International Journal of Botany Studies
ISSN: 2455-541X; Impact Factor: RJIF 5.12
Received: 06-02-2021; Accepted: 01-03-2021: Published: 08-03-2021
www.botanyjournals.com
Volume 6; Issue 2; 2021; Page No. 63-70

Biodiversity of fresh water algae from Vellar river Cuddalore district of Tamil Nadu

A Aranganathan, K Sivakumar
Department of Botany, Division of Algal Biotechnology, Annamalai University Annamalai Nagar, Tamil Nadu, India

Abstract
Algal samples were collected from Vellar River in Cuddalore district in Tamil Nadu. Collections were carried out during the month of January to December 2019. Samples were studied in the laboratory and identified. The following algae were present (chlorophyceae) Pediastrum *duplex* var. *reticulatum, P. duplex* var. clathratum, *P. duplex* var. genium, *P. duplex, P. duplex var. subgranulatum, P. duplex var. gracillimum, P. tetras, P.tetras var. tetradron, P.simplex, P.ovatum, P. boryanum, P. boryanum var. longicorne, P. tetras var, tetradron, Tetraedron gracile, T. trigomum, T. minimum forma tetralobulatum, Coelastrum microporum, C. cambricum var. intermedium, C.proboscideum, C.scabrum, Scenedesmus dimorphus, S. acuminatus, S. obliquus, S. muzzanensis, S. bijugatus, S. prismaticus, S. quadricauda, S. quatricauda var. longispina, S. quadricauda f. granulatus, S. protuberans f. minor, S. armatus var. bicaudatus, S. armatus var. bicaudatus, S. perforates, S. abundans, S. quadricauda var. quadrispina, S. denticulatus var, australis, S. abundans, S. longus var. dispar, S. longus var. naegelli, S. quadricauda var. westii, S. arcuatus var. capitatus, S. arcuatus, S. bijugatus var. gravenitzii, S. acutiformis, S. smithii var. linearis, S. quadricauda var. maximum, S. perforatus var. major, S. quadricauda, Selenastrum gracile, S. westii, Dictyosphaerium pulchellum, Pandorina morum, Scenedesmus bijugatus var. gravenitzii, S. prismaticus, S. dimorphus, Spirogyra condensate, Oedogonium sp, Closterium acerosum, C. closterioides var. intermedium, C. acerosum, Staurastrum gracile, Staurastrum crenulatum, S. floriferum var. elevatum, S. gracile form a Iyengar et Vimala Bai, Cosmarium granatum, C.sexangulare var. minima, C. pusillum, C. furcotaspermum, C. blytii var. novae sylvae, C. boeckii, C.subcostatum f. minor, Chroococcus turgidus, C.tenax, Merismopedia sp, Oscillatoria limosa*,(Bacillariophyceae*) Cyclotella sp, Calonesis sp, Synedra sp, Navicula sp, Amphora sp, Navicula cincta, Navicula sp, Cymbella sp, Pinnularia sp,(Eugleophyceae) Euglena limnophila, E.caudata, E.hemichromata, Phacus platalea, P. orbicularis, Lepocinclis sp, Trachelomonas volvocina var. punctate, T.hispida var. hispida, T.armata var. steinii, T.curta var*. punctate algae are described with photographs.

Keywords: biodiversity, fresh water algae, chlorophyceae, bacillariophyceae, euglenophyceae

Introduction

Ecology is the study of structure and function of the nature. Exploitation of nature by man has disturbed the delicate ecological balance between living and non-living components of the biosphere. The unfavorable condition created by man, have threatened the survival not only of man himself, but also other living organisms (Sharma, 2000).

Water is the most vital resource for all kinds of life on this planet. It has got a majestically power to embellish the land by flourishing the life of the planets and animals and thereby giving life to the planet. Water is a soul and hope of the nature. The solid part of the earth is blessed with water in many forms. Among these fresh and marine are two sub divisions, which spread on the earth's surface and cover about two third of land. About 97% of the water on earth consists of sea water; about 2% is ice which is located mainly in the Polar Regions and the remaining 1% is mainly seen in fresh and brackish land waters. Due to the easy availability of water, human civilization has been flourishing in the vicinity of the water resources. It is used for various activities such as drinking, irrigation, fish production and power generation etc. Increased human activities over the last 25 years are imposing a greater stress on the water bodies, causing changes in their features and there is an imperative need of scientific management to exploit and conserve the natural resources of the water bodies. To achieve this goal, basic and applied research on various aspects of the aquatic ecosystem is very essential.

Algae, a heterogeneous assemblage of photoautotrophs, are ubiquitous, cosmopolitan and play a pivotal role as pioneers leading to the establishment of higher plant communities. They inhabit diverse habitats (lentic to lotic, aquatic to sub-aerial or aerial, xeric, snowy, polluted and unpolluted) and are endowed with the capability to survive in hostile environments. They have a tremendous potential to trap atmospheric carbon dioxide and nitrogen. Approximately 40% of atmospheric CO_2 and equally good amount of nitrogen are fixed by microplankton (Goyal, 1977). They have revealed very good scope for environmental management as soil conditioners, bio-fertilizers, bio-indicators, bio-monitors, ameliorators, feed for animals, protein supplement and rehabilitators of degraded ecosystem through biosorption of pollutants (Whitton and Potts, 2000).

Biodiversity of algal flora in the water bodies is governed by the ambient physico-chemical factors. Algae are the primary producers in the food-chain of the aquatic ecosystem and their productivity depends upon the quality of water. Among the aquatic algae, phytoplankton occupies an important position in the food-web of the freshwater ecosystems, as primary producers. Any change in the phytoplankton community will reflect on the entire aquatic system. So, knowledge on their abundance, composition and

seasonal variation is an essential pre-requisite for any successful aqua-management programmed. Further, the phytoplankton are good indicators of changes in water quality because they are strongly affected by environmental conditions and they respond quickly to the changes in environmental quality. Hence, qualitative and quantitative studies of phytoplankton are of great importance.

In India, numerous lakes and reservoirs have been studied for their water quality in relation to algal taxonomy by Trivedy and Goel (1984), Desikachary (1986), Anand (1988), David *et al.* (2003), Veereshakumar and Hosmani (2006), Tiwari and Shukla (2007) [22], Sivakumar and Senthilkumar (2008), Poonguzhali and Mayakannan (2009), Khelchandra Singh *et al.* (2010), Mathevan Pillai *et al*., 2011 and Prabhakar *et al.*, 2012. But still there are many aquatic ecosystems that remain unexplored, particularly in Cuddalore district of Tamil Nadu state. Lentic water bodies sparkling in afternoon sunlight hides a minuscule waterscape in closer to a slum than a paradise. It contains millions of organisms in every cubic centimeter, some of which are photosynthetic, others of which feed on live and dead, dissolved and particulate organic materials present in the water which contains their excretions and secretions, faces and corpses, intermixed with debris washed into suspension from the surrounding land.

Material and Methods

Description of study area

The Sethiyathope. Watershed scheme was formed in 1848. This was the first watershed in the Vellar basin. Sethiyathope scheme is one of the important irrigation system in the Vellar basin in Tamil Nadu, providing irrigation facilities to 7244 hectares of direct command for double crop paddy and to 12, 222 hectares of direct command for single crop paddy (39204 acres of both direct and indirect command) in South Arcot District. The system comprises of Sethiyathope supply channel on the left bank of the Vellar river known as Vellar Rajan Channel and its 9 branches, two major tanks namely Wallajah Tank and Perumal Tank and their channels, and a few minor tanks and a drainage carrier known as the Paravanar river. This scheme was introduced during 1847-48 and it is at the tail end of the vellar river, situated in Sethiyathope village, about 25 Kms from Chidambaram town.

The Vellar River is the main source of water supply to this system and it carries fairly heavy flood discharges during the north-east monsoon and moderate to normal flow during the south-west monsoon. The soil type in the major portion of the command area is clay and most suitable for paddy cultivation.

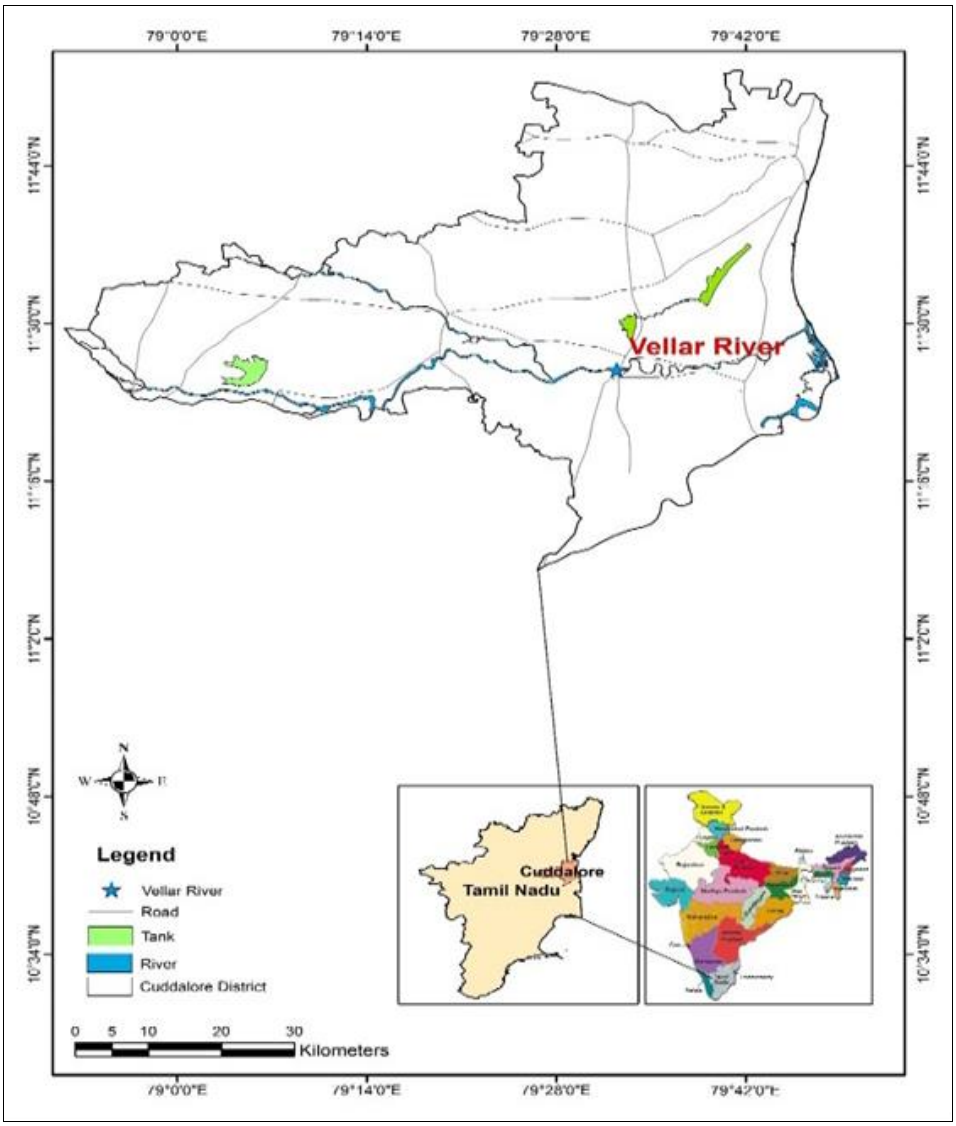

Fig 1: Figure showing station locations in the vellar river

Collection of phytoplankton

Phytoplankton samples were collected in the month of January 2019 to December 2019, from the said river. The phytoplankton samples were then immediately preserved by using 4% formalin for further taxonomic study. Fresh as well as preserved algal forms were observed thoroughly under research microscope and identified with the help of standard literature on algae, algae in dentification was done by using standard monographs. Desikachary (1959), Prescott (1964), Bongale and Bharathi (1980), Gonzalves (1981), Cox (1996), Anand (1998) and Sivakumar and Senthilkumar (2008).

Results and Discussion

This chapter presents the results of research regardin g the algal diversity in the vellar river cuddalore district the details of collections were given in The algal taxa belonging to 73 genera under four classes namely Chlorop hyta, Bacillariop hyta, Euglenop hyta, Cy anop hyta were id entified from the vellar river. Out of the 94 algal taxa recorded, 49 belon g to Chlorop hy ceae, 9 to Bacillariop hy ceae, 10 to Euglenop hy ceae, 4 to Cy anophy ceae,

Microphotographs of Recorded Phytoplankton

Pediastrum *duplex* var. *reticulatum* Lagerheim G. lagerheim, 1882

Cells more or less H shaped with sides of process of marginal cells nearly parallel. Intercellular spaces large and oval, cells 10-20 (-40) µ in diameter. Colonies 8-16 celled, 58-70 µ in diameter.

Pediastrum *duplex* var. clathratum (A. Braun) Lagerheim 1882

Cells with more deeply emarginated sides and larger intercellular spaces than in Pediastrum *duplex*. Colonies 8-64 celled. Cells 9-25 µ in diameter.

Pediastrum *duplex* var. genuinum (A. Braun) Hansgning.

Colonies 4-8-16-32 celled with fairly large intercullar spaces. Marginal cells with stout processes which are straight or slightly cured Cell membrane smooth or punctuate. Cells 6-18 µ, and colonies 45-65 µ in diameter.

Pediastrum *duplex* Meyen F.I.F Meyan, 1829

Colonies usually of 16-32 sometimes of 4,8,64 or 128 cells with small lens shaped perforations between cells inner side of marginal cells concave, outer side produced into two short truncate processes. Cells (6) -8-21 um diameter

Pediastrum *duplex* var. subgranulatum Raciborski 1889

Colonies 8-16-32-64 celled. Cells and intercellular spaces more or less as in the type of the species, but the cell distinctly granulate. Cells 10-25 µ in diameter. Colonies 16-64 celled, 100-180 µ in diameter.

Pediastrum *duplex* var. Gracillimum West G.M. Smith 1920

Colonies with very large intercellular spaces. Cells very narrow, as broad as or narrower than the processes Body of marginal cells curved outwards and with two long processes with emarginated apices. Inner cells also similar to marginal cells but with shorter processes cells 10-18.5 (-22) µ broad, 12-25 (-32) µ long.

Pediastrum tetras (EHR) J. Ralfs 1844

Colonies rectangular, oval, or circular of 4-8-16 (-32) cells without intercellular spaces Marginal cells divided into two lobes by a deep linear to cuneate incision on the outer side reaching to the middle of the cell. Each lobe truncates, slightly emarginated, or further divided into two lobes. Inner cells 4-6 sided with a single linear incision. Daimeter of cells 5-15 (-27) µ eight celled colonies 20-33 µ and 16 celled colonies up 50 µ in diameter.

Pediastrum tetras var. tetraodon (Corda) Hansging 1886

Colonies 4-8 celled incision of cells deep with the lobes adjacent to the incision of the marginal cells very pronounced cell s 8-18 µ in diameter.

Pediastrum simplex Meyen F.I.F. Meyen, 1829

Colonies circular to oval, of 4-8-16-32 or more cells, Inner side of marginal cells nearly straight, outer side produced into a gradually tapering process, sides produced into a gradually tapering process, sides concave. Inner cells polygonal cells in contact with adjacent ones and usually without intercellular spaces. Cell wall smooth or puncctate to granulate cells (7) 8-13 µ broad, (15-) 19-26 (-30) µ long.

Pediastrum ovatum (EHR.) A. Braun G.M. Smith, 1926

Colonies usually 4-8-16 (rarely 32-) called, with the cells arranged in a ring round a central space or with one or more interior cells and a number of marginal cells. Perforate or almost imperforate, the perforations being small. Cell wall smooth or ornamented four celled colonies up to 60µ 8-celled colonies up to 80µ and 16 celled colonies up to 100µ in diameter cells 8.5-19µ broad, 14-37µ long.

Pediastrum boryanum (Turpin) Meneghini G.M. Smith, 1926

Colonies circular to oval and usually of 16-32 (rarely 4-8 or up to 128) cells arranged in concentric rings without intercellular space. Inner cells polygonal with straight sides. Outer face of marginal cells slightly to deeply emarginated and with two short processes ending in stumpy spines. Cells wall usually granulate, sometimes smooth. Cells 7-40µ in diameter. Horns (processes) 7-10 µ long.

Pediastrum boryanum var. longicorne Reinseh, 1867

Colonies circular to oval and usually of 16-32 (rarely 4-8 or upto 128) cells arranged in concentric rings without intercellular spaces Inner cells polygonal with straight sides. Outer faces of marginal cells slightly to deeply emarginated and with two longer processes ending in stumpy spines. Cell wall usually granulate, sometimes smooth, cells 7-40 µ long.

Pediastrum tetras var. tetraodon (Corda) Hansging 1886

Colonies 4-8 celled incision of cells deep with the lobes adjacent to the incision of the marginal cells very pronounced cell s 8-18 µ in diameter.

***Tetraedron* gracile (Reinsch) Hansgirg G.W. Prescott**

Cells flat and rectangular with the corners produced into narrow processes which usually branch twice and end in spines. The primary branches usually at right angles with one another and parallel to one side of the cell. Cells with processes, 30-43 (-80) µ in diameter, without processes.

***Tetraedron* trigonum (Naegeli) Hansgirg G.M. Smith, 1920**
Cells flat, triangular with somewhat concave sides and rounded corners each ending in a stout spine. Cells without spines, 18-30 µ in diameter spines 5-10µ long.

***Tetraedron* minimum forma tetralobulatum (Reinsch) G.B. De Toni, 1889**
Cells small and quadrangular with the side concave and angles rounded. Cell wall smooth. Cells having a short spine from each angle. Cells 11-14 µ in diameter. Spines 1.5-1.8µ long.

Coelastrum microporum Naegeli G.M. Smith, 1920
Colonies more or less spherical and of 8-16-32-64 (usually 16-32) cells with small intercellualr spaces Cells spherical to ovoid, enclosed by delicate gelatinous sheaths and interconnected by almost imperceptible gelatinous processes. Cells with sheath 4-27 µ in diameter. Colonies 20-90 µ in diameter.

Coelastrum proboscideum Bohlin J. Brunnthaler, 1915
Colonies more or less pyramidal and of 4-8-16, rarely more cells, intercellular spaces usually large and polygonal. Cells conical, truncate and six-sided with the lateral sides slightly concave. Poles of cells thickened. Cells 12-20 µ diameter colonies 20-110 µ in diameter.

Coelastrum Scabrum Renisch G.W. Prescott, 1951
Colonies more or less spherical or avoid, 4-8-16 celled. Cells angular globose with three or more wart-like truncate processes form the outer surface cells 8-10 µ in diameter.

Scenedesmus dimorphus (Turpin) F.T. Kuetzing, 1833
Colonies 4-8 celled with the cells arranged in a linear or subalternating series (eight-celled colonies always in subalternating series). Differ from S. Obliquns in the outer cells of the colony being more or less luante and the apices of the cells being attenuated Cells 2-8 µ broad, 14-35 µ long.

Scenedesmus acuminatus (Lagerheim) Chodat G.M. Smith, 1916
Colonies curved and of four to eight fusiform cells with sharp pointed ends. All the cells in a colony lunate or the interior cells forming a flat plate and the other cell lunate and at an angle to the plane of the interior cells; rarely all cells in the same plane cell wall smooth and without teeth or spines cells 2-7um broad, 12-48 um between apices.

Secendesmu obliquus (Turpin) Kuetzing F.T. Kuetzing, 1833
Colonies usually of 4, sometimes 2 or 8 erect cels arranged in alinear or sub-linear series. Cells fusiform with acute or slightly rounded ends and usually with straight sides. Outer side of terminal cell concave or slightly convex Cell wall smooth and without terminal teeth or spines cells (2-) 2.7-6.6 (-9) µ broad, (5-) 6-23 (-27) µ long.

Scenedesmus prismaticus P. Bruhl and K. Biswas, 1922
Colonies 4-Cells arranged in a single linear series Cells prismatic with pyramidal end faces, hexagonal in cross section with the terminal and lateral faces meeting at sharp angle. In side view the longitudinal rides in front and at the back appear as dark lines cells 4-6 µ long.

Scenedesmus quadricauda (Kirchner) Chodat, 1913
Colonies usually 2-4 celled, rarely eight-celled and arranged in a linear series. Cells ovoid to oblong-ovoid. External cells with one or more median lateral spines from the outer face in addition to spines from their poles, or rarely without spines. Cells 2-7 µ broad, 6-15 l µ long spines 3.5-8 µ long.

Scenedesmus quadricauda var. granulates (Hortobagyi) Hortob, 1954
It different from the type by the presence of verrucose protuberances from extremities of cells.

Scenedesmus protuberans f. minor Ley, 1947
Differs from the type in having smaller cells. Terminal cells 4.4-5.3 µ broad, 23-25 µ long cells 4.4-5.7 (6.0) µ broad, 18-22 µ long spines of terminal cells 19-27 µ long.

Scenedesmus armatus var. bicaudatus (Guglielmetti) R. Chodat, 1926
Colonies two to four celled. Differs from the type in having a long spine from one of the poles of the terminal cell only, the spines of the two terminal cells alternating with each other. Longitudinal ribs usually seen only in the interval cells. Cells 2.5.4.6 µ broad 8.3-12 µ long. Four-celled colonies 8.3-12 µ broad, 10-18.5 µ long spines 3.5-8.8 µ long.

Scenedesmus armatus (Chodat) G.M. Smith
Colonies usually four-celled rarely two –or-eight-celled, cells oblong-ellipsoid with acute spices and arranged in a linear series. Terminal cells with a single long spine from each pole. All cells with a median lateral longitudinal rib which is sometimes indistinct or only at either end of the cell. Cell 3-8 µ broad, 7-16 µ long. Four-celled 7-16 µ broad, 12-25 µ long.

Scenedesmus perforates var. major (Turner) Comb. M.T. Philipose 1967
Colonies four eight celled, much large thatn in the types and sometimes with a long spine from the poles of some of the internal cells. Pyrenoids one (or three) in each cell. Cells 10-16.5 µ broad, 27-33 long perforations 1-2.5 µ broad, 20 µ long. Central pyrenoid 8-10 µ in diameter. Spines 8-25 µ long.

Scenedesmus abundans (Kirchner) Chodat, 1913
Colonies usually 2-4 celled, rarely eight-celled and arranged in a linear series. Cells ovoid to oblong-ovoid. External cells with one or more median lateral spines from the outer face in addition to spines from their poles, or rarely without spines. Cells 2-7 µ broad, 6-15 l µ long spines 3.5-8 µ long.

Scenedesmu quadricauda (Turp.) Breb. Var. quadrispina (Chodat) G. M. Smith
Colonies usually 2-4 celled. Cells broadly ovoid and about twice as long as broad. Poles of terminal cells with a single short recurved spine. Cells 3.5-8.5 M broad, 8.5-15-19 M long spine, 2.5- 5.5M long.

Scenedesmus denticulatus Lagerheim var. australis Playfair
Colonies two or four celled. Cells arranged in a single linear series, oblong cylindrical with more or less rounded ends and with one shor t teeth from the poles of all cells. Cells 4-7 um broad, 13.5-21 um long.

Scenedesmus abundans (Kirchner) Chodat, 1913
Colonies usually 2-4 celled, rarely eight-celled and arranged in a linear series. Cells ovoid to oblong-ovoid. External cells with one or more median lateral spines from the outer face in addition to spines from their poles, or rarely without spines. Cells 2-7 µ broad, 6-15 l µ long spines 3.5-8 µ long.

Scenedesmus longus var. dispar (Brebisson) G.M. Smith, 1916
Colonies four-celled. Cells oblong fusiform with acute ends and arranged in a sub alternating series, usually in two planes, two cells above and two cells below. Inner cells with a single spine from one pole only. Terminal cells with a spine from each pole, the spine at one pole being oftern placed at right angles to the longitudinal axis of the cell; the oblique spine of one terminal cell generally alternating with the oblique spine of the other terminal cell. Cell wall usually smooth cells 3-7.2 µ broad.

Scenedesmus quadricauda var. westii G.M. Smith, 1916
Colonies usually four to eight celled. Cells 4.5-9-13 µ broad, 10-22-29 µ long. Spines 10.6-16. µ Long.

Scenedesmus arcuatus var. capitatus G.M. Smith, 1918
Colonies curved, four eight celled (usually eight-celled). Cells in eight-celled colonies arranged in a double series. Cells in four celled colonies in a linear or sub linear series. Cells slighty curved with one side convex and the other straight or slightly concave. Ends of cells stumpy and with nodular thickenings. Cells 5-11.3 µ broad, 10.6-28 µ long.

Scenedesmus bijugatus var. graeventizii (Bernard) Comb.nov M.T. Philipose, 1967
Colonies four to eight celled. Cells fusiform, ellipsoid, oblong- ellipsoid to ovoid with obtuse poles and arranged in an eight-celled colonies in two-series, oblong-ovoid, sometimes slightly angular at the base due to mutual pressure. Cell wall smooth without teeth or spines. Cells wall smooth, without teeth or spines. Cells 3.5-9.5 µ broad, 8.5-18 µ long.

Scenedesrus acutiformis Schroeder B. Schroeder, 1897
Colonies 2-4-8 celled (usually 4-celled). Cells cylindrical fusiform and arranged in a singl linear series cell wall smooth. Median cells with a lateral longitudinal ridge extending from pole to pole on each side. Terminal cells with two to four ridges. Poles of cells acute and without teeth or spines, but sometimes with a minute papilla. Cells 3.8.8 µ broad, 1-22.4 µ long.

Scenedesmus smithii Teiling var linearis var. Nov. E. Teiling, 1942
Colony four celled with the cells arranged in a subaltennating series. Cells more or less naviculoid with the side of cells, where they are in in contact with one another, flat. Poles of cells with 2-3 sharp psines which ar often obliquely placed. Cells 4.5-10 µ broad, 15-23 5 µ long.

Scendesmus quadricauda var. maximum W.et G.S. West G.M. Smith 1916
Colonies usually four-celled rarely eight celled. Colonies and cells much larger than in the type. Cells 9-11.5 µ broad, 27-39 µ long spines 18-30 µ long.

Scenedesmus quadricauda (Kirchner) Chodat, 1913
Colonies usually 2-4 celled, rarely eight-celled and arranged in a linear series. Cells ovoid to oblong-ovoid. External cells with one or more median lateral spines from the outer face in addition to spines from their poles, or rarely without spines. Cells 2-7 µ broad, 6-15 l µ long spines 3.5-8 µ long.

Selenastrum gracile Reinsh G.M. Smith, 1920
Cells lunate to sickle shaped and quite narrow in proportion to the length. Apices of cells acute. Apices of cells acute. Chloroplast without a pyrenoid. Cells 3-5 µ broad, 13-30 µ long.

Selenastrum westii G.M. Smith, 1920
Colonies of 2-4-8 irregularly arranged cells with their convex sides in contact, rarely free. Cells lunate to arcuate but not sickle shaped and with acuminate apices. Chloroplast without a pyrenoid cells 1.5-3 µ broad, 15-39 µ long.

Pandorina morum (O.F. Muller) Bory Abuzer Celeki *et al*., Tur J Bot 31 (2007)
Sub-spherical coenobium 24-37.5 (20-60) um wide consists of 8-16 cells, pear shaped cells 8-10 (8-17) um long. Chloroplast with basal pyrenoid.

Spirogyra condensata (Vaucher) Kutzing Naskar et.al, Our Nature Filaments yellow - green; vegetative cells 52 - 65um broad, 71.5 104um long, septa of the cells plane; Chloroplast single forming 1 to 2 spirals.

Oedogonium Link G. Mahendur Perumal and N. Anand, 2008
Filament single unbranched, vegetative cells uninucleate, cylindric or some time capitellate, basal cell with hold fast, vegetative cell, except the basal one capable of division oogonia and anthiridia produced by the direct division of vegetative cells.

Closterium acerosum (Schrank) Ehrenb 1905.
2-5 Cells large, 8-16 times longer than their diameter, very slightly bent or almost straight, narrowly fusiform, outer margin slightly curved, inner margin almost straight or slightly convex; semicells gradually tapering to the apices, which are narrow and rounded-truncate; cell wall colourless and smooth, in older individuals becoming yellowish-brown and very delicately striolate; chloroplasts riged; with a median series of 7-11 pyrenoids; zygospore globose; length 300-460µ; breadth 26-48u.

Staurastrum crenulatum var. britannicum.
Cells length 26.56um, breadth 35.17um, Isthmus 11.97um.

Staurastrum floriferum var elevatum
Cell length -28.39um, breadth- 40.3um, spines 1.39um - 1.87um

Staurastrum gracile Ralfs
Cells small, about 2.7 times longer than broad with slight constricted in the form of an acute notch; semi cell slightly broading towards the faintly convex apex, upper angles produced into more or less horizontally disposed long processes tipped with 3 minutes spines and showing many concentric series of denticulations; chloroplast axile with one pyrenoid in each semi cell. Long cell 17.5p, lat cell 12.5p, isthmus 5u.

Cosmarium granatum
Cells small, sub-rhomboid-elliptic, deeply constricted, sinus narrowly linear, slightly dilated at the apex; semicells truncate - pyramidate, basal angles rounded - subrectangular, sides at the base subparallel, then converging towards the apex, commonly straight or slightly convex, upper angles obtuse, apex narrowly truncate and straight. Cell-wall finely punctate. Chloroplast axile, each with one pyrenoid. Cells 26-47um long; 19-30µm breadth.

Cosmarium sexangulare Lund. Forma minima Nordst
Cells about one third the size of the typical form deeply constricted, sinus very narrow, with a dilated apex; semicells with theapex retuse and the upper lateral margins conspicuously retuse. Cell wall punctate chloroplasts one in each semicell axile, with one pyrenoid. Cell 13.5-15µm long; 11-12um breadth; breadth of sithmus 3um.

Cosmarium pusillum (Breb.) Arch.
Cells minute, deeply constricted, sinus slightly open; semicells transversely pyramidate- rectangular, sides very slightly convex, converging upwards, basal angles slightly rounded, apex widely retuse, upper angles scarcely rounded. Cell wall smooth.Chloroplasts axile with a small central pyrenoid.Cell 6.8-9.6um long; breadth 7-9.6um; breadth of isthmus 2.7-4.8um.

Cosmarium furcatospermum West & G.S.
Cells small, deeply constricted, sinus linear, semicells truncate - semicircular or oblong subsemicircular, basal angles subrectangular or slightly rounded, lateral margins 4-5 crenate - granulate, apex widely truncate and 5-6 undulate, with two series - axile with a central of small granules within the whole margin. Chloroplast pyrenoid.Cells length 18-22u long, 16.5-19u breadth, Isthmus 5.7-7.

Cosmarium boeckii Wille
Cells small, very deeply constricted, sinus narrowly linear semi cells trapeziform-semicircular, lateral margins convex, incised - crenate, crenations 3, upper and lower emanginate, middle crenation entire and subacute, apex truncate, and 4-5- undulate-nodulose, with two series of granules within the margin, with more granules in the outer series than in the inner; in the centre with a rather slight but broad tumour, lower granule situated immediately above the isthmus. Chloroplasts axile, with one Pyrenoid cells 29-38µm long, 27-35.5µm breadth, breadth of isthmus 8-13um.

Cosmarium subcostatum Nordst forma minor
Cells rather smaller than in the type, deeply constricted, sinus narrowly linear with a dilated extremity; subtrapeziform-reniform, basal angles rounded, sides convex and crenulate, with only 2-3 emarginate lateral crenations. Chloroplasts axile, with two Pyrenoids.Cell 26-38µ long, breadth 23-32um; breadth of isthmus 6.6-12um

Chroococcus turgidus (Kutzing) Nageli
A Colony consisted of 2-8 (2-32). Cells enclosed by sheath, spherical and emispherical cells 29-34 (6-45) um in diameter.

Chroococcus tenax (Kirchner) Hieronymus
Cells 10-14-20 um diameter, with sheath 20-26 um diameter. Sheaths usually quite thin, with sharp contours, usually distinctly lamellate, colourless, yellowish or brown.

Merismopedia Meyen.
A Cells 4-16 colonies arranged in homogenous mucilage, cells globose. Oblong before cell division. Colonies can perform very slow gliding movement

Oscillatoria limosa (C. Agardh) Gomont
Straight or less straight, round ended trichome, unbranched and end cell rounded with slightly thickened membrane, cells 3.5 - 4 (2.5-5) um in length and 10.5 12.5 (11-22) um in width, trichome without sheath.

Cyclotella Kuetzing
Plant solitary or colonial, sometimes united in short chain with in muciliaginous enveloped, discoid or drum shaped, ornamented in two concentric regions, the outer zone radially striated;

Navicula Bory.
Solitary and free floating aggregated into irregularly radiating clusters, rectangular in girdle view with smooth girdles and without intercalary bands, valves elongate, usually attenurated towards capitates rounded. Axial field narrow with distinct straight raphe and polar.

Amphora Ehrenberg.
Cells sessile with concave faces attached in girdle view, broadly elliptic in outline, with truncate ends, girdle usually separated by several punctate or striate axile field strongly excentric, raphe gibbous with its central nodule close to the concave margin

Navicula cincta (Ehr.) Ralfs.
Valves 14-24.5 um long by 4- 5.5 um wide; Striae 14-16 in 10 um. Cells solitary and free floating aggregated into irregularly radiating clusters, rectangular in girdle view with smooth gridles and without intercalary band, valves elongate, usually attenuated towards capitates rounded. Axial field narrow with distinct straight raphe and polar.

Cymbella C.A. Agardh.
Cells solitary, gelatinous mass, intercalary band absent, invalve view asymmetrical longitudinally lunate rhombic or naviculoid, dorsal surface convex, axile areas narrow gradually widening towards centre, raphe thin, Excentric usually placed towards ventral side with well-defined nodules.

Pinnularia Ehrenber.
Plant solitary; in girdle view, rectangular intercalary band and septa absent, in valve view linear with convex or parallel margin, ends usually broadly rounded axial area

narrow, central area variable in shape, may or may not be reaching the sides, lineate, radial or transverse may or may not be convergent poles.

Euglena limnophila Lemmermann.
Cells 81-98 um long, 10- 14 um um broad, nearly rigid, cylindrical to spindle shaped, slightly narrow and truncate anteriorly, gradually tapering and terminating into sharp, hyaline posterior tail piece (20- 27um) long. Pellicle spirally striated (7-8 stirae per 10 um). Chloroplasts numerous small (2- 4um in diameter), disc shaped, parietal without pyrenoids. Paramylon grains dimorphic, two large. Flagellum present, Stigma present. 157

Euglena caudata Hubner
Cells spindle - shaped, 64um long, 26.5 um broad, anteriorly shortly stretched, posterior long attenuated, terminate in colourless caudus. Nucleus in the central part of cell. Chloroplasts parietal, numerous, saucer shaped, bearing pyrenoid with two paramylon shells. Stigma relatively large.Flagellum shorter than the cell in length.

Phacus platalea Drezepolski
Cell broadly oval and flat, slightly asymmetrical and with a sharply pointed oblique tail; paramylum a single large on medium sized central disc; apical furrow usually reaching up to the middle only; cell (with tail) 48-54 x 29-32 um; tail alone 10-12um.

Trachelomonas volvocina var punctata Plaf.
Lorica spherical, brown in colour.Flagella aperature without a rim or collar. Lorica 10 -16 um in diameter. Lorica surface thickly and strongly punctuate.

Trachelomonas hispida (Perty) Stein emened.
Lorica 22-36um long, 20-25um broad, broadly ellipsoid with slightly swelled lateral sides, broadly rounded at both end, finely and densely porous, cowerea with short pointed spines (below 2 um long) in surface. Flagellum aperture with or without annular thickening or sometimes encircled with spines at rim (4-6µm in diameter). Chloropiasts parietal discoid with double sheathed pyrenoid (6-15 in number, 5-8 um in 154 diameter). Paramylon bodies oval to rod shaped (below 3um). Nucleus 10-14um in diameter.Flagellum one and half to two times to lorica length.Stigma present.

Trachelomonas armata (Ehrenberg) Stein var 1993)
Lorica 32-45pm long, 25-35um broad, in front slightly narrowed and rounded with irregular series of short conical spines (2-Sum in length), at backward broadly rounded with a series of long, robust, curved and convergent spines (8-17um long), 153 with a without short conical spines. Flagellum aperture surrounded by short annular thickening and by circle of spines in circumference of pore (4-6um in diameter). This variety is distinguished by the features of lorica spines. Bicudo and De-Lamonica - Freire (1993) reviewed the diagnostic features of T. armata and proposed that many infra specific taxa by the lorica spines should be synonymized to var. steinii.

Discussion
A total number of genera 26 and species 73 belonging to chlorophyceae (genus 12, species 49) bacillariophycea (genus 7 and species 9) cyanophyceae (genus 3 species 4) euqlenophyceae (genus 4 and species 10) recorded from Velar River in cuddalore district of Tamilnadu

Acknowledgement
The authors are thankful to Head of the deportment of botany Annamalai University.

Reference
1. Abujam SKS, Dakua S, Bakalial B, Saika AK, Biswas SP, Choudhury P. Diversity of Plankton in Maijan Beel, Upper Assam. Asian J Exp. Biol. Sci. 2011; 2(4):562-568.
2. Adesalu TA, Nwankwo DI. Effect of water Quality Indices on Phytoplankton of a Sluggish Tidel Creek in Lagos, Nigeria, Pakistan J Biol. Sci. 2008; 11:836-844.
3. APHA. Standard methods for examination of water and waste water, 20th ed. American Public Health Association, Washington DC. U.S.A, 1998.
4. Basavaraja D, Navayana J, Puttaiah ET, Prakash K. Phytoplankton species diversity indices in Anjanapura Reservoir, Western Ghat Region, India. Journal of Envi. Bio. 2013; 34:805-810.
5. Chakraborty N, Pal A, Talukdar P, Pal R, Chattopadhyay P, Mukherjee M. Studies of environment parameters in relation to algal bloom formation in different ecological conditions. Indian Hydrobiology. 2005; 8(1):75-78.
6. Chakraborty T, Mukhopadhyay A, Pal R. Micro Algal Diversity of Kolkata, West Bengal, India. Indian Hydrobiology. 2010; 12(2):204-224.
7. Deshmukh BS, Gunale VR. A systematic account of chlorococcales from Ahmednagar District, Maharastra, Indian Hydrobiology. 2007; 10(2):359-369.
8. Divekar MV, Deshmukh BS. Hydrobiological studies on polluted water bodies around Sangamner, Maharastra, Indian Hydrobiology. 2006; 9(2):295-300.
9. Fouzia Ishaq, Amirkhan. Aquatic Biodiveristy as an Ecological indicator for water quality criteria of River Yamuna in Doon Valley. Uttarakhand, India. World Journal of fish and Marine Science. 2012; 5(3):322-334.
10. Giesy Robet M. Observation on the cell structure of Oscillatoria limosa. Agardh. The Ohio Journal of Science. 1962; 62(3):119-124.
11. Gupta S, Shukla DN. Physico-chemical Analysis of Sewage Water and its Effect on Seed Germination and Seedling Growth of Seasmum Indicum. Journal of Research in National Development. 2006; 1:15-16.
12. Haniffa MA, Arockiasamy S, Martin P. Physico-Chemical and Microbiological Studies in the Perenial River Thabaraparani for the Assessment of Water Quality. India J. of Envtl. Pvten. 1993; 13(7):553-538.
13. Hedge GR, Sujata T.: Distribution of Planktonic Alage in Three Freshwater Lentic Habitats of Dharwad-Phykos. 1997; 36(1-2):49-53.
14. Jackher GR, Rawat M. Studies on Physico-Chemical Parameter of a Tropical Lake, Jodpur, Rajasthan, India. J Aqua. Biol. 2003; 8:79-83.
15. Jena M, Ratha SK, Adhikary SP. Algal diversity changes in Kathajodi river after receiving sewage of Cuttack and its ecological implications. India Hydrobiology. 2005; 8(1):67-74.

16. Krishnakumar Yadav, Neha Gupta, Vinit Kumar, Sandeep Arya, Deepak Singh. Physico-chemical analysis of selected ground water samples of Agra city, India. Recent Research in Science and Technology. 2012; 4(11):51-54.
17. Murugesan S, Sivasubramanian V. Cyanobacteria of Porur Lake, Chennai, Tamil Nadu. Indian Hydrobiology. 2005; 8(1):49-54.
18. Noorjahan CM. Physcio-Chemical characterization and microbial identification of commercial drinking water in Chennai, Tamil Nadu. Nat. Env. Poll. Tech. 2008; 7(1):49-54.
19. Philopose MT. Chlorococcales. Indian Council Agricultural Research, New Delhi, 1967, 365.
20. Rafia Rashid, Rouf Ahmad Bhat, Pandit K, Samiullah Bhat. Ecological study of periphytic algal community of Doodh Ganga and Khansha- Mansha streams of Yusmarg forests: A Health Resort of Kashmir Valley, India. Ecological Balkanica. 2013; 5(1):9-19.
21. Sivaji D, Joseph A. Water quality and benthic microalgal biomass of a brackish water prawn farm. Indian Hydrobiology. 2008; 11(2):247-254.
22. Tiwari S, Dixit S, Gupta SK. An evalution of various physic-chemical parameters in surface water of Shahpur Lake, Bhopal Poll. Res. 2004; 23(4):829-832.
23. WHO. Our planet our Health-Report of the WHO Commission on Health and Environment, Published by WHO, Geneva. 1992; 130:131.
24. Yadav RC, Srivastava VC. Physico-chemical properties of the water of River Ganga at Ghazipur. India. J. Sci. Res. 2011; 2(4):41-44.
25. Zafar AR. On the ecology of the algae in certain fish ponds of Hyderaba, India, Physico-chemical Complexes. Hydrobiologia. 1964; 23:179-195.