

APPENDIX - I

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## AQUATIC AND SEMI-AQUATIC PLANTS OF BIRBHUM DISTRICT, WEST BENGAL

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### ABSTRACT

The paper presents a general account of the aquatic and semi-aquatic plants of Birbhum district with a list of 75 species under 47 genera. Of these 15 species belong to Dicotyledons and 57 species belong to Monocotyledons.

### INTRODUCTION

When one studies a limited group of plants, such as, aquatic vascular plants, it is difficult to decide which species is to include or exclude. Beal (1977) suggested that there is no such organism as an aquatic vascular plant and that, in stead, a continuum exists from terrestrial to aquatic habitats. Therefore no two lists from even the same state will include the same species. In general, however, I follow Fassett (1940) who included among the aquatic vascular plants only species which under normal conditions may germinate and grow with at least their bases under water.

In India the study on hydrophytes and marshland plants has been carried out by a number of workers (Biswas and Calder, 1937; Misra, 1946; Mirashi, 1954, 1957-58; Sen and Chatterjee, 1959; Maheshwari, 1960; Subramanyam, 1962; Vyas, 1964; Trivedi and Sharma, 1965; Paul, 1973; Singh and Tomar,

1982; etc.). However the district Birbhum has been partly and botanically explored by different workers (Guha, 1971; Basak, 1979) from time to time but no separate work on aquatic flora of the district has been published. Therefore, a thorough study of the present day aquatic and semi-aquatic plants of the district is necessary. The area was surveyed in different seasons during the years 1983 and 1984. Specimens are preserved in the Central National Herbarium, Howrah (CAL). Latest nomenclature of the plants have been checked as far as practicable and the plants have been mainly arranged and enumerated on the broad basis of Bentham and Hooker's system of classification supplemented by Hutchinson's system of classification.

### LOCATION & HABITATS

Birbhum district of West Bengal is situated between 87°10' to 88°2' East longitude and between 23°33' to 24°35' North latitude and

extends over an area of about 4528.61 sq km. It is bounded on the east by Murshidabad district, on the West by Santal Parganas, on the South by Burdwan district and on the north partly by Murshidabad district and partly by Santal Parganas. The river Ajoy, a largest stream, is on the South forming the boundary line for the whole distance. The other streams deserving notice are the Maureksha, which flows in a wide sandy bed, is navigable during the rains, but by descending boats only. The district is also provided with many permanent ponds, ditches, jheels, marshes and canals which get filled up by water during the rainy season and maintain a rich aquatic and marshland flora.

#### TOPOGRAPHY & SOILS

In its general aspect, Birbhum district occupies a soil which is usually composed of dark clay or sand and clay particularly towards the south east portion. Patches of reddish clay and gravel towards the western portion and in some places, calcareous nodules with clay, coarse sand or ferruginous particles are also found to occupy considerable areas of land. In areas where clay has been deposited on the surface as in depressions, the ground becomes swampy during the rainy season.

#### CLIMATE

The climate of Birbhum district is of monsoon type, though the hot and dry climate of the district is well known. The heat becomes very intense particularly during the end of the March to mid of June, when maximum temperature rises to about 39.5°C or even more. In winter season, the minimum temperature falls to about 8°C. The rain

usually starts from the last week of June and continues up to the last part of the September or first week of October occasionally. During the months of July to August the heaviest shower is normally found and the average annual rainfall is about 1210.4 mm.

#### OBSERVATIONS

The common habitats of the aquatic and marshland plants are the ponds, lakes, ditches, bank of rivers and areas of the marshy-land of the district. According to the mode of life in aquatic environment, the following types of hydrophytes are recognised :

1. Free floating hydrophytes.
2. Rooted submerged hydrophytes.
3. Rooted hydrophytes with floating leaves.
4. Rooted and immersed hydrophytes occurring in shallow water (Amphibious type).
5. Wetland and marshy plants.

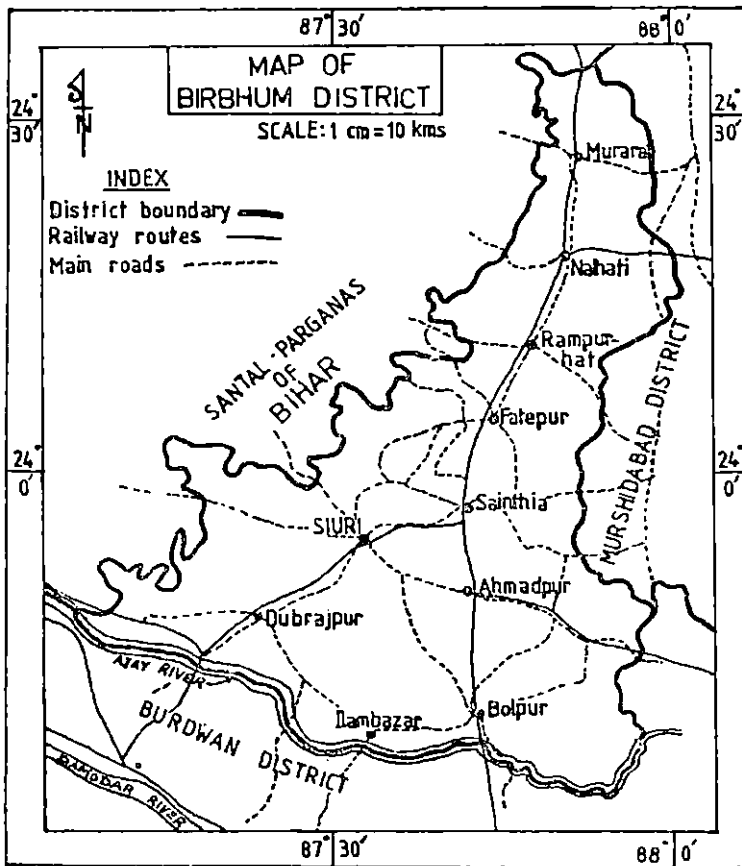
The aquatic and marshy plants show pure patches of plants like *Nymphaea pubescens* Willd, *Eichhornia crassipes* (Mart.) Solms, *Pistia stratiotes* L. in different localities of the district. Besides, there are number of common associations of aquatic and marshy species which are noticeable in different areas :

##### Associates of aquatic plants

- (A) *Nelumbo*, *Nymphoides*, *Aponogeton*
- (B) *Nymphoides*, *Utricularia*, *Hydrilla*
- (C) *Marsilea*, *Azolla*, *Hydrilla*.
- (D) *Nelumbo*, *Hydrilla*, *Hygroryza*

##### Associates of marshy & wetland plants

- (A) *Hydrolea*, *Schoenoplectus*, *Phragmites*



(B) *Polygonum*, *Cyperus*, *Hygroryza*, *Leersia*

(C) *Cyperus*, *Panicum*, *Phragmites*, *Sacciolepis*

Plants like *Nymphaea pubescens* Willd., *Nymphoides indicum* (L.) O. Ktze, *Hydrolea zeylanica* (L.) Vahl, *Alternanthera sessilis* (L.) R.Br. ex DC., *Aponogeton natans* (L.) Engl. et Krause show a wide range of distribution. The present study shows that three pteridophytes and seventy two species of angiosperms belonging to twenty families inhabit

the ponds, lakes, ditches, marshes and river beds of the district.

#### SYSTEMATIC ENUMERATION

##### MARSILEACEAE

##### *Marsilea quadrifoliata* L.

Common in ponds, lakes and near the margin of ponds. Development and maturity of the sporocarp June to August. CRM 18.

##### SALVINIACEAE

##### *Salvinia cucullata* Roxb. ex Bory

Occasional in ponds and lakes. Develop-

ment and maturity of the sporocarp July to September. CRM 6, 48.

AZOLLACEAE

*Azolla pinnata* R.Br.

Common in ponds and lakes during rainy season. Development and maturity of the sporocarp July to September. CRM 21, 59.

NELUMBONACEAE

*Nelumbo nucifera* Gaertn.

= *Nelumbium speciosum* Willd.

Frequent in ponds and lakes.

Fl. & Fr. : March to October. CRM 2, 47.

NYMPHAEACEAE

*Nymphaea esculenta* Roxb.

Rare, in lakes and ponds.

Fl. & Fr. : August to November. CRM 28, 60.

*N. pubescens* Willd.

= *N. lotus* Hook.f. & Thoms.

Common in ponds and lakes forming pure patches.

Fl. & Fr. : June to November. CRM 23, 87.

FABACEAE (PAPILIONACEAE)

*Desmodium bentharii* Ohashi

Occasionally in moist places.

Fl. & Fr. : September to December. CRM 106.

*Pseudarthria viscida* (L.) Wt. & Arn.

Occurs near the banks of the ponds.

Fl. & Fr. : September to January. CRM 99.

LYTHRACEAE

*Rotala verticillaris* L.

Occurs in moist and muddy places.

Fl. & Fr. : November to February. CRM 93.

APIACEAE (UMBELLIFERAE)

*Centella asiatica* (L.) Urb.

= *Hydrocotyle asiatica* L.

Occurs in moist and muddy places.

Fl. & Fr. : September to November. CRM 17.

MENYANTHACEAE

*Nymphoides indicum* (L.) O. Ktze.

= *Limnanthemum indicum* Griseb.

Very common in ponds and lakes.

Fl. & Fr. : April to December. CRM. 4 22, 86.

HYDROPHYLLACEAE

*Hydrolea zeylanica* (L.) Vahl

Common in marshy places.

Fl. & Fr. : September to January. CRM 25, 61.

LENTIBULARIACEAE

*Utricularia aurea* Lour.

= *U. flexuosa* Vahl

Occurs in stagnant water of ponds and ditches.

Fl. & Fr. : September to December. CRM 20, 101.

*U. hirta* Klein ex Link

Occurs in moist sandy laterite soil.

Fl. & Fr. : August to December. CRM 34, 85.

*U. minutissima* Vahl

Occurs in moist sandy soil.

Fl. & Fr. : August to November. CRM 58, 95.

AMARANTHACEAE

*Alternanthera sessilis* (L.) R. Br. ex DC.

Common in moist, marshy places and in ditches.

*Fl. & Fr.* : Major part of the year. CRM 3, 49, 88.

POLYGONACEAE

*Polygonum hydropiper* L.

Occurs in marshy places and in ditches.

*Fl. & Fr.* : September to April. CRM 24, 57.

CERATOPHYLLACEAE

*Ceratophyllum demersum* L.

Common in ponds, lakes and ditches.

*Fl. & Fr.* : August to November. CRM 94.

HYDROCHARITACEAE

*Hydrilla verticillata* (L. f.) Royle

Common in old tanks and ponds.

*Fl. & Fr.* : August to November. CRM 5, 19.

PONTEDERIACEAE

*Eichhornia crassipes* (Mart.) Solms.

Common in ponds forming pure patches.

*Fl. & Fr.* : August to November. CRM 1, 42.

ARACEAE

*Alocasia macrorrhiza* (L.) G. Don

= *A. indica* Spach.

Common in marshy places.

*Fl. & Fr.* : August to February. CRM 56.

*Colocasia esculenta* (L.) Schott

= *C. antiquorum* Schott.

Common in marshy places.

*Fl. & Fr.* : August to February. CRM 46.

*Pistia stratiotes* L.

Common in ponds and sometimes forming pure patches.

*Fl. & Fr.* : August to November. CRM 16, 26.

APONOGETONACEAE

*Aponogeton natans* (L.) Engler et Krause

Occurs in ponds and lakes.

*Fl. & Fr.* : August to October. CRM 27, 84.

CYPERACEAE

*Cyperus compressus* L.

Common in moist places during rainy season.

*Fl. & Fr.* : July to December. CRM 13.

*C. difformis* L.

Occurs in moist places and in rice fields.

*Fl. & Fr.* : August to November. CRM 29.

*C. digitatus* Roxb.

Common in wet soil.

*Fl. & Fr.* : June to November. CRM 8, 43.

*C. distans* L. f.

Common in moist soil during rainy season.

*Fl. & Fr.* : July to October. CRM 40.

*C. exaltatus* Retz.

Grows in marshy places.

*Fl. & Fr.* : August to December. CRM 53.

*C. iria* L.

Common in rice fields and other marshy places during rainy season.

*Fl. & Fr.* : August to November. CRM 75.

**C. laevigatus L.**

Common in moist and muddy places.

Fl. & Fr. : July to November. CRM 30.

**C. nutans Vahl**

Occurs in wet soil.

Fl. & Fr. : June to September. CRM 67.

**C. rotundus L.**

Frequent in moist and marshy places during rainy season.

Fl. & Fr. : June to November. CRM 54.

**C. tenuispica Steud.**

= *C. flavidus* Clarke

Common in wet soil and in rice fields.

Fl. & Fr. : June to October, CRM 66, 104.

**C. triceps (Rottb.) Endl.**

= *Kyllinga triceps* Rottb.

Common in moist and marshy places.

Fl. & Fr. : August to December. CRM 41.

**C. uncinatus Poir.**

= *C. cuspidatus* H. B. & K.

Occurs in shallow ditches.

Fl. & Fr. : July to December. CRM 7.

**Eleocharis atropurpurea (Retz.) K.B. Presl**

Common in marshy places and in rice fields.

Fl. & Fr. : June to September, CRM 10, 69.

**E. plantaginoides (Rottb.) Don**

Common in marshy places and in shallow water of ponds and lakes.

Fl. & Fr. : June to October. CRM 102.

**E. spiralis R. Br.**

Common in marshy places.

Fl. & Fr. : July to October. CRM 107.

**Fimbristylis aestivalis (Retz.) Vahl**

Occurs on the margin of wet crop field, mainly during rainy season.

Fl. & Fr. : May to September. CRM 44, 96.

**F. dichotoma (L.) Vahl**

= *F. diphylla* (Retz.) Vahl

Commonly occurring in muddy places and in rice fields.

Fl. & Fr. : July to January. CRM 103.

**F. miliacea (L.) Vahl**

Occurs in low lying areas.

Fl. & Fr. : July to November. CRM 64.

**F. squarrosa Vahl**

= *F. bisumbellata* (Forsk.) Bub.

Grows specially in crop fields.

Fl. & Fr. : June to September. CRM 76.

**F. tetragona R. Br.**

Occurs in moist crop fields.

Fl. & Fr. : July to November. CRM 97.

**Kyllinga brevifolia Rottb.**

= *Cyperus brevifolius* (Rottb.) Hassk.

Occurs in moist and marshy places.

Fl. & Fr. : June to September. CRM 91.

**K. nemoralis (Forst.) Dandy ex Hutch.**

= *Cyperus kyllinga* L.

Grows in marshy places during rainy season.

Fl. & Fr. : June to October. CRM 12, 80.

**Pycneus pumilus (L.) Nees**

= *Cyperus pumilus* L.

Common in moist places and near the ponds and ditches.

Fl. & Fr. : August to November. CRM 14, 81.



- P. sanguinolentus** (Vahl) Nees  
= *Cyperus sanguinolentus* Vahl  
Common in moist places.  
*Fl. & Fr.* : May to September. CRM 77.
- Rikliella squarrosa** (L.) J. Raynal  
= *Scirpus squarrosus* L.  
Occurs in moist crop fields.  
*Fl. & Fr.* : July to November. CRM 70.
- Schoenoplectus articulatus** (L.) Palla  
= *Scirpus articulatus* L.  
Grows in marshy places and in shallow water of old ponds and lakes.  
*Fl. & Fr.* : September to November. CRM 9, 65.
- S. lateriflorus** (J.F. Gmel.) Lye  
= *Scirpus supinus* L.  
Commonly occurring in marshy places and in rice fields.  
*Fl. & Fr.* : August to January. CRM 37, 92.
- Scirpus grossus** L. f.  
Common in wet soil.  
*Fl. & Fr.* : August to January. CRM 15.

POACEAE (GRAMINEAE)

- Bothriochloa pertusa** (L.) A. Camus  
= *Andropogon pertusus* (L.) Willd.  
Occurs in wet soil and marshy places.  
*Fl. & Fr.* : July to November. CRM 31, 79.
- Chrysopogon aciculatus** (Retz.) Trin.  
= *Andropogon aciculatus* Retz.  
Common in moist places.  
*Fl. & Fr.* : August to November. CRM 50, 73.

- Echinochloa stagnina** (Retz.) P. Beauv.  
= *Panicum stagninum* Retz.  
Common in stagnant ditches and banks of ponds.  
*Fl. & Fr.* : July to December. CRM 89, 105.
- Elytrophorus spicatus** (Willd.) A. Camus  
= *E. articulatus* P. Beauv.  
Frequently found in ditches and rice fields.  
*Fl. & Fr.* : August to November. CRM 108.
- Eragrostis tenella** (L.) P. Beauv. ex Roem. et Schult.  
= *E. plumosa* (Retz.) Link  
Common during rainy season in wet soil.  
*Fl. & Fr.* : May to November. CRM 36, 98.
- E. viscosa** (Retz.) Link  
Found in wet soil.  
*Fl. & Fr.* : July to November. CRM 45.
- Hygroryza aristata** (Retz.) Nees, ex Wt. and Arn.  
= *Leersia aristata* (Retz.) Roxb.  
Common in ponds, lakes and ditches.  
*Fl. & Fr.* : October to February. CRM 63, 72, 100.
- Hymenachne pseudointerrupta** D. Muell.  
Found to grow in marshy places and in water logged areas.  
*Fl. & Fr.* : September to December. CRM 90.
- Ischaemum rugosum** Salisb.  
Found occasionally in wet sandy soil.  
*Fl. & Fr.* : November to January. CRM 11.

**Iseilema laxum** Hack.

Grows in marshy places and in rice fields after rainy season.

*Fl. & Fr.* : September to January. CRM 35.

**Leersia hexandra** Sw.

Found to grow in moist soil and in low lying rice fields.

*Fl. & Fr.* : October to January. CRM 52, 74.

**Leptochloa capillacea** Beauv.

= *L. chinensis* (L.) Nees

Grows profusely on the margins of old tanks, lakes and in moist places.

*Fl. & Fr.* : October to December. CRM 39.

**Oryza rufipogon** Griff.

Common in paddy fields, ponds and other marshy places.

*Fl. & Fr.* : May to November. CRM 33.

**Panicum austroasiaticum** Ohwi

Found to grow near ponds, in moist grazing grounds and in rice fields.

*Fl. & Fr.* : August to November. CRM 51.

**P. paludosum** Roxb.

Grows very thickly at the margins of lakes, in marsh lands, still water and banks of ponds.

*Fl. & Fr.* : June to November. CRM 68.

**P. repens** L.

Grows in moist sandy areas.

*Fl. & Fr.* : July to October. CRM 109.

**Paspalidium flavidum** (Retz.) A. Camus

= *Panicum flavidum* Retz.

Frequently grows in ditches and in rice fields.

*Fl. & Fr.* : July to November. CRM 82.

**Paspalum commersonii** Lamk.

= *P. scrobiculatum* L.

Commonly growing in moist places and rice fields.

*Fl. & Fr.* : October to December. CRM 38.

**Phragmites karka** (Retz.) Trin. ex Steud.

= *P. maxima* (Forsk.) Blatt. & Mc Cann

Occurs in marshy places.

*Fl. & Fr.* : August to December. CRM 55.

**Sacciolepis indica** (L.) A. Chase.

= *Panicum indicum* L.

Rare. Found to grow in moist places and on the margins of old tanks and lakes.

*Fl. & Fr.* : September to December. CRM 62.

**S. interrupta** (Willd.) Stapf

= *Panicum interruptum* Willd.

Grows in low lying areas.

*Fl. & Fr.* : November to January. CRM 32, 71.

**S. myosuroides** (R.Br.) A. Camus

= *Panicum myosuroides* R.Br.

Usually found to grow in damp places.

*Fl. & Fr.* : August to December. CRM 78.

**Vetiveria zizanioides** (L.) Nash.

= *Andropogon muricatus* Retz.

Common in marshy places.

*Fl. & Fr.* : July to December. CRM 83.

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