

Marine Macroalgae: A Host for Epiphytic Microalgae at Bhavnagar District, Gujarat, India

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ABSTRACT

Algae are class of autotrophic organism grows in both fresh and marine environment. Marine macro algae especially seaweed being exploited as a food, animal feed, chemical, biofuels, bio oils even in cosmetics for their bioactive components. In marine habitat some seaweed act as a civil engineer and microalgae build complex community on their host seaweed or macro algae. This association sometimes becomes fruitful by maintaining food chain and increase the rate of productivity of ecosystem and sometimes it affects the growth of host organism. Investigation on association of epiphytic microalgae with seaweed is rare in Bhavnagar district coast, Gujarat, India. Thus, this investigation carried out for forming a checklist of epiphytic microalgae at Coast of Gopnath, Bhavnagar district, Gujarat, India. During this study 7 species of epiphytic microalgae were recorded on 3 different host macro algae *Gelidium crinale*, *Chaetomorpha crassa*, *Cladophora glomerata*. This research makes check list of epiphytic algae in Gopnath coast and focused on the need of extensive investigation about relationship between benthic flora and fauna with seaweed and their effect on seaweed growth, phytochemical productivity rate.

KEYWORDS: Epiphytes microalgae, Host Macroalgae, Gopnath coast, Effect

INTRODUCTION

Marine life such as marine animal, coral reefs, mangrove, seaweeds, sea grasses play important role to support and maintain the marine ecosystem and marine food chain. In marine life seaweed or macro algae was functioning high productive organism in food chain. Healthy food chain sustains survival of marine animal as well as small scale fisherman's income sources. The commercial production of seaweed has expanded greatly over the past century with various beneficial application in field of food, fodders, chemical production, medicines, dietary supplements, biofuels (Tiwari & Troy, 2015). Seaweed or macro algae play a marine civil engineer role by providing themselves as a host or substratum for building epiphyton, epiphytes or epiphytic micro algal development.

The microalgae associate to other plants known as epiphyton, epiphytes or epiphytic microalgae [18]. Epiphytic microalgae not easily observed by naked eye as it is microscopic organism. Epiphytes diminutive species must rely on a host for survival

and adjust to the chemical and physical characteristic of their host's environment (Burns and zotz 2010).

Epiphytes play an important ecological role in primary production (Brock 1970, D'Antonio 1985). They act as a major food source for various organisms, such as snails, fish and other invertebrates (Reyes-Vasques 1970, D'Antonio 1985). Phytoplankton, Diatoms, Dinoflagellates and Cyanobacteria consider as a epiphytic microalgae. They are minute in size and sessile microscopic organism associated with macroscopic macroalgae, which are presenting abundant in intertidal zone. Primarily they grow near-shore coastal body water with suitable substrates [15]. The thalli of macroalgae provide ample space for colonization and house minuscule epiphytic algal communities (Orthuno-Aguirre and Riosmena-Rodriguez 2007).

In aquatic environment seaweed does not require fertilizer or arable land for their development. Their growth maintains healthy nutrient rich food chain, ecosystem, and give chance to other epiphytic

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microalgae for their development and productivity increment. The structure and texture of blades and thallus is suitable substrate for attachment of microalgae [16]. Biotic and abiotic components of environment affect the distribution of epiphytic microalgae on host macroalgae. Biotic factor like seasonal cycle of host, surface characteristic, grazing activity of herbivores in food chain and abiotic factors

like temperature, salinity, current of water, light, and water quality may influence the diversity, abundance and community structure of epiphytic algae.

Sometimes over development of epiphytic algae affect the seaweed varieties especially for cultivated seaweed by decreasing in biomass due to competition in space and nutrient with the host (Buschmann and Gomez 1993).

MATERIAL AND METHOD:

Study area



Fig: 1 study site

Study carried out at Gopnath coast part of Bhavnagar district, Gujarat, INDIA. It is come between N 21° 14' 52.4436", E 72° 4' 20.8272", 75 km far from Bhavnagar city. Majority of the coast is rocky.

Sampling and sample analysis

During the survey at study site, random sampling method selected with the help of 1m² quadrat. The species present in quadrat were collected in polythene bags and brought at laboratory. In laboratory sample washed with seawater as well as with regular water for removing debris. Then carefully epiphytic algae separated from their host and observed under the light microscope. Species identified with the help of some monograph, reference book and articles. Monthly physicochemical parameter taken by multi parameter kit. (Due to covid infection in December month, data was not taken)

RESULT AND DISCUSSION

This study carried out during September 2020 to march 2021 month. In random sampling method epiphytic microalgae associated with three host marine macroalgae.



Fig: 2 *Gelidium crinale* cover with epiphytic microalgae *Erythrotrichia carnea*

Total seven epiphytic microalgae reported in this study. Host macroalgae belongs to Chlorophyta group and Rhodophyta division. This host species are found more and less abundant in every season except *chaetomorpha crassa*. Variation in biotic components, lifespan of the host, variation in seasonal distribution of macro algae species form different habitats for epiphytic microalgae. Freshwater input, high currents, rainfall and other various physic chemical process take place which change the water quality, water nutrient that directly affect the health of marine ecosystem (Nirali Mehta and Shailesh Mehta 2021) and diversity of algae.

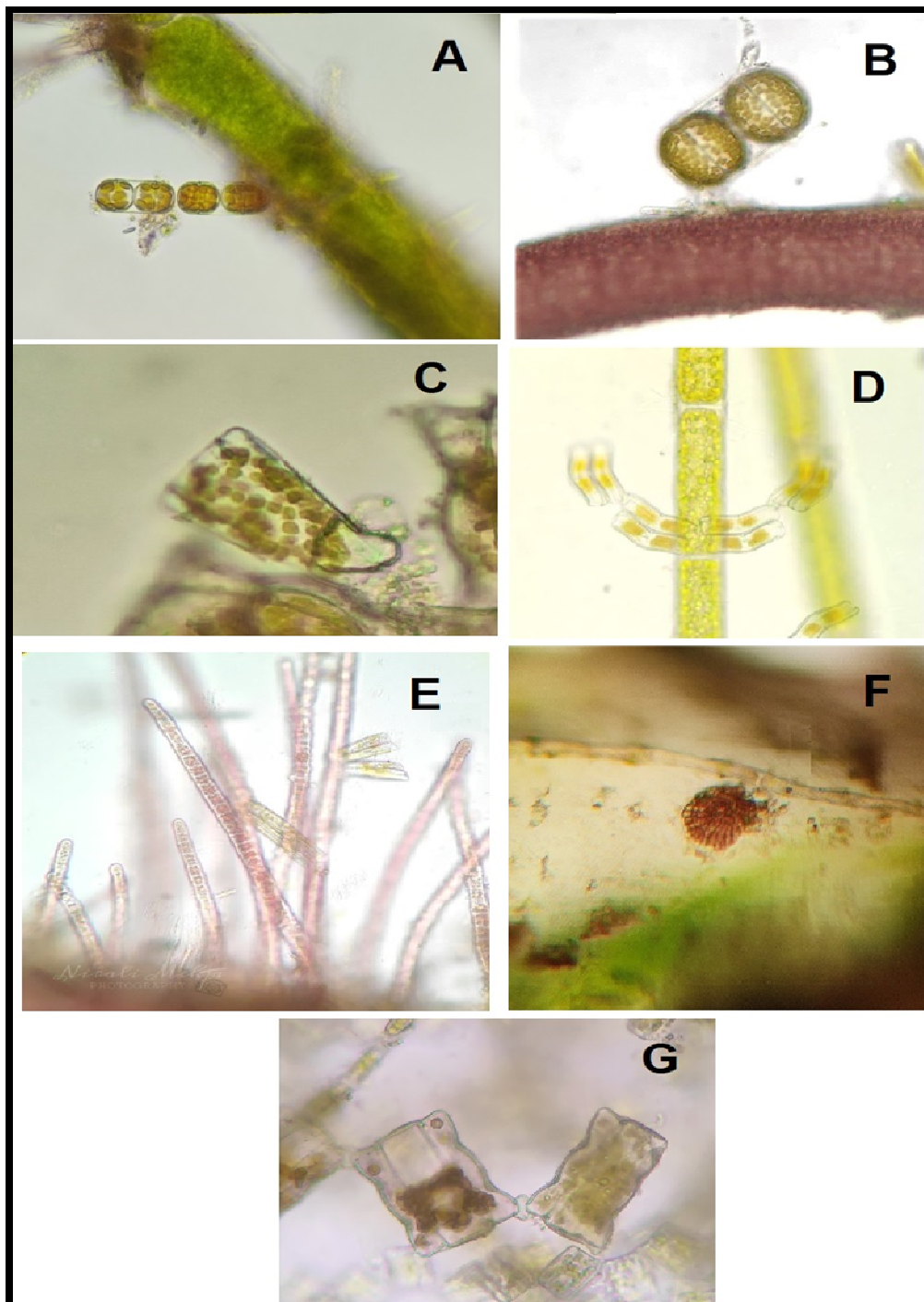


Fig: 3 Epiphytic microalgae: A-B) *Melosira* sp., C) *Licmophora* sp , D) *Achnanthes* sp. , E) *Erythrotrichia carnea* (Dillwyn 1807) J. Agardh 1883., F) *Hydrolithon farinosum*(J.V.Lamouroux), G) *Biddulphia reticulate*

A-B) *Melosira* sp.

Classification

Kingdome: Chromista

Subkingdome: Harosa

Division: Ochrophyta

Class: Bacillariophyceae

Order: Melosirales

Family: Melosiraceae

Genus: Melosira

Association: This epiphytic microalgae make association with the marine green macroalgae *Cladophora glomerata* and *Gelidium crinale* belongs to chlorophyta, rhodophyta division.

C) *Licmophora sp.*

Classification

Kingdome: Chromista

Subkingdome: Harosa

Division: Ochrophyta

Class: Bacillariophyceae

Order: Licmophorales

Family: Licmophoraceae

Genus: Licmophora

Association: This epiphytic microalgae make association with the marine green macroalgae *Cladophora glomerata* belongs to chlorophyta, division.

D) *Achnanthes sp.*

Classification

Kingdome: Chromista

Subkingdome: Harosa

Division: Ochrophyta

Class: Bacillariophyceae

Order: Achnanthesales

Family: Achnanthesaceae

Genus: Achnanthes

Association: This epiphytic microalgae make association with the marine green macroalgae *Cladophora glomerata* belongs to chlorophyta, division.

E) *Erythrotrichia carnea* (Dillwyn 1807) J. Agardh 1883

Classification

Kingdome: Plantae

Subkingdome: Biliphyta

Division: Rhodophyta

Class: Compsopogonophyceae

Order: Erythropeltales

Family: Erythrotrichiaceae

Genus: Erythrotrichia

Species: *Erythrotrichia carnea* (Dillwyn 1807) J. Agardh 1883

Association: This epiphytic microalgae associate with the marine red macroalgae *Gelidium crinale*. This macroalgae is member of rhodophyta division.

F) *Hydrolithon farinosum* (J.V.Lamouroux) Penrose & Y.M.Chamberlain, 1993

Classification

Kingdome: Plantae

Subkingdome: Biliphyta

Division: Rhodophyta

Class: Florideophyceae

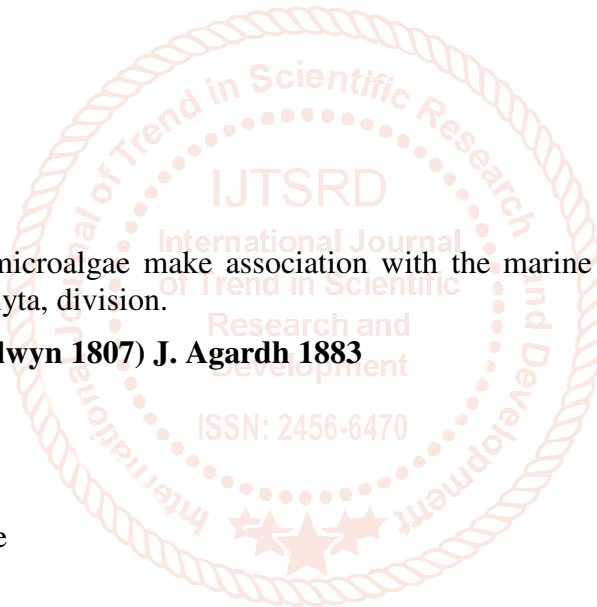
Order: Corollinales

Family: Hydrolithaceae

Genus: Hydrolithon

Species: *Hydrolithon farinosum* (J.V.Lamouroux) Penrose & Y.M.Chamberlain

Association: This epiphytic microalgae make association with the marine green macroalgae *Chaetomorpha crassa*. This macroalgae is member of Chlorophyta division.



G) *Biddulphia reticulata***Classification****Kingdom:** Plantae**Subkingdom:** Biliphyta**Division:** Ochrophyta**Class:** Bacillariophyceae**Order:** Biddulphiales**Family:** Biddulphiaceae**Genus:** *Biddulphia***Species:** *Biddulphiareticulata*

Association: This epiphytic microalgae make association with the marine green macroalgae *Cladophora glomerata* belongs to chlorophyta, division.

Table: 1 Presence and Absence of epiphytic micro algal associate with macroalageat study site.

Sr. No.	Epiphytic Microalgae	Host Macroalgae		
		<i>Gelidium crinale</i>	<i>Chaetomorpha crassa</i>	<i>Cladophora glomerata</i>
1.	<i>Melosira sp.</i>	√	-	√
2.	<i>Licmophora sp.</i>	-	-	√
3.	<i>Achnanthes sp.</i>	-	-	√
4.	<i>Erythrotrichia carnea</i>	√	-	-
5.	<i>Hydrolithon farinosum</i>	-	√	-
6.	<i>Biddulphia reticulata</i>	-	-	√

Table: 2 Month wise occurrence of Epiphytic Microalgae.

SPECIES	MONTH					
	September	October	November	December	January	February
<i>Melosira sp.</i>	-	√	√	√	√	√
<i>Licmophora sp.</i>	√	-	√	-	√	-
<i>Achnanthes sp.</i>	√	-	-	√	-	-
<i>Erythrotrichia carnea</i>	-	√	√	-	√	-
<i>Hydrolithon farinosum</i>	-	√	√	-	-	√
<i>Biddulphia reticulata</i>	-	-	√	-	√	√

Table: 3 Physicochemical parameter of seawater at Gopnath site.

Month	Temperature (°C)	pH	EC. (mS)	TDS (ppt)	Salt (ppt)	D.O. (mg/l)
September	36	8.54	38.7	27.1	19	8.3
October	36.8	8.35	36.5	24	17.8	5.45
November	31.3	9.07	26.6	17.6	13.3	9.0
January	27.8	8.36	44.7	29.5	22.4	7.91
February	27.8	8.42	45.7	28.9	23.6	6.8

Epiphytic microalgae like diatoms were dominant epiphytes due to their high fucoxanthin content which have most efficient photosynthetic carotenoids that absorb maximum light and thus it is more abundantly dominant on host marine macroalgae species.

CONCLUSION:

During this study 6 distinct morphotaxa of epiphytic algae identified from the thalli of 3 different seaweed. Epiphytic algae maximum recorded in November month and less recorded in September and December. These study revealed important source for future explanation of marine epiphytes and their host specificity mechanism. It is also provide baseline data for seasonal and spatial distribution of associated flora because biotic and abiotic both factor affect the distribution of organism in trophic food chain. The main aim behind this research was to make check list

of epiphytic algae in Gopnath coast and focused on the need of extensive investigation about relationship between benthic flora and fauna with seaweed and their effect on seaweed growth , phytochemical productivity rate.

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