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Quantitative analysis of lichen vegetation in Ramsai forest sites of Gorumara National Park, India

Anup Kumar Sarkar

Department of Botany, Prasanna Deb Women's College, Jalpaiguri(India)

ABSTRACT

Studies on lichen species are important for a better understanding of a forest. The present study was carried out on ten forest sites of Ramsai Forest Range dominated by Shorea robusta and Schima wallichii to assess the lichen diversity.The purpose of this work was to assess the status of lichen community by using ecological parameter.A total of 13 lichens were recorded from the study area.

Keywords: Lichens, Quadrate, Terricolous lichens, Microlichen, Macrolichens.

INTRODUCTION

Lichens are dual organisms formed by the symbiotic association of a fungus and an alga.They are also known as composite plants.They usually grow in tropical and temperate regions.They require moisture,moderate temperature,sunlight and pure atmosphere.They grow on leaves,tree trunks and on exposed rocks. The Lichens are fascinating composite organisms evolved and diversified after a symbiotic association between algae and fungi [1] (Hale).The associated entity grows at an average rate of l-5 mm per year and persists for tens or hundreds of years on their substratum.The growth forms of lichens are usually conspicuous on the substrates, forming grey, green,dark brown and orange patches. They are categorized primarily based on their morphology and size into three major types, viz. crustose (crust like), foliose (leaf like) and fruticose (shrubby). The lichens belonging to the former category are called microlichens and the latter two are referred to as macrolichens.[2],[3]

Lichens are important component of forest ecosystem as they play a significant role in succession, food chain and nutrient cycling.But in the present days several environmental and anthropological pressure on trees like cutting of trees, grazing, forest fire, air pollution etc. leads to threat for several lichens. Deforestation has been identified as the major threats to the lichen flora of Indian forests.Thus holistic efforts are needed to measure and monitor the extent of actual impact of these land use changes on the lichen abundance and diversity.Lichens growing on trunk of trees and fallen lichens are good indicator of ecosystem operation and their requirement of greater environmental stability make them highly sensitive indicators of overall ecosystem functioning and various environmental disturbances.In this article author describe the diversity of lichen genera on trunk of trees and their distribution pattern in different forest sites of Ramsai forest range.

MATERIALS AND METHODS

2.1. Description of Study Site:

Study area Ramsai Range was located at southern part of Gorumara National Park, India.This range is about 18 km far from Maynaguri, a block of District Jalpaiguri of an Indian state West Bengal. Based on the information obtained from Range officer, the area was classified into ten sites, five from each of Ramsai beat and Kalamati beat. The use of local name of each forest site was adopted from the knowledge of Forest guards. Different topography and climatic factors, had different types and levels of disturbance intensity on habitat; and thus the lichen community of different sites were different.

2.2.Sampling:

For the studies of lichen diversity in Ramsai forest range, the quadrate methods were used [Hussan et. al.,[5]]. For this purpose 10 random sites were choosen from both Ramsai and Kalamati beats.In each forest beat five quadrates laid down for trees.The size of quadrates for trees were 10 m. sq. Plant species found within each sampling plot were photographed and identified by their vernacular and scientific names using various book, available article and internet pages.Some of the common trees of these sites are *Shorea robusta* Gaertn. f., *Schima wallichii* (DC.)Koth., *Syzygium cumini* (Linn.) Skeels,*Toona ciliata* Roem., *Dillenia pentagyna* Roxb., *Lagerstromia perviflora* Roxb., *Albizia procera, Anthocephalus indica* ,*Careya arborea* Roxb.,*Wrightia tomentosa* Roem.& Schult., *Amoora spectabilis* Miq,*Amoora walichii* King.,*Lagerstromia speciosa,Terminalia alata* Heyne ex Roth., *Bischofia javanica* Blume, *Terminalia bellerica* (Gaetn.)Roxb. etc. [4].

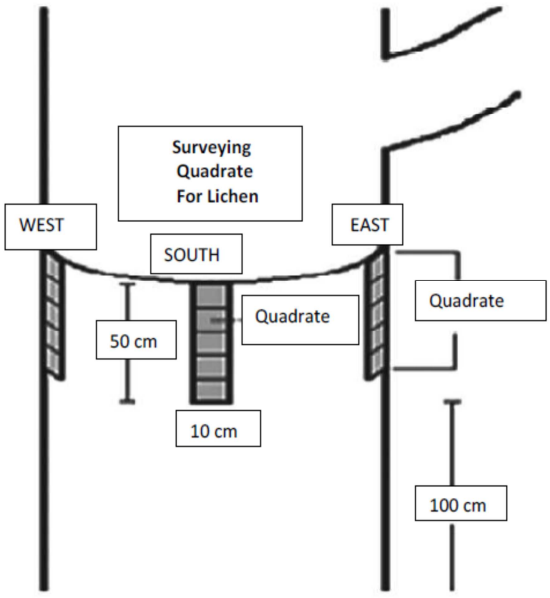


Fig 1: Quadrate for Lichen

2.3 Lichen recording on the tree trunk:

From each quadrate five plants (one at the centre and the other four at the corners) of each ten sample quadrants. Sampling was completed within two weeks to avoid differences between habitats, and thus any temporal bias in lichen availability and composition.As for the recording of lichens on the tree trunk, monitoring quadrates are used which consist of four independent segments with five squares 10 cm x 10 cm. With the aid of a compass or GPS (Global Positioning System) the four segments are attached to the sides of the tree trunk facing the East, West, North and South. The segments have to be attached in a way that the lower edge is one metre above the highest point of the ground. Then, to avoid areas on the tree trunk that are unsuitable for the survey, for instance wounds and knots, a shifting of a segment by a maximum of 20° clockwise is permitted. Another tree has to be selected if the placement of at least three segments is impossible. If conditions such as damaged or decorticated parts, knots, rain tracks and

parts with bryophyte cover higher than 25% the attachment of segments is prohibited. Then the lichen species which occur in each segment are recorded, as well as the number of squares of each segment in which the lichen species was found is counted. This is called frequency and it is the basis of the quantitative survey of the lichen vegetation.Within a quadrate each segment of lichen thallus was considered as one individual.The specimens were identified by studying the morphology, anatomy and chemistry. The recent literature was consulted for identification of the lichen taxa.[2-6] .

2.4.Data Analysis Techniques:

The data on lichen vegetation were quantitatively analyzed for abundance(A), density, and frequency(F) and A/F ratio by the following formulas given by Curtis and Mc Intosh (1950).

$$\text{Abundance} = \frac{Total\ number\ of\ individual}{Number\ of\ quadrate\ occurence}$$

$$\text{Density} = \frac{Total\ number\ of\ individual}{Total\ Number\ of\ quadrate\ studied}$$

$$\text{Frequency (\%)} = \frac{Number\ of\ quadrate\ occurence}{Total\ Number\ of\ quadrate\ studied} \times 100$$

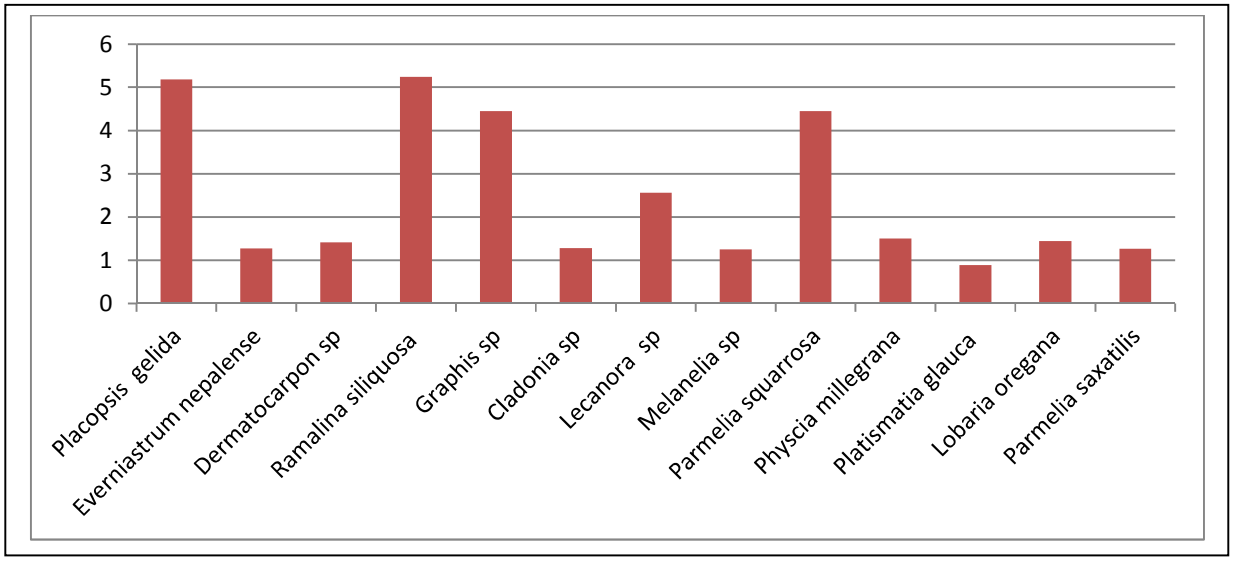
The ratio of abundance to frequency (A/F) is a relative measure to present the distribution of lichen vegetation in a community.

RESULTS

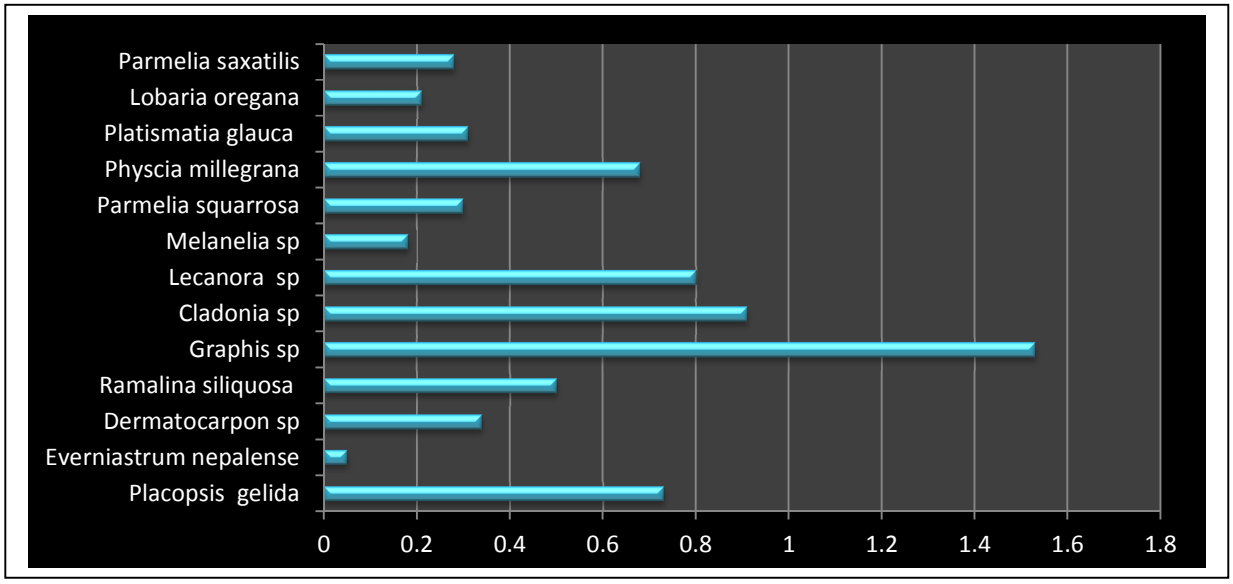
Quantitative analysis of lichen vegetation at study site is given in Table 1. A total of 13 lichen genera were recorded from the study area.

Table 1.: Abundance, Density, Frequency (%) and Abundance/ Frequency (A/F) of Lichen Taxa of Ramsai Forest

Lichen Taxa	Abundance	Density	Frequency (%)	A/F
Placopsis gelida	5.183	0.368	7.1	0.73
Everniastrum nepalense	1.278	0.441	34.7	0.05
Dermatocarpon sp	1.414	0.058	4.1	0.34
Ramalina siliquosa	5.240	0.545	10.4	0.50
Graphis sp	4.448	0.129	2.9	1.53
Cladonia sp	1.285	0.014	1.4	0.91
Lecanora sp	2.562	0.082	3.2	0.80
Melanelia sp	1.259	0.068	6.8	0.18
Parmelia squarrosa	4.445	0.649	14.6	0.30
Physcia millegrana	1.500	0.033	2.2	0.68
Platismatia glauca	0.890	0.025	2.8	0.31
Lobaria oregana	1.441	0.098	6.8	0.21
Parmelia saxatilis	1.272	0.056	4.4	0.28



Graph 1: Status of Abundance of Lichen species of Ramsai Forest



Graph 2: Status of Abundance/Frequency ratio of Lichen species of Ramsai Forest

CONCLUSION

The survey of lichens growing on different tree species in Ramsai Forest Range revealed the presence of 13 species of lichens.From the quadrate analysis by using ecological parameter it was clear that *Graphis* sp is the most common lichen species of this forest range., The the A/F value of lichen species was recorded to be maximum 1.53 for *Graphis* sp and the A/F value 0.05 individuals of *Everniastrum nepalense*. A/F value is also good for *Cladonia* sp and *Lecanora* sp. The A/F value of *Cladonia* sp is 0.91 and for *Lecanora* sp the A/F value is 0.80.The present study thus serves as baseline record regarding the level of Lichen community in the forest. This study also suggested to the followers for the research of assessment of soil environmental quality of the forest range by using such lichen species as bio indicators.Hope that, this research help to a better plan of biodiversity conservation for Ramsai forest range and other forests.

Fig2: A Study site in Kalamati beat of Ramsai Range

Fig 3: Graphis sp

Fig 4: Cladonia sp

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