Ph.D.thesis:

Ecofloristic survey of aquatic and marshy land angiosperms of Paschim Medinipur district, West Bengal, India.

Materials and Methods:

5. Materials and Methods

5.1. Floristic study

5.1.1. Quantitative study and floristic analysis:

A quantitative study was carryout by the quadrat system (Misra, 1968) to note the frequency, abundance, and density of a single plant species. The diagnostic characteristics of the plant study to produce an accurate and precise means for species identification with the assistance of obtainable literature and the Departmental Herbarium of Botany and forestry Department, Vidyasagar University, and Botanical Survey of India (BSI), Shivpur, Howrah for proper plant identification. The magnitude of the quadrat tested was resolved by the "Species Area Curve" technique (Oosting, 1958). To tabulate the phytosociological data laid down 2 x 2 m quadrat randomly at accessible areas of the aquatic field in selected zones. The areas in particular zones put down randomly 2 x 2 m quadrats in the aquatic field. Quadrats were marked with wooden pegs and studied in different seasons in a year. In each locality, 20 - 200 quadrats randomly placed during our study in all subdivisions area of Paschim Medinipur district. To mean over and under dispersion of plant population, Cole (1946) used contagious and negatively contagious terms. The distribution of any species with a relative measure of the degree of contagiousness has used in the ratio of abundance in frequency (Whitford, 1948). The Frequency, density, and abundance were indomitable according to Curtis and McIntosh (1950), and graphically plotted through Origin software (6.1). The importance values of individuals and a number of species, these two factors regulate the community species diversity. The quantitative parameter is beneficial, as it delivers a complete representation of the density, frequency, and concealment of a species in community relations. (Figure 5)

High frequency x Low abundance = Regular distribution

Low frequency x High abundance = Contagious distribution

For details on all the analyses possible with this data (species richness, diversity, frequency, percent cover). If the data collected once, species frequency can be obtained by dividing the number of points where a species was present by the total number of points. If data are collected in two different times or from different locations, they can be compared for changes in species frequency of occurrence over time.
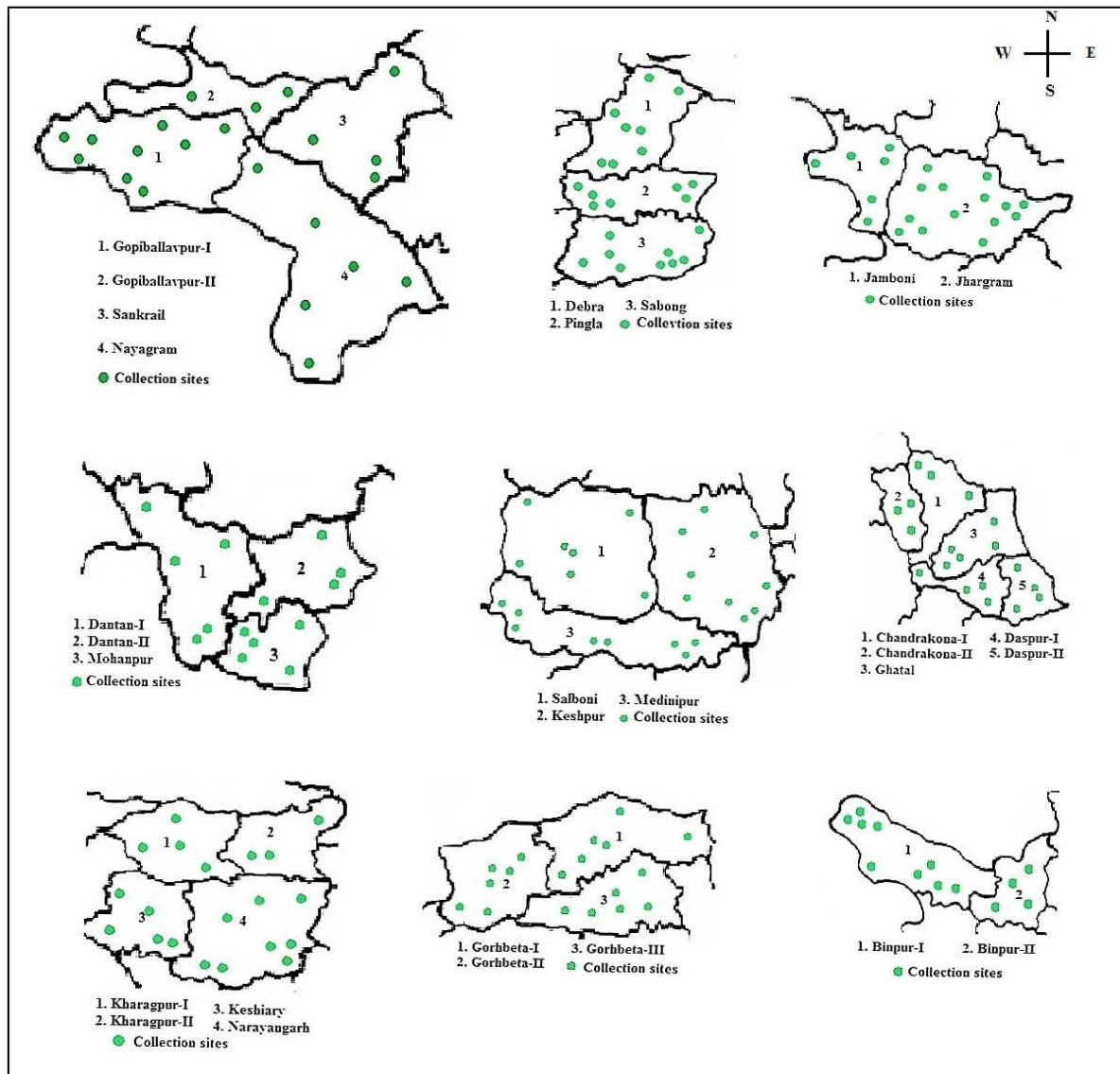

Figure 5: Different collection sites, locality of quadrats in 29 blocks with green marks.

The significant quantitative analysis for example density, frequency, and abundance of aquatic plant species was calculated as per Curtis and McIntosh (1950).

5.1.1.1. Determination of plant species Density:

$$\text{Density} = \frac{\text{Total number of individuals of a species in all quadrats}}{\text{Total number of quadrats studied}}$$

5.1.1. 2. Determination of plant species Frequency (%):

$$\text{Frequency (\%)} = \frac{\text{number of quadrats in which the species occurred} \times 100}{\text{Total number of quadrats studied}}$$

5.1.1. 3. Determination of plant species Abundance:

$$\text{Abundance} = \frac{\text{Total number of individuals of a species in all quadrats}}{\text{Total number of quadrats in which the species occurred}}$$

5.1.2. Similarity and dissimilarity indices

Manifestations of similarity and dissimilarity intended by formulae as per Mishra (1989) and Sorensen (1948) as follows:

Index of similarity (S) = 2C/A+B

Where A= Number of species in the community A

B= Number of species in the community B

C= Number of common species in both the communities.

Index of dissimilarity= 1-S

Ph.D.thesis**:**

Ecofloristic survey of aquatic and marshy land angiosperms of Paschim Medinipur district, West Bengal, India.

Materials and Methods:

5.1.3. PCA (Principal Component Analysis):

PCA (Principal Component Analysis) of aquatic angiosperm species created according to Jolliffe, I.T. (2002), through PAST software. Index of diversity (Shannon–Weaver, 1963) was calculated and the method for calculating the Shannon diversity index is $H' = - \Sigma$ pi in pi.

5.1.4. Plant collection, identification, and description

An extensive floristic survey was directed during 2008- 2015. The plant specimens were together in its aquatic macrophytic biodiversity assessment periodically at the altered reproductive periods to arrange herbarium specimens and authenticate their correct identity. The recorded specimens identified taxonomically with the assist of obtainable monographs, taxonomic amendments, and floras. Collected plant specimens verified for accurate citations at the Herbarium center of Vidyasagar University, Department of Botany and Forestry, West Bengal, India. For a concrete and informative plant description, we use authentic literature from different flora, books, journals, reports, and little modification by us. Most useable references for plant descriptions are *'Aquatic and Wetland Plants of India'* by Cook (1996) and *'Aquatic and semi-aquatic plants of the lower Ganga delta'* by Naskar (1990).

5.1.5. Plant documentation and preserved

Collected samplings documented alphabetically and deposited at the Herbarium center of Vidyasagar University, Department of Botany and Forestry, West Bengal, India. These collected macrophytic plant species are classified based on their habitat and morphological characteristics. Plants were composed directly and subsequently, the collected specimen was methodically washed, extra water soaking with filter paper, reserved in polythene bags with filter paper, and immediately transported to the laboratory and well-preserved by 10% formalin and observed.

5.1.6. Floristic documentation

The hydrophytes and marsh plants that collected in the present study those clustered into five altered "morpho-ecologic" classes (Pohl, 1937). These are (1) Marshy land plants (ML); (2) Emergent Anchored plants (EA); (3) Free Floating plants (FF); (4) Rooted with Floating Leaved plants (RF); (5) Submerged Anchored plants (SA).

5.2. Exploration of medicinally important aquatic plants:

The plants were collected from the different tribes and rural zone of West Bengal after a brief interview from villagers. We also conducted several people from the village area for data authentication and side by side, we consult with Ayurveda doctors, Ojha, and senior people. We collect the best knowledge of literature and matching the field interview data side by side taken the photographs for proper authentication.