

A SURVEY ON MARINE MACROALGAE ALONG THE COAST OF SUDUKATTANPATTI, RAMESWARAM ISLAND.

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ABSTRACT - Marine macroalgae are commonly known as Seaweeds and distributed horizontally in different zonations viz. supra tidal (supra littoral), intertidal (littoral) and subtidal (sub littoral) regions of the seas, estuaries and also in the brackish water environments, wherever dead corals, rocks, stones, pebbles and any other suitable substrata are available for their attachment. This research work was carried out for enumeration of the macroalgal species (distribution and availability) through field survey along the coast of SudukattanPatti, Rameswaram Island, Ramanathapuram district, Tamilnadu, Southeast coast of India. The survey was conducted twice in a month during 2018. Herbarium specimens were prepared and submitted to the Research Department of Botany, Pasumpon Thiru Muthuramalinga Thevar Memorial College, Kamuthi, Ramanathapuram Dist-623604, Tamilnadu, India. A total of 81 macroalgal species were identified which belong to Chlorophyta (13 genus; 29 species), Rhodophyta (15 genus; 28 species) and Phaeophyta (13genus; 24 species). The key canopy-forming Genus are *Caulerpa*, *Padina*, *Sargassum*, *Turbinaria*, *Gracilaria* and *Gelidiella*, which are also present throughout the year. *Ulva lactuca* and *Caulerpa* species grow well during Northeast monsoon and washed ashore (December to January). *Gelidiella*, *Sargassum* and *Turbinaria* species also attain more biomass during Northeast monsoon and are harvested for commercial purpose after the end of the monsoon (February to May). *Valonia utricularis*, *Avrainvillea erecta*, *Udotea flabellum*, *Neomeris annulata*, *Asparagopsis taxiformis*, *Dictyopteris delicatula*, *Chnoospora implexa*, *Colpomenia sinuosa* and *Zonaria variegata* species were meagerly found during post Northeast monsoon (February to June). This is the first documentation of macroalgal biodiversity in this site. The present study will be useful and can be taken as new baseline record for biodiversity and mariculture studies.

KEYWORDS: Macroalgae, Seaweed, Marinealgal diversity, Rameswaram Island.

INTRODUCTION

Seaweeds are marine, benthic, autotrophic, belonging to non-flowering plants and inhabit the marine ecosystem. Based on morphology, cell wall and pigment composition, they are classified into green (Chlorophyta), brown (Phaeophyta) and red (Rhodophyta) algae (McHugh, 2003). The seaweeds are distributed horizontally in different zonations viz. supra tidal (supra littoral), intertidal (littoral) and subtidal (sub littoral) regions of the seas estuaries and also in the brackish water environments, wherever dead corals, rocks, stones, pebbles and any other suitable substrata are available for their attachment. Seaweeds occupy 90% of marine plant species and globally, 50% of photosynthesis was done by seaweeds (Dhargalkar and Neelam, 2005).

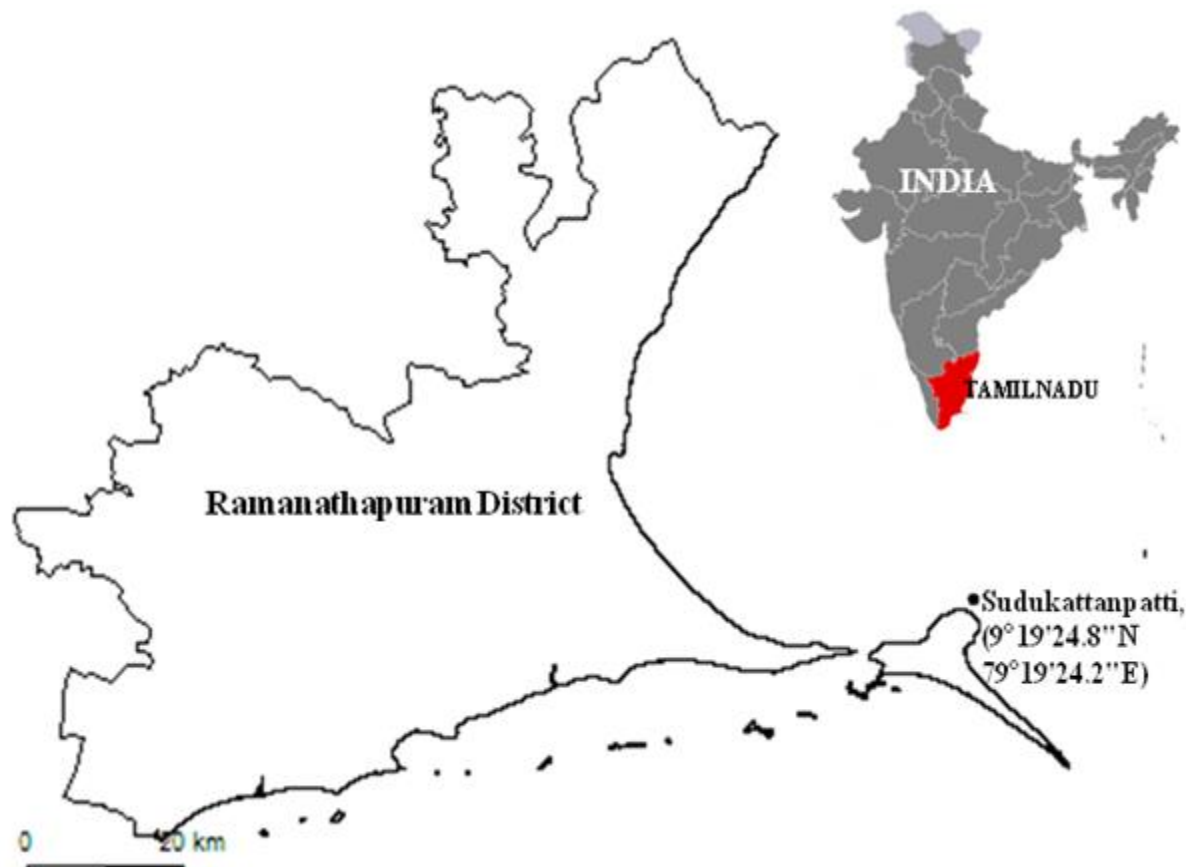
In India, luxuriant growth of several species of seaweeds occur along the Southeast coast of Tamil Nadu (Mandapam to Kanyakumari), Gujarat coast (Okha, Dwarka, Porbandar, Veraval and Diu), Lakshadweep (Arabian Sea) and Andaman Nicobar Islands (Bay of Bengal). Approximately 844 species (including forma and varieties distributed among 217 genera) of seaweeds found along the Indian coast (Oza and Zaidi, 2000). Seaweeds are one among the renewable and economically valuable marine resources (Chapman and Chapman 1980, Tseng 1981). The application of seaweed extracts in nutraceuticals, pharmaceuticals and as soil enhancers, as well as becoming increasingly of value as a food source or “sea vegetable” due to increased awareness of the health benefits of eating seaweed and seaweed extracts: improved weight loss (Hall *et al.*, 2012), combating mineral deficiency (Flores *et al.*, 2015), antioxidant (Garcia-Casal *et al.*, 2009) and anti-tumour properties (Kuda *et al.*, 2005).

The usage of seaweed is increasing day by day, especially for phycocolloid production. it is necessary to explore the natural resources of seaweeds along the coast of India which helps to find the suitable species for seaweed mariculture, which creates sustainable livelihood to the coastal inhabitant. Hence the study was conducted to document the marine macroalgae resource and its availability along the coast of the study site.

MATERIALS AND METHODS

This research work was carried out at SudukattanPatti (Fig. 1) ($9^{\circ}19'24.8''N$ $79^{\circ}19'24.2''E$) which is located in Palkbay stretch of Rameswaram Island, Ramanathapuram district, Tamilnadu, southeast coast of India. This site is intertidal, shallow, sandy coast and coral reef associated lagoon. The substratum is sandy as well as rocky (intermittent with dead corals and stones with sea shells) bottom covered with patches of seaweeds and sea grasses. The northern side of sea is protected by dead coral reef stretch, which is located 700 m away from the shore. The water is clear and transparent at low tide and turbid with fine suspended sand at high tide period. The water depth was 0.5 to 1.5m at low tide.

Fig. 1 Map of the Study site.



During low tide, the survey was carried out bimonthly. The observed macroalgae were identified (Ohno and Mairh 1982; Radhakrishnan 1976; Rajendran et al 1991; Anonymous 1978; Srinivasan 1969, 1973; Krishnamurthy and Joshi 1970; Nair et al 1986; Chennubhotla et al 1991; Jagtap 1992; Chennubhotla 1992, 1996; Kaliaperumal 1993; Kaliaperumal and Kalimuthu 1993; Umamaheswara Rao 1967, 1970, 1990, 1999, 1964, 1970a, 2000; Sahoo et al. 2001; Krishnamurthy et al. 1980; Krishnamurthy 1991; Mantri 2006; Subbarao and Mantri 2006; Silva et al. 1996, Untawale and Jagtap 1984; Untawale et al 1980, 1983, 1989; Rath and Adhikary 2005; Guiry and Guiry 2018), recorded and classified as meager (+), average (++) and dominant (+++) based on their occurrence in the natural habitat. Macroalgae collected from the site were washed thoroughly to make them free from sediments and epiphytic animals and brought to laboratory. Herbarium specimens were prepared and submitted to the Research Department of Botany, Pasumpon Thiru Muthuramalinga Thevar Memorial College, Kamuthi, Ramanathapuram Dist-623604, Tamilnadu, India.

RESULTS AND DISCUSSION

A total of 81 marine macroalgal species were recorded which belong to Chlorophyta (29 species; Table 1), Phaeophyta (24 species; Table 2) and Rhodophyta (28 species; Table 3). The recorded species belongs to 15 Orders, 25 families, and 41 Genera (Fig. 5). Among these Chlorophyta has 4 Orders, 10 Families and 13 Genus (Fig. 2), Phaeophyta has 3 Orders, 3 Families and 13 Genus (Fig. 3) and Rhodophyta has 8 Orders, 12 Families and 15 Genus (Fig. 4). The month wise availability of maximum number species in the following manner, Chlorophyta [(Jan, Feb, Nov, Dec) > Oct > Mar > Sep > (Jul, Aug) > (May, Jun) > Apr], Phaeophyta [(Jan, Feb, Nov, Dec) > Mar > Oct > Aug > (Apr, May, Jun, Jul, Sep)], Rhodophyta [Jan > Dec > (Feb, Nov) > Mar > Oct > Apr > Sep > Aug > (May, Jun, Jul)] and Total No. of Species [Jan > Dec > Feb > Nov > (Mar, Oct) > Sep > Apr > Aug > Jul > (May, Jun)] (Fig 6) in the chosen study site.

Fig. 5 Systematics of observed macroalgae at the study site.

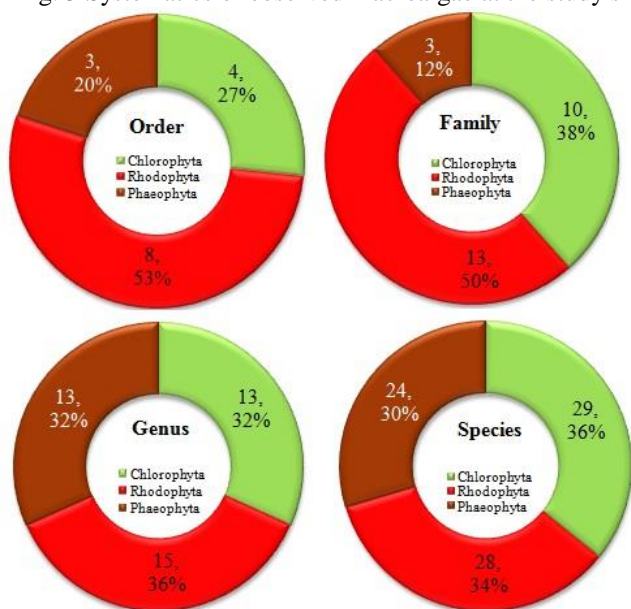


Fig. 6 Month wise distribution of seaweeds at the study site.

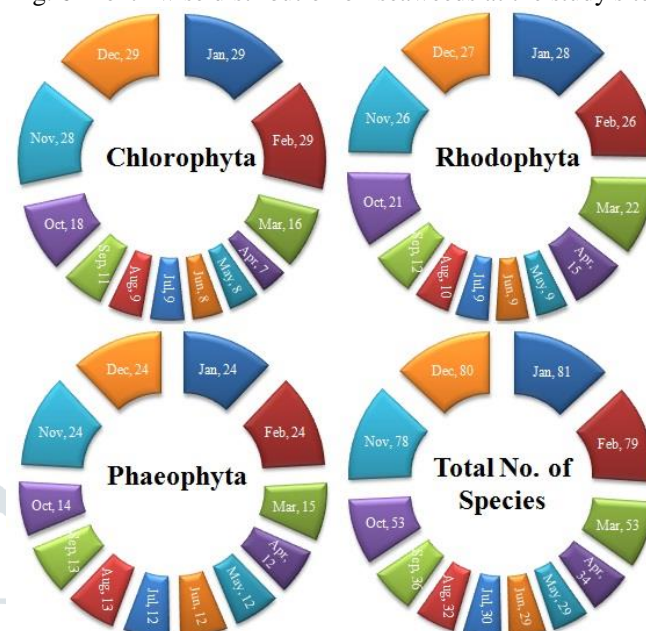


Fig 7. Provisional key to the genera of Chlorophyta

- | | |
|---|------------------------------|
| 1. Thallus calcified | - 2 |
| 1. Thallus not calcified | - 4 |
| 2. Thallus cylindrical, simple, unbranched, "wormlike", white at base, green near apices | - <i>Neomeris</i> |
| 2. Thallus flat, if branched, branches not radially arranged | - 3 |
| 3. Thallus consisting of chains of flat segments | - <i>Hatineda</i> |
| 3. Thallus flat blade and stipe polystromatic and corticated | - <i>Udotea</i> |
| 4. Thallus comprising of individual large vesicles or clusters of large vesicles | - 5 |
| 4. Thallus multicellular | - 10 |
| 5. Thallus vesicular/ globose | - 6 |
| 5. Thallus siphonous | - 7 |
| 6. Thallus elongate, light green, clavate (club-shaped), clustered | - <i>Boergesenia</i> |
| 6. Thallus more or less globose, a dark green, clavate segments, easily separated | - <i>Valonia/Valoniopsis</i> |
| 7. Thallus cylindrical | - 8 |
| 7. Thallus flat, rounded or irregular blades | - 9 |
| 8. Thallus with horizontal rhizomes, erect branches and branched rhizoids | - <i>Caulerpa</i> |
| 8. Thallus as interwoven siphons, pseudo-parenchymatous blades, bases of laterals not swollen | - <i>Bryopsis</i> |
| 9. Thallus larger, with multiple blades, species anchored in sand by bulbous mass | - <i>Avrainvillea</i> |
| 9. Thallus terete, branched axes or irregular cushions | - <i>Codium</i> |
| 10. Thallus flat sheets, or hollow tubes, branched or unbranched, distromatic | - <i>Ulva</i> |
| 10. Thallus filamentous | - 11 |
| 11. Filaments free, unbranched, robust | - <i>Chaetomorpha</i> |
| 11. Filaments free, or anastomosing, lateral branches with crosswalls | - <i>Cladophora</i> |

Fig 8. Provisional key to the genera of Phaeophyta

- | | | |
|-----|--|-----------------------------|
| 1. | Thallus multicellular, flat or prostrate | 2 |
| 1. | Thallus multicellular, erect or globose | 7 |
| 2. | Thallus calcified, erect, broad to elongate fans with inrolled margins | - <i>Padina</i> |
| 2. | Thallus not calcified | 3 |
| 3. | Thallus fan-shaped or tapering markedly from apex to base; thick largely creeping plant often with ventral surface well anchored to substratum | - <i>Lobophora/ Zonaria</i> |
| 3. | Thallus strap like, branches not tapering markedly | 4 |
| 4. | Blades with distinct midrib | - <i>Dictyopteris</i> |
| 4. | Blades without distinct midrib | 5 |
| 5. | Thallus with regular branchlets | 6 |
| 5. | Thallus with irregular branchlets | - <i>Spatoglossum</i> |
| 6. | Thallus flat dichotomously branched, slender with blended tip | - <i>Stoechospermum</i> |
| 6. | Thallus flat dichotomously or trichotomously branched with pointed tips | - <i>Dictyota</i> |
| 7. | Thallus irregularly-shaped mass without distinct axes | 8 |
| 7. | Thallus with one or many axes, having some consistent pattern to the branches or blades | 9 |
| 8. | Thallus sac-like, often lobed, hollow when mature; margins not inrolled | - <i>Colpomenia</i> |
| 8. | Thallus initially hollow, soon becoming flattened with many holes; margins inrolled | - <i>Hydroclathrus</i> |
| 9. | Thallus with of air bladder (bulbous and obvious), Main axes terete, leaf-like blades | - <i>Sargassum</i> |
| 9. | Thallus without air-bladders | 10 |
| 10. | Thallus leaf like or pyramidal branches | 11 |
| 10. | Thallus Tough, erect or matted thalli | - <i>Chnoospora</i> |
| 11. | Main axes divided into leaf-like, vesicle at the center | - <i>Hormophysa</i> |
| 11. | Main axis thread like, pyramid shaped blade | - <i>Turbinaria</i> |



Fig 9. Provisional key to the genera of Rhodophyta

- | | | |
|-----|---|-----------------------|
| 1. | Thallus calcified | - 2 |
| 1. | Thallus uncalcified, not crustose: erect and/or creeping, corticated | - 4 |
| 2. | Thallus soft or slippery even if calcified, pink or whitish, cylindrical to ligulate | - <i>Liagora</i> |
| 2. | Thallus stony or stiff, heavy calcification Free living, branches erect or creeping but attached only at base | - 3 |
| 3. | Thallus irregular branching, segments flat, separated by non-calcified joints | - <i>Amphiroa</i> |
| 3. | Thallus dichotomous branching, segments cylindrical | - <i>Jania</i> |
| 4. | Thallus filamentous, Main axes monosiphonous with cortication | - 5 |
| 4. | Thallus fleshy, or otherwise | - 6 |
| 5. | Cortication only at nodes, dissimilar orders of branching | - <i>Ceramium</i> |
| 5. | Cortication continuous, similar orders of branching | - <i>Centroceras</i> |
| 6. | Thallus hollow, divided by transverse diaphragms | - <i>Champia</i> |
| 6. | Thallus not hollow, more or less cylindrical, if flattened not blade-like | - 7 |
| 7. | Branching in one plane, flattened, dissected fronds, apices curling toward ventral surface | - <i>Portieria</i> |
| 7. | Branching three dimensional | - 8 |
| 8. | Thallus evidently uniaxial | - 9 |
| 8. | Thallus multiaxial or obscurely uniaxial | - 12 |
| 9. | Thallus soft, pale rose with horizontal rhizomes and erect plumose fronds | - <i>Asparagopsis</i> |
| 9. | Thallus stiff, dark red to yellowish brown | - 10 |
| 10. | Thallus Tough, wiry plants, lacking rhizines | - <i>Gelidiella</i> |
| 10. | Thallus Fleshy | - 11 |
| 11. | Ultimate branchlets as short spines or spinose, alternating or radially attached in axes | - <i>Acanthophora</i> |
| 11. | Ultimate branches longer if spinose, or rounded, ends of branches often hooklike or pointed | - <i>Hypnea</i> |
| 12. | Branching subdichotomous, irregular, very coarse alga with stout, warty branches | - <i>Kappaphycus</i> |
| 12. | Branching dichotomous, trichotomous, regular or irregular | - 13 |
| 13. | Main axes erect with short, bushy, rounded branches, branchlets mostly short, knobby, in paniculate or radially branched patterns, inconspicuous masses or clumps | - <i>Laurencia</i> |
| 13. | Main axes indistinct, erect, fleshy to compressed and lax with long tapering branches, or massive stiff mats | - <i>Gracilaria</i> |

The provisional artificial key was given to the Genera of recorded seaweeds of Chlorophyta (Fig. 7), Phaeophyta (Fig. 8) and Rhodophyta (Fig.9). The keys can serve as guide to identify the Genus of the seaweed available in the study region. The key canopy-forming Genus was *Caulerpa*, *Padina*, *Sargassum*, *Turbinaria*, *Gracilaria* and *Gelidiella*, which were also present throughout the year. *Ulva lactuca* and *Caulerpa* species grow well during Northeast monsoon and the mature algae washed ashore (December to January) due to the surfing close to the substratum of the species. *Gelidiella*, *Sargassum* and *Turbinaria* species also grow well Northeast monsoon while these species are harvested widely for commercial purpose at the end of the monsoon (February to May). *Valonia utricularis*, *Avrainvillea erecta*, *Udotea flabellum*, *Neomeris annulata*, *Asparagopsis taxiformis*, *Dictyopteris delicatula*, *Chnoospora implexa*, *Colpomenia sinuosa* and *Zonaria variegata* species were meagerly found during post Northeast monsoon (February to June). The present study will be useful and could be taken as new baseline record for future biodiversity studies.

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Table 1. Seasonal variability of macroalgal Species (Chlorophyta) found at SudukattanPatti.

Sl. No.	Class	Order	Family	Species Name	Availability Status (2018)													
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1	Ulvophyceae	Ulvales	Ulvaceae	<i>Ulva compressa</i> Linnaeus (= <i>Enteromorpha compressa</i> (Linnaeus) Nees)	+++	++	+	-	-	-	-	-	-	++	++	+++		
2				<i>Ulva intestinalis</i> Linnaeus (= <i>Enteromorpha intestinalis</i> (Linnaeus) Nees)	+++	++	++	+	+	+	+	++	++	++	+++	+++		
3				<i>Ulva prolifera</i> O.F.Müller (= <i>Enteromorpha prolifera</i> (O.F.Müller) J.Agardh)	++	++	+	+	-	-	-	-	-	+	++	++		
4				<i>Ulva lactuca</i> Linnaeus	+++	++	+	-	-	-	-	-	-	-	+	+++		
5				<i>Ulva reticulata</i> Forsskal	+++	+	+	-	-	-	-	-	-	-	++	+++		
6				Cladophorales	Cladophoraceae	<i>Chaetomorpha indica</i> (Kützting) Kützting	+	++	-	-	-	-	-	-	-	+	++	
7						<i>Chaetomorpha intestinalis</i> Kützting	+	++	+	-	-	-	-	-	-	+	++	++
8						<i>Chaetomorpha linum</i> (O.F.Müller) Kützting (= <i>Chaetomorpha crassa</i> (C.Agardh) Kützting & <i>Chaetomorpha linum</i> f. <i>brachyarthro</i> (Kützting) Børgesen)	+	+	+	-	-	-	-	-	-	-	+	++
9	<i>Chaetomorpha linoides</i> Kützting	+	+			-	-	-	-	-	-	-	+	+	+			
10	<i>Cladophora glomerata</i> (Linnaeus) Kützting	++	+			-	-	-	-	-	-	-	+	+	+			
11	Siphonocladaceae	<i>Boergesenia forbesii</i> (Harvey) Feldmann	++			++	-	+	+	+	+	++	+	-	+			
12	Valoniaceae	<i>Valonia utricularis</i> (Roth) C.Agardh	+			+	-	-	-	-	-	-	-	-	+	+		
13		<i>Valoniopsis pachynema</i> (G.Martens) Børgesen	+			+	-	-	-	-	-	-	-	-	+	+		
14	Bryopsidales	Bryopsidaceae	<i>Bryopsis corymbosa</i> J.Agardh	+	+	-	-	-	-	-	-	-	+	+	+			
15			Caulerpaceae	<i>Caulerpa cupressoides</i> (Vahl) C.Agardh	+	-	-	-	-	-	-	-	-	+	+	+		
16				<i>Caulerpa microphysa</i> (Weber-van Bosse) Feldmann	++	+	-	-	-	-	-	-	-	+	+	++		
17				<i>Caulerpa racemosa</i> (Forsskal) J.Agardh	+++	+++	+	+	+	+	+	+	++	++	++	+++		
18				<i>Caulerpa chemnitzia</i> (Esper) J.V.Lamouroux (= <i>Caulerpa racemosa</i> var. <i>peltata</i> (J.V.Lamouroux) Eubank & <i>Caulerpa peltata</i> J.V.Lamouroux)	++	++	+	++	+	+	+	+	++	++	++	++		
19				<i>Caulerpa scalpelliformis</i> (R.Brown ex Turner) C.Agardh	+++	++	+	-	-	-	-	-	+	+	++	++		
20				<i>Caulerpa sertularioides</i> (S.G.Gmelin) M.Howe	+	+	-	-	-	-	-	-	-	-	+	+		
21				<i>Caulerpa taxifolia</i> (M.Vahl) C.Agardh	++	++	+	+	+	-	+	+	+	++	++	++		
22				<i>Codium arabicum</i> Kützting	+	+	-	-	-	-	-	-	-	-	+	+		
23				Halimedaceae	<i>Halimeda gracilis</i> Harvey ex J.Agardh	+++	+++	++	-	++	++	++	+	++	++	++	+++	
24	<i>Halimeda macroloba</i> Decaisne	+++			+++	++	-	+	+	+	+	++	++	++	++			
25	<i>Halimeda opuntia</i> (Linnaeus) J.V.Lamouroux	+++	+		-	-	-	-	-	-	+	+	+	+				
26	<i>Halimeda tuna</i> (J.Ellis & Solander) J.V.Lamouroux	++	++		+	+	-	++	+	+	+	+	++	++				
27	Dichotomosiphonaceae	<i>Avrainvillea erecta</i> (Berkeley) A.Gepp & E.S.Gepp	+	+	-	-	-	-	-	-	-	-	+	+				
28	Udoteaceae	<i>Udotea flabellum</i> (J.Ellis & Solander) M.Howe	+	+	-	-	-	-	-	-	-	-	+	+				
29	Dacycladales	Dacycladaceae	<i>Neomeris annulata</i> Dickie	+	+	+	-	+	+	+	+	+	+	+				

Note: + meager, ++ average, +++ dominant and - not found.

Fig. 2 Habit a) *Ulva intestinalis*, b) *Ulva prolifera*, c) *Ulva lactuca*, d) *Boergesenia forbesii*, e) *Caulerpa racemosa*, f) *Caulerpa scalpelliformis*, g) *Caulerpa sertularioides* and h) *Neomeris annulata*.



Table 2. Seasonal variability of macroalgal Species (Phaeophyta) found at SudukattanPatti.

Sl. No.	Class	Order	Family	Species Name	Availability Status (2018)													
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyopteris delicatula</i> J.V.Lamouroux	+	+	-	-	-	-	-	-	-	-	+	+		
2				<i>Dictyota bartayresiana</i> J.V.Lamouroux	++	+	+	-	-	-	-	-	-	+	+	++		
3				<i>Dictyota dichotoma</i> (Hudson) J.V.Lamouroux	+++													
4				<i>Lobophora variegata</i> (J.V.Lamouroux) Womersely ex E.C.Oliveira	++	++	+	-	-	-	-	-	-	-	-	+	+	
5				<i>Padina gymnospora</i> (Kützinger) Sonder	+++	++	++	+	+	+	+	+	+	+	+	++	++	
6				<i>Padina pavonica</i> (Linnaeus) Thivy	++													
7				<i>Padina tetrastrumatica</i> Hauck	+++	++	++	+	+	+	+	+	+	+	+	++	++	
8				<i>Spatoglossum asperum</i> J.Agardh	+	+	-	-	-	-	-	-	-	-	-	+	+	
9				<i>Stoehospermum polyodioides</i> (J.V.Lamouroux) J.Agardh (= <i>Stoehospermum marginatum</i> (C.Agardh) Kützinger)	+	+	-	-	-	-	-	-	-	-	-	+	+	
10	Ectocarpales	Scytosiphonaceae	<i>Zonaria variegata</i> (Lamour.) A.g.	+	+	-	-	-	-	-	-	-	-	+	+			
11			<i>Chnoospora implexa</i> J.Agardh	++	+	-	-	-	-	-	-	-	-	+	+			
12			<i>Colpomenia sinuosa</i> (Mertens ex Roth) Derbès & Solier	+	+	-	-	-	-	-	-	-	-	-	+	+		
13			<i>Hydroclathrus clathratus</i> (C.Agardh) M.Howe	+	+	-	-	-	-	-	-	-	-	+	+			
14	Fucales	Sargassaceae	<i>Hormophysa cuneiformis</i> (J.F.Gmelin) P.C.Silva	+	+	-	-	-	-	-	-	-	-	+	+			
15			<i>Sargassum ilicifolium</i> (Turner) C.Agardh	+++	+++	++	+	+	+	+	+	++	++	+++	+++			
16			<i>Sargassum microcystum</i> J.Agardh	++	+	+	-	-	-	-	++	+	+	+	++			
17			<i>Sargassum plagiophyllum</i> C.Agardh	+++	+++	++	+	+	+	+	+	++	++	+++	+++			
18			<i>Sargassum swartzii</i> C.Agardh	+++	+++	++	+	+	+	+	+	++	++	+++	+++			
19			<i>Sargassum tenerrimum</i> J.Agardh	+++	+++	++	+	+	+	+	+	++	++	+++	+++			
20			<i>Sargassum wightii</i> Greville ex J.Agardh	+++	+++	++	+	+	+	+	+	++	++	+++	+++			
21			<i>Turbinaria decurrens</i> Bory	++	++	+	+	+	+	+	+	+	++	++	++			
22			<i>Turbinaria conooides</i> (J.Agardh) Kützinger	+++	+++	++	+	+	+	+	+	++	++	+++	+++			
23			<i>Turbinaria ornata</i> (Turner) J.Agardh	+++	+++	++	+	+	+	+	+	++	++	+++	+++			
24			<i>Turbinaria turbinata</i> (Linnaeus) Kuntze (= <i>Turbinaria trialata</i> (J.Agardh) Kützinger)	+	+	-	-	-	-	-	-	-	-	-	+	+		

Note: + meager, ++ average, +++ dominant and - not found.

Fig. 3 Habit a) *Dictyota bartayresiana*, b) *Lobophora variegata*, c) *Padina pavonica*, d) *Padina tetrastromatica*, e) *Spatoglossum asperum*, f) *Stoechospermum polypodioides*, g) *Colpomenia sinuosa* and h) *Turbinaria conoides*.



Table 3. Seasonal variability of macroalgal Species (Rhodophyta) found at SudukattanPatti.

Sl. No.	Class	Order	Family	Species Name	Availability Status (2018)												
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Florideophyceae	Nemaliales	Liagoraceae	<i>Liagora ceranoides</i> J.V.Lamouroux	+	+	+	-	-	-	-	-	-	-	-	-	
2				<i>Liagora viscida</i> (Forsskål) C.Agardh	+	-	-	-	-	-	-	-	-	-	+	+	
3				<i>Gelidiella acerosa</i> (Forsskål) Feldmann & Hamel	+++	+++	+++	+++	+	+	+	+	+	+	+	++	++
4		Gracilariales	Gracilariaceae	<i>Gracilaria canaliculata</i> Sonder	+++	+++	+++	++	+	+	+	+	+	++	++	+++	
5				<i>Gracilaria debilis</i> (Forsskål) Børgesen	+	+	+	-	-	-	-	-	-	+	+	+	
6				<i>Gracilaria edulis</i> (S.G.Gmelin) P.C.Silva	+++	+++	++	+	-	-	-	-	+	+	++	++	
7				<i>Gracilaria opuntia</i> Durairatnam	++	+	+	+							+	+	++
8				<i>Gracilaria salicornia</i> (C.Agardh) E.Y.Dawson	+	+	+	+	+	+	+	+	+	+	+	+	+
9		Bonnemaisoniales	Bonnemaisoniaceae	<i>Asparagopsis taxiformis</i> (Delile) Trevisan	+	-	-	-	-	-	-	-	-	-	-	+	
10		Corallinales	Lithophyllaceae	<i>Amphiroa anceps</i> (Lamarck) Decaisne	+	+	-	-	-	-	-	-	-	+	+	+	
11			Corallinaceae	<i>Jania adhaerens</i> J.V.Lamouroux	+	+	+	+	-	-	-	-	-	-	+	+	
12				<i>Jania rubens</i> (Linnaeus) J.V.Lamouroux	+++	++	+	+	+	+	+	+	+	+	+	++	
13				<i>Jania spectabilis</i> (Harvey ex Grunow) J.H.Kim, Guiry & H.-G.Choi (= <i>Cheilosporum spectabile</i> Harvey ex Grunow)	++	+	+	-	-	-	-	-	-	+	+	+	
14	Gigartinales	Rhizophyllidaceae	<i>Portieria hornemaniai</i> (Lyngbye) P.Silva	+++	++	+	+	+	+	+	+	+	+	++	+++		
15		Cystocloniaceae	<i>Hypnea esperi</i> Bory	+	+	+	+	-	-	-	-	-	+	+	+		
16			<i>Hypnea musciformis</i> (Wulfen) J.V.Lamouroux	+++	++	+	+	-	-	-	-	+	+	++	+++		
17			<i>Hypnea valentiae</i> (Turner) Montagne	++	++	+	+							+	+	++	
18		Solieriaceae	<i>Kappaphycus alvarezii</i> (Doty) Doty ex P.C.Silva (Cultivated)	+	+	+	+	+	+	+	+	+	+	+	+		
19	Rhodymenales	Champiaceae	<i>Champia indica</i> Børgesen	+	+	+	+	-	-	-	-	-	+	+	+		
20			<i>Champia parvula</i> (C.Agardh) Harvey	+++	++	+	-	-	-	-	-	-	+	+	++		
21	Ceramiales	Ceramiaceae	<i>Centroceras clavulatum</i> (C.Agardh) Montagne	+	+	-	-	-	-	-	-	-	-	+	+		
22			<i>Ceranium tenerrimum</i> (G.Martens) Okamura	+	+	-	-	-	-	-	-	-	-	-	+	+	
23		Rhodomelaceae	<i>Acanthophora dendroides</i> Harvey	++	+	-	-	-	-	-	-	-	-	-	+	++	
24			<i>Acanthophora muscoides</i> (Linnaeus) Bory	+++	++	+	+	-	-	-	+	+	+	+	+	+++	
25			<i>Acanthophora spicifera</i> (M.Vahl) Børgesen	+++													
26			<i>Palisada perforata</i> (Bory) K.W.Nam (= <i>Laurencia papillosa</i> (C.Agardh) Greville & <i>Laurencia perforata</i> (Bory) Montagne)	+	+	+	-	-	-	-	-	-	-	-	+	+	+
27			<i>Laurencia glomerata</i> (Kutzing) Kutzing	+	+	+	-	-	-	-	-	-	-	-	+	+	+
28			<i>Laurencia parvula</i> Børgesen	+	+	+	-	-	-	-	-	-	-	-	+	+	+

Note: + meager, ++ average, +++ dominant and - not found..

Fig. 4 Habit a) *Gelidiella acerosa*, b) *Gracilaria canaliculata*, c) *Gracilaria edulis*, d) *Gracilaria opuntia*, e) *Gracilaria salicornia*, f) *Portieria hornemanii*, g) *Hypnea musciformis*, h) *Kappaphycus alvarezii*, i) *Champia parvula* and j) *Acanthophora spicifera*.



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