

POLLUTION INDICATING FORMS OF ALGAE FROM MAKRERA FRESH WATER LAKE NEAR BEAWAR (AJMER) RAJASTHAN

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Algae are ubiquitous and involved in water pollution through producing massive surface growth, blooms and imparting obnoxious odour. In all 29 species belonging 16 genera of polluting algae have been recorded in different sites of lake. As species diversity showed an inverse correlation with pollution, the occurrence of dominant blue green algae in the lake could be used as a specific index of pollution. The algal infection and genetic stock of Makrera lake studied present fascinating academic and applied significance. Algal infestation in biology of lake *vis-à-vis* self-purification, allergenic diseases spread, indicator organism and in impairing water quality are the half marks for futuristic use in multiple ways.

Keywords : Algae; Makrera lake; Pollution indicating forms.

Since there are distinct habitats in water, each with its characteristics microbial communities, an attempt was made to investigate algae taxa of Makrera lake, which exhibited a tendency of eutrophication and no attempt was made so far for a detailed study of algae of this lake. Water constitutes one of the important habitats for microorganisms as it is a source of various nutrients for the growth and development of these organisms. Among the microbial communities of water, algal constitute an important component. The biological productivity of fresh water will determine the algal composition and their diversity. Any change in the above parameters will lead to increase or decrease in the abundance and diversity of these organisms. It is well established fact that algae are involved in water pollution by massive surface growth, blooms and imparting obnoxious odour. There are several reports on algae of water bodies from time to time¹⁻⁸.

The water flows into the lake from Beawar city during monsoon carries large amounts of organic and inorganic matter there by making the lake water rich in nutrients.

Ajmer is centrally located in the state of Rajasthan. Beawar town is situated on the southern part of the National Highway No. 8, 58 km from Ajmer. Makrera lake or fresh water natural lake is situated 6 km from Beawar town. Three sites were randomly selected with variable site characteristics based on various anthropological activities *viz.* entry of domestic effluents and sewage from near by beawar city, cattle, washing, irrigation and perching of migratory birds for the collection of water samples.

Water samples were collected from the above sites at monthly intervals between 8.00 AM to 12.30 PM in duly sterilized labeled (sampling) polythene bags / bottles. After collection the samples were preserved in 5% formalin (FAA) and were identified using the keys provided by several workers⁹⁻¹³.

Algae collected from Makrera lake have been identified. A total 196 species belonging to 57 genera of algae were collected and identified. In all 29 species belonging to 16 genera of polluting algae belonging to Chlorophyceae, Bacillariophyceae, Eugleniophyceae and Cyanophyceae were recorded.

Chlorophyceae was represented by 26 genera with 55 species. Only 9 species showed continuous occurrence throughout the year. The peaks were recorded during monsoon (50 species) and lowest number (36 species) was recorded during summer.

Bacillariophyceae was represented by 14 genera with 66 species. Only 6 species showed continuous occurrence throughout the year at all sites. Maximum 64 species were recorded in monsoon and minimum 26 species were recorded during summer.

Eugleniophyceae was represented by 3 genera with 12 species. Only 4 species showed continuous occurrence throughout the year at all sites.

Cyanophyceae was represented by 14 genera with 63 species. Only 19 species belonging to 6 genera exhibited their presence throughout the year at all sites. Maximum 60 species were recorded in monsoon and summer and minimum 41 species were recorded during winter. As species diversity showed an inverse correlation

with pollution, the occurrence of dominant blue green algae species such as - *Microcystis flosaquae*, *M. aeruginosa*, *Spirulina laxissima* and *S. Major*, resulted in decreasing the diversity, occurrence and abundance of blue green algae in the lake. This could be used as a specific index of pollution and toxic protein products which are poisonous to fish, cattle, sheep and other dominated animals. *Microcystis aeruginosa* has been reported with the highest degree of pollution¹⁴.

Twenty nine genera and 16 species (Table 1-2) that are tolerant to organic pollution have been identified from the lake and these share the list of 60 genera and 80 species given by Palmer^{14,15}. Maximum number of organic pollution tolerant genera was present during spring and summer seasons. According to Palmer's^{14,15} genus index, a score of 29 was obtained, on the basis of observations made, which gave a definite indication on the existence of organic pollution in the lake water.

Water pollution caused by sewage leads to eutrophication and deoxygenating of water bodies, results in tremendous growth of algae which covers the whole surface of lake. When these algae complete their life cycle they begin to die. At this time aerobic decomposers become very active. The decomposer organisms soon use up all the dissolved oxygen of the water body. Since no dissolved oxygen is left in the water of lake, all the aquatic animals die.

Table 1. Pollution tolerant genera¹⁵, of algae in order of decreasing emphasis recorded in Makrera lake water.

S.No.	Genus	S.No.	Genus
1.	<i>Euglena</i>	17.	<i>Fragilaria</i>
2.	<i>Oscillatoria</i>	18.	<i>Ulothrix</i>
3.	<i>Chlamydomonas</i>	19.	<i>Surirella</i>
4.	<i>Scenedesmus</i>	20.	<i>Lyngbya</i>
5.	<i>Chlorella</i>	21.	<i>Merismopedia</i>
6.	<i>Nitzschia</i>	22.	<i>Spirulina</i>
7.	<i>Stigeoclonium</i>	23.	<i>Chlorococcum</i>
8.	<i>Ankistrodesmus</i>	24.	<i>Cosmarium</i>
9.	<i>Phacus</i>	25.	<i>Cymbella</i>
10.	<i>Phormidium</i>	26.	<i>Navicula</i>
11.	<i>Melosira</i>	27.	<i>Synedra</i>
12.	<i>Closterium</i>	28.	<i>Microcystis</i>
13.	<i>Anabena</i>	29.	<i>Aphanocapsa</i>
14.	<i>Pediastrum</i>		
15.	<i>Trachelomonas</i>		
16.	<i>Arthrospira</i>		

Table 2. Pollution tolerant species¹⁵, of algae in order of decreasing emphasis recorded in Makrera lake water.

S. Genus	S. Genus
No.	No.
1. <i>Nitzschia palea</i>	9. <i>Pediastrum duplex</i>
2. <i>Scenedesmus quadricauda</i>	10. <i>Navicula cryptacephala</i>

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| 3. <i>Ankistrodesmus falcatus</i> | 11. <i>Microcystis aeruginosa</i> |
| 4. <i>Chlorella vulgaris</i> | 12. <i>M. flosaquae</i> |
| 5. <i>Scenedesmus obliquus</i> | 13. <i>Cymbella affinis</i> |
| 6. <i>Euglena acus</i> | 14. <i>Spirulina laxissima</i> |
| 7. <i>Oscillatoria formosa</i> | 15. <i>Arthrospira laxissima</i> |
| 8. <i>Anabena bekkii</i> | 16. <i>Stigeoclonium tenue</i> |

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