



## Seasonal variability of *Laurencia* species (Red seaweed) in Tirunelveli region, the south east coast of Tamil Nadu, India

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### Abstract

The present study was carried out to compare the seasonal variability of *Laurencia* species in Tirunelveli region, the south east coast of Tamil Nadu, India. For the collection and estimation of *Laurencia* species, Tirunelveli region was divided in to four stations namely Kootapuzhi, Perumanal, Idinthakarai and Koothankuzhi. Monthly survey was conducted regularly for a period of four years from January 2007 to December 2010. The *Laurencia* species were enumerated at random using a quadrat (0.5m<sup>2</sup>). A total of four species of *Laurencia* were collected in the study area such as *Laurencia flagellifera*, *Laurencia obtusa*, *Laurencia pinnatifida* and *Laurencia poiteaui*. The frequency and density were calculated and all the *Laurencia* species showed a similar pattern of seasonal variation. Among the species collected the highest frequency (45.00%) and density (2.25) were observed in *Laurencia pinnatifida* during monsoon season and the lowest frequency (20.00%) and density (0.96) were recorded in *Laurencia obtusa* during pre-monsoon season. All the *Laurencia* species were disappeared during the summer season. From the present study, it was concluded that all the *Laurencia* species (Rhodophyceae) exhibited the maximum frequency and density during the monsoon season followed by the declined trend was observed in the post-monsoon season. During the summer season all the *Laurencia* were disappeared followed by the frequency and density of *Laurencia* species (Rhodophyceae) was minimum during the pre-monsoon season in the selected Tirunelveli region in south east coast of Tamil Nadu, India.

**Keywords:** Red seaweed, South east coast, *Laurencia*, Tirunelveli

### Introduction

Seaweeds or marine macro algae are plants and ecologically, commercially valuable living marine resources that belong to the primitive groups of non-flowering plants. Seaweeds are commonly categorized in to three groups such as Chlorophyceae (Green seaweeds), Phaeophyceae (Brown seaweeds) and Rhodophyceae (Red seaweeds) especially on the basis of the pigments and the stored food materials<sup>1</sup>. The distribution of seaweeds is determined by many factors such as physical and chemical characters of marine water. Growth and biomass production in relation to irradiance have been determined in some seaweed. The ecology of marine macro algae or seaweeds is dominated by three specific environmental requirements<sup>2</sup>. These are the marine water, the sufficient light to drive photosynthesis and another important common requirement is to have a fine point of attachment. As a result, most of the seaweeds are commonly found in the littoral zone and within that zone more frequently on rock shores than on sand or shingle shore. Seaweeds are rich in carbohydrates, proteins, aminoacids, lipids, vitamins, minerals etc<sup>3,4,5,6</sup>. Therefore, seaweeds have been harvested by man for centuries particularly in Japan and China where they form a part of the staple food. In Western countries, seaweeds are generally utilized for the production of valuable biochemicals<sup>7,8</sup>. The important components of seaweeds viz. agars, algin and carrageenans are used as ingredients in food, pharmaceuticals, industrial processes and diverse consumer products<sup>9</sup>.

The red marine macro algal species of *Laurencia* are commonly available in Indian waters and have not been investigated in detail for their distribution, frequency and density. *Laurencia* species have sulphated polysaccharide contents as polymer of galactose (galactan, occasionally substituted by xylose) but more complicated structures than agar and carrageenan. Previously there were two reports described agar of different *Laurencia* species having good gel strength indicating thereby their use as potential agarophyte<sup>10</sup>. Antiviral (reverse transcriptase inhibitor) sulphated polysaccharide was reported from *Laurencia* species<sup>11</sup>. In this study, the regular field survey was conducted to investigate the distribution of *Laurencia* species at different stations of Tirunelveli region in the south east coast of Tamil Nadu to provide a potential explanation for seasonal variability pattern observed for the *Laurencia* species according to marine environmental conditions related to its distribution.

### Material and Methods

The Tirunelveli region in the south east coast of Tamil Nadu, India extends from Kootapuzhi in the south to Koothankuzhi in the north. The entire study area was categorized in to four stations namely Kootapuzhi (S<sub>1</sub>), Perumanal (S<sub>2</sub>), Idinthakarai (S<sub>3</sub>) and Koothankuzhi (S<sub>4</sub>). The survey of *Laurencia* species from the intertidal area was carried out during the low tide. For the sampling of *Laurencia* species transect lines and a quadrat (0.5m<sup>2</sup>) was used. Samples were selected at random as per

requirement. This was carried out by selecting sampling points in the area using quadrat. Sampling points were selected in such a manner that every species of the study area has good chance of being selected. The number of quadrats was determined as per the area selected. For this purpose the whole station (for example station S<sub>1</sub>) was divided into four segments namely segment A, segment B, segment C and segment D. Quadrats were placed every three meters on four segments. Each segment was 250m long in which 80 quadrats were placed. Monthly 160 quadrats were taken and the number varying according to the tidal height. Seaweed species present in the quadrats were observed, counted species wise and number of individuals in each species was noted for quantitative assessment frequency and density<sup>12</sup>.

## Results and Discussion

Totally there are four species of *Laurencia* namely *Laurencia flagellifera* (figure -1a), *Laurencia obtusa* (figure -1b), *Laurencia pinnatifida* (figure -1c) and *Laurencia poiteaui* (figure -1d) collected from Tirunelveli region and all the species found in the study area were observed during pre-monsoon, Monsoon and post-monsoon seasons and all the species of *Laurencia* were disappeared in the summer season. Though all the members of *Laurencia* showed similar patterns of seasonal distribution, with respect to frequency and density high level of variability was observed between the seasons and stations. Among the four seasons studied, a well marked seasonal variability was observed and all the taxa of *Laurencia* were disappeared during summer season in the study area. The post-monsoon season was noted to be more growth of *Laurencia* members which showed the highest frequency and density in the present study. A well marked declining in the frequency and density were recorded in the subsequent seasons of pre-monsoon and monsoon. Among those species which were observed in all the four stations, the species *Laurencia poiteaui* showed the highest frequency (47.25%) followed by *Laurencia pinnatifida* (45.00%), *Laurencia flagellifera* (32.50%) and *Laurencia obtusa* (31.25%) during the monsoon season and the species *Laurencia obtusa* showed the lowest frequency (20.00%) followed by *Laurencia pinnatifida* (21.25%), *Laurencia flagellifera* (22.50%) and *Laurencia poiteaui* (30.00%) during pre-monsoon season in Tirunelveli region, while during the summer season all the *Laurencia* species were disappeared as shown in table-1.

Even though the members of *Laurencia* showed the similar pattern of seasonal distribution, high level of the variability was recorded with respect to density between the seasons and stations. In *Laurencia* species, *Laurencia poiteaui* showed the highest density (2.46) followed by *Laurencia pinnatifida* (2.25), *Laurencia flagellifera* (1.72) and *Laurencia obtusa* (1.43) during Monsoon. *Laurencia obtusa* showed the lowest density (0.53) followed by *Laurencia flagellifera* (0.62), *Laurencia pinnatifida* (1.51) and *Laurencia poiteaui* (1.56) during Pre-monsoon season.



Figure-1a  
*Laurencia flagellifera* J. Ag.



Figure-1b  
*Laurencia obtusa* (Hudson) Lamouroux



Figure-1c  
*Laurencia pinnatifida* (Gmelin) Lamouroux

**Table-1**  
**Seasonal variability of *Laurencia* species in the Tirunelveli region**

-	-	Post-monsoon		Summer		Pre-monsoon		Monsoon	
S.No.	Name of the Seaweeds	F	D	F	D	F	D	F	D
1.	<i>Laurencia flagellifera</i>	26.25	0.73	0	0	22.50	0.62	32.50	1.72
2.	<i>Laurencia obtusa</i>	23.75	1.37	0	0	20.00	0.53	31.25	1.43
3.	<i>Laurencia pinnatifida</i>	28.75	1.90	0	0	21.25	1.51	45.00	2.25
4.	<i>Laurencia poiteaui</i>	36.75	1.96	0	0	30.00	1.56	47.25	2.46

F–Frequency, D–Density



**Figure-1d**  
***Laurencia poiteaui* (Lamouroux) Howe**

The similar studies were conducted in *Caulerpa* species from Tirunelveli region<sup>13</sup> and *Enteromorpha* species from Kanyakumari region<sup>14</sup>. In the previous studies, seasonal variability of green seaweeds (Chlorophyceae) were studied and all the green seaweed showed the similar pattern of seasonal distribution that all the chlorophyceae members were observed to have the highest frequency and density during summer season. In contrast with the earlier report, the *Laurencia* species (red seaweed) showed the similar pattern of seasonal variation that all the *Laurencia* species (red seaweed) were reported to have the highest frequency and density during the Monsoon season. And all the species of *Laurencia* disappeared during summer season.

## Conclusion

From the present observations, it was noted that both frequency and density of all the *Laurencia* taxa varied with seasons and stations. All the taxa of *Laurencia* exhibited an uniform pattern of increase in frequency and density during monsoon season followed by decrease in frequency and density in the successive post-monsoon season, during the summer season all the *Laurencia* species were disappeared and the *Laurencia* species

reappeared during pre-monsoon season. The rate of increase or decrease in frequency and density varied with taxa and stations.

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