

Diversity of Aquatic Medicinal Angiosperms of District Hamirpur, Himachal Pradesh, India

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ABSTRACT

Aquatic plants are the species that thrive on water or wetlands. Plants are used as medicine in almost all cultures. The study of literature indicates that most of the work was done on terrestrial angiosperms in Himachal Pradesh. Aquatic plants are considered as menace as they are generally the result of eutrophication. Hence, no attention has been paid on the study of aquatic plants. But these aquatic plants are used as medicine by local people to cure various ailments. Keeping these facts in view, the present investigation was formulated to study aquatic plants of district Hamirpur, Himachal Pradesh in reference to medicinal uses. This study was carried out between January 2019 to June 2023 in Hamirpur district, Himachal Pradesh, India. The water bodies were visited every month and aquatic plants were collected and herbaria were prepared. Plants were identified with the help of literature. The medicinal uses were documented by interacting with local people and consulting the literature. During present exploration 15 species of medicinally important aquatic angiosperms belonging to 14 genera and 14 families were reported. The changes in land use pattern are resulting in loss of aquatic plant diversity. Therefore, urgent steps are needed to save these useful aquatic herbs. The present study can be utilized in bioprospecting by pharmaceutical industries.

Key words : Aquatic plants, Medicine, Diversity, Bioprospecting, Himachal Pradesh

Introduction

Aquatic plants are found in the ecosystems ranging from rivers and wetlands to the tidal shores, all over the world. Suitable living conditions for these plants to thrive is permanently or periodically wet land that allows the plants to play significant role in ecosystem functioning. The aquatic plants may be found either in, on or under the water with specific adaptations (Tomlinson, 1983). These plants are believed to be the phylogenetic descendants of terrestrial plants which developed specific adaptations during the course of evolution (Bornette and Puijalon, 2001). The terrestrial plants are widely studied while knowledge of medicinal properties of

aquatic plants remained obscure (Macaskill, 2010). Aquatic plants vary in structure and development. Many aquatic plants share their environment with not only other plants but also microorganisms and wildlife. Like all plants, they can produce phytochemicals which help them to survive, grow and compete in such habitats (Bhowmik *et al.*, 2013). Aquatic plants are utilized by local people as antimicrobial, antidiabetic, antiprotozoal, antidiuretic, antihelmentic, anticoagulant and antiplatelet, antiviral, hypocholesterolemic, anticancer, hypolipidemic, antioxidant, antiepileptic, anti-inflammatory and analgesic and antiparkinsonian activities (Ramesh, 2013). The impact of medicinally important aquatic plants could raise awareness in the world, prevent-

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ing communities from destroying them, their surrounding ecosystems and water sources, hopefully reducing pollution. Keeping in mind all these facts, the present study was carried out with the objective to find out diversity and medicinal importance of aquatic plants of Hamirpur district of Himachal Pradesh, India.

Materials and Methods

The present study was carried between January 2019 to June 2023 in different seasons from various parts of Hamirpur district of Himachal Pradesh. The water bodies were visited every month and aquatic plants were collected. The characteristic features of these plants were noted in the field and the collected plants were brought to the laboratory for further identification. The coloured photographs of the plants were taken in their natural habitat. Herbarium mounts of all the collected plants were prepared for record and identification according to standard procedure of Jain and Rao (1976). Identifi-

cation and medicinal uses were documented by interacting with local people and consulting the literature.

Results and Discussion

The present study revealed 15 spp of aquatic medicinal plants belonging to 14 genera and 14 families

Plate-2



Lemna minor L.



Naturtium officinale R.Br



Phylla nodiflora (L.) Greene



Polygonum plebeium R.Br.



Potamogeton crispus L.



Potamogeton natans L.

Plate-3



Ranunculatus scleratus L.



Trapa natans L.



Utricularia aurea Lour



Acorus calamus L.



Apium graveolans L.



Coix lacryma-jobi L.



Cyperus rotundus L.



Eclipta prostrata (L.) L.



Hydrilla verticillata (L.f.) Royle

Plate-1.

Sr. No.	Botanical Name	Common Name	Family	Part Used	Medicinal Uses	References
1.	<i>Acorus calamus</i> L.	Sweet flag, Calamus	Araceae	Rhizome	Extract is used in cough, stomach cramps, flatulence, indigestion, heartburn, diarrhea, throat irritation, liver disorders, chest congestion, rheumatism, bronchitis, asthma, diabetes, malaria, tuberculosis and fever. Antioxidant, antibacterial, anticancer, neuroprotective, cardioprotective and radioprotective. Oil extracted from rhizome used in piles, dyspepsia, asthma, dysentery, loss of appetite, catarrh.	Arseculeratne <i>et al.</i> , 1985; Dobelis, 1986; Elliott, 1976; Thomson Schultes, 1978; Hussey, 1974; Kumar <i>et al.</i> , 2015; Muthuraman <i>et al.</i> 2011; Kumari <i>et al.</i> 2010; Shah and Gilani, 2012
2.	<i>Apium graveolans</i> L.	Celery	Apiaceae	Leaves, stem and seeds	Anticancer, antidiabetic, antihypertensive, antihyperlipidemic, antioxidant, antimicrobial and anti- inflammatory	Sultana <i>et al.</i> , 2005; Ko <i>et al.</i> , 1991; Tsi and Tan, 2000, Tiwari, 2004; Friedmen <i>et al.</i> , 2002 Shanmugapriya and Usha Devi, 2014
3.	<i>Coix lacrymajobi</i> L.	Hanjeli	Poaceae	Roots and seeds	Oil extracted from roots and seeds exhibit antimicrobial, anti-inflammatory, anti-angiogenic, analgesic, anti-allergic, cytostatic, antioxidant, antitrypanosomal, antileishmanial anticancer	Diningrat <i>et al.</i> , 2020; Wang <i>et al.</i> , 2016; Zhang <i>et al.</i> , 2014
4.	<i>Cyperus rotundus</i> L.	Nutsedge, motha, nutgrass	Cyperaceae	Roots and rhizome	Analgesic, antibacterial, anticancer, antimalarial, antiemetic, antiobesity, anti-inflammatory, anticancer, antioxidant, antispasmodic, antidiarrheal, antimicrobial, antimutagenic, antipyretic, memory enhancer.	Dhar <i>et al.</i> , 2017; Soman <i>et al.</i> , 2013
5.	<i>Eclipta prostrata</i> (L.) L.	False Daisy, bringraja	Asteraceae	Whole plant	Antioxidant, antiviral, antibacterial, antihepatotoxic, antimycotoxic, antihemorrhagic, antiproliferative, antitumor, antihyperglycemic, antidementia, antihyperlipidemic, antivenom, anti-HIV and larvicidal.	Gani and Devi, 2015; Chung <i>et al.</i> , 2017
6.	<i>Hydrilla verticillata</i> (L.f.) Royle	Hydrilla or water thyme	Hydrocharitaceae	Whole plant	Improves digestion, blood circulation, helps in detoxification, control blood sugar, strengthens immunity, anti-bacterial, antitumor, improves neurological health.	Zhuang and Beentje, 2017a; Pal <i>et al.</i> , 2004, 2005

Sr. No.	Botanical Name	Common Name	Family	Part Used	Medicinal Uses	References
7.	<i>Lemna minor</i> L.	Common duckweed, lesser duckweed	Lemnaceae	Whole plant	Used as remedy for rheumatism, dropsy, diuretic, antiscorbutic, antisyphilitic, colds, measles, edema and externally to treat eye diseases, carbuncles and skin ailments, antimicrobial, antifungal.	Gulchin <i>et al.</i> , 2010; Watt and Breyer-Brandwijk, 1962; Lansdown, 2019
8.	<i>Naturtium officinale</i> R.Br	Watercress	Brassicaceae	Leaves	Depurative, diuretic, antioxidant, antimicrobial, expectorant, anticancer hypoglycaemic, antidiabetic treatment of pulmonary diseases, abdominal pain, tuberculosis.	Corona <i>et al.</i> , 2008; Freitas <i>et al.</i> , 2013; Aries <i>et al.</i> , 2013; Bahramikia <i>et al.</i> , 2009; Graf <i>et al.</i> , 2016
9.	<i>Phyla nodiflora</i> (L.) Greene	Jalapippali	Verbenaceae	Whole plant	Antimicrobial, antibacterial, antifungal, hepatoprotective, antioxidant, antitumor, antidiuretic, anti-inflammatory, antidiabetic, hypolipidaemic, skin problems	Malathi <i>et al.</i> , 2011; Arshad <i>et al.</i> , 2010; Durairaj <i>et al.</i> , 2009; Shukla <i>et al.</i> , 2009; Rangachari <i>et al.</i> , 2011
10.	<i>Polygonum plebeium</i> R.Br.	Knotweed	Polygonaceae	Whole plant	Anti-inflammatory, anti-proliferative, hepatoprotective, helpful in the treatment of liver fibrosis	Jeong <i>et al.</i> , 2005; Khoshbaten <i>et al.</i> , 2010; Mumtaz <i>et al.</i> , 2009
11.	<i>Potamogeton crispus</i> L.	Curly-leaved pondweed	Potamogetonaceae	Whole plant	Diuretic, antibacterial, antifungal, anticancer, antioxidant	Du <i>et al.</i> , 2014; Fareed <i>et al.</i> , 2008; Lupoe <i>et al.</i> , 2015
12.	<i>Potamogeton natans</i> L.		Potamogetonaceae	Leaves	Antifungal, febrifuge and resolvent.	Haroon, 2006; Duke and Ayensu, 1985
13.	<i>Ranunculus scleratus</i> L.	Field buttercup, corn crowfoot, corn buttercup	Ranunculaceae	Whole plant	Used in the treatment of plagues, scorpion bite, blood stasis, acute icteric hepatitis hypertension. Also possess antioxidant, antibacterial anti-diarrheal, antiphlogostic, antimalarial properties. Promote blood circulation, relieve swelling. Leaves juice used in sciatica, rheumatism, dysuria, asthma and pneumonia.	Mei <i>et al.</i> 2012; Neag <i>et al.</i> , 2017; Gangwar and Joshi 2008; Ambasta <i>et al.</i> , 1992
14.	<i>Trapa natans</i> L.	Water chestnut	Trapaceae	Whole plant	Aphrodisiac, astringent, appetizer, antipyretic, constipating, diuretic, spleen infections, diuretic, febrifuge and antiseptic. Warm fruit paste applied over affected parts to cure sciatica and back pain.	Shalini <i>et al.</i> , 2019; Sen and Behera 2018; Agrahari <i>et al.</i> , 2010
15.	<i>Utricularia aurea</i> Lour		Lentibulariaceae	Whole plant	Antimalarial and antitumor	Choosawad <i>et al.</i> , 2005; Kumar <i>et al.</i> , 2018

for the treatment of various human diseases. Hamirpur district is rich in biodiversity and to harness medicinal potential of aquatic angiospermic herbs need further study. The present exploration may be utilized for bioprospecting by pharmaceutical industry. The list of medicinally important aquatic herbs (Table 1).

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Conflict of Interests

There is no conflict of interests regarding research, authorship and publication of this research article.

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