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Economic importance of Hydrophytes: A Review

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Abstract- The present paper deals with role of water loving plants, i.e., Hydrophytes in different fields. As we know, most of the aquatic plants are considered as weeds, being troublesome both for aquatic habitat as well as mankind because the people are unaware about the great potential and economic importance of these plants. During the recent past, a number of instances and experiments have proved that these highly productive plants are generally more productive than conventional terrestrial crops. These plants can be used for making bio-gas, bio- fertilizers, fodder, as fish feed, and several plant-based industries. These plants are the source of a number of chemicals, which has immense medicinal value. Many of these plants are sold in the urban vegetable market for its important food values, as vegetable or as medicine. The present work is a holistic approach of aquatic plants with reference to their economic importance. The study was done in Pakur district of Jharkhand state covering some important water bodies and the plants were identified and collected as per BSI guidelines.

Key words: Hydrophytes, Aquatic, economic importance, Pakur.

INTRODUCTION

Hydrophytes refer to the aquatic plant bodies that live freely, entirely or partially submerged in different aqueous environments. They are the plant bodies that adapt themselves to survive in an aquatic ecosystem by modifying their leaves, stems and roots due to the modifications in their cellular components. The hydrophyte plants can live in diverse habitats like marine, lentic and lotic water sources. Hydrophyte is a term that has been originated from the Greek word, Hydro means water and phyton means plants.

There were many scientists whose contribution made it possible to study the nature, existence, adaptations and role of hydrophytic plants. Firstly, the hydrophyte plants

were regarded as aquatic plants, growing in the water. The term hydrophyte was first given by the two scientists named Warming and Raunkiaer. Warming organized the plant species by the degree of soil wetness. Then, Weaver and Cements were the two scientists who classified hydrophyte plants into three major groups; floating, submerged and amphibious types.

Hydrophytes are those plants which live in water and adjust with their surroundings. They either remain fully submerged in the water like *Hydrilla*, *Vallisneria*, etc. or most of their body parts remain under the water like *Trapa*, lotus, etc. water lilies, sedges, crow foots are other important water plants. Many hydrophytes absorb water and gases over the whole surface and have no stomata like the spiked water milfoil (*Myriophyllum spicata*), which is completely submerged in water.

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Aquatic and marshy amphibious plants are still regarded by general mass of people as 'nuisance' because they are not yet aware of the great potential and economic value of these profusely growing uncontrollable plants. These are highly productive as compared to most terrestrial crops.

Hydrophytes play a significant role in the stabilization of shoreline, in the removal of nitrogen, phosphorus and other toxic water pollutants, weed control etc. They also function as the producers for aquatic organisms like fish, tadpole, insect larvae etc. It also traps sediments and limits erosion. As a matter of fact, these plants have been proved to be good source of livestock feed, human food, fish feed, biofertiliser, energy, fiber and paper. Furthermore, they have the capacity to purify the wastewater through the uptake of dissolved nutrients, including trace metals. Macrophytes play an important role in the ecological functioning of lentic ecosystems. They also play a key role in determining the structure and function of ecosystems by making available energy and nutrients for higher trophic levels. Aquatic macrophytes have played very important role in restoration of shallow eutrophic lakes. Therefore, the evaluation of the life cycle of macrophytes is a key issue before using them in restoration of waterbodies. Some sporadic mentions on the flora of the lentic waterbodies were made by earlier workers.¹⁻⁷

MATERIALS & METHODS

The present work is based on collection of samples from various water bodies of Pakur district in the state of Jharkhand. Pakur district is situated in the north east corner of Jharkhand State. It is located at 23°40' to 25°18' latitude and 86°25' to 87°57' E. longitude, being part of Chotanagpur plateau. It is situated on the north-eastern corner of Jharkhand state, being dominated by tribal communities and aquatic habitats with fabulous treasure of aquatic and semi aquatic vegetation. The present work includes regular visit of the sampling sites for collection and identification of plants. Some of the local people and ethnic communities were also contacted to know how common mass of people use these plants in their daily life to arrange their bread and butter.

RESULT & DISCUSSION

Most of the aquatic plants are considered as weeds; the reason behind this is that the people are unaware about the great potential and economic importance of these plants.

During the recent past, a number of instances and experiments have proved that these highly productive plants are generally more productive than conventional terrestrial crops. These plants can be used for making bio-gas, bio-fertilizers, fodder, as fish feed, and several plant-based industries. These plants are the source of a number of chemicals, which has immense medicinal value. A number of aquatic plants are used as food. During scarcity this group of plants is consumed by the poor people as staple food. Many of these plants are sold in the urban vegetable market for its important food values, as vegetable or as medicine.

Further research on economic importance of Aquatic plants will open new vistas to mankind for their foods and also for several articles of commerce. Economic importance of certain hydrophytes has been discussed as below.

FOOD VALUE

Some of the shoreline plants are good source of cattle feeds like Typha, some wetland grasses, even *Eichhornia crassipes* is consumed by the cattle, as these are the good source of protein supplement. Most of the water birds feed on these aquatic plants.

Aquatic plants act as the life line for most of the fish reared in the water bodies, especially the carps like silver carp, Milan carp, Chinese carp etc. in one way the aquatic plants serve as food for the fish and in other way, fish are good source of controlling weeds biologically. *Potamogeton*, *ceretophyllum*, *Utricularia*, *Eichhornia*, *Najas*, *Hydrilla* and other duck weed sps are good source of fish food.

A number of common aquatic plants are used as human food. *Trapa bispinosa*, Rhizomes of *Nelumbo nucifera* and *Nymphaea* species called as Kamal Kakdi is a good source of carbohydrate used by tribals and rural people as main food. Rhizomes of *Scirpus grossus* is also used as food. Beside these, some of the aquatic plants like, *Alternanthera philoxeroides* (Mart.) Griseb., *Alternanthera sessilis*, *Bacopa monniere* (L) Wttst., *Centella asiatica* L., *Chenopodium album* L., *Enhydra fluctuans* L., *Ipomoea aquatica* Forsk., *Ludwigia perennis* Linn., *Hygrophila auriculata* (K. Schum) Heine., *Sagittaria sagittifolia* Linn. etc. are used as pot herbs and are very common in Indian kitchens.

SOURCE OF COMPOST AND FIBER

Luxuriant growth of plants under nutrient rich water bodies act as a good source of compost, for e.g., *Eichhornia*, *Pistia*, *Spirodella*, *Lemna*, and *Wolfia* are good source of compost and bio-fertilizer when composted in proper way.

In recent times *Eichhornia* fiber is being used to make folders, baskets, mats and other useful goods. Similar possibilities are there to use the fibers of *Nelumbo* and *Nymphaea*. There is need of further research in this aspect to explore more and more fiber yielding aquatic plants.

Medicinal importance of Aquatic Plants

The rural and tribal people still have faith on their traditional system of treatment. During the course of studies following plants have been reported to be used against different diseases. The brief ethnomedicinal descriptions of such plants have been mentioned below.

1. *Acorus calamus* Linn.

Fam:- ARACEAE

Local Name:-Ghorbaz

Used against cough cold & fever. Rhizomes after heating along with mustered oil used for body massage. Rhizome is used as stringent by the local athletes.

2. *Aeschynomene indica* Linn.

Fam - FABACEAE

Local Name – Phulan

The extract of the plant is used as spermicidal agents. Decoction of the leaves along with leaves of *Andrographis paniculata*, root of *Thespesia populnea* and stem bark of *Strichnos nuxvomica* are taken internally for 40 days to cure snakebite.

3. *Alternanthera sessilis* (L.) R.Br.

Fam:- AMARANTACEAE

Whole plant leaves and shoots are accredited with galactogogue; a good fodder increases the flow of milk in the cattle. Young shoots are nutritious, contain protein and iron.

4. *Ammania baccifera* Linn.

Fam- LYTHRACEAE

Local Name – Dad Mari

Bitter, appetizer, laxative, stomachic, aphrodisiac, removes blood troubles, strangury, Leaves are acrid, used for ring worm and other skin diseases. Herb is reported to possess anti-tubercular properties.

5. *Anagallis arvensis* Linn.

Fam:- PRIMULACEAE

Local Name – Krishna neel

Whole plant is used in leprosy, dropsy, epilepsy, hydrophobia, fish poisoning and snake bite. It is diuretic, diaphoretic, expectorant and useful in rheumatism, cerebral, hepatic and renal complaints. The extract of plant is hypertensive, antiviral and diuretic inhibits herpes and poliomyelitis virus.

6. *Bacopa monniere* (L) Wttst.

Fam:- SCROPHULARIACEAE

Local Name: - Brahmi

Against nervous disorder, constipation, bronchitis in children. It is used against mental ailment. It is also used as brain Tonic.

7. *Blumea lacera* (Burm.F.) DC.

Fam:- Asteraceae

Local Name – Jangali muli

It is hot, pungent, bitter, anti-pyretic; cures bronchitis, blood diseases. Juices of leaves are used as an anthelmintic, febrifuge, astringent, and diuretic; it is given in bleeding piles. Root with black pepper is given in cholera. The root kept in the mouth is said to cure diseases of the month. Essential oil from *Blumea* has been shown analgesic, hypothermic and tranquilizing activities.

8. *Caesulia axillaris* Roxb

Fam:- Asteraceae

Local Name – Gurguza

Plant is used in baldness. Bark of fresh herb is crushed and applied on wounds. The essential oil from plant is antimicrobial on human pathogenic bacteria and fungi.

9. *Centella asiatica* Linn

Fam:- APIACEAE

Local Name –Thankuni

Plants is acid, bitter; digestible, tonic, cooling, Laxative, alterative, alexiteric, antipyretic; improves appetite, voice, memory; cures Leucoderma, anemia, Urinary discharges, blood diseases, bronchitis' inflammations' Fever, Spleen enlargement, thirst, asthma., small pox, As a remedy for leprosy it has a considerable repute. Powder of dried leaves with milk is an alternative tonic and said to improve memory. The root contains the major portions of the active principle "vellarin".

10. *Chenopodium album* Linn

Fam- CHENOPODIACEAE

Local Name – Bhatua Sag

The Plant is considered as laxative and anthelmintic; Leaf powder is used externally as an antiseptic around genitalia of children. The infusion used for curing intestinal ulcer, and considered useful in piles, throat and eye troubles. Decoction is tonic, diuretic and aphrodisiac, given in biliousness, hepatic disorders and spleen enlargement. Flowers and buds are used in stomach troubles, Weakness in children. Seeds are used for abortion.

11. *Commelina benghalensis* Linn

Fam- COMMELINACEAE

Local Name – Kanteri

The drug is bitter, emollient, demulcent, refrigerant, and laxative, beneficial in leprosy. The plant is used in sores and snakebite.

12. *Commelina diffusa* Burm.F.

Fam- COMMELINACEAE

Local Name – Kansura

Whole plant crushed and applied on burns, itches and boils. Leaves are used for poulticing sores.

13. *Cyperus iria* Linn.

FAM- CYPERACEAE

Local Name – Galmotha

The Plant is used as astringent, stimulant, tonic and stomachic.

14. *Cyperus rotundus* Linn

FAM- CYPERACEAE

Local Name – Motha

The root is pungent, acrid, cooling, astringent, appetizer, stomachic, diuretic, emmenagogue, vulnerary; Useful in Leprosy, Thirst, Fever, dysentery, prurits, Pain, Vomiting, epilepsy, Ophthalmia, erysipelas, dyspepsia and urinary contractions. The Whole plant along with young leaves of *Azadirachta indica* and black pepper with leaves of *Ocimum sanctum* is made into decoction and the vapour is used to cure malarial fever. The decoction is given three times a day for the same purpose. Tubers diuretic, Root paste is applied for healing wound and sores and also used in stomach complaints.

15. *Eclipta alba* (L.) Hassk

Fam: -ASTERACEAE

Local Name – Bhengaria

The juice is taken to cure diarrhoea, throat pain and to reduce fever. Root is tonic and alterative, emetic and purgative and also applied to the wounds of cattle. Juice of leaf is hepatic tonic. Source of a black stain, enters into preparations for darkening hair. Fresh plant is applied with sesame oil in elephantiasis, and juice in affections of liver and dropsy. Root is used as tonic in hepatic and spleen enlargements and in various chronic skin troubles; it is given internally in scalding of urine. It relieves headache when applied with oil. Farmers use the herbal juice for sickle wounds. The root is used as tonic for darkening the hair. The leaf juice is used for external application on cattle wounds to prevent pus formation and bacterial infection.

Root is used in snakebite and scorpion sting. Leaf paste is applied to cure white spot formed due to burning. The oil prepared from the herb is a great repute as hair dye and has cooling affect on the brain.

16. *Enhydra fluctuans* Lour

Fam:- ASTERACEAE

Local Name:-Muchri Sag

Consumed in the form of potherbs (Sag) as blood purifier and the leaf along with honey is consumed against anaemia.

17. *Heliotropium Indicum* Linn.

Fam- BORAGINACEAE

Local Name – Hanthi Sunrh

The Juice of the leaves is used as an application to wounds and roses, to boils and to the bites of scorpions and stings of insects. Decoction of leaves is used in urticaria and fever, and that of roots in chague and fever. Flower is considered as emmenagogue in small doses. Seeds masticated as stomachic.

18. *Hygrophila auriculata* (K.Schum) Heine

Fam:- ACANTHACEAE

Local Name: -Ramdana.

Plant is used against body swelling, itching and waist pain. Root used in hydrocele. The decoction of the plant is used against jaundice.

19. *Ipomea auqatica* Forsk.

Fam :- CONVULVACEAE

Local Name :- Karmi Sag.

It is given to nursing mother to promote lactation. It promotes sperm formation too. It is also used against cough, anemia and diarrhoea.

20. *Ludwigia perennis* Linn

Fam :- ONAGRACEAE

Local Name :- Prasuti ghas

Decoction of whole plant is given in Prasuti (Post natal) and in fever.

21. *Monochoria vaginalis* (Burms.F.) Pres

Fam- PONTEDERIACEAE

Local Name – Monochoria

Leaf juice is used in cough; root of the plant is useful in stomach and liver complaints. Root is also used in asthma and tooth ache.

22. *Nelumbo nucifera* Gaertn,

Fam :- NYMPHACEAE

Local Name :- Kamal

Rhizomes in powdered form are used against Menorrhoea & piles. Flowers are used against fever and liver diseases. Seeds are used against Skin diseases.

23. *Nymphaea nouchalli* Burm. f.

Fam: - NYMPHACEAE

Local Name: - Kumudni

It is used against cough, vomiting & leucorrhoea; It is also given to person suffering from premature ejaculation.

24. *Nymphoides indicum* (L.) O. Kuntze,

Fam : MENYANTHACEAE

It is given against fever and jaundice.

25. *Oldenlandia corymbosa* Linn.

Fam- RUBIACEAE

It is considered as stomachic and refrigerant; decoration is prescribed in remittent fever with gastric irritability and also used in jaundice and other liver trouble. Juice is given internally with little milk and sugar in the burning at the stomach pit and to cure heat eruptions.

26. *Oxalis corniculata* Linn.

Fam- OXALIDACEAE

Local Name – Tin Patia

Leaves have been used in fever, dysentery and scurvy.

27. *Polygonum glabrum* Willd.

Fam : POLYGONACEAE

Local Name : Dardmari

Leaves are used against Colic pain and Whole plant is used against itching.

28. *Portulaca oleracea* Linn.

Fam- PORTULACEAE

Local Name – Gologola Sag

Herb is refringent, vulnerary, antiscorbutic, aperient and diuretic; used in scurvy and diases of liver, spleen, Kidney, and bladder; also employed in cardio-vascular disease, dysuria, haematuria, in dysentery, sore nipples and ulceration of herb is employed to stimulate gastic secretion.

29. *Rungia repens* Linn. Nees

Fam- ACANTHACEAE

Herb is given in cough, fever; as vermifuge and diuretic. The plant is also given in skin infections. Fresh leaves are bruised and mixed with castor oil and applied to scale in cases of *Tinea capitis*, a scaly fungal infection.

30. *Sphaerantus indicas* Linn.

Local Name – Gorakh Mundi

Fam- Asterceae

Hot laxative, digestible, tonic, Fattening, alternative, alexipharmic; used in insanity, tuberculous glands,

indigestion, bronchitis, spleen disease, elephantiasis, anemia, pains in uterus and vagina, piles, strangury, epileptic convulsion, asthma, leucoderma, dysentery, vomiting, urinary discharges, rectal pain, Looseness of breasts, hemi crania.

31. *Spilanthus acmella* Murr.

Fam- ASTERACEAE

Local Name – Akakara

Leaves and flower heads are chewed to relieve toothache and infection of throat and gums. Leaves are rubbed on the skin to smothe the itching.

32. *Vallisnaria spiralis* Linn

Fam : HYDROCHARITACEAE

Local Name: Shenwar

It is used against diarrhoea, leucorrhoea and syphilis.

Other Uses

Treatment of waste water and Source of Energy

Some fast-growing aquatic plants absorbs heavy metal and purify water, e.g., *Eichhornia*, *Typha*, *Phragmites*, *Spirodella*, *Lemna*, and *wolfia* are successfully used to purify water. These plants are also the good source for Bio-Gas

CONCLUSION

On the basis of above discussion, it may be concluded that hydrophytes are so potent herbs having immense nutritional and medicinal values and useful in so many ways. There is need to cultivate these plants and proper marketing management, so that common mass of people will get employment and entire human population will be benefitted in addition to biodiversity conservation.

REFERENCES

1. **Unni K. S. 1971.** An ecological study of the macrophytic vegetation of Doodhari lake Raipur, M.P. India. Distribution and seasonal changes in aquatic plants. *Hydrobiol.* **37:** 139-155.
2. **Shah G. L. 1978.** Flora of Gujarat State. Sardar Patel University Press, Vallabh Vidya Nagar, **2:** 504.
3. **Billiore D. K. and Vyas L. N. 1981.** Distribution and production of macrophytes in lake Pichhola, Udaipur, India. *Int. J. Ecol. Envir. Sci.*, **7:** 45-54.
4. **Chambers, P.A. and Klaff, J. 1987.** Light and nutrients in the control of aquatic plant community structure. *J. Ecol.*, **75:** 611-619.

Biospectra : Vol. 18(1), March, 2023

An International Biannual Refereed Journal of Life Sciences

5. **Biswas, K. and Cadler, C.C. 1984.** Handbook of Common Water and Marsh Plants in India and Burma, Bishen Singh Mahendrapal Singh, Dehra Dun, India.
6. **Kiran, B.R. and Puttaiah, E.T. 2005.** Aquatic macrophyte diversity in Hosur tank near Bhadravathi town, Karnataka. *Environment and Ecology*, **23S (Spl-4)**: 875-877.
7. **Islam, E. 1999.** A study of the certain aquatic macrophytes of lentic habitat of Dibrugarh district, Assam. *Adv. Pl.Sci.*, **12**: 35-40.
15. **Mukherjee P. 2009.** Aquatic Biodiversity of Victoria Lake of Lohardaga (Jharkhand), India. *Biospectra*. **4(2)**: 417-420.
16. **Mukherjee P. 2011.** Studies on Weed Diversity in Pakur District of Jharkhand; Recent Studies in Biodiversity and Traditional Knowledge in India. pp. 131-143.
17. **Mukherjee P. and Dutta P. 2018.** Alien Invasive Flora of Santhal Pargana, Jharkhand (India). National Publishers and Distributors, 36, Saket Nagar, B.H.U., Varanasi (UP).

ADDITIONAL REFERENCES

8. **De, A.K., S. Mandal, C.H. Rahaman and P.K. Dan. 1988.** A contribution to the aquatic angiosperms of Santiniketan, West Bengal with reference to water environment. In Environmental Management and Planning, Ed. A. K. Sen, Wiley Eastern Limited New Delhi, pp.164-174.
9. **Dey, S.C. and Kar, D. 1989.** Aquatic macrophytes of lake Sone in Assam. *Environ. Ecol.*, **7**: 253-254.
10. **Jha, H. K. 2018.** Study of aquatic weeds and their control in and around Jamtara district of Jharkhand., Ph. D. Thesis. JRU, Ranchi.
11. **Mishra, K. C. 1974.** Manual of Plant Ecology. Oxford and IBH Publ. Co., New Delhi, India.
12. **Muenschler, W. C. 1944.** Aquatic plants of United States. Comstock Publishing Company, Inc. Ithaca, New York. p. 374.
13. **Mukhopadhyaya, C.R. 1987.** Aquatic and semiaquatic plants of Birbhum district, West Bengal. *J. Econ. Tax. Bot.*, **9**:230-238.
14. **Mukherjee P. 2001.** The Floristic and Ecological Studies of Aquatic and Semi aquatic Angiosperm of Loardaga. Ph.D. Thesis, Ranchi University, Ranchi.
18. **Mukherjee P. and Kumar J. 2017.** Survey of alien invasive aquatic and semi aquatic plant species of Santhal Pargana, Jharkhand. *Biobrio*. **4 (1 and 2)**: 221-224.
19. **Naskar, K.R. 1990.** Aquatic and Semi-aquatic Plants of The Lower Ganga Delta. Daya Publishing House, New Delhi.
20. **Rao, K.S.S. 1981.** Flora of South Eastern Kachchh. Ph.D. Thesis, M.S. University, Vadodara.
21. **Shankar & Mishra. 2012.** Study of aquatic medicinal plants of Hazaribagh district of Jharkhand India, *IRJP*, **3(4)**: 405 - 409.
22. **Sinha, A.K. & Verma, S. K. 1988.** Aquatic and wetland angiosperms of Kosi division, *Eco. & Taxo. Botany*. **1**: 153 - 162.
23. **Subramanyam, K., 1962.** A systematic account of common Indian aquatic angiosperms.
24. **Verma, S.K., Pandey, P., Mukherjee, P. & Paul, D.K., 2007.** Ethnomedicinal use of some aquatic plants in Jharkhand, *J. Haematol. & Ecotoxicol*. **2(1)**:34 - 37.
