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Aquatic angiosperm of BTC area, Assam, with reference to their traditional uses

Namita Deka and Nilakshee Devi

Department of Botany, Gauhati University, Guwahati, Assam

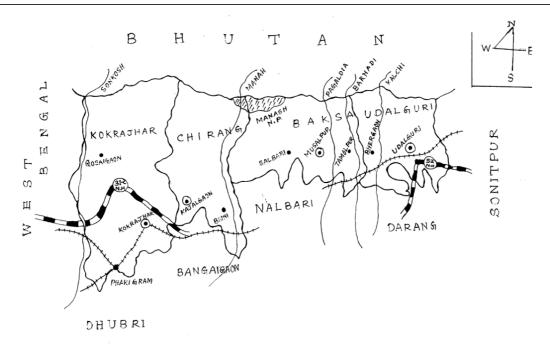
ABSTRACT

The diversity of aquatic plants of BTC area is quite rich due to presence of a large number of perennial water bodies. The study has reported the presence of 126 aquatic species which are used for various purpose by the tribal and non-tribal communities inhabiting there in. These plants belong to 89 genera and 48 families. Among these plants, 78 species belong to dicot and 48 to monocot. The food value, medicinal value and other uses of plants are reported. The habitat categorization of plants is also done.

Key words: Aquatic, Angiosperm, BTC, Bodo

INTRODUCTION

Assam being a part of Eastern Himalayas is rich in biodiversity. Assam is also quite rich in aquatic angiospermic flora. But this rich flora has not received much attention, with the result that our knowledge on this group is far from completion which is again based on a few sporadic publications. Aquatic vegetation is well observed in rivers, lake, marshy places, paddy fields, ponds, swamps, beels, ditches, jheels etc. Aquatic plants spend part of their life cycle in water or their seeds germinate in water phase or in substrate of water body[1]. The importance of these plants are of great significance among the tribal and non tribal people of BTC area [2]. They use these plants as food, medicine, dye, fire wood, for ritual purpose, Bodoland Territorial Council (BTC) Area which is located in the north bank of river Brahmaputra in Assam. The region is inhabited predominantly by Bodo speaking ethnic group. BTC includes four districts namely Baksa, Chirang, Udalguri and Kokrajhar. At present Kokrajhar town serves as the head quarter of Bodoland. The area under these four districts has been estimated as Kokrajhar 3169.2 SqKm., Chirang 1069.96 Sq.Km., Baksa 3056.89 SqKm and Udalguri 1673.93 SqKm. The geographic boundary of BTC lies between $26^{0}7'12''$ N to $26^{0}47'50''$ N latitude and $89^{0}47'40''$ E to $92^{0}18'30''$ E longitude and is situated at the North Western part of Assam. The provisional geographic area of BTC is 8795 SqKm. Many perennial water reservoirs such as rivers, beels, jheels and swamps are observed in these districts. Again monsoonal rains make ponds, ditches, puddles in plain areas and form temporary marshy depressions in and around reserve forests, paddy fields etc. All these provide an ideal luxuriant growth of hydrophytic plants which are categorized into free floating, rooted floating, rooted submerged, rooted emergent, freely submerged and wetland hydrophytes[3]. The rivers flowing over the area are Beki, Manas, Pahumara, Balti, Aai, Champabati, Gourang, Pagladia, Puthimari, Baralia etc. There are many beels in this area like Daula Beel, Barkharua, Thekrai Beel, Garhchorajhar Beel, Raisinglajhar Beel, Charan Beel, Deeplai Beel etc.



MAP OF BODOLAND TERITORIAL COUNCIL

MATERIALS AND METHODS

The specimens have been collected at their vegetative, flowering and fruiting stages at regular intervals covering all the seasons of the year. Herbarium Sheets (42cmX28cm) have been prepared following the procedures of [4]. Plants have been identified by comparing Voucher specimens with the collection of herbarium sheets of Botanical Department of Gauhati University, Kanjilal Herbarium, Shillong, CNH and by using different floras and monographs of [5, 6, 7, 8, 9, 10 and 11]. Families have been presented following [12] with slight modification. The local uses of plant species of the areas have been analyzed as per the process suggested by [13 and14] and verified with [2 and 15]. Habitat Study and ecological categorization of the identified specimens have also been done.

RESULTS AND DISCUSSION

The aquatic and marshland vegetation of BTC area is quite rich. It shows high diversity due to presence of a large number of different kind of water bodies. The present study reveals the occurrence of 126 aquatic angiosperms belonging to 89 genera and 48 families. Among these families 32 belong to dicotyledonous and 16 belong to monocotyledonous plants. Regarding habitat categories, 85 species are wetland hydrophyte, 13 rooted emergent, 9 free floating, 12 rooted floating, 4 rooted submerged and 3 freely submerged. The wetland hydrophytes are the most dominating and grow on the peripheral areas of the wetlands. The 5 most representing families are Asteraceae(13 species), Polygonaceae(11 sps), Cyperaceae(8 species), Scrophulariaceae(8 species) and Commelinaceae(7 species). Many species are consumed by local people, some utilized for medicinal purpose and some for other purpose. E.g. tender shoot of *Ipomoea aquatica* are used as leafy vegetables, whereas dried stem of *I. fistulosa* is used as fire wood. Again local people consider *Utricularia*, *Najas*, *Eichhornia* as good manure for paddy fields. Some species like *Eriocaulon septangulare* which is endemic to western ghats has been recorded from this area. The submerged species *Myriophyllum indicum* is endemic to India. Some rare species collected from the area are *Nelumbo nucifera*, *Euryale ferox*, *Trapa natans* L. var. *bispinosa. Rotala* sps are also considered to be endemic. The orchid *Spiranthes cernua* is available in the wetlands of BTC area. The seeds of *Hygroryza aristata* can be cooked as rice during starvation.

Table1: Number of water bodies surveyed in BTC area

Sl. No.	Type of water bodies	No. of water bodies
1	Wetlands	20
2	Ponds	50
3	Rivers	7
4	Ephemeral	50

Table 2: Numerical presentation of hydrophytic angiosperms of BTC area

Таха	Number of		
Taxa	Family	Genera	Species
Dicotyledones	32	51	78
Monocotyledones	16	38	48
Total	48	89	126

Table 3: Habitat categorization of aquatic angiosperms of BTC area

Habitat category	No. of species	
Free-Floating	09	
Rooted Floating	12	
Freely Submerged	03	
Rooted Submerged	04	
Rooted Emergent	13	
Wetland Hydrophytes	85	
Total	126	

Table 4: Aquatic Angiosperms of BTC Area at Present State

Sl. No.	Family	Species	Uses	Habitat category
1	Sauraraceae	Houttaynia cordata Thunb.	Leaf extract given to eat in diarrohea	Wetland hydrophyte
2	Urticaceae	Pilea microphylla (L.) Liebm.	Plant infusion diuretic	Wetland hydrophyte
3	Ranunculaceae	Ranunculus sceleratus L.	leafs used in ashma, tonsil	Rooted emergent
4	Nelumbonaceae	Nelumbo nucifera Gaertner	Flowers used in skin diseases; thalamus edible; flowers in ritual purpose.	Rooted floating
5	Nymphaeaceae	Nymphaea nouchali Burm.f.	Fruit and seed edible	Rooted floating
		N. rubra Roxb.ex Andrews	Fruit and seed edible	Rooted floating
		N.stellata Willd.	Fruit and seed edible	Rooted floating
6	Ceratophyllaceae	Euryale ferox Salisbury Ceratophyllum demersum Linn.	Fruit edible cooling against boils	Rooted floating Freely Submerged
7	Caryophyllaceae	Drymaria cordata Willd.	Paste of leaves applied in insect bite & to cure	Wetland hydrophytes
		Stellaria media (L.) Vill.	sinus. Edible as leafy vegetable	Wetland hydrophytes
8	Amaranthaceae	Alternanthera sessilis (L.) R. Br. ex DC.	tender shoots edible as leafy vegetables	Wetland hydrophytes
		A. philoxeroides (Mart). Griselo	tender shoot as leafy vegetable	Rooted emergent
9	Polygonaceae	Persicaria barbata (L.) Hara	Roots astringent	Wetland hydrophytes
		Persicaria chinensis (L.) H.Gross	As leafy vegetable	Wetland hydrophytes
		Persicaria hydropiper (L.) Spach.	Dry plants burnt to control mosquito	Wetland hydrophytes
		Persicaria hydropiper Ssp. Flaccida (L.) Spach.	Dry plants burnt to control mosquito	Wetland hydrophytes
		P. orientale (L.) Asse. P. perfoliata (L.)H.	Leaves in healing wounds Tender shoot edible as vegetable	Wetland hydrophytes Wetland hydrophytes
			Whole plants given to eat to control dysentery of	
		P. strigosa (Roxb.) Nakai	cow	Wetland hydrophytes
		P. viscosa (BuchHam. ex. D.Don) H. Gross ex Nakai	Fumigation of plant to control insect.	Wetland hydrophytes
		Polygonum plebejum (L.) Hara	Roots in treatment of pneumonia	Wetland hydrophytes
		Rumex maritimus L.	edible as leafy vegetables	Wetland hydrophytes
10	Capparidaceae	Rumex dentatus L. Cleome gynandra L.	edible as leafy vegetables Paste of leaves applied to cure boils	Wetland hydrophytes Wetland hydrophytes
10	Brassicaceae	Cardamine hirsuta Hook.&T	As leafy vegetable	Wetland hydrophytes
	Drassieuceuc	Rorippa palustris(L.) Bess.	As leafy vegetable	Wetland hydrophytes
		Rorippa sinuata (N.) Hitc	As leafy vegetable	Wetland hydrophytes
12	Rosaceae	Fragaria indica Andr.	fruits edible	Wetland hydrophytes
13	Papilionaceae	Aeschynomene aspera Linn.	white spongy portion of stem is used in preparation of hat, doll, crown etc.	Wetland hydrophytes
		A. indica L.	white spongy portion of stem is used in preparation of hat, doll, crown etc.	Wetland hydrophytes
14	Hypericaceae	Hypericum boreale Fassett	Twigs used in urenary disorders	Wetland hydrophytes
15	Oxalidaceae	Oxalis corniculata L.	Tender shoots used as leafy vegetables, in dysentery	Wetland hydrophytes
16	Balsaminaceae	Hydrocera triflora (L.)Wt & Arn.	Dye of flower used in nail Juice of aerial part given to treat cough, cold,	Rooted emergent
17	Lythraceae	Rotala rotundifolia (Buch-Ham) Koeh	fever	Wetland hydrophytes
18	Onagraceae	Ludwigia adscendens (L.) Hara L.octavalvis (Mich.)Raven	Used as vegetables A kind of tea made from leaves	Rooted floating Wetland hydrophytes
		L. perennis L.	Boiled leaf extract used externally in reducing	Wetland hydrophytes
		<i>L. prostrata</i> Roxb.	fever Plant extract given to eat in leucorrhea	Wetland hydrophytes
19	Haloragaceae	Myriophyllum indicum L.	As organic fertilizer	Rooted submerged
20	Trapaceae	Trapa natans var.incisa Makino	Fruit edible	Rooted floating
~		Trapa natans var.bispinosa (Roxb.)Makino	Fruit edible	Rooted floating
21	Apiaceae	Centella asiatica (L.) Urban	Leaf extract given to eat in dysentery	Wetland hydrophytes
		Hydrocotyle sibthorpioides Lamk. Oenanthe fistulosa Flamingo	Leaf extract tonic Aerial parts given to eat in digestive disorders	Wetland hydrophytes Wetland hydrophytes
		<i>Oenanthe javanica</i> (Bl.)DC.	As leafy vegetable	Wetland hydrophytes
22	Menyanthaceae	Nymphoides cristata Roxb.	Tubers given to eat in gastric	Free floating
		N. indica (L.)Kuntz	Tubers eaten in fever and jaundice	Free floating
23	Convolvulaceae	Ipomoea aquatica Forsk.	As leafy vegetable	Rooted floating

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24	0.1	I. fistulosa(Mart ex Choisy)Aust	Flowers as mild purgative, stem as fire wood	Wetland hydrophytes
24 25	Solanaceae Hydrophyllaceae	Nicotiana plumbaginifolia Viv. Hydrolea zeylanica (L.) Vahl	Leaf paste applied on tongue swellings Leaves antiseptic	Wetland hydrophytes Wetland hydrophytes
26	Scrophulariaceae	Bacopa monnieri (L.)Pennell	Edible as leafy vegetable	Rooted emergent
20	Scrophulariaceae	Limnophila heterophylla (Roxb.)Bentham	Twig paste applied in hair	Rooted submerged
		L. sessiliflora (Benth.) Wett.	As organic fertilizer	Rooted emergent
		L. crustacea (L.)F.Muell.	Leaf crust used in jaundice, leucorrhea	Wetland hydrophytes
		L. dubia (Linn.) Pennell	Twig paste in skin diseases	Wetland hydrophytes
		L. pusilla (Willd.)Bold.	As leafy vegetable	Wetland hydrophytes
		L. rotundifolia (L.)Alston	Leaf juice given to eat in dysentery	Wetland hydrophytes
		L. ruellioides (Colsm.)Pennell	of child Leaf juice in dysentery of child	Wetland hydrophytes
27	Verbanaceae	Phyla nodiflora (L.) Greene	Plants febrifuge, diuretic	Wetland hydrophytes
28	Lamiaceae	Dysophylla stellata (Lour.) Benth.	Whole plant in skin diseases	Rooted emergent
29	Lantihulariaaaaa		Whole plant in prevention of diseases caused by	Ũ
	Lentibulariaceae	Utricularia aurea Lour.	mosquito	Freely submerged
30	Rubiaceae	Oldenlandia corymbosa L.	Leaf extract eaten in fever	Wetland hydrophytes
31	Campanulaceae	Sphenoclea zeylanica Gaertn	As leafy vegetable	Rooted emergent
32	Asteraceae	Cotula hemisphaerica (Roxb.)Wall. Ex Benth.	Leaf in inflammation Leaf extract in liver disorder, scorpion sting &	Wetland hydrophytes
		Eclipta prostrata L	also as dye	Wetland hydrophytes
		Enhydra fluctuans Lour.	As leafy vegetables and in hypertension	Rooted floating
		Erechthities valerianaefolia D.C	whole plant in malaria	Wetland hydrophytes
		Gnaphalium indicum L.	Twig paste as antidandruff	Wetland hydrophytes
		G. polycaulon Pers.	Leaf anti diabetic	Wetland hydrophytes
		Grangea maderaspatana (L.)Poir	Leaf used in burning	Wetland hydrophytes
		Lactuca saligna Linn.	Whole plant in abdominal diseases	Wetland hydrophytes
		Mikania micrantha Kunth	Leaf in insect bite	Wetland hydrophytes
		Spilanthes paniculata Wall.ex DC Spilanthes acmella Murr.	As leafy vegetable Root paste applied to control tooth ache	Wetland hydrophytes Wetland hydrophytes
		Sonchus arvensis Linn.	Roots in jaundice	Wetland hydrophytes
		Wedelia chinensis (Osbeck)Merr	Leaf hepatoprotective; in hair blackening.	Wetland hydrophytes
33	Alismataceae	Sagittaria guayanensis Humb.,Bonp.& Kunth	Tubers in gastric troubles	Rooted floating
		S. sagitifolia Linn.	Plants used to induce	Rooted emergent
			flow of lochia	-
34	Hydrocharitaceae	Hydrilla verticillata (L.f.)Royl	As organic fertilizer	Rooted submerged
		Ottelia alismoides (L.)Perso	Fruits edible, seed diuretic	Rooted submerged
35	Najadaceae	Vallisneria spiralis L. Najas indica (Willd)Cham	As organic fertilizer as green fertilizer	Rooted submerged freely submerged
36	Commelinaceae	Amischophacelus axillaris (L.) Rao et Kamathy	Whole plants in tympanites	Wetland hydrophyte
50	Commennaeeae		Leaves applied in wounds and roots filtrate given	
		Commelina benghalensis Linn.	to treat in liver troubles	Wetland hydrophyte
		C. diffusa Burm.f.	Stem mucilage applied in wounds	Wetland hydrophyte
		C. obliqua Buch.Ham	Stem mucilage in wounds	Wetland hydrophyte
		Floscopa scandens Lour.	Leaf sap applied to treat	Wetland hydrophyte
		•	inflammation of eyes	
		Murdannia nudiflora(L.) Brenan M.loriformis (L.) Bruckner	whole plant in bronchitis Whole plants in cough, cold, inflammation	Wetland hydrophyte Wetland hydrophyte
37	Eriocaulaceae	Eriocaulon septangulare Linn.	Leaf and inflorescence applied in skin diseases	Rooted emergent
		Eichhornia crassipes (Mart) Solms (Buch-Ham.ex		-
38	Pontederiaceae	Meisn) Sojak	As organic fertilizer	Free floating
		Monochoria hastata (L.) Solms	Flowers edible	Rooted emergent
		M. vaginalis (Burm.f.) presler ex Kunth	Flowers edible	Rooted emergent
39	Arecaceae	Calamus tenuis Roxb.	Stem in furniture; fruit edible	Wetland hydrophyte
40	Acoraceae	Acoras calamus Linn.	Rizomes used as carminative, stimulant & as a	Wetland hydrophyte
41	Araceae	Amorphophalus campanulatus Blume	tonic Dried, boiled tuber edible	Wetland hydrophyte
-11		Colocasia esculenta (L.) Schott.	Rhizome, petiole, leaf edible as vegetables	Wetland hydrophyte
		Lasia spinosa (L.) Thw	Rhizome used in dysentery; tender shoot edible	Wetland hydrophyte
		Peltandra virginica (L.) Kunth	Rhizome used in dysentery	Rooted emergent
		Pistia stratiotes Linn.	leaves used in piles	Free floating
		Typhonium trilobatum (L.) Schott	Petiole edible as vegetable	Wetland hydrophyte
42	Lemnaceae	Lemna minor Linn. L. perpusilla Torrey	As duck & fish food As duck & fish food	Free floating
		<i>Spirodela polyrhiza</i> (L.)Sch.	As duck & fish food	Free floating Free floating
		Wolffia punctata Griseb	As duck & fish food	Free floating
43	Typhaceae	Typha latifolia Linn.	Leaf for weaving baskets, mats etc	Wetland hydrophyte
44	Cyperaceae	Cyperus exaltatus Retz.	As fodder	Wetland hydrophyte
		C. difformis Linn.	Root extract in fever, cold, cough	Wetland hydrophyte
		C. distans Linn. F	Root extract in fever, cold, cough	Wetland hydrophyte
		C. iria Linn.	Root extract in fever, cold, cough	Wetland hydrophyte
		Eleocharis rostellata (Tor.)Tor.	As fodder	Wetland hydrophyte
		Fimbristylis miliacea (L.) Vahl Mariscus menttimus Kunth.	Root extract in cold, cough As fodder	Wetland hydrophyte Wetland hydrophyte
		Scirpus debilis Pursh	Tubers in vomiting and dysentery	Wetland hydrophyte
45	Poaceae	Hygroryza aristata (Retz.) exNees. whight & Arn	Seeds cooked as rice	Free floating
		Hymenachne assamica (Hook.) Hitch.	As fodder	rooted emergent
		Panicum miliaceum Linn.	As fodder	Wetland hydrophyte
		Urochloa platyphylla (Munro ex C. Wright) Web	As fodder	Wetland hydrophyte
46	Zingiberaceae	Alpinia galanga (L.) Sw.	Seeds used as spice	Wetland hydrophyte
47	Comme	Hedychium coronarium Koen ex Retz	Flowers used during bath	Wetland hydrophyte
47	Cannaceae	Canna indica var,flava (Ros. Ex Bak.) Nb Tan.	As ornamental plant	Wetland hydrophyte
48	Orchidaceae	Canna indica var.indica L. Spiranthes cernua (L.)Rich.	As ornamental plant Plant tea used as diuretic for urinary disorders	Wetland hydrophyte Wetland hydrophyte
+0	Siemuaceae	Zeuxine affinis (Lind.)Benth. ex Hook.f.	Rhizome in tuberculosis	Wetland hydrophyte
				ay arophyte

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