



Ethno-medicinal uses of some aquatic plants in district Haridwar, Uttarakhand

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Abstract

This paper deals with the documentation of ethno-medicinal uses of aquatic plants occurring in the wetlands of district Haridwar, Uttarakhand, India. The empirically prepared and accepted prescriptions as remedy for the treatment of various diseases with the help of aquatic plant species by different ethnic communities of Haridwar district are provided along with the respective method of preparation, prescribed dosage and administration, which were recorded from the responses received from local physicians and patients. Thoroughly the data were collected from, local residents, along with herbal practitioners, Vaidhyas, shepherds, farmers, exorcists and saints have been interviewed to ascertain plant species identification and traditional curative methodology of diseases with the help of ethno-medicinal plants.

Keywords: aquatic plants, haridwar district, water bodies, ethno-medicinal uses

Introduction

Nature has design to earth in various forms of life and made diverse ecosystem for organism. Aquatic plants or hydrophytes are curious forms of plant-life and are necessary component of the water ecosystem. Wetland ecosystem forms a significant environment for the survival of aquatic, semi-aquatic and moisture loving floral and faunal associations. Aquatic plants act as a biological filter and called as 'Kidney of the Landscape'. Mostly these plants are herbaceous, occasionally shrubby in nature and perennial. The aquatic plants growing in water bodies has been categories into four group i.e. free floating plants or parts of plants floating, submerged plants, which plants are under water, semi-submerged plants are rooted plants with aerial float or plant part under water, and moisture loving plants along the edge of the water body. They provide beneficial services to all organisms as well as human for food, fodder and medicine (Allen-Diaz *et. al.*, 2004; Anonymous 1883- 1885, 1886-1970) [3,4].

Uttarakhand is situated in the Northern part of India. Physio-graphically the state can be divided into three zones namely the Himalaya, the Shivalik and the terrain region. Uttarakhand mainly comprises of mountainous terrain. There are 13 administrative districts in the state in which one important district Haridwar, is a mix of both mountain and plain area. The famous holy Ganges originates from the Gangotri glacier, travels 300km in the Himalayan ranges and enters the plains of Haridwar region. Haridwar district is located on the Gangetic belt along with a rich number of aquatic floras. The region has many natural water resources in different forms, which are the most fruitful life supporting systems and of immense socio-economic value to the people and nearby inhabitants. The water bodies in district Haridwar are nalas, streams, ponds, canals, rivers, and low-lying wetlands. There is a large number of the aquatic flora throughout the region which includes plants in ponds, marshy marshes, reservoirs and waterlogged areas etc. These wetlands are rich in various important aquatic medicinal plants. Inhabitants of the district use different

plant species traditionally for the treatment of several ailments in their day to day life. From north to north-west Himalayan region, local communities have found the medicinal use of thousands of plants found in every ecosystem down to the coastal plains (Arora, 1981) [6].

Haridwar region comes under the monsoon climate zone and is very rich in wetlands. The water bodies remain underwater during the rainy season and provide a good habitat to plant species. The dominant species found in these water bodies are *Eichhornea crassipes*, *Percicaria laphthifolia*. In some areas the ponds are deep and narrow, filled with disintegrated and elevated land away from the river mainly dominated by *Arundo donax*, *Typha latifolia*, *Phragmites karka*. Among free floating plants (*Azolla pinnata*, *Eichhornea crassipes*, and *Lemna gibba*), semi-submerged (rooted plants with aerial float *Ludwigia octovalvis*, *Nymphaea alba*, *Marsilea minuta* and *Trapa natans*), submerged (*Ceratophyllum demersum*, *Hydrilla verticillata*, *Vallisneria*) and moist loving plants (*Ipomoea aquatica*, *Typha angustifolia*, *Ludwigia*, *Monochoria vaginalis*, *Phragmites karka*, *Polygonum* spp., *Rotala rotundifolia*, *Rumex dentatus* and *Sagittaria latifolia*) can be seen in the study area.

Public interest in herbal medicines has been increasing, because of the current widespread belief that "green medicine" is safer and more efficient than costly allopathic drugs, which tend to have adverse side effects. The importance of plants to human health is verified by the medicinal usage by 70-80% of global human population who rely primarily on traditional herbal medicines to meet their primary health care demands. For centuries, People have been using wild and wetland plants for medicinal purposes and are still prevalent in tribal and rural areas. Local doctors have an important role and reputation in rural health care. They volunteer for a small fee.

Ethnomedicinal reports especially on aquatic plants in Haridwar district are scanty. The growth of a large number of aquatic plants has attracted the attention of ethno-medicinal, botanical surveys across India. Even though

many workers have reported hydrophytic flora in different parts of the country (Subramanyam 1962, Mehta *et al.*, 1972, Gupta 1979) [37, 27, 23] some ethno-botanists conduct studies focusing mainly on the ethno-botanical aspects of medicinal plants in Uttarakhand (Uniyal 1968, Goel 1982, Tiwari 1986, Gaur and Tiwari 1987, Gaur 1999, Rawat & Bhatt 2002 etc. Recent works on ethnomedicinal aspect of Haridwar district have been done by Dangwal and Kumar (2016, 2018) [41, 21, 40, 19, 20, 30, 14].

A systematic work on the therapeutic value of aquatic plants has not been done in the district. An attempt has been made to preserve and document this vanishing knowledge of medicinal properties of economic plant wealth of wetlands used by the residents of Haridwar district of Uttarakhand.

Study Area

The present study of was conducted in Haridwar district of Uttarakhand state, (India). It is covering an area of about 2360 km² in the South-Western part of Uttarakhand. The study area is located at 29.96° latitude in the North and 78.16° degree longitude in the East and an altitude range of about 249.7m.a.s.l. This area is hilly and plane. The total average annual rainfall of the region is approximately about 2136.7mm. Monsoon rains mainly occur during the summer

time. The soil in the Upper Shivalik is a conglomerate of sand and clay. The soil in the submontane tract is light and shallow, supported by a deep layer of boulders. The soils of this region are mostly sandy to coarse loam. Lowland soils are moist alluvial deposits everywhere (DCHB Haridwar 2011) [11].

Material and Methods

The Exhaustive field survey has been carried out in different regions of district during 2017 to 2019. The interviews were conducted along with the discussions with cowherd, shepherd and local communities nearby the wetlands. The information of this communication is based on personal observations and interviews with experts in the field of the district. Standard methods of collection, preservation and maintenance of herbarium were followed by (Jain and Rao 1977; Singh and Subramaniyam, 2008).

The collected plant specimens were identified with the help of recent and relevant floras, and was confirmed matching with the help of local herbaria of B.S.I, DD, and GUH herbarium, Dept. of Botany, Srinagar Garhwal. The plant specimens are deposited and maintain in the herbarium Dept. of Botany, S.R.T. Campus, Badshahi Thaul, Tehri Garhwal.

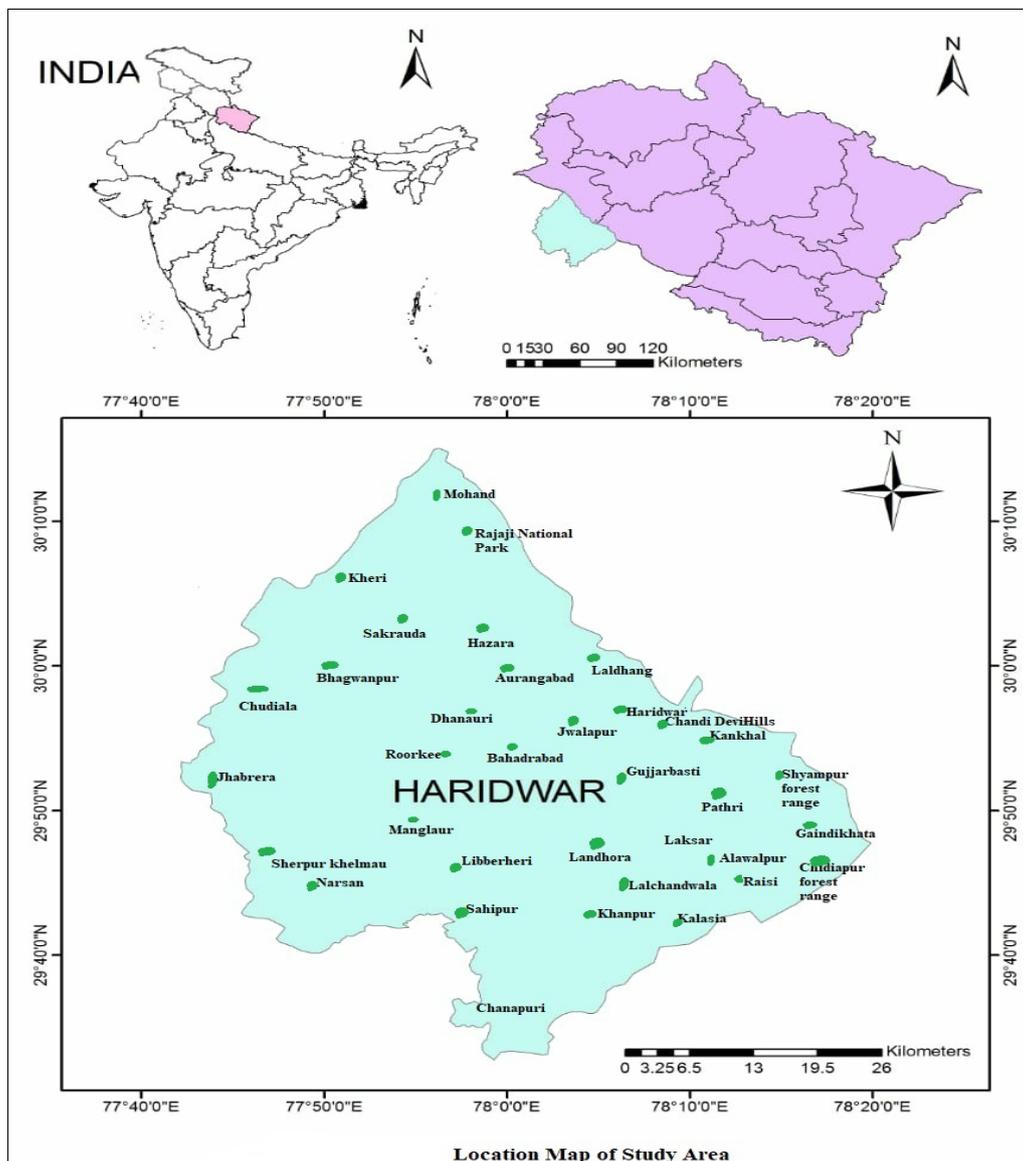


Fig 1

Enumeration

In the enumeration, the plant species are arranged in alphabetical order, Family name (in parentheses), Botanical name, Common name, preparation and ethno-medicinal uses are enumerated.

Family- Alismataceae

Sagittaria sagittifolia L. Common Name- Panipatta

Ethnomedicinal uses: 10gm root paste mixed with one teaspoon of honey and is taken twice in a day to cure cough problem.

Family- Araceae

Acorus calamus L. Common Name- Vacha

Ethnomedicinal uses: 15ml extract of rhizome is given thrice a day in stomach ulcer, fever and cough complaint.

Colocasia esculenta (L.) Schott. Common Name- Hathikaan

Ethnomedicinal uses: Leaf lamina is boiled with cow milk, take it to enhance pregnancy.

Lemna gibba Common Name- Kaai

Ethnomedicinal uses: Plant paste is applied on skin disease

Pistia stratiotes Common Name- Kumbhi

Ethnomedicinal uses: Plant paste is externally applied in boils and burns and leaves poultice is applied on piles.

Family-Amaranthaceae

Alternanthera philoxeroides Griseb. Common Name- Chomin

Ethnomedicinal uses: 10ml shoot extract with a pinch of salt is given three time in a day to cure dysentery.

Family- Apiaceae

Centella asiatica (L.) Urban. Common Name- Brahmi

Ethnomedicinal uses: Plant juice half a cup of tea mixed with jaggery and taken twice in a day for 10-15 days to avoid the urinary calculus. Fresh plant boiled with Khatki booti (*Oxalis corniculata* L.) and Tulsi (*Ocimum sanctum* L.) leaf in water and is taken three time in a day to cure the dysentery.

Family- Asteraceae

Ageratum conyzoides L. Common Name- Bukambur

Ethnomedicinal uses: Leaf poultice is applied on cut and injury.

Eclipta alba (L.) Hassk. Common Name- Bhangra.

Ethnomedicinal uses: Leaf extract along with little honey is given against cough and fever.

Family-Ceratophyllaceae

Ceratophyllum demersum Common Name- Sivara

Ethnomedicinal uses: Plant paste is applied on burning sensation.

Family- Commelinaceae

Commelina benghalensis L. Common Name- Kanhawa

Ethnomedicinal uses: Leaf poultice is applied on boils and burns. Plant extract 10ml mixed with honey is given to relief in cough.

Family-Convolvulaceae

Ipomoea aquatica Forsk. Common Name- Kalmi saag

Ethnomedicinal uses: Decoction of fresh shoot and leaf is used as droplets against ear disease and retinitis.

Ipomoea carnea Common Name- Hakim

Ethnomedicinal uses: Leaf poultice is applied on hurt, muscle swelling and pain.

Family- Cyperaceae

Cyperus haspan L. Common Name- Bada motha

Ethnomedicinal uses: Rhizome paste is mixed with honey and taken in fever and bronchitis.

Family-Marsileaceae

Marsilea minuta L. Common Name- Chaupatia

Ethnomedicinal uses: Fresh plant decoction is taken twice a day for 10-12 days against painful discharge of urination. Root paste is applied on eczema.

Family- Musaceae

Musa balbisiana Colla. Mem.Gen. Common Name- Kela.

Ethnomedicinal uses: Leukwarm juice of the stem is useful in earache.

Family-Nelumbonaceae

Nelumbo nucifera Gaertn. Common Name- Kamal

Ethnomedicinal uses: Petiole is taken raw regularly for curing stomach ulcer. Flowers boiled in water, after cold it is taken in dizziness complaint. One spoon rhizome paste with honey is taken daily for 2 weeks against diabetes. Seed kernel is eaten raw to improve eye vision.

Family-Onagraceae

Ludwigia octovalvis Common Name- Banlaunga

Ethnomedicinal uses: 20ml plant decoction is taken twice in a day to cure the leucorrhoea.

Family- Poaceae

Arundo donax L. Common Name- Nalsar

Ethnomedicinal uses: The paste from fresh tender shoot is mixed with honey and given to the child to cure typhoid and pneumonia. Shoot paste is applied on wound.

Oryza sativa Common Name- Dhaan

Ethnomedicinal uses: After soaking the seeds in an earthen pot for 2 hours, drinking it water to cures leucorrhoea.

Family- Polygonaceae

Rumex dentatus L. Common Name- Jungli palak

Ethnomedicinal uses: Root powder is taken in eczema constipation. Leaf paste is applied in burns and injuries.

Persicaria lapathifolia- Common Name- Mirchi, Jahri

Ethnomedicinal uses: Plant infusion is given to relief in stomach problem.

Family- Pontederiaceae

Eichornia crassipes Common Name- Samaddarsokh

Ethnomedicinal uses: Leaf paste is applied on skin disease.

Family- Ranunculaceae

Ranunculus scleratus L. Common Name- Jaldhaniya

Ethnomedicinal uses: Plant paste is used on wart, skin disease, spider toxin and rheumatism.

Family- Salviniaceae

Azolla pinnata Common Name- Jaljaal

Ethnomedicinal uses: Plants are chewed to treat the sore throat and decoction is used in cough.

Family- Plantaginaceae

Veronica anagallis-aquatica Common Name- Sadevi

Ethnomedicinal uses: Plant poultice is externally applied on burn, ulcer.

Family- Trapaceae

Trapa natans L. Common Name- Singhara.

Ethnomedicinal uses:- Fruits are eaten to control the high blood pressure and urine infection. Flour is quite beneficial in leucorrhoea. Peel water chestnut and put it in a kulhad (soil pot) water for 3 days, chew it in the morning and drink

the water, in blood pressure.

Family- Zingiberaceae

Hedychium coronarium Koenig Common Name- Kapurkachri.

Ethnomedicinal uses: Stem juice is externally used to relieve in swelling. Leaf and rhizome paste is applied on forehead to treat the headache. Root juice mixed with water and used to wash the eyes to relieve in redness, swelling and pain.



Fig 2

Result and Discussion

The district Haridwar is conferred in rich biodiversity with its cultural heritage. It is a land of diverse culture with large number of rural population. They have their own customary health care systems and used some specific crude plant product to treat health related problems. There are a number of lentic and lotic water bodies at different location which harboring luxuriant growth of aquatic and marshy plants. These plants are potentially rich in standings of medicine resources. Most of the plant species used by the local people for medicinal purposes to heal various disorder like wounds, eczema, stomach problems, gastro-intestinal, diarrhoea, spermatorrhoea, blood dysentery, cough and cold, fever, etc. The frequency of plant parts used are bark, fruits, leaf, root or whole plants etc. in the form of juice, powder, paste as well as infusion or decoction, chewing, pounding are used in traditional medicine. Even today, more than 85% of rural people consult these traditional healers before visiting city health centers. Most of the families of Haridwar district traditionally grow some medicinal herbs in their home gardens, ponds etc.

A number of 27 species of aquatic plants under 21 families and 28 genera were collected from different wetland sites of district like Libberhedi Roorkee-Mangalore Gangnahar area, Iqbalpur, Bahadarabad, Roshanabad, Dhanori, Bhagwanpur, Khanpur, Lakshar area, Mohamadpur jatt, Sherpur khelmau, Aurangabad, Bharatpur, Prahladpur, Govardhanpur, Madabela, Shyampur Mathana, Aam Khedi etc.

The availability of wetland plants is seasonal. Some valuable aquatic plants from this region are *Hedychium coronarium*, *Ipomoea aquatic*, *Nelumbo nucifera*, *Ipomoea carnea*, *Typha latifolia*, *Trapa natans*, *Cyperus rotundus*, *Eichhornia crassipes* etc. used by local inhabitants.

Some plant species are very rare to find in nature because of excessive and unscientific exploitation. Although the population of few plant species has been close to declining i.e., *Acorus calamus*, *Nelumbo nucifera*, *Centella asiatica*, *Marsilea minuta*, *Ipomoea carnea*, *Pistia stratiotes*, *Typha latifolia*, *Trapa natans* etc. So it is dreaded that it will take out from the state if suitable protection procedures are not taken up in time. Most of the aquatic plants are grown wild and hence people freely collect them but some species are planted and cultivated in a few spot i.e. *Trapa natans*. *Nelumbo nucifera* is still cultivated in Libbarheri wetlands of district. This is a means of occupation and basis of revenue for the poor and landless people. There are so many plants whose proper medicinal value is still unknown, and which may be the potential source of medicines for curing fatal diseases. The agro-climatic condition of Haridwar area is suitable for cultivation. Before decade, *Caesulia axillaris* was famous for but now the plant has totally been wiped out from the field in village areas.

A serious awareness is needed to be raised among the local people on sustainable utilization and management of the plant resources that are used as herbal remedies by the ethnic communities of the area. Thus, it proves to be a necessary step for conservation as well as dissemination of knowledge about ethno-medical value along with scientific cultivation of aquatic plants, to make people aware about this knowledge and importance of such pond plants which is used by the residents of Haridwar district of Uttarakhand.

Conclusion

The wetlands are shrinking and disappearing at a very fast rate and plants are depleting in the same pace. Water is the prime requisite of the wetland vegetation and any change in the availability of water affects their presence as well as distribution. The survival of aquatic species is very much threatened and therefore the studies on the aquatic resources, especially those having medicinal value, are important. Wetlands not only provide useful resources but are also significant with respect to the ecology and maintenance of the climate of the region. Most of the wetland region has been converted to agriculture fields and residential colonies, and are still being destroyed. Thus, a comprehensive investigation of studied plants would be a handy work for the invention of future eco-friendly drug that could be potential resources for the control of diseases.

It was found that some aquatic plants like the *Eichhornia crassipes*, *Arundo donax*, *Phragmites karka* etc., grow in such a dense amount in the aquatic land dominate their existence on the water level and do not allow other plants to flourish that remain in very small quantities or end up at that place.

Due to increasing population in villages and cities and construction of roads and different types of industries, ponds, puddles and wetlands in Haridwar district are in very critical condition and shrinking continuously with loss of aquatic biodiversity.

No law has been applied. So, the people of most of the villages and towns of the district are feeling free to do construction work on the waterlogged land and the water area is continuously decreasing. So there is a need to make and follow such laws forcibly, by which ponds, rivers, puddles and water-filled places can be kept safe and through which plants can be protected and conserved.

By law, the indiscriminate construction on the place of the pond should be banned and measures should be taken to conserve the place of the pond, so that the aquatic plants instead of becoming endangered in the coming future in this area to be preserve biodiversity and allow future generations to consume them.

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