Biodiversity of Microalgae and Cyanobacteria from Salt Pans of Tuticorin and Marakannam, Tamil Nadu, India

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Abstract:

The microbial diversity represents larger reservoir for potential discovery of new biotechnological products, new pharmaceutical and new enzymes to carry out novel process. The biodiversity of Microalgae, cyanobacteria from saltpans of Tuticorin and Marakannam, Tamil Nadu, India was estimated. Salt pans are one of the hypersaline extreme environment exhibit wide ranges of environmental stress through salinity changes. Among halophilic microorganism, bacteria, cyanobacteria, diatoms, green microlage and fungi are abundant in saltpans. Recent trends of research are focusing to identify new potential algae from its diversity which can be useful to mankind. The halophilic cyanobacteria show high value products and potential one.

Key words: Cyanobacteria, Biodiversity, Microalgae, Halophilic, Salt pans.

Introduction

Microalgae communities diverge according to the ambient environmental factors of marine and salt pan environments. The long coastlines of tropical India offer a rich scope to explore marine cyanobacterial resources for human welfare and national development. Saltpans are one of the hypersaline extreme environments. In the hypersaline extreme environment of salt pans microalgae community and diversity is very low. There are no exclusively freshwater divisions of algae, but certain groups exhibit a greater abundance and diversity within freshwaters, especially the members of Cyanophyceae, Chlorophyceae, and Charophyceae (Smith 1950). The green algae, conjugating greens and desmids (Zygnematophyceae) encompass a rich in almost exclusively occupy freshwater. Other groups such as the Bacillariophyceae and Chrysophyceae are well represented in both spheres. Among the halophilic microalgae, cyanobacteria, diatoms and green algae are abundant in salt pans (Nagasathya and Thajuddin 2008). They are characteristically exposed to a wide range of environmental stress and perturbations manifest mainly through salinity changes. Among halophilic microorganisms, bacteria, cyanobacteria, diatoms, green algae and fungi are abundant in saltpans. (Das Sarma and Arora, 2002). Marine cyanobacteria are capable of

adapting salinity stress. The objective of this study was distribution and biodiversity of the cyanobacteria occurring in the saltpans of Tuticorin and Marakannam, Tamil Nadu, Inida.

Materials and Methods

The present survey was done in four different salt pans located from Tuticorin and Marakannam, Tamil Nadu, India. The Physio-Chemical analyses were carried in all the water samples by using YSI Multiparameter (Model: 600XL-B-O, 650MDS, YSI Incorporated, Yellow Springs, Ohio 45387, USA). Saltpan water samples and visible cyanobacterial specimens were collected in polythene bags and plastic vials with code numbers pertaining to the place and area of collection. The collected water samples were brought to the laboratory and allowed to centrifuge at 8000 rpm for 15 min. to obtain the thick algal pellet. An inoculation loop full of algal pellet was used as inoculums and subjected to streak on Petri plates with solidified BG11 medium and F/2 medium using 2 % agar. The streaked Petri plates were then kept for incubation under light intensity of 120 µmol photons/m^{-2}/s^{-1} on 12:12 h Light/Dark with 25 °C. They were maintained in culture room at the Department of Biotechnology, University of Madras, Tamil Nadu, India under white fluorescent lamps (1400 lux).

All the plates were frequently monitored for every day and the arousing colonies were marked. Each and every pure algal colony was then allowed to streak on separate solidified BG11 and F/2 medium to obtain pure cyanobacterial cultures. Identification of the cyanobacterial samples were carried out using the taxonomic publications of (Butcher, 1959, Carmelo and Grethe, 1997), Geitler (1932), Iyengar and Desikachary (1944), Smith (1950), Desikachary (1959). At the same time all the isolated microalgal cultures were further sub-cultured for 21 days interval to maintain the pure microalgal colonies.

Results

Isolation studies

Different groups of algae were observed such as Chlorophyceae, Bacillirophyceae and Cyanophyceae were recorded inTuticorin and Marakannam, Tamil Nadu, India. The most common microalgae observed were *Chlorella* sp., *Chlorococcum* sp., *Scendesmus* sp., *Cosmarium* sp., *Dunaliella* sp., *Closterium* sp., *Navicula* sp., *Nitzschia* sp., *Pinnularia* sp., *Synedra* sp., *Nostoc* sp., *Anabena* sp., *Oscillatoria* sp., *Phormidium* sp., *Anabaena* sp., *Lyngbya* sp., *Synechocystis* sp., *Synechococcus* sp. and *chrocooccus* sp. in all the places of collections which are considered as versatile species.

Cyanobacterial flora in different salt pans of Tuticorin.

Microorganism	Salt pan 1	Salt pan 2	Salt pan 3	Salt pan 4
Cyanophyta				
Anabaena sp	+	+	+	+
Lyngbya sp	+	-	+	-
Oscillatoria sp	+	+	+	+
Phormidium sp	+	+	+	+
Synechococcus sp	+	+	-	-
Synechocystis sp	-	-	-	+
Bacillariophyta				
Navicula sp	+	+	+	+
Nitzschia sp	+	+	+	+
Pinnularia sp	-	+	-	+
Synedra sp	+	-	-	+
Chlorophyta				
Chlorella sp	+	+	+	+
Chlorococcum sp	-	+	+	-
Cosmarium sp	+	-	-	-
Dunaliella sp	+	+	+	+
Closterium sp	+	-	-	+

Cyanobacterial flora in different salt pans of Marakannam

Microorganism	Salt pan 1	Salt pan 2	Salt pan 3	Salt pan 4
Cyanophyta				
Anabaena sp	+	+	+	+
Lyngbya sp	+	-	+	-
Phormidium sp	+	+	+	+
Synechococcus sp	+	+	-	-
Microcystis sp	+	+	+	+
Bacillariophyta				
Navicula sp	+	+	+	+
Nitzschia sp	+	+	+	+
Synedra sp	+	-	-	+
Chlorophyta				
Chlorella sp	+	+	+	+
Chlorococcum sp	-	+	+	-
Dunaliella sp	+	+	+	+
Scenedesmus sp.	+	+	-	+
Closterium sp	+	-	-	+

Non – heterocystous forms dominate in the saline environment and this finding is in accordance with many other workers (Thajuddin and Subramanian, 1992; Palaniselvam, 1998). Desikachary (1959) suggested that probably 20% of all known cyanobacteria occur in saline conditions and majority of them are truly marine

(Thajuddin and Subramanian, 2002; Thajuddin and Subramanian, 1991a; Nagarkat *et.al.,* 2000). In the present investigation that the diversified ecosystem of cyanobacterial diversity in salt pans. The both samples possess more than 15 morphologically different cyanobacterial species represented. Morphological identification of cyanobacteria showed both filamentous and unicellular growth formation was observed.

Conclusion

Salt production has played an irreplaceable role in the livelihood of Tuticorin and Marakannam people. As a result of this study, it was found that all the cyanobacterial strains isolated from saltpan samples are halophilic. This indicates that saltpans of Tuticorin and Marakannam offer untapped reservoir of halophilic marine cyanobacteria. Awareness of the proper physico-chemical and biological management of the salt pans can lead in the co-cultivation of Muicroalgae, cyanobacteria, etc . These strains being indigenous in origin can be brought under mass cultivation in outdoor environments and can further be utilized as a most promising source of value added compounds of industrial importance.

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