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Planktonic diversity of Yeldari Dam Parbhani district Maharashtra

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Abstract
Parbhani district consists of many fresh water bodies; one of them is Yeldari dam, situated in the in Yeldari village. Yardari dam is largest dam in Parbhani district which providing water to agriculture and drinking as well as for fish culture to know about more details about this dam and its link of food chain. In this research study phytoplankton study was carried out for one year period i.e. from 2014 to 2015. In this research study a total of 25 algal genera were recorded belonging from class Chlorophyceae, Cyanophyceae and Bacillariophyceae along with 15 families. Extensive growth of phytoplankton shows the increased amount of nutrients in water body. In this research study phytoplankton belonging to Cyanophyceae group shows domination on Chlorophyceae and Bacillariophyceae group.

Keywords: Cyanophyceae, fresh water, phytoplankton, Yeldari dam

1. Introduction
Phytoplankton growth can occur at any place and in any environment therefore, there distribution pattern, ecology, periodicity, qualitative and quantitative occurrence differ widely. They are small aquatic organisms that drift on water currents. They are microscopic aquatic plants, occurring in unicellular, multicellular, colonial or filamentous forms, without any resistance to currents in free floated and attached form. Phytoplankton communities are widely spread from aquatic to terrestrial lands and very few are aerial. Plankton is the major primary producers in many aquatic systems and an important food source for many organisms. The first and foremost visible symptoms of nutrient enrichment are the prolific growth of algal communities which produce blooms [2]. They are the major O_2 producer and they have been ascertained as promising and commercially important in the food industry and aquaculture, as a natural source of high-value products such as fatty acids, carotenoids, steroids, proteins etc [8]. The Blue Green Algae are ecologically beneficial in Paddy fields for sustaining soil fertility, reclaiming of alkaline soil and can contribute 25-30 kg N_2 per season [5]. Aquatic biodiversity has shown enormous aesthetic and economic value as well as it also responsible for maintaining and supporting overall environmental health naturally which link to the food web and food chain [11].
The present investigation was carried out on Yeldari dam planktonic diversity which is located 15 km distances away from Jintur city in the Yeldari village (rural area) at the GPS latitude N 190 43' 12.4'' Latitude N 190 43' 12.4" Longitude E 760 43' 55". Yeldari dam is fresh water body built on Purna river which is sub basin of Godavari River. This dam has spread on large agricultural area there are so many villages were came under the this dam during construction i.e. Kinhi, Kawatha, Amberwadi, Bamni, Wazar and Sawangi, Sonsawangi and Belkheda. Presences of dead crop plants and cow shed at the edge of lake made the water rich in nitrogenous waste. Phytoplanktons responds to environmental changes because of their short life cycle and growing crops in field indicates the exact quality of water which they are found. The present study has been undertaken 1st time on Yeldari dam to know the climatic changes as per the sites and species richness.

2. Materials and Methods
The present investigation was conducted during 2014 to 2015 on Yeldari dam at village Yeldari near the Parbhani district in Maharashtra. During this research study total three sites were selected for the study i.e. 1st side near waterfall of dam, 2nd side is one and half kilometer

away from water fall and 3rd side is back side water storage area of dam. In present study microalgal samples and water samples were collected seasonally that is rainy, winter, and monsoon season based on the different algal forms i.e. in stagnant water, in flowing water, attached with aquatic plants, on rocky surfaces etc. Micro algal samples were collected with the help of spoon forceps, micro sieve and water samples were also collected in floating water directly in plastic bottles. The larger samples were collected in polybags. The polybags and plastics bottles were labeled and brought to the laboratory for further investigation. Collected samples were preserved in 4% formalin solution on the spot. The plankton identification was done with the aid of plankton identification key and monographs [1, 3, 5, 7, 9, 10, 11, 12, 13, 15, 17].

3. Results

Table 1: Features of Yeldari Reservoir/dam

Year of start- Final completion	1958- Oct 1968 (9 years 10 month)
Village	Yeldari
Taluka	Jintur
District	Parbhani
River	Purna
Basin	Godavari
Water speed	101.54km2
Total length of dam	4432Mtr.
Earthen dam	4880 Mtr.
Overflow section	149.65 Mtr.
Official name	Yeldari Dam
Location	Yeldari
Capacity	809, 660Km2 (194, 250cumi)
Depth	40.6m
Catchment area	7330sq km
Area occupy	2472 ha at FRL
Owner	Government of Maharashtra India

Table 2: List of planktonic algae identified from the sites of Yeldari water reservoir area

S. No	List of species	Site 01	Site 02	Site 03
1	*Microcystis aeruginosa* Kutz	+	+	+
2	*Chroococcus cohaerens* (Breb) Nag	+	+	+
3	*Chroococcus pallidus* Nag	+	+	+
4	*Gloecapsa polydermatica* Kutz.	+	+	-
5	*Gloeothece samoensis wille*	+	+	+
6	*Aphanocapsa biformis* A.Br.	+	+	+
7	*Aphanocapsa koordersi* strom	+	-	-
8	*Spirulina meneghiniana* Zanard. ex Gomont	+	+	-
9	*Spirulina princeps* W. et G. S. West	+	+	+
10	*Spirulina subtilissima* Kutz. ex Gomont	+	+	+
11	*Oscillatoria acuta* Bruhl *et* Biswas, orth. mut. Geitler	+	+	+
12	*Oscillatoria annae* van Goor	+	+	+
13	*Oscillatoria irrigua* (Kutz). Gomont	+	+	+
14	Oscillatoria limosa Ag. Ex. Gomont	+	+	+
15	*Oscillatoria princeps* Vaucher ex. Gomont	+	+	+
16	*Oscillatoria subbrevis Schmidle* Forma	+	+	+
17	*Oscillatoria tenuis* Ag. ex Gomont	+	+	+
18	*Phormidium ambiguum* Gomon	+	+	+
19	*Phormidium retzii (Ag.) Gom*	+	-	-
20	*Lyngbya arboricola* Bruhl et Biswas	+	+	+
21	*Lyngbya hieronymusii* Lemm	+	+	+
22	*Lyngbya majuscula* Harvey ex Gomot	+	+	+
23	*Lyngbya perelegans* Lemm	+	+	+
24	*Lyngbya sordida* (Lanard.) Gomon	+	+	+
25	*Plectonema wollei* Farlow ex Gomont	+	+	-
26	*Richelia intracellularis* Johs. Schmidt	+	+	+
27	*Anabaena fuellebornii* Schmidle	+	+	+
28	*Anabaena variabilis* Kutzing ex. Born. et. Flah.	+	+	+
29	*Nostoc linckia* (Roth) Bornet ex Born. et Flah.	+	+	-
30	*Nostoc punctiforme* (Kutz.) Hariot	+	+	+
31	*Microchaete tenera* Thuret ex Born.et Flah.	+	+	+
32	*Rivularia sp.*	+	+	+
33	*Stigonema dendroldeum* Fremy	+	+	-
34	*Cladophora sp.*	+	-	-

35	*Oedogonium sp.*	+	+	+
36	*Oedogonium sp.*	+	+	+
37	*Chlamydomonas sp.*	+	-	-
38	*Scenedesmus bijuga Satpati, S. bijuga* (Turp.)	+	-	-
39	*Scenedesmus quadricauda (Turp.) Breb*	+	+	-
40	*Pediastrum sp.*	+	+	+
41	*Pediastrum biwae Negoro.*	+	+	+
42	*Spirogyra sp.*	+	+	+
43	*Spirogyra communis* (Hassal) Kutzing	+	+	+
44	*Spirogyra majuscula* Kutzing	+	+	+
45	*Spirogyra maravillosa* Transeu	+	-	+
46	*Cosmarium* sp.	+	-	-
47	*Synedra ulna* (Nitz) Her	+	+	+
25	*Navicula anglica Ralfa*	+	+	-
26	*Navicula cari* Her. V. anguta Grun	+	+	-
27	*Navicula hungarica* Grun	+	+	-
Total		50	43	35

Percentage of phytoplankton diversity

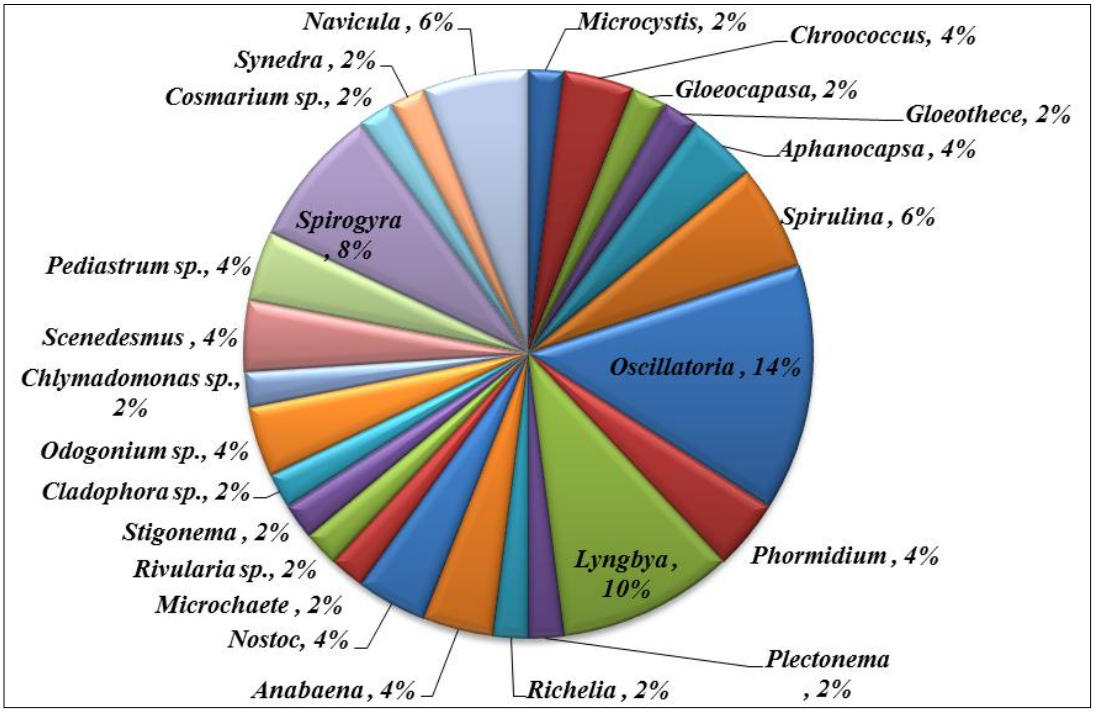

Fig 1: Graphical representation of algal diversity of Purna river with all species in the percentage form

In the present planktonic diversity survey of Yeldari dam class Cyanophyceae members were most dominant with 16 genera to all three sites as compared to Chlorophyceae (07) and Bacillariophyceae (02) as shown in table 02. As per the site wise study first site with 50, second 43 and from third site 35 algal members were recorded. Total 25 algal genera were recorded out of that 16 genera from Cyanophyceae, 07 genera from Chlorophyceae and 02 genera belongs to Bacillariophyceae. The algal genera belonging from class Chlorophyceae are *Spirogyra sp.*(8%), *Oedogonium sp.* (4%), *Pediastrum sp.* (4%), *Chlamydomonas sp.* (2%), , *Scenedesmus sp.* (4%), *Cladophora sp.* (2%), *and Cosmarium sp.* (2%) from class Cyanophyceae *Microcystis sp.* (2%), *Chroococcus sp.* (4%), *Gloeocapasasp sp.* (2%), *Gloeothece sp.* (2%) , *Aphanocapsa sp.* (4%), *Spirulina sp.* (6%), *Phormidium sp.* (4%), *Oscillatoria sp.*(14%), *Lyngbya sp.* (10%), *Plectonema sp.*(2%), *Richelia sp.* (2%), *Anabaena sp.*(4%), *Nostoc sp.* (4%), *Microchaete sp.* (2%), *Rivularia sp.* (2%), and *Stigonema sp.* (2%), etc. and from class Bacillariophyceae *Synedra sp.* (2%) and *Navicula sp.* (2%) were recorded. In this over all study *Oscillatoria*, *Lyngbya* and *Spirogyra* specimens were most dominant which shows 14%, 10% and 8% percentage which is highest percentage in this research survey. Reported species were mainly belongs from 15 families i.e. Chroococcaceae, Oscillatoriaceae, Nostocaceae, Microchataceae, Rivularaceae, Scytonemaceae, Cladopharaceae, Oedogoniaceae, Chlamydomonaceae, Scenedesmaceae, Hydrodictaceae, Zygnemaceae Desmidiaceae, Fragilariaceae and Naviculaceae along with nine orders i.e. Chroococcales, Nostocales, Stigonematales, Cladophorales, Oedogoniales, Volvocales, Chlorococcales, Zygnemales and Pennales. Total 50 algal species were recorded from 1st site, 43 from 2nd site but *Aphanocapsa koordersi, Phormidium retzii, Cladophora sp., Chlamydomonas sp. Scenedesmus bijuga, Spirogyra maravillosa* and *Cosmarium* sp. were absent from 2nd site and 35 algal species were recorded from 3rd site but *Gloecapsa polydermatica, Aphanocapsa koordersi, Spirulina*

meneghiniana, Phormidium retzii, Plectonema wollei, Nostoc linckia, Stigonema dendroldeum, Cladophora sp. Chlamydomonas sp. Scenedesmus bijuga, Scenedesmus quadricauda, Cosmarium sp. *Navicula anglica, Navicula cari* and *Navicula hungarica* species were absent from 3rd site its mention in table 02.

4. Discussion

In this planktonic diversity study total 50 algal specimens were recorded with 25 algal genera from 15 families from three sites. In this survey *Oscillatoria* (14%), *Spirogyra* (8%), *Lyngbya* (10%), *Navicula* (6%) and *Spirulina* (6%) shows the highest percentage as compared to others remaining all algal specimens it shows only 2% and 4%. In this study the genus *Oscillatoria* was recorded with 7 species i.e. O. *acuta, O. annae, O.irrigua, O. irrigua, O.* limosa, *O. princeps, O. subbrevis* and *O. tenuis*, genus *Spirulina* with three species i.e. *S. meneghiniana, S. princeps* and *S. subtilissima*, genus *Lyngbya* with 5 species *i.e. L. arboricola, L. hieronymusii, L. majuscule, L. perelegans and L. sordid*, genus *Spirogyra* with four species i.e. *S. communis, S. majuscule* and *S. maravillosa, genus Navicula* with three species i.e. *N. anglica, N. cari and N. hungarica, genus Pediastrum* with two species one at species level and one at genus level i.e. *Pediastrum biwae*, genus *Scenedesmus* with two species i.e. *Scenedesmus bijuga and S. quadricauda*, genus *Phormidium, Anabaena, Nostoc, Oedogonium* and *Chroococcus* were recorded with two species i.e. *Anabaena fuellebornii and A. variabilis, Phormidium ambiguum* and *P. retzii, Nostoc linckia, N. punctiforme, Chroococcus cohaerens* and *C. pallidus* and in *Oedogonium t*wo species identified at genus level only. Remaining all genus was recorded with one species only i.e. *Microcystis aeruginosa, Gloecapsa polydermatica, Gloeothece samoensis, Plectonema wollei, Richelia intracellularis, Microchaete tenera, Rivularia sp., Stigonema dendroldeum, Chlamydomonas sp. Cosmarium* sp. and *Synedra ulna*. This algal genera were also recorded by many researcher like Prescott, G.M. in (1951) from Western Great Lakes Area; Shukla et.al. in (2008) from Foothills of Western Himalaya ; Tippawan and Yuwadee in (2012) from Thailand; Kumar and Sahu in (2012) from in Paddy Fields of Lalgutwa Area, Ranchi, Jharkhand; Hosmani in (2013) from Mysore district ; Satpati et.al. in (2013) from Sundarbans mangrove forest, India; Jain in (2015) from Chhatarpur District of Madhya Pradesh and Gupte in (2017) from Shelar Lake.

5. Conclusion

The present investigation deals with the phycological study of algal flora vicinity along the Yeldari dam three sites. In this investigation total 50 species were recorded which belongs from three classes Cyanophyceae (33 species), Chlorophyceae (13 species) and Bacillariophyceae (04 species). In this research study class Cyanophyceae algal species were most dominant as compare to other i.e. thirty four in number. Out of three selected sites there was rich algal growth recorded from 1st site as compared to second and third and most dominant genus *Oscillatoria, Lyngbya* and *Spirogyra* was recorded. From first site 50 species, second 43 species and from third site 35 species was recorded. Reported species were mainly belongs from the 25 genera were distributed in 15 families.

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