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ECONOMICALLY IMPORTANT AQUATIC PLANTS OF NADIA DISTRICT, WEST BENGAL, INDIA

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ABSTRACT

Wet lands are imported self-sustained ecosystem, plays a significant role for the formation of a wide range of well diversified flora. These aquatic and wet land plants have immense importance for sustainable life support systems including economic and aesthetic values and as such have played a central role in the evolution of human settlement, agriculture, culture, industrial growth etc., out of 10 wet lands of Nadia 40 species of economically Important plants have been documented of which 38 belongs to Angiosperms and 2 belongs to Pteridophyte group. These 40 plant species are used in 8 various ways of which 38 medicinal plant species used for the treatment of 49 types of ailments.

Keyword: Aquatic plant, economic, medicinal, Nadia district.

Introduction

Wet lands are imported self-sustained ecosystem plays a significant role for the formation of a wide range of well diversified flora. These aquatic and wet land plants have immense importance for sustainable life support systems including economic and aesthetic values and as such have played a central role in the evolution of human settlement, agriculture, culture, industrial growth etc.

But in actual, it is very difficult to draw a line between the hydrophytes and the terrestrial plant communities because aquatic habitat cannot be sharply distinguished from the terrestrial ones. Therefore, they are defined in various ways by different authors - According to Weaver and Clement (1938) the hydrophytes are plants that grow in water, in soil covered with water or in soil that is usually saturated with water. Muenschar (1944) described the hydrophytes 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 immense." Presently Cook (1996) provide a broader definition of hydrophytes which read as - 'All pteridophytes and spermatophytes whose photosynthetically active parts are permanently or at least for several months of each year part or whole submerged with water or which float in the surface of water,' and regarding the wetlands plants idea of cook is very definite which stated wetland plants are those which grows in places where inundation must occurred for at least fourteen days and saturation for at least sixty consecutive days. This idea of Cook (I.e.) is followed here to identified the wet land and aquatic plants.

Indian perspective Agarkar (1923), Biswas and Caldar (1936), Bhandari *et al.* (1962), Subramanyam (1962), Deb (1976), Cook (1996) etc. are the prominent workers who studied the aquatic and wetlands flora of different state as well as India as a whole. Besides these there are several

publications like of Majumdar (1965). Mukhopadhyay (1987), Naskar (1990), Ghosal *et al* (1993), Dutta *et al.* (2002), etc. which deal with the aquatic and wet lands plants of West Bengal state and its different districts and regions. Prain (1903) has also treated aquatic and wetland plants of the state in his book entitled 'Bengal Plants'. But unfortunately, there is no such complete work regarding the aquatic and wetland plants of Nadia district, except the publication of Bala & Mukherjee (2007).

Material and Method

Study Area

Nadia, bordering district of the state of West Bengal, situated between 22°53'N-24°11'N latitude and from 88°09'E-88°48'E longitude. Covering an area of 3927 Sq. Km. average elevation of the district is 46ft MSL. The district is bounded in North & North West by - Murshidabad District, in South & South-East by North 24 Parganas District, in West- by Burdwan District in South-West- by Hoogly District, in East & North-East-Republic of Bangladesh. The district is sharing international border with India and Bangladesh, which is 265 km in length.

The district is a large alluvial plain spreading Southward from the head of the delta formed by the succession of rivers into which the Ganga has from time to time distributed itself. The alluvial formation in the district is due to the Ganga-Bhagirathi system. The alluvial formation is found on the top of the surface in different layers and colours. The soil regions in this area are categorized as Ganga flat-lands, Ganges riverine lands and Ganges low lands. Agriculturally, the soil is considered to be high land and bears rice and cold weather crops. To the West of the district is the Kalantar, a low-lying tract of black clay soil stretching from Murshidabad district.

The important rivers in the district are the Bhagirathi, the Jalangi and the Churni. The Bhairab-Jalangi and the Mathabhanga-Churni. The Bhagirathi rivers flows through the Western side of Nadia district sharing the boundary with the neighbourhood district Bardhaman.

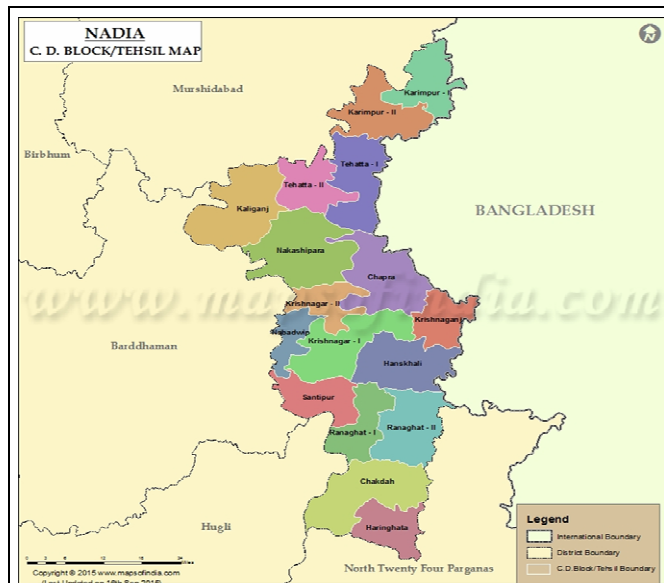


Fig. 1 : Map of Nadia district



Fig. 2 : River map of Nadia district

All the collection of data obtained from extensive field study. Some specific wetlands were chosen for this present survey work and to collect data. All the information is collected based on the selective questionnaires asked to the local people.

Identification and information like vernacular name, usages were collected from the people around those wetlands. 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 ojhās.

Plant specimens were collected, preserved and the data recorded in field books. Collected plant specimens were processed as vouchers for herbarium preservation following procedures as mentioned by Jain and Rao [1977]. The collected voucher specimens re identified from fresh materials with the help of different Floras (Prain, 1903), Medicinal Plant Resources of South West Bengal (Paria; 2005), Bibliography of Flora and Ethnobotany of West Bengal (Mitra, Bandopadhyay, Mukherjee; 2010).

All thecollected plants specimens were arranged alphabetic order and following the sequence of Scientific names, vernacular name, names in other language, botanical description of the plant, phenology, parts use and uses.

Literature survey

There is no such work done about economically important aquatic plants of Nadia district except one by G. Bala and A. Mukherjee (2007). Besides these, some publication on Ethnobiology in India which are also deal with economically important aquatic plant or aquatic medicinal plant.

Result and Discussion

In the table-1 40 plants of which 16 belongs to dicotyledons and 10 belongs to monocotyledons. 2 plants grouped under pteridophyte. In details stat analysis is given in table- 2 From the figure - 3 we also observe that 40 plnats species used in 84 different ways among which 38 species (45%) are used Medicinally, 29 species (35 %) are used as food and by the same way, 2 species (2%) used as fodder and forage plants, 4 species (5%) used as biofertilizer, compost, manure and 11 species (13%) used for other purposes. It is very interesting to know among these 40 plants species *Nymphaea nouchali* Burm. F. is the species which is used in maximum 22 cases followed by *Commelina benghalensis* L. in 21 cases, *Desmodium gangeticum* (L.) DC., *Marsilea minuta* L. in 20 cases, *Jussiaea repens* L., *Nelumbo nucifera* Gaertn. *Nelumbo nucifera* Gaertn., *Pistia stratiotes* L. in 19 cases. Different plants parts are used for the treatment of different ailment as showed in table -4 from this conspectus we come to know that leaves are the most usable part followed by root and rhizome, seed, shoots respectively and we also observe that in 18 cases we used root and rhizome portion it means that plants wealth will be destroyed these 18 plants species should be taken under consideration for future conservation as due to over exploitation their number may reduce. A conspectus of different disease treated by these 38 aquatic medicinal plants are given in the table - 5.

Last but not least we may say that every usage recorded in this present study should be scanned strictly under the light of recent knowledge of Phytochemistry and Pharmacology also for in search of some potent future medicine.

Table 1 : Conspectus of Family, Genera & Species of Economically Important Aquatic plants of Nadia District

Sl. No.	Plant group	Class	Family	Genera	Species
1	Angiosperm	Dicot	16	18	21
		Monocot	10	14	17
2.	Pteridophyte	Polypodiopsida	1	1	1
		Filicopsida	1	1	1

Table 2 : All the data present in the observation summarised below

Sl. No.	Scientific name	Vernacular name	Family	Flowering and fruiting time	Parts used	Availability
1.	<i>Alternanthera sessilis</i> (L.) DC.	Shalinche	Amaranthaceae	December to March	Whole plant	Very common
2.	<i>Aponogeton natans</i> (L.) Engler et. Krause	Ghechu	Aponogatonaceae	August to November	Leaf, seed, flowering spike, young shoot	Common
3.	<i>Asteracantha longifolia</i> (L.) Nees.	Kulekhara	Acanthaceae	September to November	Whole plant	common
4.	<i>Azolla pinnata</i> R. Br.		Salviniaceae		Whole plant	Common
5.	<i>Bacopa monnieri</i> (L.) Pennell.	Brahmi shak	Scrophulariaceae	September to October	Whole plant	Very common
6.	<i>Cantella asiatica</i> (L.) Urb.	Thankuni	Apiaceae	May to November	Whole plant	Very common
7.	<i>Ceratophyllum demersum</i> L.	Jaljhanghi	Ceratophyllaceae	June to September	Whole plant	Very common
8.	<i>Colocasia esculenta</i> (L.) Schleid.	Kochu	Araceae	Rarely flower	Whole plant	Very common
9.	<i>Commelina benghalensis</i> L.	Kanchira	Commelinaceae	June to October	Whole plant	Very common
10.	<i>Commelina paludosa</i> L.	Jata kanclira	Commelinaceae	August to April	Young shoots	Common
11.	<i>Cynadan dactylon</i> (L.) Pers.	Durba	Poaceae	Throughout out the year	Whole plant	Very common
12.	<i>Cyperus iria</i> L.	Bara chucha	Cyperaceae	May onward	Whole plant	Very common
13.	<i>Cyperus rotundus</i> L.	Mutha	Cyperaceae	Mid-February to June	Whole plant	Very common
14.	<i>Dentella repens</i> (L.) Frost.	Bhuin pat	Rubiaceae	September to January	Leaf	Common
15.	<i>Desmodium gangeticum</i> (L.) DC.	Salpani	Fabaceae	March to August	Whole plant	Common
16.	<i>Echinochloa colona</i> (L.) Link	Shama	Poaceae	July to September	Seed, Young shoot	Common
17.	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	Bara shama	Poaceae	Throughout the year	Whole plant	Common
18.	<i>Eclipta alba</i> L.	Keshute	Asteraceae	Throughout the year	Whole plant	Very common
19.	<i>Eichhornia crassipes</i> (Mart) Solms.	Kochuripana	Pontederiaceae	May to September	Whole plant	Very common
20.	<i>Enydra fluctuans</i> Lour.	Hingcha	Asteraceae	November to April	Stem, Leaf	Very common
21.	<i>Hydrilla verticillata</i> (L.F) Royle.	Jal khangi	Hydrocharitaceae	December	Whole plant	Common
22.	<i>Hygrophila schulli</i> (buch. Ham) M.R. and S.M Almeida.	Kanta kalia	Acanthaceae	September to March	Whole plant	Common
23.	<i>Ipomoea aquatica</i> Forssk.	Kalmi shak	Convolvulaceae	Throughout the year	Whole plant	Very common
24.	<i>Ipomoea carnea</i> Jacq. Ssp. <i>Fistulosa</i> (mart ex choissy) D. Austin.	Dhol kalmi	Convolvulaveae	Throughout the year	Whole plant	Very common

25.	<i>Jussiaea repens</i> L.	Kesara-dam	Onagraceae	October to July	Whole plant	Common
26.	<i>Limnophila indica</i> L.	Karpur	Plantaginaceae	March to November	Whole plant	Common
27.	<i>Marsilea minuta</i> L.	Shushni shak	Marsileaceae		Whole plant	Very common
28.	<i>Monochoria hastata</i> (L.) Solms.	Boro Nokha	Potendariaceae	July to October	Whole plant	Very common
29.	<i>Nelumbo nucifera</i> Gaertn.	Padma	Nelumbonaceae	Throughout the year	Whole plant	Very common
30.	<i>Nymphaea alba</i> L.	Swet shaluk	Nymphaeaceae	June to August	Root, flower, seed, rhizome	Very common
31.	<i>Nymphaea nouchali</i> Burm.F.	Neel shaluk/ Laal shaluk	Nymphaeaceae	Throughout the year	Leaf, rhizome, flower, seed, tuber	Very common
32.	<i>Nymphoides indica</i> Kuntz.	Chandmala	Menyanthaceae	July to August	Leaf, flower buds, fruit	Very common
33.	<i>Ottelia alismoides</i> (L.) Pres.	Parmikalla	Hydrocharitaceae	February to June	Whole plant	Very common
34.	<i>Pistia stratiotes</i> L.	Topapana	Araceae	June to September	Whole plant	Very common
35.	<i>Polygonum barbatum</i> L.	Bekh-unjuber	Polygonaceae	August to April	Whole plant	Very common
36.	<i>Polygonum plebeium</i> R. Br.	Chemti shak, Dubia shak	Polygonaceae	March to April	Leaf, seed	Very common
37.	<i>Ranunculus sceleratus</i> L.	Jal dhanian	Ranunculaceae	February to June	Whole plant	Common
38.	<i>Sagittaria sagittifolia</i> L.	Choto kut	Alismataceae	July to August	Whole plant	Rare
39.	<i>Spirodela polyrhiza</i> (L.) Scheild	Khudipana	Lemnaceae	October to November	Whole plant	Common
40.	<i>Trapa bispinosa</i> Roxb.	Pani phol	Trapaceae	October to March	Leaf, fruit	Very common

Table 3 : Statistical Analysis of the usages of plant species

Sl. No.	Name of the Plant Species	No. of parts used	No. of use
1.	<i>Alternanthera sessilis</i> (L.) DC.	4	13
2.	<i>Aponogeton natans</i> (L.) Engler et. Krause	4	4
3.	<i>Asteracantha longifolia</i> (L.) Nees.	4	10
4.	<i>Azolla pinnata</i> R. Br.	1	2
5.	<i>Bacopa monnieri</i> (L.) Pennell.	2	12
6.	<i>Cantella asiatica</i> (L.) Urb.	2	13
7.	<i>Ceratophyllum demersum</i> L.	2	7
8.	<i>Colocasia esculenta</i> (L.) Schleid.	5	9
9.	<i>Commelina benghalensis</i> L.	2	21
10.	<i>Commelina paludosa</i> L.	1	1
11.	<i>Cynadan dactylon</i> (L.) Pers.	2	17
12.	<i>Cyperus iria</i> L.	4	13
13.	<i>Cyperus rotundus</i> L.	5	13
14.	<i>Dentella repens</i> (L.) Frost.	1	5
15.	<i>Desmodium gangeticum</i> (L.) DC.	3	20
16.	<i>Echinochloa colona</i> (L.) Link	3	3
17.	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	4	12
18.	<i>Eclipta alba</i> L.	2	9
19.	<i>Eichhornia crassipes</i> (Mart) Solms.	5	6
20.	<i>Enydra fluctuans</i> Lour.	2	10
21.	<i>Hydrilla verticillata</i> (L.F) Royle.	2	5
22.	<i>Hygrophila schulli</i> (buch. Ham) M.R. and S.M Almeida.	3	9
23.	<i>Ipomoea aquatica</i> Forssk.	5	14
24.	<i>Ipomoea carnea</i> Jacq. Ssp. <i>Fistulosa</i> (mart ex choissy) D. Austin.	3	6
25.	<i>Jussiaea repens</i> L.	3	19
26.	<i>Limnophila indica</i> L.	2	7

27.	<i>Marsilea minuta</i> L.	4	20
28.	<i>Monochoria hastata</i> (L.) Solms.	3	7
29.	<i>Nelumbo nucifera</i> Gaertn.	6	19
30.	<i>Nymphaea alba</i> L.	4	19
31.	<i>Nymphaea nouchali</i> Burm.F.	6	22
32.	<i>Nymphoides indica</i> Kuntz.	4	7
33.	<i>Ottelia alismoides</i> (L.) Pres.	4	11
34.	<i>Pistia stratiotes</i> L.	3	19
35.	<i>Polygonum barbatum</i> L.	5	10
36.	<i>Polygonum plebeium</i> R. Br.	2	2
37.	<i>Ranunculus sceleratus</i> L.	3	7
38.	<i>Sagittaria sagittifolia</i> L.	4	7
39.	<i>Spirodela polyrhiza</i> (L.) Scheild	2	13
40.	<i>Trapa bispinosa</i> Roxb.	2	18

Table 4 : Conspectus of the Plants parts usages

Sl. No.	Plant Parts	No of Usages
1.	Bud	2
2.	Corm	1
3.	Flower	4
4.	Fruit	3
5.	Inflorescence	1
6.	Leaves	35
7.	Petiole	3
8.	Root & Rhizome	18
9.	Seed	11
10.	Shoots	10
11.	Stem	4
12.	Tuber	4

Table 5 : Conspectus of Different Diseases Treated

Sl. No.	Name of the diseases	Number of treated occasions
1.	Acne	1
2.	Amenorrhoea	1
3.	Anaemia	3
4.	Asthenia	1
5.	Asthma	3
6.	Bronchiole problem	4
7.	Burn	9
8.	Cancer	3
9.	Cardiac problem	6
10.	Cholera	1
11.	Cold & cough	5
12.	Constipation	1
13.	Cysts	1
14.	Demulcent	4
15.	Diarrhoea/dysentery	13
16.	Diuretic	7
17.	Dropsy/oedema	4
18.	Elephantiasis	1
19.	Eye problem	3
20.	Fever	13
21.	Gastro-intestinal problem	11
22.	Gonorrhoea	3
23.	Haemorrhoid	4
24.	Headache	3
25.	Hepatic obstruction	1
26.	Hypertension	4
27.	Inflammation	2
28.	Insomnia	2

29.	Jaundice	4
30.	Kidney trouble	3
31.	Laxative	5
32.	Leprosy	6
33.	Liver trouble	5
34.	Malaria	2
35.	Nervous breakdown	1
36.	Piles	5
37.	Pneumonia	2
38.	Psychological disorder	2
39.	Rheumatism	5
40.	Scabies	1
41.	Sedative	1
42.	Skin disease	8
43.	Sore throat	2
44.	Stomach disorder/digestive problem	3
45.	Syphilis	2
46.	Tooth & gum problem	2
47.	Tubercular fistula & tuberculosis	4
48.	urinary tract infection	5
49.	Vaginal soreness	1

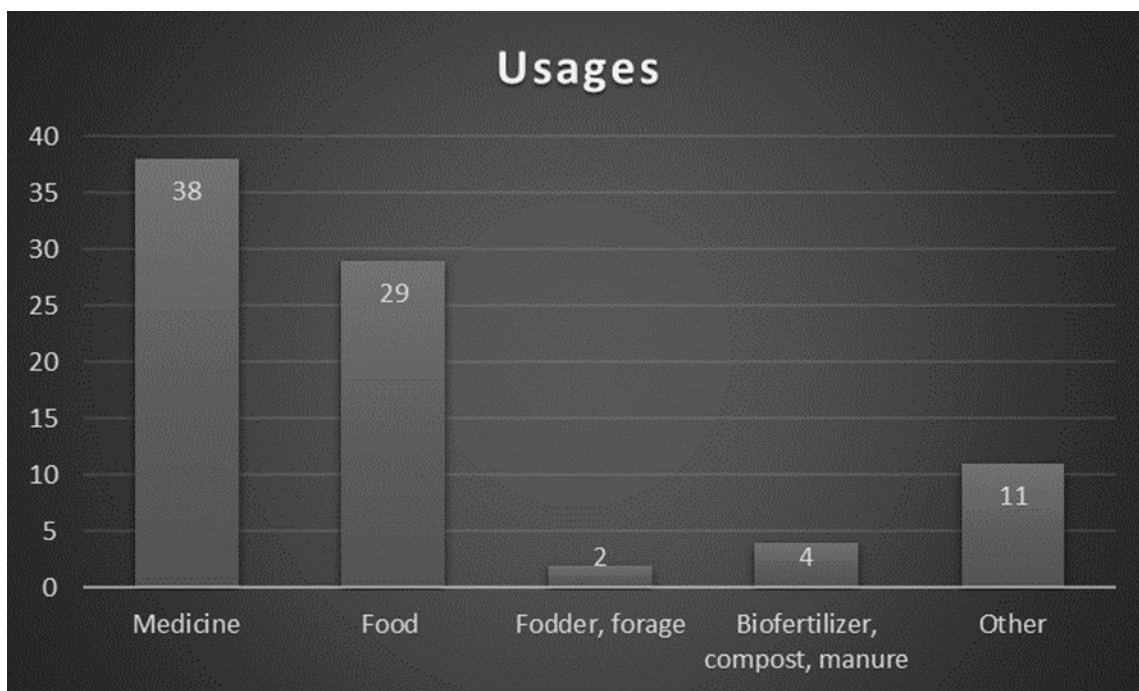


Fig. 3 : A graphical representation of the way plants are used the most.

Conclusion

In gist of the above survey work it can be concluded that Nadia district of the West Bengal state from the point of the economically important Aquatic wet land plants are very important. In this preliminary survey work here 40 economically important plants species were enumerated which were not reported earlier from this district for these particular usages. A handsome amount of local populace is still depending on these plant species to meet up their day-to-day needs. But due to fast pace of industrial development of the districts, increasing demand of the agricultural land due high population pressure, etc. is primarily response to a steady decline in the numbers and areas of the wetlands of the district, besides these fast paces of social reforms and westernization of the societies local rural people give up their

age-old practices and starts to depends on the chemical synthetic drugs for their ailments. So, this vast treasure of the knowledge of healing system based on the natural plant-based medicine are become on the way of its extinction. Most of this treatment process is not in written forms, they entirely live on the traditional practices of our older generations. So, it is the right time to document this vast knowledge and save the Pandora box of the treasure to lose forever. With this ideology I have started my Dissertation work, and now submit this report of my survey with this hope that, this information will help different national pharmaceutical industry to find out new molecules for healing of some incurable human diseases like Cancer, HIV infection or like that.

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