

Algal succession patterns on the rocky shores of Batu Ferringhi in Penang Island

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Observations at 3 fixed stations, viz. stations 1, 2 and 3, over a period of two years on the rocky shores of Batu Ferringhi, Penang Island, indicated the colonizational successions of 9, 8 and 6 species of algae at each station, respectively. Three algal species, viz. *Jania* sp., *Sargassum grevillei* and *Struvea delicatula*, demonstrated identical colonizational successions, i.e., high during the early and late months of the year, whilst thin/none during the middle months of the year. Though the Chlorophyta *Valoniopsis pachynema* was found in all the three stations the pattern of colonizational succession at only stations 1 and 3 were identical and similar to the above mentioned species, whilst station 2 manifested a pyramidal type of density distribution with maximum density between the months of July-September and dropping low in the early and late months of the year.

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Introduction

Recent studies by SIVALINGAM (1976, 1977a, b & c) on various aspects of tropical algae in Penang Island have unravelled many unknown facts on the phycology of the marine environment of this island. Due to the various intriguing factors of the algal forms in this region the author has initiated a study on the colonizational successions of algae at Batu Ferringhi, where most of the algal species are confined within a narrow span of rocky shore conformation.

The main purpose of this research is to present qualitative information on algal colonizational successions over a 24 month period (January 1976—December 1977) indirectly focussing upon the possibilities of providing shelters to increase the standing stock of fishery resources in depauperate areas through the introduction of artificial substrates which may be future grazing grounds. On top of this, the investigation might also throw some insight into the seasonal trends of the algal components.

Materials and Methods

The rocky shores of Batu Ferringhi with the three established investigation stations are as indicated in **Plate 1**. All three stations are ca. 18.3 meters apart, with station 3 being most exposed to wave action followed by stations 2 and 1.

Prior to experimentation 16.24cm square investigation plots at stations 1, 2 and 3 located near the intermediate tidal zone, were scrapped off completely from algal forms and its colonizational successions were followed regularly each month over a period of two years. In this experimentation, 15.24 cm square plots were employed after taking into consideration the narrowness in depth distribution, scantiness and miniaturization of algal forms in the waters of this island.

The density of colonization was estimated visually and classified into 5 categories, i.e., (1) large amount; (2) fairly large amount; (3) little amount and (4) trace. Based on these evaluations the colonizational succes-

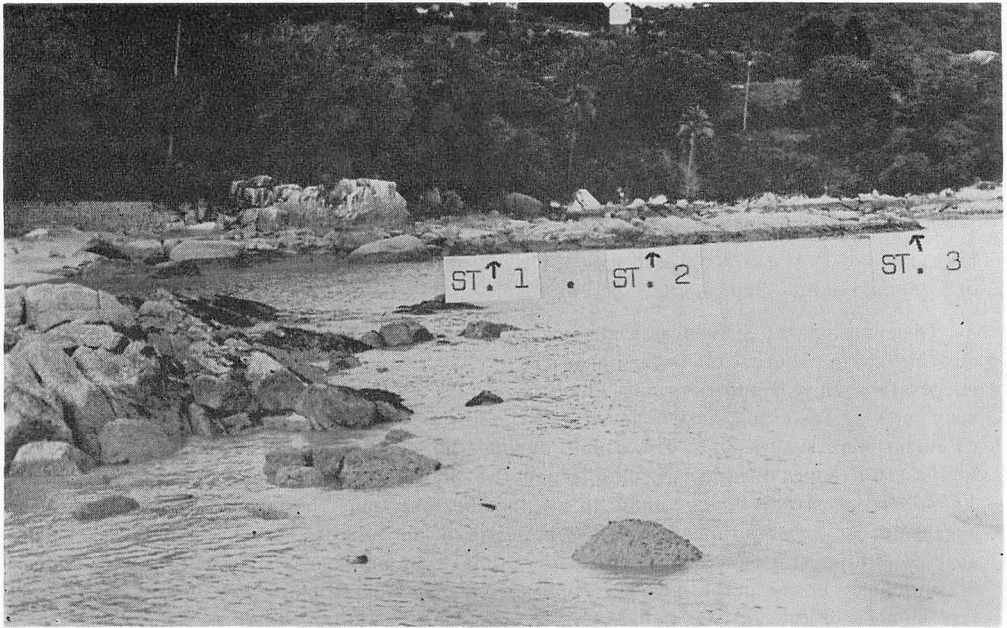


Plate 1. Rocky shores of Batu Ferringhi showing the locality of the three stations of investigation.

sion patterns of the three stations were observed.

Results

Fig. 1. shows the algal successions in the three stations. In station 1, 9 algal species established themselves with *Jania* sp., *Sargassum grevillei* and *Valoniopsis pachynema* having a closely related colonizing pattern. Colonization of these species take place between the months of January—February and the later part of the year. The algal species *Acanthophora orientalis* establishes itself between the months of April—May, *Gracilaria* sp. 1 and 2 during September, *Hypnea* sp., 1 during October, *Padina tenuis* during August and *Struvea delicatula* in January. Populationwise *Jania* sp., *Sargassum grevillei* and *Valoniopsis pachynema* seem to be the dominant species.

In station 2 only eight algal species were identified, out of which *Sargassum grevillei*, *Cladophora fascicularis* and *Struvea delicatula* showed similar colonizational succession patterns as that of station 1. However,

Jania sp., *Sargassum grevillei* and *Cladophora fascicularis* were the predominant algal species. Unlike station 1, instead of *Hypnea* sp. 1, *Hypnea* sp. 2 was found with irregular trace existence during the months, February, March and September. Further, the algal species *Dictyota bartayresii* was predominant in September like *Gracilaria* sp. in station 1. The peculiarity of station 2 is that the Chlorophyta *Valoniopsis pachynema* showed a different colonization succession pattern as compared to stations 1 and 3. It demonstrated maximum colonization between the months of July—September and decreased in density during the months of July—September and decreased in density during the early and late months of the year.

Station 3, as expected due to direct exposure to adverse wave action, harboured only 6 algal species out of which *Jania* sp., *Sargassum grevillei*, *Struvea delicatula* and *Valoniopsis pachynema* colonized in similar patterns to that of stations 1 and 2. Though *Hypnea* sp. 2 and *Cladophora fascicularis* were also found in this station they only

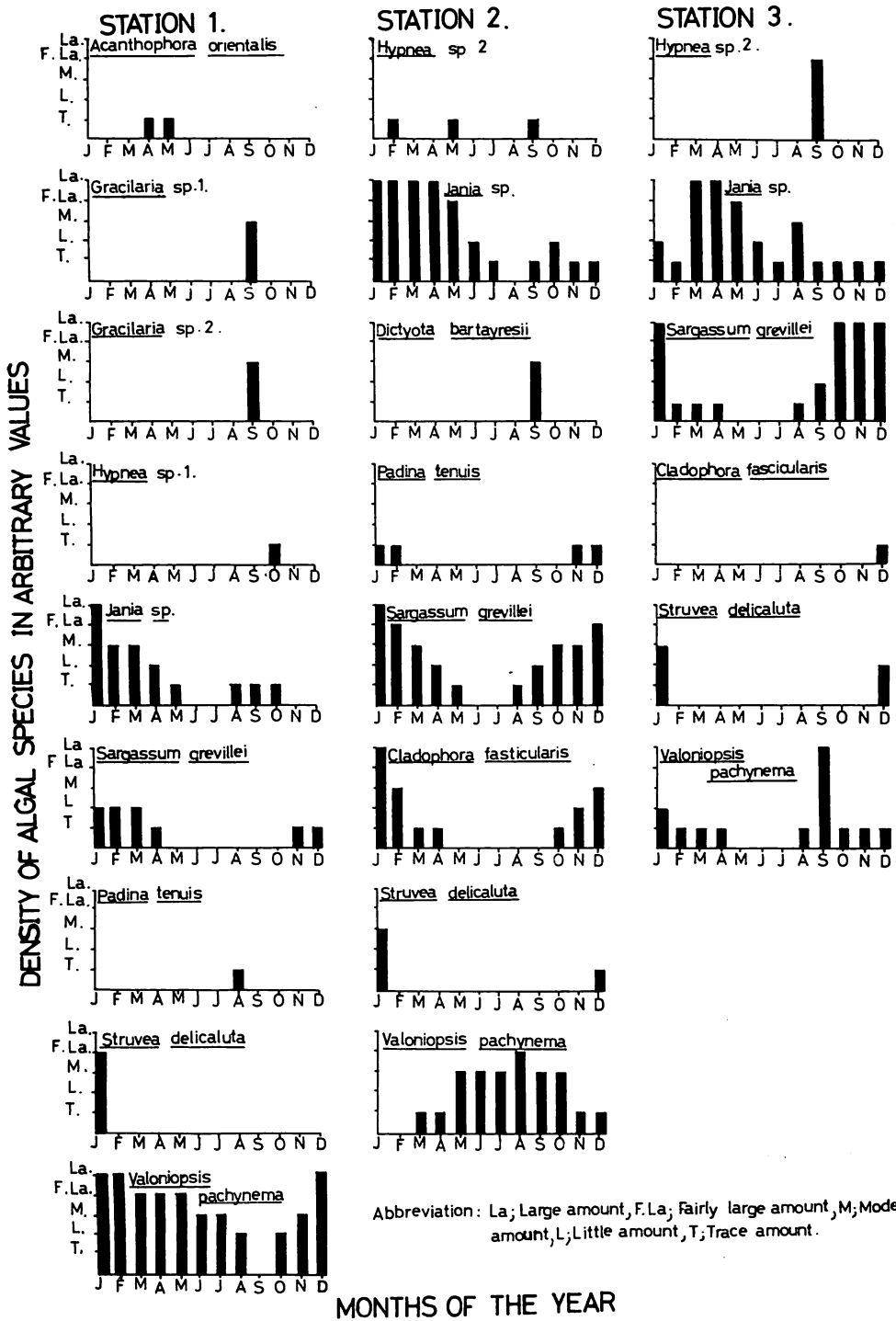


Fig. 1. Patterns of algal succession by the various algal species colonizing in the three stations of investigation.

colonized specifically during the months of September and December, respectively, unlike station 2.

Discussion

It is obvious from the results that the colonizational succession patterns of algae in the marine environment of Penang Island is greatly influenced by the two monsoon seasons existent in this region, i.e. the North East Monsoon (East Coast of Peninsular Malaysia) and the South West Monsoon (West Coast of Peninsular Malaysia) which prevail between the months of October till early May and May till September, respectively. This suggests that during the heavy rainstorms of the South West Monsoon season due to the variation in numerous coastal environmental factors the density of algal colonization is scanty while high and successional during the dry seasons of January till April/May and during the North East Monsoon season between the months of October and May.

Results at all three stations indicate explicitly that the algal species of *Jania* sp., *Padina tenuis*, *Sargassum grevillei*, *Cladophora fascicularis*, *Struvea delicatula* and *Valoniopsis pachynema* have two seasonal colonization in a year and this seems to occur during the dry season in this particular region. The same too applies to the other algal species though some are monoseasonal while others bi-and triseasonal. Further, the variation in algal diversity from station 1 to 3 suggest that prevailing currents and

wave action play a vital role in governing such colonizing factors notwithstanding the fact that these stations are not situated very far apart from each other.

Based on the results obtained the author is of the opinion that with careful artificial substrate introduction, i.e., *tyre reefs and specially designed concrete* would probably be possible to facilitate breeding grounds for marine fishery seedlings objectively to augment the depleting marine fishery resources of Malaysia through the present understanding of algal colonizational successions.

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P. M. シバリンガム：ペナン島 Batu Ferringhi の岩石海岸における藻類の遷移様式

ペナン島 Batu Ferringhi の岩石海岸に 3 定点を設置し、2 年間にわたって藻類の消長を観察した。*Jania* sp. *Sargassum grevillei*, *Struvea delicatula* の 3 種は年の初めと終りに優占し、また、緑藻の *Valoniopsis pachynema* は St. 1 と 3 では上述の種類と同じ様式の遷移が観察されたが St. 2 では 7 月から 9 月に優占するピラミッド形の消長を示した。