

SOME CHLOROCOCCALES FROM NASHIK (M.S.)

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ABSTRACT : Twenty five taxa of Chlorococcales are being collected from different aquatic habitats of Nashik, between May,2009 to January,2010. These taxa belongs to 14 genera, 25 species and 06 varieties. The most common genera are *Hydrodictyon*, *Pediastrum*, *Coleastrum*, *Scenedesmus*. Genus *Gloeotaenium* is the rare genera reported from Maharashtra, and it is collected from the Nashik.

Key words : *Chlorococcales*, *Aquatic habitat*.

INTRODUCTION

Algae are simple chlorophyll containing organisms that vary considerably in size, shape and color. Algae plays an important role to maintain aquatic ecosystem and form the base of food chain/web. These are extremely important. They produce more oxygen than all the plants in the world, put together. Fresh water green algae of Maharashtra have been studied by several workers as Kamat (1961,62,63,74,75). Life cycles of selected green algae and soil algae in Maharashtra were studied by Deore (1978), Deshmukh (2006), Mitra *et al.* (2009), Sen & Naskar (2003), Shukla *et al.* (2007) and Balkrishnan & Chugule (2002). So far no work has been done on green algae of the Nashik city of Maharashtra.

MATERIAL AND METHODS

The study is based on field survey, laboratory work and authentic literature. Samples were collected during May,2009 to January,2010. Collection were made with help of phytoplankton net and manually. Algal samples were preserved in 4% formalin and slides were prepared by fresh material and mounting in glycerin. For the detailed studies of green algae, photomicrography has been done under Labomade electric microscope with digital camera.

RESULTS AND DISCUSSION

Identification has been done after Philipose (1967), Prescott (1951), Randhawa (1969) and Anand (1998).

Order : Chlorococcales

Family : Chlorellaceae

Genus : *Chlorella* Beijerinck

***Chlorella vulgaris* Beijerinck (Fig. 1)**

Cells small, spherical solitary and arranged in an irregular colony, free floating, chloroplast single cup shaped, parietal, with one pyrenoid, not distinct. Cell diameter - 8.8 μ

Habitat : Trimbkeshwar September,2009

Family : Chlorococcaceae

Genus : *Chlorococcum*

***Chlorococcum* :**

Cells solitary or aggregated, spherical to ellipsoid, chloroplast parietal with one to many pyrenoids.

***Chlorococcum infusum* (Schrank) Meneghini (Fig.2)**

Aquatic species, cells spherical, solitary or in flat colony, cell 11.88 μ in diameter

Habitat : Trimbkeshwar September,2009

Family : Characiaceae**Genus : *Characium* A. Braun ex Kuetzing, 1849**

Unicellular, aquatic and epiphytic. Attached to the substratum by a short or long stalk. Cell spindle shape or ovoid, pyriform, with a single parietal laminate chloroplast having one or many pyrenoid.

***Characium ambiguum* Hermann ex. Rabenhorst (Fig.3)**

Cell small, elongated attached by a short stalk without basal thickening, cell-8.25 μ broad and 36.3 μ long

Habitat : Epiphytic on Mougeotia - Ramkund September, 2009

Family : Hydrodictyaceae**Genus : *Hydrodictyon* Roth.*****Hydrodictyon reticulatum* (Linn.) Lagerheim (Fig.4)**

Colonies reticulate, meshes pentagonal or hexagonal, cells elongate-cylindrical, cell 52.8 μ , long, 19.8 μ broad, Hexagon 132 μ long, 102.3 μ broad.

Habitat : Planktonic form in a Ramkund September, 2009.

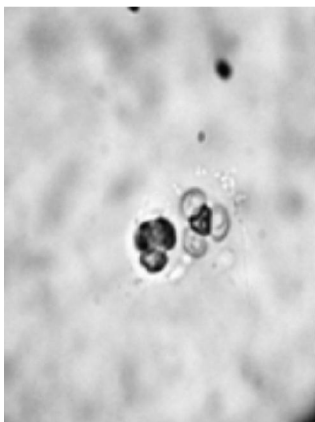
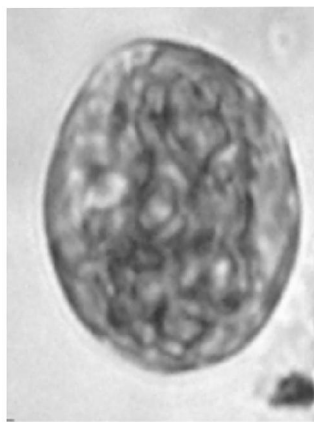
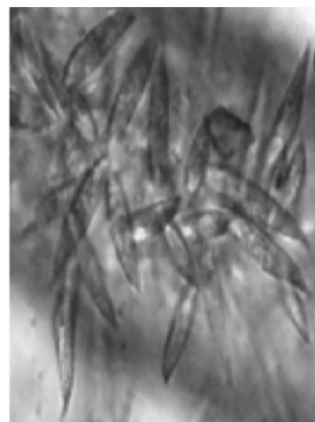
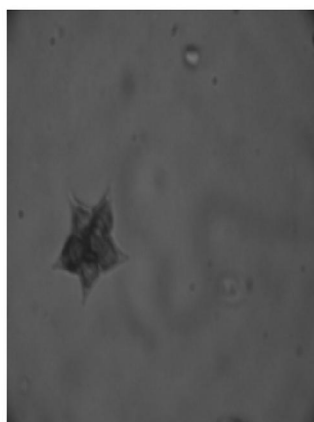
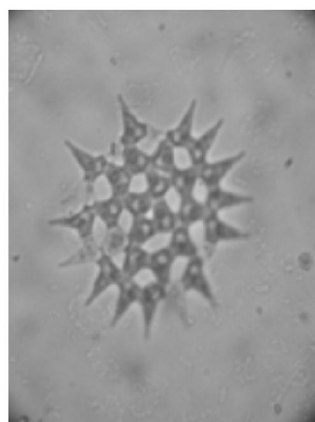
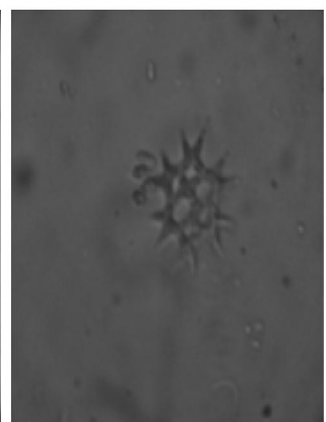
Genus : *Pediastrum* Meyen 1829

Thallus colonial, free floating, stellate - shaped 32-64 cells, arrange in single layer one cell thick, marginal cell with two processes, chloroplast single parietal with one pyrenoids.

***Pediastrum tetras* (Her.) Ralfs (Fig.5)**

Colony circular of 8 cell, marginal cell with four projections, marginal cells divided into two by deep linear incision. Each lobe further divided into two lobes, cell diameter - 3.3 μ , length - 9.9 μ , colony diameter - 26.4 μ .

Habitat: Ramkund August, 2009.

1. *Chlorella vulgaris*2. *Chlorococcum infusionum*3. *Characium ambiguum*4. *Hydrodictyon reticulatum*5. *Pediastrum tetras*6. *Pediastrum ovatum*7. *Pediastrum simplex* var. *deodenarium*8. *Pediastrum duplex* var. *gracillimum*

***Pediastrum ovatum* (Ehr.) A. Braun (Fig.6)**

Colony is of 6 cells, with the cells arranged in a ring with one interior cell and 5 marginal cells. Colony-17.16 µ in diameter. Cell 6.5 µ broad, 5.9 µ long.

Habitat : Ramkund August,2009

***Pediastrum simplex* var. *deodenarium* (Bailey) Rabenhorst (Fig.7)**

Colony circular 16-32 cells, presence of large intercellular spaces. Inner face of marginal cell concave. Outer face is prolonged into a single tapering process. Sides of marginal cells are also concave. Inner cells are similar to marginal cells but with a shorter process. Colony 51.15 µ in diameter, cells 6.6 µ broad, 9.9 µ long.

Habitat : Ramkund August,2009

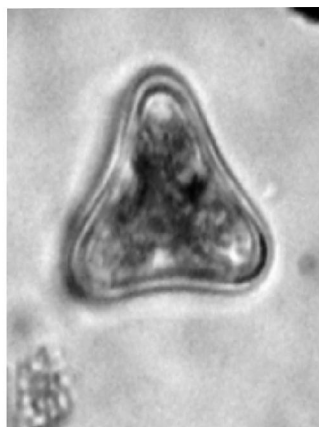
***Pediastrum duplex* Meyen var. *gracillimum* (Bailey) Rabenhorst (Fig.8)**

Colony 8 celled, with very large intercellular spaces. Cells very narrow as broad as or narrower than the processes. Body of marginal cells curved outwards and with long process. Inner cells are similar as the outer cell but with a short process.

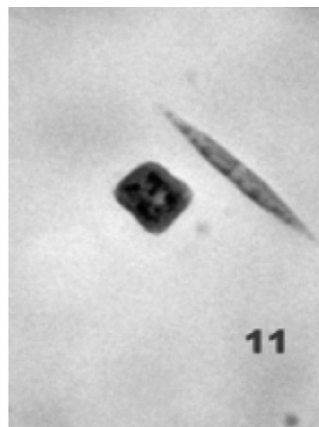
Habitat : Someshwar August,2008



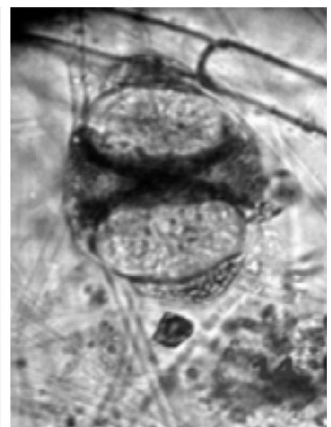
9. *Oocystis gigas*



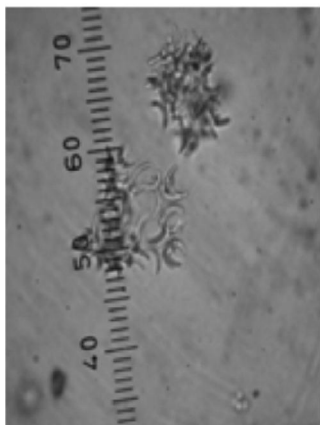
10. *Tetradron trilobulatum*



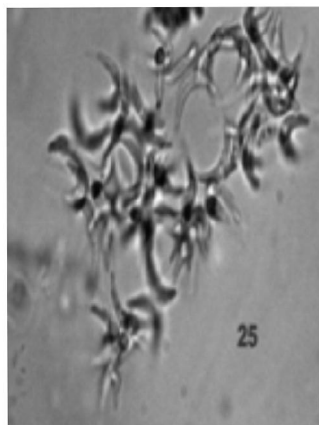
11. *Tetradron minimum*



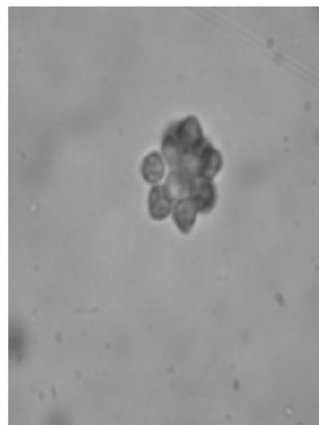
13. *Gloeotaenium loitlebergerianum*



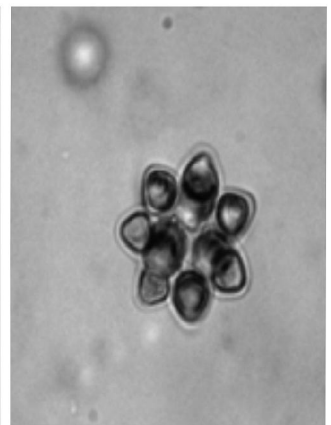
14. *Selanestrum*



15. *Kirchneriella lunaris*



16. *Coelastrum sphaericum*



17. *Coelastrum proboscideum*

Family : Oocystaceae

Genus : Oocystis Naegeli

***Oocystis gigas* Archer (Fig.9)**

Colony of two-four cell, envelope is more or less round and narrow, cells broadly ellipsoid, about 1-1.5 times longer than broad, colony diameter 4.9 µ and length 19.8-23.1 µ. Cell 9.9-13.2 µ long, 6.6- 9.9 µ broad.

Habitat : Ramkund September,2009

Family : Tetradendroceae**Genus : *Tetraedron* Kuetzing*****Tetraedron trilobulatum* (Reinsch) Hansgirg (Fig.10)**

Cells triangular, sides equal in length and concave, angles are broadly rounded, cell membrane thick and smooth. Cell 6.2 μ in diameter

Habitat : Ramkund November, 2009

***Tetraedron minimum* Hansgirg (Fig.11)**

Cell small and quadrangular with the sides concave and angles rounded. Cell wall smooth, cell 1.4-1.5 μ in diameter.

Family : Selenastraceae**Genus : *Ankistrodesmus* Cord, 1838**

Free floating, solitary, loose temporary colonies not enclosed within mucilaginous envelope. Cells acicular, straight with gradually tapering ends.

***Ankistrodesmus falcatus* var. *acicularis* (A. Braun) G. S. West**

Cells mostly single with pointed ends. Cell 36.3 μ long, 1.65 μ broad

Habitat : Ramkund September, 2009

Genus : *Gloeotaenium* Hansgirg***Gloeotaenium loitlebergerianum* Hansgirg (Fig.13)**

Colony broadly ellipsoid in front view and oblong in side view, cells are ovoid and completely fitting the space inside the mother cell wall, cells in a colony separated from each other by a dark cross wise gelatinous bands, cell wall thick and laminated. Dark gelatinous disc opposite the cells is present in old cell. Chloroplast with distinct pyrenoids. Colony 4 celled length 79.2 μ , colony width 42.9 μ . Cell 16.5-19.8 μ broad, 16.5-29.5 μ long.

Habitat : Someshwar July, 2009

Genus : *Selanestrum* Reinsch, 1867 (Fig.14)

Free floating colonies made up of 4-8-16 cells, without an outer envelope. Cells semi-lunar, acicular, joined to each other by their convex side, ends usually acutely pointed. Chloroplast single, parietal, cell with pyrenoid

Habitat : Planktonic form Trambkeswar, December, 2009.

Genus : *Kirchneriella* Schmidle***Kirchneriella lunaris* (Kirchner) Moebius (Fig.15)**

Colonies spherical with an outer gelatinous envelope, cells irregularly arranged, crescent shape with prominent ends, twice as long as broad. Cell 10.56-13.2 μ , long, 3.3 μ broad

Habitat : Someshwar April, 2008

Family : Coelastraceae**Genus : *Coelastrum* Naegeli, 1849*****Coelastrum sphaericum* Naegeli (8 celled) (Fig.16)**

Colonies spherical, compressed and with intercellular spaces are half the cell diameter, Cells oval with the narrow end directed outward cells at the contact are flat. The outer free side strongly curved.

Colony diameter 24.75 μ , length 93.1 μ . Cell 8.1-9.9 μ long, 9.9 μ broad (16-celled colony)

Habitat : Ramkund September, 2009- December, 2009.

***Coelastrum proboscideum* Bohlin (16 celled) (Fig.17)**

Cells with truncate projection. Cells are pyramidal intercellular spaces large and polygonal. Cells conical, truncate and six sided with the lateral sides' slightly concave. Colony diameter 24.75 μ , length 23.1 μ . Cell 8.25-9.9 μ long, 9.9 μ broad (16-celled colony)

Habitat : Ramkund September, 2009

***Coelastrum microsporum* Naegeli (Fig.18)**

Colonies spherical or oblong (8-16), cells with a small intercellular spaces, cells spherical enclosed by delicate gelatinous sheath and attached by gelatinous processes.

Colony diameter - 26.4 μ , length 33 μ . Cell 9.9 μ broad, 9.9 μ long (8 celled colony diameter- 33 μ , length 36.3 μ ., Cell 13.2 μ broad, 13.2 μ long

Habitat : Ramkund September,2009

Family : Scenedesmaceae

Genus : Hofmania Chodat

Hofmania lauterbornei (Schmidle) Brunthaler

Colony 4 celled with large square space in the centre. Cells semicircular in front view chloroplast single, parietal and with a single pyrenoid. Cell 2.4 μ long, 1.65 μ broad, colony 8.25 μ long and 6.6μ broad.

Habitat : Ramkund September,2009

Genus : Scenedesmus Meyen,1829

Scenedesmus diamorphus Kuetz (Fig.19)

Colonies 8 celled with sub alternating series, outer cells of the colony being sharp lunate and apices of the cell being attenuated. Cell 6.9 μ broad, 33.74 μ long.

Habitat : Planktonic form in a Ramkund November-December,2009

Scenedesmus protuberans Fritsch et Rich (Fig.20)

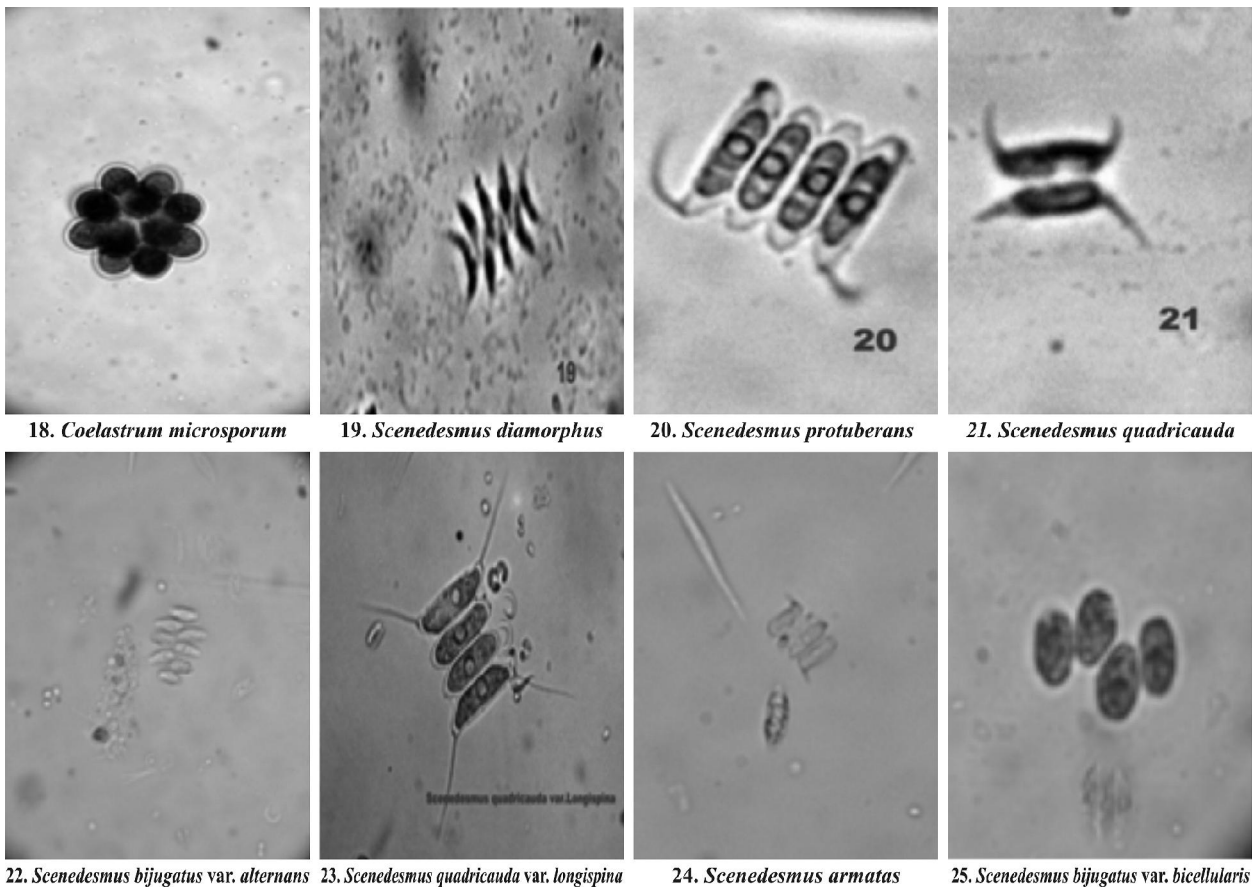
colony 4-celled, cells in a linear series and laterally in close contact with adjoining cells except at the end. Terminal cells are longer than the inner cells with their apices drawn out protruding and with a long spine truncate ends. Cells 8.9 μ broad, 31.7 μ long, spine 30.7 μ long.

Habitat : Planktonic form in a Ramkund November-December,20

Scenedesmus quadricauda (Turpin) Brebisson (Fig.21)

Colonies four celled, cells cylindrical with rounded ends, arranged in a linear series. Poles of terminal cells with a curved spine. Cell wall is smooth and with ridge. Cell 5.9 μ broad, 16.8 μ long, spine 7.9μ long, colony length 17.8 μ long.

Habitat : Planktonic form in a Ramkund



18. *Coelastrum microsporum*

19. *Scenedesmus diamorphus*

20. *Scenedesmus protuberans*

21. *Scenedesmus quadricauda*



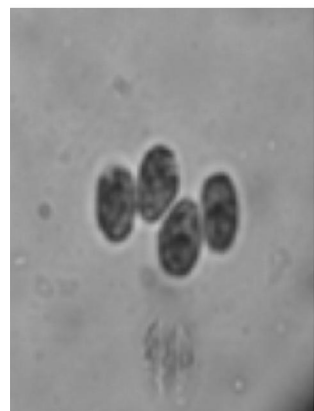
22. *Scenedesmus bijugatus* var. *alternans*



23. *Scenedesmus quadricauda* var. *longispina*



24. *Scenedesmus armatas*



25. *Scenedesmus bijugatus* var. *bicellularis*

***Scenedesmus bijugatus* (Trup.) Lagerheim var. *alternans* (Reinasch) Borge (Fig.22)**

Colony flat, eight celled, cells arranged in alternating series, adjacent cell adnate to each other along a short portion of their length only. Cells ellipsoid with rounded ends cell length is 3.4 μ .

Habitat : Planktonic form in a Ramkund November-December,2009

***Scenedesmus quadricauda* (Turpin) Brebisson var. *longispina* (Chodat) Smith (Fig.23)**

Colony 4 celled, cells oblong cylindrical with rounded ends arranged in a linear series. Poles of terminal cells with a long curved spine. Cells length is 9.9 μ broad, 3.3 μ long, spine length 6.6 μ , colony length 19.8 μ .

Habitat : Planktonic form in a Ramkund November-December,2009

***Scenedesmus armatus* (Chodat) Smith (Fig.24)**

Colony 4 celled, cell oblong-ellipsoid with acute spices and arranged in a linear series terminal cell with a singal spine. Colony length 23.8 μ , 14.8 μ broad, cell 14.8 μ length, 5.9 μ broad

Habitat : Planktonic form in a Ramkund November-December,2009

***Scenedesmus bijugatus* Kuetz.f**

Colonial thallus, flat plate, rarely curved free floating, 2-4-8 cells arranged in a single linear series. Cells are oblong with the ends broadly rounded.

***Scenedesmus bijugatus* var. *bicellularis* (Chodat) Comb. (Fig.25)**

Colony 4 celled, cell arrange in a group of two, cell 4.95 μ broad, 9.9 μ long, colony length 19.8 μ

Habitat : Planktonic form in a Ramkund November,2009

Twenty five taxa have been reported from the study area. Genus *Hydrodictyon*, *Pediastrum*, *Coleastrum*, *Scenedesmus* are common genera from all the localities, these taxa also recorded from foot hills of Western Himalayas (Shukla *et al.*,2007), Western Uttar Pradesh (Mitra *et al.*,2009). These phytoplanktons are abundant in Ramkund. Genus *Gloeotaenium* was the rare genera of Maharashtra, recorded only from district Amravati Bhandara. It is also reported from Nashik district during present study and from Western Uttar Pradesh (Mitra *et al.*,2009). All these taxa are being reported for the first time from this area.

ACKNOWLEDGMENTS

I am thankful to University Grants Commission New Delhi for sanctioning financial assistance (FIP). He is indebted to Prof. V.N. Suryavanshi Principal G.E.Society's, H.P.T. Arts and R.Y.K. Science College, for encouragement and providing laboratory facilities.

REFERENCES

- Anand, N. (1998). *Indian Fresh Water Micro Algae*. Bishensingh Mahindra Pal Singh, Dehra Dun.
- Balkrishanan, M. S. and Chugule, B. B. (2002). *Checklist of algae, biodiversity of the Western ghats of Maharashtra* (eds. Jagtap, A. P. and Sing, N. P.). Published by Bishen Singh, Mahindra Pal Singh, Dehradun, pp. 38-40+113-122.
- Deore, L. T. (1978). Studies on the fresh water algae of Maharashtra, *Ph.D.Thesis*.
- Desmukh, B. S. (2006). Ecological and hydrobiological studies of Pravara river, *Ph.D.Thesis*.
- Kamat, N. D. (1961-62). Jour. Univ. Bombay, **30(3-5)** : 22-31
- Kamat, N. D. (1962-63). Jour. Univ. Bombay, **31(3-5)** : 28-41
- Kamat, N. D. (1963). *Hydrobiologia*, **22** : 209-305
- Kamat, N. D. (1974). *Phykos.*,**13** : 22-32.
- Kamat, N. D. (1975). *J. Bombay Nat. Hist. Soc.*, **72** : 450-476.
- Mitra, P. K.; S. K. Tripathi, Jai Prakash, R. K. Dwivedi (2009). *J. Indian Bot. Soc.*, **88(3&4)** : 19-23.
- Philiphose, M. T. (1967). *J. Bombay Nat. Hist. Soc.*, **65** : 88-104
- Prescott, G. W. (1951). *Algae of the Western Grate lake area*. Cranbook Institute of Science. Bloom field hill Michigoan, p. 946
- Sen, Neera and Kumudranjan Naskar (2003). *Algal flora of Sunderbans Mangals*. Daya Publishing House, Delhi.
- Shukla, Sunil Kumar; P. K. Mishra and Chandra Prakash Shukla (2007). *J. Indian Bot. Soc.*, **86(3&4)** : 80-85.