



Diversity Of Algae In Paddy Fields Of Samastipur, Bihar

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Abstract

A survey conducted on diversity of algae in paddy fields of four different sampling areas of different corners of Samastipur district of North Bihar namely Gangapur (Site-I), Pusa (Site-II), Mujauna (Site-III) and Dariya (Site- IV) showed 27 spp. of Cyanophyceae and 22 spp. of Chlorophyceae during the crop season. Amongst Cyanophyceae, species of Nostoc, Anabaena, Microcystis, Gloeocapsa, Hapalosiphon, Aulosira and Rivularia and from Chlorophyceae, members of Scenedesmus, Ankistrodesmus, Chlorella, Cosmarium and Oedogonium were recorded in all the paddy fields.

Keywords: Cyanophyceae, Chlorophyceae, Diversity, Paddy Fields

Introduction:

Rice is one of the most important crops of India which is grown in 42 million hectares of land. It is the main crop of Bihar and is cultivated in most part of the state. Samastipur is a district of North Bihar where wetland is a complicated mosaic of scattered agricultural fields. It is a haven for micro-biodiversity, particularly that of algae, which is still largely unexplored. Algae form an integral part of the rice field ecosystem all over the world. They represent the significant autotrophic component of the biotic community of all soils. The ecosystem of rice fields is unique man-made fresh water ecosystem. Rice is cultivated two times in a year with a maturity period between 90 – 140 days depending on the rice species and geographical areas. As rice is semi aquatic plant with the depth of water ranges between 3 – 4 inches for a period of 2 – 3 months. So, the paddy field ecosystem lies between lentic and lotic system depending upon the life stages of the crop. Since the rice cultivation is subject to systematic water management and changes in water quantity and quality hence alteration in algal composition becomes evident.

Rice fields favour the growth of members of Cyanophyceae as well as Chlorophyceae in terms of light, temperature, pH, humidity, water and nutrient availability (Mitra, 1951). Heterocystous forms of Cyanobacteria have been extensively studied for their diversity in rice fields (Singh, 1961; Choudhary, 1999). The information on systematic enumeration of non-nitrogen-fixing forms including Chroococcaceae in the rice fields is limited. This study has been aimed to enumerate the periodic occurrence of members of Chlorophyceae and Cyanophyceae in different rice fields of Samastipur (Bihar).

Materials and Methods:

A total of 4 sampling areas were selected at the four corners of district. From each sampling areas two big sampling sites were selected and from each sapling sites, soil samples were collected by a random selection from different corners and center of the fields with the help of spade, khurpi and meter scale. The selected areas were Gangapur (Site-I), Pusa (Site-II), Mujauna (Site-III) and Dariya (Site- IV) of Samastipur district.

Soil samples were collected from each site selected through standard methods. Soil sample were collected at the two growth stages i.e. at the seedling and panicle stages of the rice plant. From each area, two big paddy fields were selected and from each paddy field soil samples were collected by removing the surface debris from selected spots and scrapping about 2 gm of soil from 1 – 5 cm deep soil layer. About 10 soil samples were collected from 1 – 5 cm deep soil. From each plot, soils were collected and put together in a sterile cotton bag. Soils of all the sites were taken into laboratory for biological analysis. Algal samples were identified with the help of standard literatures of Prescott (1951), Philipose (1967), Desikachary (1959), Prasad (1962, 64 and 65), Prasad and Srivastava (1992), Talpsayi (1962), Kamat (1963, 1982) etc.

Results and Discussion:

In the present investigation altogether twenty-seven species of Cyanophyceae and twenty-two species of Chlorophyceae were investigated from the paddy fields during the crop season as presented in table 1 and 2 respectively.

From the table 1, it is quite clear that a total of 27 algal species of Cyanophyceae were found in all the four selected paddy fields during the course of investigation. Gaikwad (2022) reported 20 species of blue green algae from the paddy fields of Bhor and Velha taluka of Pune, Maharashtra. Dey et al. (2010) detected about 58 species of 20 genera of Cyanophyta from the paddy fields of Mayurbhanj, Orissa. Srinivas and Aruna (2016) reported about 34 sp. of Cyanophyta from the Siddipet regions in Telangana state. Bharati et al. (2020) detected about 21 taxa of Cyanophyceae from Patna, Nalanda, Vaishali and Samastipur district of Bihar. Kumar and Jha (2018) found 17 genera and 21 species of blue green algae from the paddy fields of Chhapra district (Bihar). Choudhary (2009) found 21 sp. of blue green algae of the family Choorococcaceae from the paddy fields of Muzaffarpur district (Bihar). Present observation of 27 taxa of blue green algae from four selected paddy fields of Samastipur district (Bihar) is supported by the observations of above authors.

Form the table 1, it is quite clear that sp. of Nostoc, Anabaena, Microcystis, Gloeocapsa, Hapalosiphon, Aulosira and Rivularia were detected in all the four selected paddy fields throughout the crop season. Some members were found in three or two crop fields while a few were reported in one paddy field only

Altogether 22 algal taxa of Chlorophyceae have been identified from all the four selected paddy fields during the study (Table 2). Out of 22 algal taxa, only 13 taxa were detected at sites I, II, and III and only 12 at site IV.

Out of 22 taxa, *Scenedesmus bujugatus*, *Ankistrodesmus falcatus*, *Chlorella vulgaris*, *Cosmarium* sp. and *Oedogonium* sp. were found in all the paddy fields. Some of the taxa like *Scenedesmus quadricauda* and *Cladophora glomerata* were detected in three paddy fields. Rest taxa were found in two paddy fields only.

Kumar and Sahu (2012) while studying the Chlorophycean diversity in paddy fields of Ranchi, Jharkhand found a total of twenty-four algal taxa more or less similar to the members found in the present studies. In the present investigation members of the Chlorococcales, Cladophorales, Conjugales, Zygnematales were detected significantly as also found by Kumar and Sahu (2012). Some of the member like Chlorella, Chlamydomonas, Scenedesmus, Oocystis were observed during flooded paddy fields. Mats of Hydrodictyon appeared during later stage of crops.

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Table 1: List of blue green algal taxa found at different sites of paddy fields during the crop season.

| Sl. No. | Name of taxa | Site I | Site II | Site III | Site IV |
|---------|-------------------------------------|--------|---------|----------|---------|
| 1. | <i>Aphanizomenon sp.</i> | + | - | + | - |
| 2. | <i>Microcystis aeruginosa</i> | + | + | + | + |
| 3. | <i>Gleocapsa punctata</i> | + | + | + | + |
| 4. | <i>Aphanothece sp.</i> | + | - | + | + |
| 5. | <i>Aphanothece conferta</i> | - | + | + | - |
| 6. | <i>Nostoc punctiforme</i> | - | + | - | + |
| 7. | <i>Nostoc linckia</i> | + | + | + | + |
| 8. | <i>Nostoc commune</i> | + | + | + | + |
| 9. | <i>Anabaena sphaerica</i> | + | + | + | + |
| 10. | <i>Anabaena oryzae</i> | + | + | + | + |
| 11. | <i>Anabaena fertilissima</i> | + | + | + | + |
| 12. | <i>Anabaena variabilis</i> | + | + | + | + |
| 13. | <i>Hapalosiphon welwitschia</i> | + | + | + | + |
| 14. | <i>Welwitschia prolifica</i> | - | + | + | |
| 15. | <i>Cylindrospermum major</i> | + | - | - | + |
| 16. | <i>Synechocystis aquatilis</i> | + | + | - | - |
| 17. | <i>Aphanocapsa crassa</i> | - | - | + | - |
| 18. | <i>Merismopedia punctata</i> | - | + | + | - |
| 19. | <i>Aulosira prolifica</i> | + | + | + | + |
| 20. | <i>Oscillatoria tenuis</i> | + | - | - | + |
| 21. | <i>Phormidium tenue</i> | + | - | + | - |
| 22. | <i>Lyngbya sp</i> | | + | + | - |
| 23. | <i>Microcoleus sp</i> | + | - | - | - |
| 24. | <i>Scytonema hofmannii</i> | + | - | - | - |
| 25. | <i>Stigonema dendroideum</i> | + | - | - | - |
| 26. | <i>Tolypothrix sp.</i> | - | - | - | - |
| 27. | <i>Rivularia sp.</i> | + | - | - | - |

(+) Present

(-) Absent

Table 2: List of green algal taxa found at different sites of paddy fields during the crop season.

| Sl.no. | Name of taxa | Site I | Site II | Site III | Site IV |
|--------|---------------------------------|--------|---------|----------|---------|
| C1 | <i>Chlamydomonas debaryana</i> | + | - | - | + |
| C2 | <i>Chlorococcum minutum</i> | - | + | + | - |
| C3 | <i>Pediastrum duplex</i> | + | - | - | + |
| C4 | <i>Scenedesmus bijugatus</i> | + | + | + | + |
| C5 | <i>Scenedesmus acuminatus</i> | + | + | - | - |
| C6 | <i>Scenedesmus quadricauda</i> | - | + | + | + |
| C7 | <i>Coelastrum microsoprum</i> | + | - | + | - |
| C8 | <i>Coelastrum reticulatum</i> | - | + | - | - |
| C9 | <i>Ankistrodesmus falcatus</i> | + | + | + | + |
| C10 | <i>Oedogonium sp</i> | + | + | + | + |
| C11 | <i>Chlorella vulgaris</i> | + | + | + | + |
| C12 | <i>Oocystis solitaria</i> | - | - | + | - |
| C13 | <i>Closterium acutum</i> | - | - | - | - |
| C14 | <i>Cosmarium contractum</i> | + | + | + | + |
| C15 | <i>Zygnema pectinatum</i> | - | + | + | - |
| C16 | <i>Spirogyra sp.</i> | - | + | - | + |
| C17 | <i>Euglena sp.</i> | + | - | + | - |
| C18 | <i>Hydrodictyon reticulatum</i> | - | + | + | - |
| C19 | <i>Scendesmus obliquus</i> | + | - | - | + |
| C20 | <i>Ulothrix flacca</i> | - | + | - | - |
| C21 | <i>Cladophora glomerata</i> | + | - | + | + |
| C22 | <i>Rhizoclonium sp.</i> | + | - | - | + |

(+) Present

(-) Absent