Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.2151

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **3 (6):** 130-136 (2015)

International Journal of Pure & Applied Bioscience

Research Article

OPEN ACCESS

Phytoplanktonic Study of Rice Fields of Jammikunta Region, Karimnagar District, Telangana, India

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ABSTRACT

Food grain production to meet the dietary requirement of ever increasing Indian population. Some of the algae and bacteria have capable to fixation of atmospheric nitrogen to ammonia, which are some from BGA members. During this present investigation out of total 25 taxa of Cyanophyceae 14 species and 8 families, Chlorophyceae belonging to 10 where, Chlorellaceae represent cladophoraceae 2 species, desmidaceae 1 species, following Oedogoniaceae 1 species Zygnemataceae have been found with 2 species, 2species from Characeae etc.1species from naviculaceae under class of Bacillariophyceae. Cosmarium, species were high, observed during the period of August to October, during these months the water level declined gradually in rice field. It was found that population of algae belongs to above mentioned order were less in number during advent of summer month.

Key words: *N,-fixing, Blue-Green Algae, Rice Fields, Chemical Fertilizers*

INTRODUCTION

Paddy is one of the major crops in India. It can grow in aquatic habitat, one of the grass family members. India has different climatic conditions, vary from Kashmir to Kanya Kumari. Algae are grown in variety of habitats like marine, freshwater, epiphytic, association with other higher group plants like, Azolla, Cycas etc. Algal members have different thallus forms like colonies, unicellular, filamentous, unbranched or branched, coccoid etc. Nitrogen is one of the major components in every organism body framing components, which are proteins. Rice is uptake the nitrogen in the form of ammonium ion. But rice has not able to form atmospheric nitrogen to ammonia. Several farmers every year depend on chemical fertilizers for high yield. He spent thousands of rupees on chemical fertilizers. But in the nature some of the algae and bacteria have capable to fixation of atmospheric nitrogen to ammonia, which are some from BGA members. Another algal is main biomass producers from chlorophyceae members, which are indirectly helps to higher yield in rice fields.

Many attempts have been made to intensify the food grain production to meet the dietary requirement of ever increasing Indian population. In this connection, high yielding fertilizer responsive rice cultivars and improve cultural practices have been introduced in the country.

Cite this article: Odelu, G., Phytoplanktonic Study of Rice Fields of Jammikunta Region, Karimnagar District, Telangana, India, *Int. J. Pure App. Biosci.* **3(6):** 130-136 (2015). doi: http://dx.doi.org/10.18782/2320-7051.2151

The paddy field ecosystem provides an environment favourable for the growth of BGA with respect to their requirements for light, water, high temperature, and nutrient availability. This may account for the higher abundance of BGA in paddy soils than in other cultivated soils as reported under widely different climatic conditions of India. In the paddy fields, the relative occurrence of BGA varies within large limits, due to various factors association with that.

In North and South India they comprised 50% above the total number of species recorded. In acidic soils of Kerala state (India), their abundance varied between 0 to 76% of the total algae. N2-fixing BGA are not invariably present in tropical rice soils, only 2/3 were found to harbour nitrogen-fixing forms. Reasons for the heterogenous and sometimes limited distribution of N2-fixing BGA, as no systematic analysis has correlated their presence or absence with environmental factors. From the seed germination and preperation of field ready to put plantlets in the field. Between tillering and panicle initiation, filamentous green algae and non heterocystous blue-green algae were dominant.

STUDY AREA

Study area belonging to Telangana State, this state has black and reds oils in majority of irrigation land. Karimnagar district Latitude 1705’0” N, Longitude 78029’0” E, Altitude 1600 M. Jammikunta is one of the major areas of paddy production area of this district. Area with nearly 30 villages, almost of the villages cultivate paddy as major crop. The main irrigation source as canal water from S.R.S.P (Lower Manair Dam), which is one of the river Godavari based project. Another source of water from local ponds, small drains and wells. Study area divided into four major sites, which comprises each one have 8 villages as one unit. Paddy fields are around 20,000 ha.

MATERIALS AND METHODS

The algal materials were collected in the specimen tubes from waterlogged and moist soil surfaces. The filamentous form which are epiphytes and their filaments float on water were collected in wide mouthed bottles with finger and forceps directly. Surface water was also taken for the study of phytoplankton and desmids. The snails were directly collected which shows green surface and collection also taken from the aquatic plants surface and near rice plants by scarping the surface. The collected specimens were brought to the Laboratory, Govt. Degree College, Jammikunta. Department of Botany carefully washed and preserved in 4%formaldehyde solution. Temporary Mounts of algal specimen were prepared with suitable stains and observed under compound microscope. Micrometric measurement with the help of stage and ocular micrometer has been taken & Camera Lucida diagrams were made for the morph-taxonomical identification with the help of standard monographs, available research papers and publication some microphotographs of dominant forms were also taken by several workers and standard manuals on algae.

RESULTS AND DISCUSSION

During this present investigation out of total 25 taxa of Cyanophyceae 14 species and 8 families, Chlorophyceae belonging to 10where , Chlorellaceae represent cladophoraceae 2 species ,Desmidaceae 1 species, following Oedogoniaceae 1 species Zygnemataceae have been found with 2 species, 2 species from Characeae etc.1species from Naviculaceae under class of Bacillariophyceae (Table-1). Seasonal fluctuations on populations of algae were seen in most of the seasons in present investigation. Algae population were drastically reduced in advent of monsoon due to the ploughing and field preparation activities where field flooded with suspended soil particles. A qualitative study of algae in paddy fields by (Gupta, 1966) showed that the algae began to grow one month after the first monsoon rain; the algal community was poor in both quality and quantity and was dominated by Spirogyra sp. associated with Anabaena sp.

Rice cultivation generally occurred during the rainy season (July-November) and rice fields were dry during December-April. Twenty four soils were sampled. These were acidic, having an average pH value of 5.3 at the beginning of the rice cultivation and 5.9 after two months of submersion.

Higher population of Cosmarium and Euastrum species were also observed in this time. After paddy sowing in field most of the member of cyanophyceae. In addition to this, the luxuriant growth of

Bacillariophyceae and Chlorophyceae were present due to pudding of soil where it releases large quantities of readily available nutrients into the flood waters. Cosmarium, species were high, observed during the period of August to October, during these months the water level declined gradually in rice field. It was found that population of algae belongs to above mentioned order were less in number during advent of summer month. The seasonal fluctuation in Cladophora showed distinct change; as its colony were mainly grow in snail appears during July but full growth was observed only in the month of August. The population of the Chlorella vulgaris was very low throughout the year except rainy seasons.

Table.No.1: Algal species observed

S. No.	Species	Family	Class	Thallus form
1	Chroococcus minor	Chroococcaceae	Cyanophyceae	Unicellular
2	Microcystis elangata	Microcystaceae	Cyanophyceae	,,
3	Lyngbya sp.	Oscillatoriaceae	Cyanophyceae	Filamentous
4	Oscillatoria indica	Oscillatoriaceae	Cyanophyceae	,,
5	Phormidium sp.	Oscillatoriaceae	Cyanophyceae	,,
6	Anabaena cylindrica	Nostocaceae	Cyanophyceae	,,
7	Nostoc commune	Nostocaceae	Cyanophyceae	,,
8	Calothrix simplex	Rivulariaceae	Cyanophyceae	,,
9	Tolipothrix lanata	Microchaetaceae	Cyanophyceae	,,
10	Cylinrospermum sp.	Nostocaceae	Cyanophyceae	,,
11	Scytonema sp.	Scytonemaceae	Cyanophyceae	,,
12	Scytonematapsis sp.	Scytonemaceae	Cyanophyceae	,,
13	Aulosira fertilissima	Nostocaceae	Cyanophyceae	,,
14	Pseudanabaena sp.	Pseudanabaenaceae	Cyanophyceae	,,
15	Chlorella vulgaris	Chlorellaceae	Chlorophyceae	Unicellular
16	Cosmarium margaritatum	Desmidaceae	Chlorophyceae	,,
17	Navicula tripunctata	Naviculaceae	Bacillariophyceae	,,
18	Cladophora graminia	Cladophoraceae	Chlorophyceae	Filamentous
19	Rhizoclonium hieroglyphiarum	Cladophoraceae	Chlorophyceae	,,
20	Oedogonium fragile	Oedogonaceae	Chlorophyceae	,,
21	Spirogyra sp.	Zygnimataceae	Chlorophyceae	,,
22	Chara glabra	Characeae	Chlorophyceae	,,
23	Nitella sp.	Characeae	Chlorophyceae	,,
24	Chlorococcum humicola	Chlorococcaceae	Chlorophyceae	,,
25	Zygnima sp.	Zygnimataceae	Chlorophyceae	,,

BGA may occur with stability depending on weather and water conditions of the particular habitat. Anabaena and Nostoc were ubiquitous and were the major genera present in 60% of the samples. They were observed at lower pH values than other nitrogen-fixing blue-green algae. An average pH of 5.4 was observed in soils where these 2 genera were dominant, while the average pH of other samples was 6.0.The occurrence of rich algal flora results generally at the place where there are high levels of nutrients present, together with the occurrence of favourable environmental conditions. Growth and nitrogenase activity of N,-fixing blue-green algae are dependent upon a plant cover sufficiently dense to protect them

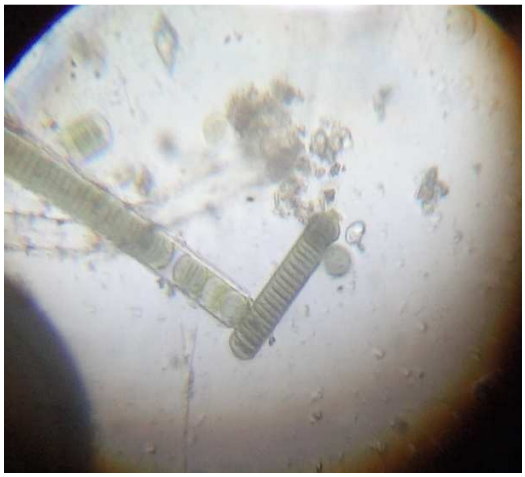
from the inhibitory effect of very high light intensity. Their abundance was positively correlated with the pH and the available P content of the soil. In the rice-fields of Valencia (Spain), N2- fixing Cyanobacteria were also present in all the samples analysed. However, its spontaneous development is less frequent than that of free-living cyanobacteria, in such a way that fields usually need to be inoculated with Azolla when it is to be used as green manure.

Figures of Some Algae

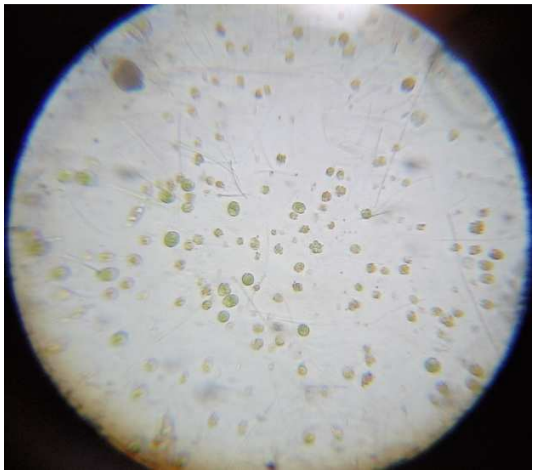
A) ***Cylinrospermum sp.***

B) ***Lyngbya sp.***

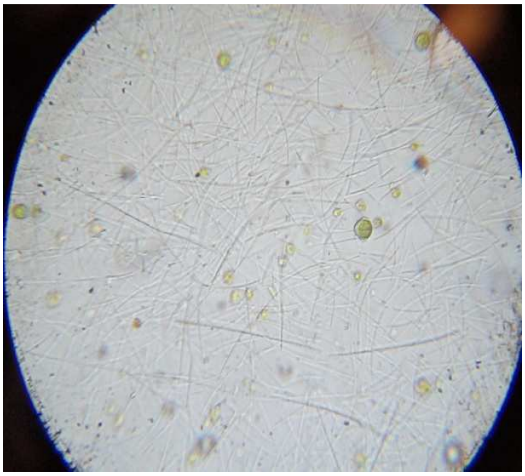
C) ***Cosmarium margaritatum***



D) ***Oscillatoria indica***



E) ***Chroococcus minor***

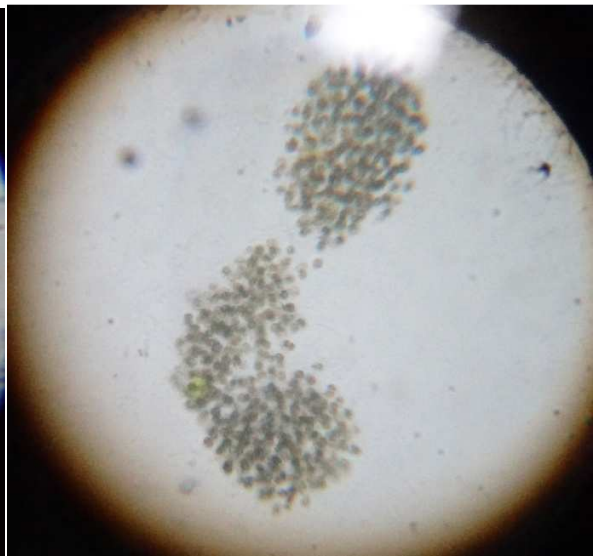


F) ***Phormidium sp.***

G) ***Spirogyra sp.***

H) ***Nostoc commune***

I) ***Navicula tripunctata***



J) ***Microcystis elangata***

Of the other genera, Scytonema was the most common, occurring in approximately 50% of the soils and being dominant in 30%. Calothrix was found in 15% of the samples, particularly in sandy soils. Cylindrospermum developed large biomasses on wet soils after harvesting and was often located in soil depressions. So, it is necessary to conserve algal genetic resources of local habitat and to do more systematic work on it which is possible only after understanding the ecology and habitats of various algal forms. By the using of high dose chemical fertilizers harm to natural occurring algal blooms, which are useful to farmers. These findings will be of great use to scientific works in future to explore more and more about fresh water Cyanophyceae of rice fields and other habitat of the area.

CONCLUSION

The rice fields with majority of species from Cyanophyceae comprise its importance. If the farmers can buy the algal spores produced by (ICAR), will surely help to decline the expenditure spend on chemical fertilizers. These are also helps to gradual decrease of government spent more money for importing of chemical fertilizers. Chlorophyceae members also useful for production of manure.

Acknowledgements

The author grateful thank to Prof. S. Seeta Ram Rao, Professor, Department of Botany, Plant Physiology And Molecular Biology Lab.UCS, Osmania University, Hyderabad, Telangana

REFERENCES

1. Annalakshmi, G. and Amsath, A., Studies on the hydrobiology of river Cauvery and itstributaries Arasalar from Kumbakonamregion with reference to phytoplankton, *IJPAES*, **2(2):** 37-46 (2012).
2. APHA., *American Public Health Association. Standard methods for the examination of water and waste water*, 19th edition,Washington (1995).
3. Banerji, J.C., Studies on the Myxophyceae of lower Bengal – II. J. Dept. Sci., Calcutta Univ., **1**: 95-109 (1938).
4. Bhakta Das, S.K. and Adhikary, S.P., Freshwater algae of Sikkim. *J.Indian.Bot.Soc*. **89 (1&2):** 169-184 (2010).
5. Chinnaiah, B., Ramesh Babu, M. and Digamber Rao, B., Phycoplankton diversity and population dynamics of Ramappa Lake,(A.P) *India.Ad.Plant.Sci*., **24(II):** 527-529 (2011).
6. Das, S.K. and Adhikary, S.P., Algal diversity in the reservoirs of Odisha state,India. *Indian Hydrobiology*,**15**(1):17-41 (2012).
7. Das, S.K., Samad, L.K., Ramanujam, P. and Adhikary, S.P., *J.Indian Bot.Soc.,* **88(1&2):** 102-118 (2009).
8. Das, S.K. and Adhikary, S.P., Diversity of Freshwater algae in Arunachal Pradesh and their distribution in different altitudes, *J.Indian.Bot.Soc*., **91(1-3):** 160-182 (2012).
9. Das, S.K. and Adhikary, S.P., Freshwater algae of Nagaland, J.*Indian.Bot.Soc*., **91(1-3):** 99-123 (2012).
10. Das, S.K., Bhakta, S. and Adhikary, S.P., Algal of Tripura, *J.Indian Bot.Soc*., **89**(3&4):334-357 (2010).
11. Desikachary, T.V., *Cyanophyta*, ICAR, Monographs on Algae. New Delhi, 686 (1959).
12. Girijakumari, S. and Nelson, P. Abraham, Composition and distribution of phytoplankton in Sasthakotta Lake, Kollam ,Kerala, *Indian Hydrobiology,* **10(2):** 377-380 (2007).
13. Gupta, R.K. and Anuj Bhadauriya, Phytoplankton (BGA) Diversity in relation to physico-chemical properties of riverwater, *Indian Hydrobiology,* **10(1):** 117-122 (2007).
14. Harsha Sadanand, T.S., Yamakanamardi, M. and Mahadevaswamy, M., Physico- chemical (Environmental) study of Loticecosystem of main river cauvery and its four down stream tributaries in Karnataka state, India, *Indian Hydrobiology*, **9(2):** 269-294 (2006).
15. Jayakumar, S. and Karpagam, S., Factors affecting productivity of Phytoplankton in a reservoir of Cuddalore district ,Tamilnadu, *Indian Hydrobiology*, **8(2):** 187-192 (2005).
16. Leela Bhosale, J., Patil, S.M., Sureka Dumal, N. and Anjaiah Sabale, B., Occurrence of Phytoplankton in the Lakes in and around Kolhapur city (Maharashtra*), Indian Hydrobiology,* **12**(2):133-142 (2010).
17. Mahajan, S.K., Algal flora of a recently constructed dam on river Dalki in West Nirmal districtof M.P., *Indian Hydrobiology*, **8(2):** 113-116 (2005).
18. Malliswar, V.N.S., Krupanidhi, D.S. and Chandra, S., Algal biodiversity in a man made water body, *Indian Hydrobiology*,**10(1):** 87-91 (2007).
19. Maya Subramoni, A study on the algal diversity of Vamanapuram river of south Kerala, in relation to certain water qualityparameters, *Indian Hydrobiology,* **10(1):** 157-163 (2007).
20. Minzoni, F., Bonetto, C. & Golterman, H.L., The nitrogen cycle in shallow water sediment systems of rice fields. Part 1: The denitrificationprocess, *Hidrobiología*, **159:** 189-202 (1988).
21. Misra, A., Patro, G.K., & Tosh, G.C., Studies on chemical control of *Chara.* In: *Aquatic weeds in Southeast Asia*. (eds): 265-268 (1976).
22. Mista, P.K., Madhulika Shukla, and Jai Prakash, Some fresh water algae from Eastern Uttar Pradesh, *Indian Hydrobiology*, **11(1):** 121-132 (2008).
23. Mruthunjaya, T.B., Mruthunjaya, T.B., Hosmoni, S.P., Rajendraprasd, N.R. and Sudeep, B.M., Diversity and distributionpattern of Chlorococcales with respect to physico-chemical charecteristics of three water bodies, *Indian Hydrobiology*, **10(2):** 293-300 (2007).
24. Murugesan, S. and Sivasubramanian, V., Fresh water diatoms from porur lake Chennai, *Indian Hydrobiology*, **11(1):** 149-154 (2008).
25. Naz, S., Hasan, M. and Shameel, M., Taxonomic study of Chrrocophyceae from northern areas of Pakistan, *Pak. J. Bot*., **36(2):** 247-281 (2004).
26. Neue, H.U., Wholistic view of chemistry offlooded soil. In: *Proceedings of the first international symposium on paddy soil fertility*. Paddy Soil Fertility Working Group (eds.): 21-53 (1988).
27. Patrick, R., A study of the number and kinds of species found in rivers in Eastern United States, *Proc.Acad.Nat.Sci.Philadelphia*, **113:** 215-258 (1961).
28. Philipose, M.T., *Chlorococcales*, ICAR,New Delhi, 365pp (1967).

29. Prescott, G.W., *Algae of the Western Great Lakes Area*. Pub. Otto Koeltz Science Publisher Michigan University, 1-977 (1951).
30. Ramadosu, A. and Siva Kumar, K., Seasonal variation of phytoplankton in relation to physico-chemical characteristics atperumal lake, Tamilnadu, *Indian Hydrobiology*, **12(2):** 149-158 (2010).
31. Reshma, S. and Prakasam, V.R., Potential of ponds as source of drinking water in Mayyanad panchayat, Kerala, *Indian Hydrobiology*,**10(2):** 319-323 (2007).
32. Sanap, R.R., Mohite, A.K., Pingle, S.D. and Gunale, V.R., Water quality assessment of Godavari river at Nasik (M.S)Indiawith special reference to Phytoplankton study, *Indian Hydrobiology*, **9(2):** 187-191 (2006).
33. Sanap, R.R., Pingle, S.B., Gunale, V.R. and Mohite, A.K., Chlorophyceae from Godavari river at Nasik (M.S), India, *Indian Hydrobiology*, **11(1):** 91-97 (2008).
34. Shoba, V., Anuradha Rammohan Santhosh, S. and Chandrathara, J., Impact assessment of retting activity on Phytoplanktonproductivity of Kadinamkulam lake, Southern Kerala, *Indian Hydrobiology*, **9(2):** 239-246 (2006).
35. Smith, G., *The Freshwater algae of the United States*.Mc.Graw Hill Book Co.,New York (1950).
36. Suxena, M.R. and Venkateshwarlu, V., Desmids of Andhra Pradesh IV from Dharmasagar Lakes, Warangal II J. Osmania University (Science) Golden Jubilee Special 179-201 (1968).
37. Thajuddin, N. and Subramanian, G., Survey of cyanobacterial flora of the southern east coast of India.Bot. Mar., **35:** 305- 314 (1992).
38. Trivedy, R.K. and Goel, P.K., Chemical and Biological Methods for Water Pollution Studies. Envir media publications.Karad,Maharashtra.,1-248 (1986).
39. Welch, E.B., *Limnological methods*. Blakiston philadelphia. USA. 381 (1948).