss of Hadejia-Nguru Wetland Located between Jigawa and Yobe States of Nigeria: A Review, *Journal of Applied Science and Environmental Management*, 23(10), 1847–1853.