Proceedings of the International Seminar
on
BLUE GROWTH INITIATIVE: SUSTAINABLE FISHERY DEVELOPMENT STRATEGIES AND ADVANCED TECHNOLOGIES FOR AQUACULTURE (BISFAA)

7th - 9th AUGUST, 2019

Organized
by

PG & Research Department Of Zoology
(DST-FIST Supported)
Fatima Mata National College (Autonomous), Kollam, Kerala, India

Supported by

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KERALA STATE COUNCIL FOR SCIENCE TECHNOLOGY AND ENVIRONMENT
KSCSTE

ISBN 978-93-5382-468-6 BISFAA 2019

BENTHIC MICROALGAL DIVERSITY OF AYIRAMTHENGU MANGROVES AND THEIR ECOLOGICAL ROLE

Jisha S. and B. Hari
Postgraduate Department of Zoology, Sree Narayana College, Kollam
(Affiliated to University of Kerala), 691001, Kerala
(E-mail: jishasooriya@gmail.com, hariprashobh@gmail.com)

Abstract: Mangrove ecosystems are one of the most productive and species diverse rich areas on earth. The study site, Ayiramthengu mangroves (Kollam district, Kerala) are fringing on the Kayamkulam backwater ecosystem. This area is the breeding and feeding grounds of a number of fishes and crustaceans. So huge numbers of larval forms of these species utilize this area as nursery grounds and they feed on planktons, micro benthos and organic detritus enriched by the mangroves. Regular samplings were done from three sampling stations for assessing the diversity of benthic microalgae. Fifteen species of benthic microalgae were collected and identified. The benthic micro flora reported from the three stations comprised of benthic algae which belongs to four classes viz. Bacillariophyceae, Cyanophyceae Pyrophyceae and Chlorophyceae. Class Bacillariophyceae dominated in the three sampling station. Pollution indicators were also present among the benthic micro algae. Presence of green alga, Spirogyra was noted from Station-3.

Key words: *Mangroves, Ayriamthengu, larval food, benthic microalgae*

Introduction

Mangroves are very interesting and distinctive communities found in tropical and subtropical land-sea ecotones. Mangroves represent a unique and ecologically important coastal habitat in the tropical and subtropical belts and are frequently seen as pioneer vegetation in coastal areas (Chapman, 1984). They are of the most productive ecosystem with high intrinsic and ecological value (Sunil Kumar, 2002). According to Quasim (1999) mangroves support high primary productivity and form rich nursery grounds for a variety of fishes, shellfishes and crustaceans. They are the feeding and breeding ground for many marine species (Shokita *et al.*, 1989; Nayak and Anjali, 2001). The larval forms of fishes and crustaceans often depend upon planktons, benthic microalgae, and detritus materials. Of which, benthic microalgae serve as main carbon source for the higher trophic organisms and macrofauna (Harith and Bojo, 2012). Benthic microalgae are microscopic eukaryotic algae that is abundantly seen in marine and detritus rich brackishwater ecosystems. In coastal waters, both phytoplankton and microphytobenthos, are considered as the prime component of higher trophic level organisms (Gillespie *et al.*, 2000). A number of studies have already done for documenting phytoplankton from aquatic ecosystems, but benthic microalgae are understudied. They are not always obvious and called as "secret garden" (Mac Intyre *et al.*, 1996). The paucity of the information on the diversity of benthic microalgae from Ayiramthengu mangroves prompted on the investigation on the assessment of diversity of benthic microalgae present in the Ayiramthengu mangrove ecosystem.

Materials & Methods

Ayiranthengu mangrove ecosystem (Kollam district, Kerala) was selected for the present study, which lies between latitudes 9° 02' and 9° 16' north and longitudes 76° 20' and 76° 12' east. The mangroves are a part of Kayamkulam estuary, which is a narrow stretch of tropical backwater on the west coast of peninsular India. The estuary opens to the sea at Vallaazeekal. Three stations were selected from the Ayiranthengu mangroves for the sampling of benthic microalgae. Station-1 is the part of the estuary and hence there will be regular interaction between the estuary and the mangrove area. This station is 1.5 km away from Ayiranthengu mangroves was fixed in the estuary for sampling. It is 1.5 m deep with sandy bottom. Station-2 is a shallow portion of the mangrove forest and is inundated and subjected to tidal influence. Major portion of the mangroves are found growing on the boarder and also within this zone. Station-3 is inside the mangrove forest, a stagnant shallow pool is formed due to the growth of mangroves. Here tidal effect is in a minimal rate due to bordering of the pool by roots of the mangrove trees. Hence most of the decaying plant parts and leaf litter are trapped here with very little disturbance. Sediment samples were collected from the three stations using a locally designed corer. Three replicates from each sampling site were also taken. The sediment samples were kept in polyethylene bags and preserved in formalin. The samples were sieved out and micro-benthos were separated and preserved in formalin. The micro benthos was examined under a binocular microscope and was identified with the help of standard books (Pennak, 1978; Tonapi, 1980).

Results & Discussions

The benthic micro flora comprised of benthic algae which were represented by four classes: Bacillariophyceae (*Amphora* sp., *Campylodiscus* sp., *Chaetoceros* sp., *Cocconeis* sp., *Coscinodiscus* sp., *Cyclotella* sp., *Hemidiscus* sp., *Melosira* sp., *Navicula* sp., *Pleurosigma* sp., *Triceratium* sp.), Cyanophyceae (*Chroococcus* sp., *Oscillatoria* sp.) Pyrophyceae (*Ceratium* sp.) and Chlorophyceae (*Spirogyra* sp.). Maximum number of species (11) were included under Bacillariophyceae, belonging to two orders, five Pennales and six Centrales. Pennales consisted of two families, Naviculoideae, 4 species (*Amphora* sp., *Campylodiscus* sp., *Navicula* sp., *Pleurosigma* sp.) and Achnanthaceae, one species only (*Cocconeis* sp.). Centrales included four families, Chaetoceraceae, one species (*Chaetoceros* sp.), Coscinodiscaceae, three species (*Coscinodiscus* sp., *Cyclotella* sp., *Melosira* sp.), Eupodiscaeae, one species (*Hemidiscus* sp) and Biddulphieae, one species (*Triceratium* sp.). Class-Cyanophyceae consisted of two species in two orders, Chroococcales (Chroococcaceae family, *Chroococcus* sp.) and Oscillatoriales (*Oscillatoria* sp.). Chlorophyceae and Pyrophyceae were represented by only one species each and they were *Spirogyra* sp. and *Ceratium* sp. respectively.

A comparative study on the occurrence of major groups of benthic algae was conducted. A total number of 15 species were predominantly and regularly found in Ayiranthengu mangroves. Maximum number of benthic micro algae (12 species) was reported from Station-2. Station-3 was represented by 10 species and Station-1 by 9 species. Among all the three stations, Class Bacillariophyceae was dominated. Twelve Bacillariophyceae, one Pyrophyceae and one Cyanophyceae were identified from Station-1. Station-2 was represented by nine Bacillariophyceae, two Cyanophyceae and one Chlorophyceae, while seven Bacillariophyceae, two Cyanophyceae and one Chlorophyceae were documented from Station-3.

Pollution indicators were notable members among the benthic micro algae. Presence of green alga, Spirogyra was noted from Station-I. The presence can be justified by the stagnant nature of the station with penetrating sunlight to the bottom. In the estuarine and shallow subtidal systems like mangroves phytoplankton and benthic microflora play an equally significant role by contributing their biomass to the ecosystem (Underwood *et al*., 1998). The biomass of benthic microalgae are considered to be equal or even surpass the biomass of phytoplankton. Pellagic phytoplankton intercept the flux of light from the surface to the bottom, at the same time benthic algae intercept the flux of nutrients from the sediment to the water column. The change in the dominance of these two groups may alter the entire trophic web (Reynolds, 2008). Any disturbance of the benthic regions of mangrove areas and adjacent brackish water areas especially, sand mining and plastic pollution can definitly impart adverse effects on the biomass of microbenthos and in turn the food web of the ecosystem. Thus the intricate food webs in the mangrove areas can be sustainably conserved through the conservation of benthic microflora and benthic floor. This will further increases the productivity of these ecosystem. It is high time to derive sustainable conservation and management policies for the take care of the benthic floors of Ayiranthengu mangroves and adjacent Kayankulam backwaters.

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