

Original Research Article

<http://dx.doi.org/10.20546/ijcmas.2016.506.103>

## Studies on Some Economically Important Aquatic Plants of Katwa Subdivision of Burdwan District, West Bengal, India

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### ABSTRACT

#### Keywords

Aquatic plants, Databank for medicinal and other economic value, Katwa, West Bengal

#### Article Info

Accepted:  
28 May 2016  
Available Online:  
10 June 2016

Aquatic plants are very remarkable forms of plant life and are essential component of the aquatic ecosystem. A variety of products and significant beneficial services are offered by these group of organisms. They play important role in the life of human beings as food, fodder, medicine, etc. In spite of that, the knowledge of correct utilization of aquatic plants is lacking among common people and in order to make them aware, steps are to be introduced. In this survey an attempt has been made to categorize aquatic plants and their utilization by the local inhabitants of Katwa subdivision of Burdwan district, West Bengal. Katwa subdivision in West Bengal is an important area situated in the Gangetic belt along with a rich number of aquatic vegetation. As many as 24 aquatic plants, out of which 16 species belonged to Dicotyledons and 8 to Monocotyledons have been listed and their potential utilization have been evaluated. Some important aquatic plants from this region are *Nelumbo nucifera* Gaertn., *Ceratophyllum demersum* L., *Ipomoea aquatica* Forssk., *Ranunculus scleratus* L., *Alternanthera sessilis* L., *Eichhornia crassipes* (Mart.) Solms., etc.

### Introduction

Natural fresh water resources are vital self sustained ecosystem which plays a significant role for the formation of a wide range of well diversified flora. These aquatic flora or plants are well observed in rivers, ponds, lakes, marshy places and other shady moist areas. Due to their habitational characteristics it is difficult to ascertain a clear definition of vascular hydrophytes and is defined in various ways by different authors. According to Weaver and Clements (1938) the hydrophytes are plants that grow in water, in soil covered with water or in soil that is usually saturated with water.

Muenschler (1944) considered aquatic plants as “those species which normally stand in water and must grow for at least a part of their life cycle in water, either completely submersed or immersed”. Reid (1961) described hydrophytes as plants, “whose seeds germinate in either the water phase or the substrate of a body of water and which must spend part of their life cycle in water”.

Aquatic and wetland angiosperms are very remarkable forms of plant life and they provide livelihoods for the millions of people who live within and around them. Economically a large number of aquatic

plants are useful for their medicinal as well as food value to the human being. Man utilized the plant parts like rhizome, roots, fruits, leaves, etc. in various ways and also for the treatment of various ailments (Bhunia and Mondal, 2009; Shankar and Mishra, 2012). Majumder (1965), Mukhopadhyay (1987), Naskar (1990), Mandal *et al.* (1986), De *et al.* (1998), Mandal and Mondal (2001), Dutta *et al.* (2002) are the prominent workers and a several publications were made on the aquatic and wetland flora of different districts of West Bengal. In spite of this impressive work, the wetlands losses have continued due to the lack of knowledge of correct utilization of aquatic plants among common people. It is clear that though aquatic and wetland possess significant economic value till these ecosystems are under danger. To overcome this situation steps are to be introduced to aware common people about the various economic importance of aquatic vegetation. For this purpose an attempt has been made to categorize aquatic plants with their economic importance and utilization by the people of Katwa subdivision of Burdwan district, West Bengal.

### **Study Area**

The town Katwa is a subdivision of Burdwan district in the state of West Bengal, India. It consists of Katwa municipality, Dainhat municipality and five community development blocks as Katwa-I, Katwa-II, Ketugram-I, Ketugram-II and Mongolkote. It extends from 23°39' to 23°65' North latitude and from 88°08' to 88°13' East longitude with an average elevation of 21m. The subdivision has a rich number of aquatic ecosystem with two main rivers the Ajay River and the Bhagirathi River along with many ponds and lakes. These wetlands play a significant role in the life of the local people.

### **Data Collection**

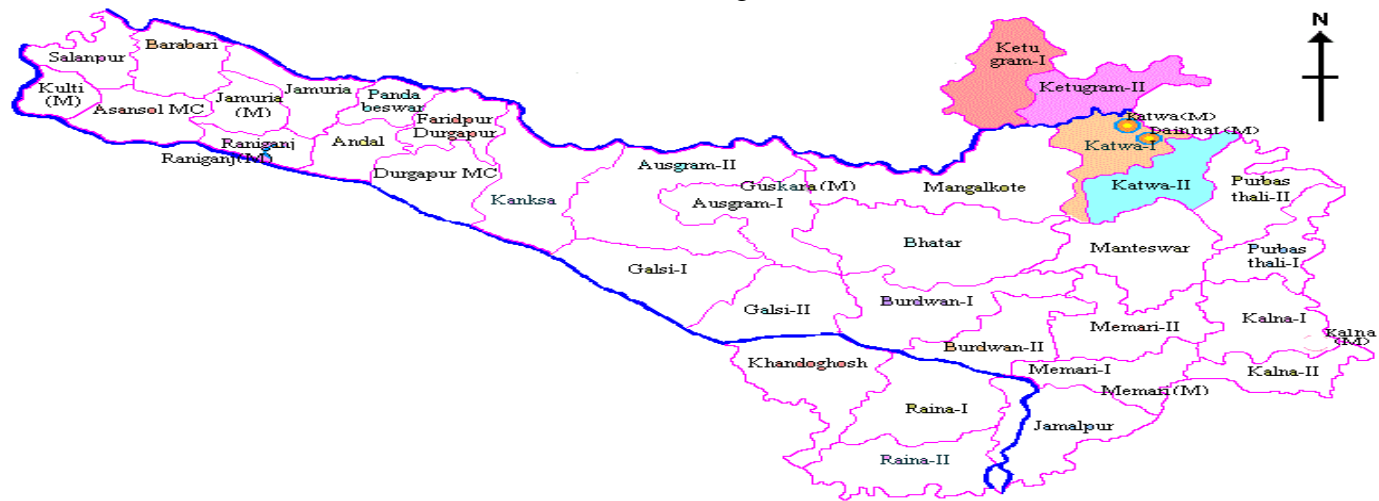
Block wise field survey in different parts of the subdivision were undertaken for two years (2014-2015) to study aquatic plants. Field observations like habit, habitat, available local names, as well as flowering and fruiting periods of the investigated taxa have been noted. Information regarding the various uses of aquatic plants was noted down by consulting various tribal people in this area and also from the local people, local herbal drug seller and ojhass. Specimens of species occurring in different wetlands were observed and collected from time to time for preparation of herbaria. The plants have been identified from fresh materials with the help of different Floras (Prain, 1903; Biswas and Calder, 1937 ; Subramanyam, 1962 ; Maheswari, 1963 ; Mondal, *et al.*, 1998).

### **Results and Discussion**

Altogether 24 aquatic plants have been recognized from this subdivision of which 16 species belong to Dicotyledons and 8 species belong to Monocotyledons (Table -1). The 16 Dicotyledons plants belong to 15 families where as the 8 Monocotyledons plants belong to 7 families. Dominating family among Dicotyledons is Nymphaeaceae and among monocotyledons it is Araceae. Ratio of species between Dicot and Monocot is 2:1 (Table -2). The recorded plant species were arranged according to morpho-ecological grouping (Table-3). Local people of this subdivision have been using these plants as food, fodder and for treatment of various common diseases like cold, fever, scorpion sting, skin infection, abdominal problems etc. The seeds of *Aponogeton natans* (L.) Engler et. Krause. are rich in starch and are with high nutritive value.



West Bengal



Map of Burdwan District showing the blocks of Katwa Subdivision

**Table.1** Summary of Present Investigation

Total No. of recorded plant Species	24
Total No. of Genera	23
Total No. of Families	21
Total No. of Dicotyledons	16
Total No. of Monocotyledons	08

**Table.2** Percentage Composition of Recorded Taxa

Taxa	Dicotyledons		Monocotyledons	
	No.	(%)	No.	(%)
Families(Total-21)	15	71.43	06	28.57
Genera (Total- 23)	15	65.22	08	34.78
Species (Total- 24)	16	66.67	08	33.33

**Table.3** Morpho-ecological Grouping of Recorded Plant Species

Sl. NO.	Habitat	Total Number	Percentage of Occurrence	Name of Species
1.	Free-floating hydrophytes	3	12.50	<i>Eichhornia crassipes</i> (Mart.)Solms., <i>Pistia stratiotes</i> L., <i>Spirodela polyrhiza</i> (L.) Schleid.
2.	Rooted hydrophytes with floating Leaves	5	20.83	<i>Nelumbo nucifera</i> Gaertn., <i>Nymphaea alba</i> L <i>Nymphaea nouchali</i> Burm.f., <i>Nymphoides indica</i> (L.) Kuntz., <i>Trapa bipinosa</i> Roxb.
3.	Submerged floating hydrophytes	1	4.17	<i>Ceratophyllum demersum</i> L.
4.	Rooted submerged hydrophytes	4	16.67	<i>Ipomoea aquatica</i> Forssk., <i>Aponogeton natans</i> (L.) Engler et. Krause., <i>Hydrilla verticillata</i> (L.F.) Royle., <i>Jussiaea repens</i> L.
5.	Rooted emergent hydrophytes	3	12.50	<i>Polygonum barbatum</i> L., <i>Monochoria hastata</i> (L.) Solms., <i>Sagittaria sagittifolia</i> L.
6.	Wetland hydrophytes	8	33.33	<i>Alternanthera sessilis</i> (L.) DC., <i>Asteracantha longifolia</i> (L.) Nees., <i>Bacopa monnieri</i> (L.) Pennell., <i>Centella asiatica</i> (L.) Urb., <i>Dentella repens</i> (L.) Frost., <i>Eclipta prostrate</i> L., <i>Ranunculus sceleratus</i> L., <i>Colocasia esculenta</i> (L.) Schleid.

**Table.4** Enumeration of Aquatic Plants (Dicotyledons)

Sl. No.	Botanical Name	Local Name	Family	Flowering and Fruiting Periods	Parts Used	Ailment/Uses
1.	<i>Alternanthera sessilis</i> (L.) DC.	Shalinche	Amaranthaceae	Through out the year	Whole plant	Leaf extract is used as blood purifier, glactagogue, in night blindness, snake bites and to destroy ova of worm. Decoction of stem and leaf is taken half cup daily for one weak to prevent blood vomiting and given to lactating mother to improve lactation. Young shoots and leaves are eaten as vegetable.
2.	<i>Asteracantha longifolia</i> (L.) Nees.	Kulekhara	Acanthaceae	September to January	Whole plant	Entire plant is used in anaemia, jaundice, rheumatism, to stop bleeding and to improve sexual power. Seed pest is used in tubercular fistula. Decoction of leaves used to treat dropsy. Root pest is applied externally in rheumatism.
3.	<i>Bacopa monnieri</i> (L.) Pennell.	Brahmi shak	Scrophulariaceae	Throughout the year	Whole plant	Used as a potent diuretic, cardio tonic, laxative, bronchodilator. Dried leaves powder is used in case of asthenia, nervous break down. The whole plant is used to treat skin disesses, epilepsy, ulcer, leprosy and to cure cold and cough.
4.	<i>Centella asiatica</i> (L.) Urb.	Thankuni	Apiaceae	July to September	Leaves	It is commonly used for wound healing, memory improvement, treatment of mental fatigue, bronchitis, asthma, dysentery and kidney trouble. A decoction of the leaves is useful in leprosy. It is also useful in diseases of nervous system and heart. Fresh tender leaves are chewed and taken to relieve from acidity and peptic ulcer.

5.	<i>Ceratophyllum demersum</i> L.	Jaljhangi	Ceratophyllaceae	September to December	Leaves	Decoction of leaf is used as cardio tonic, antipyretic and to regulate bile secretion. Leaf pest is applied externally In case of scorpion sting.
6.	<i>Dentella repens</i> (L.) Frost.	Bhuin pat	Rubiaceae	Throughout the year	Leaves	Leaves are used as blood Purifier, to improve the eyesight and for poulticing sores.
7.	<i>Eclipta prostrate</i> L.	Keshute	Asteraceae	March to July	Whole plant	Juice of the leaves boiled with coconut oil is applied on head for better hair growth and darkening of hair. Whole plant extraction used for skin diseases and asthma.
8.	<i>Ipomoea aquatica</i> Forssk.	Kalmi sag	Convolvulaceae	Throughout the year	Leaves, Shoot	Decoction of leaf and stem is use in opium and arsenical poisoning and as blood purifier. It also has purgative properties. Young shoots and leaves are used as vegetables.
9.	<i>Jussiaea repens</i> L.	Kesara-dam / Murhilata	Onagraceae	October to July	Whole plant	Dried plant powder is applied externally on skin to cure various skin diseases.
10.	<i>Nelumbo nucifera</i> Gaertn.	Padma	Nelumbonaceae	April to October	Whole plant	Decoction of flower petal is used as cardio tonic, liver tonic, anti-vomiting and in diarrhea. Leaf pest with lime used as plaster on fracture bone. Young seed paste is externally used as a cooling agent for skin diseases. Root and rhizome pest is taken against ring worms. Root powder with lemon juice is taken for treatment of piles. The fruiting torus is edible and the rhizomes are used as vegetable.
11.	<i>Nymphaea alba</i> L.	Swet shaluk	Nymphaeaceae	July to January	Roots, stocks, flowers and seeds	Roots and stocks are used to treat dysentery, bleeding piles and bloody urine. Decoction flower is used as cardio tonic, anti vomiting and in internal hemorrhage. Seeds are used in diabetes.
12.	<i>Nymphaea nouchali</i> Burm.f.	Lal shaluk	Nymphaeaceae	August to January	Whole plant	Rhizome is used to treat diarrhea, dysentery, dyspepsia,

						goiter, burn wounds and also to stop excessive menstrual flow. Flower and leaves are soaked in water overnight then the decanted water is taken for cardiac problems. Leaf paste is applied to cure scabies Root juice is used to increase breast milk.
13.	<i>Nymphoides indica</i> Kuntz.	Chandmala	Menyanthaceae	August to December	Leaves	Leaf pest is mixed with water and drunk once a day to cure jaundice, fever and dysentery. Leaf pest is applied on forehead to get relief from headache. Leaf pest is externally applied to the swelling part of the body to get relief from pain.
14.	<i>Polygonum barbatum</i> L.	Bekhanjuber	Polygonaceae	August to April	Leaves, Young shoots	Plant juice is used against pneumonia. Leaves extract is taken with honey to cure fever and colic pain. The young shoots and roots are cooked with vegetables.
15.	<i>Ranunculus sceleratus</i> L.	Jol dhania	Ranunculaceae	June to September	Leaves, stem, seeds and root	One tea spoon of rhizome powder is taken with water to cure diarrhea and dysentery. One table spoon juice of leaf extract is mixed with a cup of water and takes once a daily for a week to remove ringworm. Seeds are used as tonic and in kidney troubles. The young shoot and roots are cooked with vegetables.
16.	<i>Trapa bipinosa</i> Roxb.	Pani phol	Trapaceae	August to December	Fruits and leaves	Leaf pest is used as cooling, aphrodisiac, antipyretic, leprosy and in inflammation. Fruits are eaten raw or cooked and also used in preparation of sweets.

**Table.5** Enumeration of Aquatic Plants (Monocotyledons)

Sl. No.	Botanical Name	Local Name	Family	Flowering and Fruiting Periods	Parts Used	Ailment/Uses
1.	<i>Aponogeton natans</i> (L.) Engler et. Krause.	Ghechu	Aponogetonaceae	August to November	Leaves, seeds and young shoots	Decoction of leaves is used in stomach disorder and digestive problems. Starchy seeds is roasted and taken as food. Flowering spike and young shoots are used as vegetables.
2.	<i>Colocasia esculenta</i> (L.) Schleid.	Kouchu	Araceae	August to November	Leaves, seeds and young shoots	The leaves and rhizome are used as vegetables for the relief from constipation. Outer skin petiole is peeled and tied on the affected part against cracked feet.
3.	<i>Eichhornia crassipes</i> (Mart.) Solms.	Kaucharipana	Pontederiaceae	September to May	Leaves, petiole and flower	Good source of antioxidant. Use as carotene rich table vegetables. Whole plant is used as green manure.
4.	<i>Hydrilla verticillata</i> (L.F.) Royle.	Jal-khanghi	Hydrocharitaceae	October to December	Leaves	Decoction of leaf is used in the treatment of wounds and boils. Dried leaf powder is used for accelerate healing.
5.	<i>Monochoria hastata</i> (L.) Solms.	Boro nokha	Pontederiaceae	July to October	Leaves and stalk	Stalk and leaves are used as cooling and tonic, also in insanity. Leaf juice is applied on boils.
6.	<i>Pistia stratiotes</i> L.	Topapana	Araceae	October to February	Leaves and root	The leaves are used in eczema, leprosy, ulcers, piles and syphilis. Leaf juice boiled with coconut oil applied externally to cure chronic skin diseases. Root powder is used as laxative.
7.	<i>Sagittaria sagittifolia</i> L.	Chotokut	Alismataceae	October to February	Leaves and tuber	Leaf pest is externally used in skin diseases. Root tuber is used for birth control.
8.	<i>Spirodela polyrhiza</i> (L.) Schleid.	Khudipana	Lemnaceae	February to April	Leaves	Decoction of leaf is used in regulating urination. Pest of leaf is externally applied on wounds and cuts. Whole plant is a good source of compost.





*Alternanthera sessilis* (L.) DC.



*Asteracantha longifolia* (L.) Nees.



*Bacopa monnieri* (L.) Pennell.



*Centella asiatica* (L.) Urb



*Ceratophyllum demersum* L.



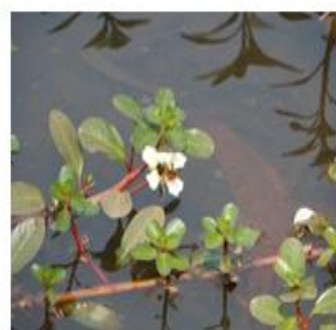
*Dentella repens* (L.) Frost.



*Eclipta prostrata* L.



*Ipomoea aquatica* Forssk.



*Jussiaea repens* L.



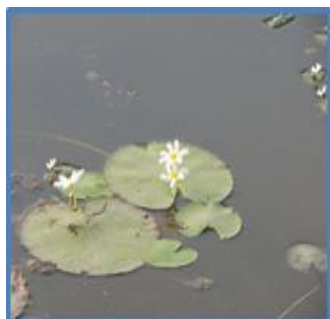
*Nelumbo nucifera* Gaertn.



*Nymphaea alba* L.



*Nymphaea nouchali* Burm.f.



*Nymphoides indica* (L.) Kuntz.



*Polygonum barbatum* L.



*Ranunculus sceleratus* L.



*Trapa bipinosa* Roxb.



*Aponogeton natans* (L.) Engler et. Krause.



*Colocasia esculenta* (L.) Schleid.



*Eichhornia crassipes* (Mart.) Solms.



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



*Monochoria hastata* (L.) Solms.



*Pistia stratiotes* L.



*Sagittaria sagittifolia* L.



*Spirodela polyrhiza* (L.) Schleid.

*Eichhornia crassipes* (Mart.) Solms. the notorious weed of water body is a good source of antioxidant agents. The fruits of *Trapa bispinosa* Roxb are directly consumed as food by the local people.

All the 24 aquatic plants have been categorized below in table in alphabetical

order along with the available local names, families, flowering and fruiting periods and uses. The present work illustrates the richness of economically important aquatic plants of this area (Tables 4 & 5).

The herbal preparations made from the

aquatic plants were mostly used to treat skin diseases, cut and wounds, and stomach and abdominal disorder. Among these invested taxa *Bacopa monnieri* (L.) Fennell. and *Ceratophyllum demersum* L. are used as cardio tonic. *Asteracantha longifolia*(L.)Nees. is used in anaemia and for treatment of jaundice. Four plants are used to treat diarrhoea and dysentery, six plants are useful in various skin problems, three plants are used for removing ring worm and most of plants are taken as vegetables. *Eichhornia crassipes* (Mart.) Solms. is a good source of antioxidant.

Tribal people have been using these aquatic plants for the treatment of common diseases like cold, cough, scorpion sting, snake bites, liver trouble, etc. These herbal medicine are very important because they are known to be free from side effects (Lata *et al.*, 2004).

The information documented in this work is totally from primary sources being based on the uses of the locally available aquatic plants by the tribal people as their household remedies. A particular plant is sometime prescribed for different ailments in different localities by different tribal people and sometimes they apply a mixture of plants for remedy of diseases.

In conclusion, the selected biozone i.e. Katwa subdivision of Burdwan district in West Bengal is an important source of aquatic plants and more information may be explored from the tribal people living in villages. The knowledge about the uses of aquatic plants is transmitted orally from generation to generation and many of them have been lost as the people of modern society are not interested to carry on this tradition. It is also a matter of concern that due to rapid urbanization the water bodies of this subdivision are in danger and the aquatic plant diversity are

harmed. Now it is important for us to document and to prepare a data bank of the aquatic plants used for the traditional herbal knowledge before it gets lost from the society and to conserve these natural resources for the benefit of the human beings for sustainable development of our country. The various medicinal uses of aquatic plants recorded here in this survey need further scientific studies for their therapeutic validation. Finally, it can be concluded that further research activities are to be carried out to have an in depth study about the life cycles, pollination mechanism, pollen production and dispersal of the botanicals for sustainable food security and conservation.

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**How to cite this article:**

Debjit Das, Subrata Mondal and Sudhendu Mandal. 2016. Studies on Some Economically Important Aquatic Plants of Katwa Subdivision of Burdwan District, West Bengal. *Int.J.Curr.Microbiol.App.Sci*. 5(6): 961-972.  
doi: <http://dx.doi.org/10.20546/ijcmas.2016.506.103>