

## Phytoplankton Diversity in the Lake Mansar, Jammu

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Though phytoplankton composition of natural waters is being used to determine the trophic status of the aquatic ecosystems but the same deserves much more than that for they have been at the receiving end due to anthropogenic activities. Moreover algae as indicators of the pollution have also been proposed by many workers (Ganapati, 1940; Pearsall *et al.*, 1946; Symons, 1956; Mechean, 1957; Sigworth, 1957; Singh, 1959; Philipose, 1959; Gorham, 1964; Jackson, 1964; Round, 1965; Pandey, 1969; Prescott, 1969; Palmer, 1980; Pandit, 1980, 99; Venkateswarlu *et al.*, 1981). So the present effort has been made to assess the diversity of phytoplankton inhabiting the Lake Mansar.

Mansar, a subtropical countryside lake in the Lower Shivaliks, is located at a distance of 64 km South of Jammu City at an elevation of 666 meters above mean sea level. For the sake of collection of phytoplanktonic organisms, one litre of water was filtered and filtrate washed into a beaker with 100ml distilled water and fixed in Lugol's solution. From this one ml of sample was drawn quickly with a wide mouthed pipette and plankton numbers were counted and the average of three samples was taken into consideration.

The phytoplanktons inhabiting the Lake Mansar belong to 46 genera and 135 species of Chlorophyceae, 18 genera and 31 species of Euglenophyceae and 1 genus and 2 species of Dinophyceae. The overall phytoplanktonic diversity of Lake Mansar is presented in Table 1 below.

**Table 1: List of various species of phytoplankton encountered during March, 1989 to February, 1991 in lake Mansar, Jammu.**

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### CYANOPHYCEAE

*Anabaena circinalis* Rabenh ex Born et Flah

*A. oryzae* Fritsch

*A. orientalis* Dixit

*A. oscillarioides* Bory ex Born et Flah

*A. unisporea* var. *crassa* Rao, C.B.

*A. volzii* Lemm.

*Aphanocapsa banaresensii* Bharadawaja  
*Aphanotheca nidulans* Richter  
*Arthrospira platensis* (Nordst) Gomont  
*Calothrix fusca* (Kutz.) Born et Flah  
*Chroococcus cohaerens* (Breb.) Nag.  
*C. minutus* (Kutz.) Nag.  
*C. turgidus* var. *maximus* Nygaard  
*Cylindrospermum indicum* Rao, C.B.  
*Gloeotrichia intermedia* (Lemm.) Geitler  
*Lyngbya aestuarii* Liebm.  
*Merismoperlia glauca* (Ehr.) Nag.  
*M. punctata* Meyen  
*M. tenuissima* Lemm.  
*Microcystis aeruginosa* Kutz.  
*Nostoc calcicola* Breb. ex Born et Flah  
*N. muscorum* Ag. ex Born et Flah  
*N. spongiaeforme* Ag. ex Born et Flah  
*N. spongiaeforme* var. *tenue* Rao, C.B.  
*N. spongiaeforme* var. *varians* Rao, C.B.  
*Oscillatoria curviceps* Ag. ex Gomont  
*Richelia intracellularis* Schmidt.  
*Scytonema cincinnatum* Thuret. ex Bord et Flah  
*Spirulina gigantea* Schmidle  
*S. meneghiniana* Zanard  
*S. subsalsa* Oerstd. ex Gomont  
**CHLOROPHYCEAE**  
**VOLVOCALES**  
*Pandorina morum* (Mull.) Bory  
*Volvox globator* (L.) Ehr.  
**CHLOROCOCCALES**  
*Ankistrodesmus convolutus* Corda.  
*A. falcatus* (Corda.) Rays  
*A. falcatus* var. *radiatus* (Chod.) Lemm.  
*Chlorella conglomerata* (Artari) Oltmanns  
*Coelastrum microporum* Naegalii  
*C. microsporum* .Naeg. var. *actaedricum* T S Kuja  
*Crucigenia suadrata* Morren  
*C. triangularis* (Cord.) Schmidie  
*Golenkinia radiata* Chodat

*Hydrodictyon reticulatum* (Linn.) Legesh  
*Kirchneriella obesa* W. Wert Schmidle var. *mansarii* var. nova Kant and Kohli  
*Lagerheimia chodati* Bernard  
*Nephrocytium agardhianum* Naeg.  
*Pachycladon umbrinus* G.M. Smith  
*Pediastrum angulosum* (Ehr.) Menegh var. *laevigatum* Reab  
*P. biradiatum* Meyen  
*P. boryanum* var. *longicorne* Reinsch  
*P. duplex* Meyen var. *clathratum* (A. Br.) Lagerh  
*P. duplex* var. *subgranulatum* Racib  
*P. integrum* Naegelii  
*P. ovatum* (Ehr.) A. Braun  
*P. tetras* var. *tetradon* (Corda) Rabenh  
*P. tetras* var. *apiculatum* Fritsch  
*P. tetras* (Ehr.) Rays  
*Scenedesmus acuminatus* (Lagerh.) Chodat  
*S. arcuatus* Lemm.  
*S. arcuatus* Lemm. var. *capitatus* G.M. Smith  
*S. armatus* (Cbod.) G.M. Smith var. *ecornis* (Ralfs) Chodat  
*S. bijugatus* (Turpin) Kuetzing var. *alternans* (Reinsch) Hansgirg forma *parvus* G.M. Smith  
*S. bijugatus* (Turpin) Kuetzing var. *bicellularis* (Chodat) Philipose  
*Scenedesmus bijugatus* (Turpin) Kuetzing var. *grevenitzii* (Bernard) Philipose  
*S. bernaidii* G.M. Smith  
*S. dirnorphus* (Turpin) Kuetzing  
*S. iyengerii* Kant & Vohra  
*S. longus* Meyen var. *naegelii* (Brebisson) G.M. Smith Comb novo Kant & Kohli  
*S. neelikoides* Kant & Vohra  
*S. obliquus* (Turpin) Kuetzing  
*S. periforatus* Lemm. var. *major* Turner  
*S. philiposii* Chadha & Pandey  
*S. platydiscus* (G.M. Smith) Chodat  
*S. prismaticus* Bruhl and Biswas  
*S. quadricauda* (Turpin) Breb. var. *longispina* (Chod.) G.M. Smith  
*S. quadricauda* (Turpin) Breb. var. *parvus* G.M. Smith  
*S. wisconsinensis* (G.M. Smith) Chod.  
*Schroederia indica* (Schroder) Lemmermann  
*Selenastrum gracile* Reinsch  
*Tetraedron incus* (Teiling) G.M. Smith

*T. incus* (Teiling) G.M. Smith. forma *decolorata* Defl.  
*Tetrallantos lagerhaimii* Teling.

### **ULOTRICHALES**

*Sphaeroplea afaricans* Fritsch  
*Ulothrix elongatum* Hodgetts  
*Ulothrix zonata* (Weber and Mohr) Kutz.  
*Uronema elongatum* Hodgetts

### **CLADOPHORALES**

*Cladophora glomerata* (L.) Kutz.  
*C. suhriana* Kutz.  
*Pithophora oedogonia* (Mont) Wittr.

### **CHAETOPHORALES**

*Coleochaete soluta* (Breb.) Pringsch  
*Dermatophyton radians* Peter  
*Leptosira mediciana* Borzi  
*Stigeoclonium farctum* Breth  
*S. tenue* (Ag.) Kutz.

### **OEDOGONIALES**

*Bulbochaete brebissonii* Kutz.  
*B. gigantea* Pringsch  
*B. setigera* Ag.  
*Oedogonium concatenatum* Wittr.  
*O. nodulosum* Wittr.  
*O. nodulosum* var. *commune* (Hun.)

### **ZYGNEMATALES**

#### **Desmidiaceae**

*Arthrodesmus convergens* Ehr.  
*Closterium acerosum* (Schr.) Ehr.  
*C. lenceolatum* Kutz.  
*C. lieblienii* Kutz.  
*C. lunula* var. *biconvexum* Schm.  
*C. moniliferum* (Bory) Ehr. var. *malinivernianiforma* (Gronbl) Kossinxaja  
*C. parvulum* Naegelii  
*Cosmarium awadhensis* Prasad & Mehrotra  
*C. biretum* Breb.  
*C. circulare* Reinsch  
*C. contractum* Kirch var. *ellipsodeum* West  
*C. cyclicum* Lund

*C. granatum* var. *ocellatum* W. & G.S. West  
*C. hundelli* Delb.  
*C. obtusatum* Schmidle  
*C. orthosticum* Lund.  
*C. pectinatum* Breb. var. *inevolutum* West & West  
*C. ehaselous* Breb.  
*C. regensii* Reinsch  
*C. subcranatum* Nordst.  
*C. subprotudium* Nordst.  
*C. subtumidum* Nordst.  
*Cosmarium turpinii* Breb.  
*C. undulatum* var. *minutum* Corda.  
*C. sp.* Corda.  
*Desmidium baileleyi* (Ralfs) Nordst.  
*D. gravillii* (Kutz.) De-Bary  
*Euastrum spinulosum* Delf.  
*E. verrucosum* Ehr.  
*Hyalotheca dissiliens* (Sm.) Breb.  
*Microsterias radiata* Hass.  
*Penium minutum* Cleve.  
*P. polymorphum* Perty  
*Pleurotaenium ehrenbergii* (Breb.) De-Bary  
*P. trabecula* (Ehr.) Naeg.  
*Spondylosium palnum* (Wolle) W. & G.S. West  
*Staurastrum natator* var. *crassum* W. & G.S. West  
*S. natator* W. & G.S. West  
*S. paradoxum* Meyen  
*S. eunctulatum* Breb.  
*S. selbaldi* Reinsch  
*S. selbaldi* Reinsch var. *orantum* Nordst.

### **Zygnemataceae**

*Mougeotia capucina* (Bory) Agardh  
*M. floridana* Trans.  
*M. gotlandica* (Cleve.) Wittrock  
*Mougeotia heterogama* Geitler  
*M. recurva* (Hassael) De-toni  
*M. sphaerocarpa* Wolle.  
*M. viridis* (Kutz.) Wittrock  
*Spirogyra hyalina* Cleve.

*S. parvula* (Trans.) Czurda  
*S. parvulum* (Trans.) Czurda  
*S. plena* (W. & G.S. West) Czurda  
*S. reticulina* Randhawa  
*S. rivularis* (Hassall) Rabenh.  
*S. submaxima* Trans.  
*Sirocladium kumaoense* Randhawa  
*Sirogonium sticticum* Kutz.  
*Zygnema giganteum* Randhawa  
*Z. inconspicuum* Czurda  
*Z. indicum* Misra  
*Z. melanosporum* Lagerh.  
*Z. terrestre* Randhawa  
*Zygnemopsis lahaulensis* Randhawa

## **BACILLARIOPHYCEAE**

### **PENNALES**

*Achnanthes lanceolata* (Breb.) Grun.  
*A. inflata* (Kutz.) Grun.  
*Amphora maharashtrensis* Sorde & Kamat  
*A. ovalis* var. *gracilis* V. Hureck  
*Anomoeoneis exilis* (Kutz.) Cleve.  
*Cocconeis placentula* Ehr.  
*C. placentula* var. *euglypta* Ehr.  
*Cymbella bengalensis* Grun.  
*C. pseudocuspidata* Gandhi  
*X. tumida* (Breb.) V.H.  
*Epithemia. zebra* (Ehr.) Kutz.  
*Fragilaria construens* (Ehr.) Grun.  
*Gomphonema constrictum* Ehr.  
*G. elegans* Grun.  
*G. ghosea* (Ag.) A. Majeed  
*G. lanceolatum* Ehr. F. Turris (Ehr.) Hustedt.  
*G. subapicatum* (F. curta) Fritsch & Reich  
*G. subventricosum* Hustedt.  
*Gyrosigma acuminatum* (Kutz.) Rabh.  
*Navicula cryptocephaloides* Hustedt.  
*N. similis* Krasske.  
*N. zonni* Hustedt  
*Nitzschia ovalis* Arnott

*N. palea* Kutz. Pinnularia Eusilla Gandhi  
*P. subcapitata* Greg.  
*Rhopalodia vermicularis* Mull.  
*Stauroneis anceps* Ehr.  
*Surirella linearis* W. Smith var. *festechi* (Pant) A. Cl.  
*Synedra acus* var. *radians* (Kutz.) Hustedt

#### CENTRALES

*Cyclotella meneghiniana* Kutz.  
*Melosira varians* Ag.

#### DINOPHYCEAE

*Glenodinium cinctum* Ehr.  
*G. kulezrynski* (Wolsz.) Schiller

#### EUGLENOPHYCEAE

*Astasia acus* Dujardin  
*Euglena gracilis* Kelbs.  
*Lepocindis ovum* Perty  
*Phacus curvicauda* Swire  
*P. longicauda* (Ehr.) Dujardin  
*Trachelomonas armata* (Ehr.) Stein  
*T. hispida* (perly) Stein

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Perusal of Table 1 reveals that the Lake Mansar has rich assemblage of phytoplankton with some pollution indicator species like *Anabaena*, *Oscillatoria*, *Fragilaria*, *Pediastrum*, *Spirogyra*, *Euglena*, *Zygnema*, *Oedogonium*, *Ulothrix*, *Gloeotrichia*, *Melosira*, *Cladophora*, *Volvox*, *Hydrodictyon*, *Cosmarium*, *Pandorina*, *Microcystis aeruginosa*, *Lyngbya*, *Cylindrospermum* etc. While *Anabaena*, *Microcystis aeruginosa*, *Oscillatoria*, *Chlamydomonas*, *Pandorina*, *Volvox*, *Euglena* etc are known to produce water blooms in inland waters (Ganapati, 1940; Philipose, 1959; Singh, 1959; Round, 1965; Prescott, 1969; Pandey, 1969, 1973), a few species of algae such as *Spirogyra*, *Cladophora*, *Hydrodictyon* etc. have been found to cause hindrances in water supplies and irrigation (Pearsall *et al.*, 1946; Pearsall, 1951; Matheson, 1952). Moreover the abundant growth of algae such as *Lyngbya*, *Gloeotrichia* etc. make the water impotable (Pearsall *et al.*, 1946; Mechean, 1957; Round, 1965). The Mansar Lake with such pollution indicator phytoplanktons seems to be under acute pollution threat.

#### REFERENCES

Ganapati, S. V. 1940. The ecology of a temple tank containing a permanent bloom of *Microcystis aeruginosa* (Kutz) Henfr. *J. Bom. Nat. Hist. Soc.* **42**: 65 – 67

- Gorham, P. R. 1964. Toxic Algae. p. 307-366. In: *Algae and Man* (D. F. Jackson, ed.). Plenum Press, New York.
- Jackson, D. F. 1964. *Algae and Man*. Plenum Press, New York.
- Matheson, D. H. 1952. The effect of algae in water supplies. *Intl. Water Supply Assoc. J. Rept. Second Congress, Paris*, p. 82.
- Mechean, O. L. 1957. The effect of pollution upon wildlife. p. 235-239. In: *Biological Problems in Water Pollution* (C. N. Tarzwell, ed.). U.S. Deptt. Hlth. Edu. and Welf. Publ. Hlth. Serv., Ohio.
- Palmer, C. M. 1980. *Algae and Water Pollution*. Castle House Publications Ltd., England.
- Pandey, S. N. 1969. Studies on planktonic algae of Kanpur, Labdev. *J. Sci. Tech. India*, **7** (2): 163-167.
- Pandey, S. N. 1973. Studies on distribution, periodicity and some ecological aspects of phytoplanktons of Kanpur, Labdev. *J. Sci. Tech. India*, **11**: 70-73.
- Pandit, A. K. 1980. *Biotic Factor and Food Chain Structure in Some Typical Wetlands of Kashmir*. Ph. D. Thesis, University of Kashmir, Sriangar, 190006, J&K, India.
- Pandit, A. K. 1999. *Freshwater Ecosystems of the Himalaya*. Parthenon Publishing, N.Y., London.
- Pearsall, W. H. 1951. Freshwater biological research and water supply. *J. Inst. Water Engrs.*, **5**: 482-484.
- Pearsall, W. H., Gartiner, A. C. and Greenshields, F. 1946. Fresh water biology and water supply in Britain. *Fresh water Assn. of the British Empire, Publ. No. 11*, p. 1-90.
- Philipose, M. T. 1959. Freshwater phytoplankton of inland fisheries. p. 272-291. In: *Proc. Symp. Algology, I.C.A.R.*, New Delhi.
- Prescott, G. W. 1969. *The Algae – A review*. Thomas Nelson & Sons Ltd., Great Britain.
- Round, F. E. 1965. *The Biology of Algae*. Edward Arnold Publishers Ltd., London.
- Sigworth, E. A. (1957). The control of odour and taste in water supplies. *J. Amer. Water Wkrs. Assn.*, **49**: 1507-1521.
- Singh, V. P. 1959. Phytoplankton ecology of inland waters of Uttar Pradesh. p. 243-271. In: *Proc. Symp. Algology, I.C.A.R.*, New Delhi.
- Symons, G. E. 1956. Taste and odour control. *Water and Sewage Wks.* **1902**: 307-310 & 348-355.
- Venkateswarlu, V., Rao, C. J. and Rao, A. N. 1981. Ecology of algal blooms - A comparative study. *Indian J. Bot.*, **4**: 31-36.