

Biological Seasonal Diversity and Effect on Ecosystem of Macrophytes in Pond of Darbhanga District, Bihar State

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Abstract

Macrophytes play an important role in pond ecosystem, where they provide food and habitat to fish, wild life and aquatic organisms. Only few plants usually become a problematic by stopping uses of water and threaten the diversity of natural pond ecosystem. These are also causing the reduction of the available water resources. When seasonal fluctuations occurred, the diversity of macrophytes is suddenly changed and also it blocked the drainage canals due to its profuse growth. In present study, a total of 9 macro phytes were recorded from litoral and sub-litoral zones of the pond. Among the rooted floating species *Hydrilla spp.* and *Eichornia spp.* Recorded. In sub margedmacrophytes, *ceratophyllum spp.* and *Utriculariaspp* were recorded.

Keywords: Macrophyte, diversity, Pond

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I. Introduction

Macrophytes are unwanted plants in ponds, causing economic as well as ecological losses by adversely affecting the aquatic ecosystem, irrigation, navigation, public health and last but not the least, the fisheries development of any nation. They were pronounced in the tropical and subtropical regions where high temperature supports profuse weed growth and multiplication. Macrophytes plants are among the prolific ones on earth associated with both positive and negative impact on aquaculture. On the other hand over growth of these plants adversely affects aquaculture productivity as they take up the available nutrients from the water body, affect plankton production, interfere with sunlight penetration, create extreme dissolved oxygen variations between day and night, give shelter to harmful insects and fish predators, require large amount of oxygen for decomposition after death leading to harmful dissolved oxygen levels, lower down water pH (due to liberation of carbon dioxide during respiration and decomposition) and interferes with fish movements and fishing operations. Many macrophytes are known to produce products of industrial importance (agar, alginates, carrageenan) and are cultured commercially world over and developed as an independent enterprises. Many aquatic plants possess great potential for phyto-remediation (bio-remediation) of polluted/waste water due to their natural ability to remove toxicants effectively (Nirmal Kumar et.al, 2008).

II. Material And Methods

Sampling was completed randomly with the help of a vertical micro-sampler of 3- meter height (**Gronived 1957** and **Jha1968**) who applied modification in wooden dredge method and SCUBA Techniques of **Kosicks and Kosicki (1959)**. In the centre of the pond there was a wooden cylindrical pillar bored lightly. The pillar helped in securing firmly five belts transects which were further supported by solid wooden sticks buried vertically at different place at water depths of 60 cm, 170 cm and 230 cm respectively. Twenty random samplings at all depths were taken and added together to find out the mean value. During sampling. Only those plants were taken into account which fell within the sampler's periphery. After collection, plants were washed to remove epiphytes. Gastropods and insects present over the leaves of the macrophytes and then sorted indifferent species and then counted. The calculation was made for different ecological parameters with the help of the following formula:

$$\text{Frequency} = \frac{\text{No of quadrates in which the species occurred}}{\text{Total No.of Quadrates studied}} \times 100$$

$$\text{Density} = \text{No. of individuals} / \text{meter}^2$$

III. Results And Discussion

Seasonal variations in density and percentage frequency of aquatic macrophytes in the Pond from March 2009 to February 2010 are shown in **Table- 1** the pond harboured four types of macrophytic vegetations viz. emergent forms **Eleocharisplantaginea**, Free floating forms **Lemna minor**, **Pistisstratiotes**, **Richherriacrassipes**, free floating forms **Lemna minor**, **Pistisstratiotes**, **Richherriacrassipes**, submerged forms **ceratophyllumdemorsum**. **Hydrillaveticillata**, **potamogetanmucronalus**, **p. crispus**, and **Utriculariaflexuose**). All the submerged forms showed the maximum density and percentage frequency during spring and the minimum during summer. However, Potamogetonmucronatus and P. Crispus displayed the highest density and frequency during winter and minimum in summer.

It was observed that all free floating forms and emergent Eleocharisplantagenia showed a steady increase in density and frequency from winter onward reaching the peak in Monsoon, Lemna minor showed absence during winter. In this was the seasonal variations and effect on ecosystem in macrophytic vegetation was investigated in the studied pond during the year 2009-2010.

The studies on diversity from different fresh water bodies of India have been carried out during the last few decades (Ayodhya D et.al, 2013, Dhote S, et.al, 2007) . The main source of pollution is due to runoff water from agriculture fields in the rainy season carrying inorganic fertilizers, toxic pesticides and other chemicals enter in the channels.(Narayana and Somashekar, 2002).

It helps in maintenance of healthy pond life and the ecophysiology of the pond. Some of the submerged macrophytes are good oxygen generators. Moreover, they provide shelter to fish food organisms particularly the insect larvae. They also absorb inorganic components from the soil, water or atmosphere and bring them in to the food chain of the pond ecosystem. The marginal weeds are also beneficial in checking the erosion in pond exposed to wind and wind action. Thus reducing the turbidity. In the view of the above facts, the aquatic macrophytes in Sunderpur area of pond were estimated during the study period.

Table 1 : the Diversity of Macrophytes in pond of Darbhanga district from March 2009 to Feb 2010.

| Sl. No. | Name of Macrophytes | Summer | | | | Rainy | | | | Winter | | | |
|---------|-----------------------|--------|-----|-----|------|-------|--------|------|-----|--------|-----|-----|-----|
| | | March | Apr | May | June | July | August | Sept | Oct | Nov | Dec | Jan | Feb |
| 1 | Eichhorniacrassipura | + | + | + | + | + | + | + | + | + | + | + | + |
| 2 | Ceratophyllumdemorsum | + | + | + | + | + | - | - | + | + | + | + | + |
| 3 | Potamogetonorispus | + | + | + | + | + | - | - | + | + | - | + | + |
| 4 | P. pestinata | + | + | - | - | - | - | - | + | + | - | + | + |
| 5 | HydrilliaVerticillata | + | + | + | + | - | - | - | - | - | + | + | + |
| 6 | Utricularia spp. | - | - | - | - | + | - | - | + | + | + | - | - |
| 7 | Typhaangustata | + | + | + | + | + | + | + | + | + | + | + | + |
| 8 | Pistiastratiotes | + | + | + | + | + | + | + | + | + | + | + | + |
| 9 | Cyperus spp. | + | + | + | - | - | + | + | + | + | + | + | + |

IV. Conclusion

The present works detail the study carried out at one water-body, designed for fish culture particularly, namely Manth pond. The analysis was done based on the standards methods prescribed by APHA. The biological parameter included Macrophytes analysis. The detailed investigation of the parameters, biological seasonal diversity and effect on ecosystem in macrophytes population as well as in density of different groups of macrophytes population of the pond under study. In the present studied manth pond9 macrophytes have been recorded.

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CONFLICT OF INTEREST

Authors declare no conflict of interest regarding publication or any other activity related to this article.

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