

Summary



Heterodermia sp.

SUMMARY

This investigation focused on diversity, distribution and ecological parameter of macrolichens in central Western Ghats of Karnataka. A total of 90 transects covered 45000 square meter areas of forests contributed about 106 species of macrolichens belongs to 33 genera and 15 families. The foliose lichen was dominated and contributed about 70 per cent and fruticose contribute 20 per cent of the macrolichen diversity. Physciaceae is the largest family which is consisting of 32 species followed by Parmeliaceae (29 species) and Usneaceae (10 species). The *Heterodermia* (16 species) is the largest genera followed by *Parmotrema* (11 species) *Usnea* (10 species) in three districts. This showed that present study area is lichenological resource rich area when compared with the other regions of India.

The corticolous species were occurred significantly varied with forest types and ecological conditions. Microclimate is playing a key role in distribution of macrolichen in the study area. The evergreen forest contributed more cyano lichen species in higher altitudes by fruticose lichens. The higher montane forest areas was home for fruticose lichens like *Usnea* and *Ramalina*, similarly the evergreen forest for *Coccocarpia* and *Leptogium* and the deciduous forests supported *Heterodermia* and *Parmotrema*. The lichens preferably grown on the moderate texture of bark and with the host tree the pH with 4 to 6.

The diversity study was carried out by using random transect method by placing 50x10m transect with sub quadrat of 20x20cm. Lichens were collected from different substrates. The identification of lichens done by morphological, anatomical and colour

tests and also used TLC as confirmatory test. Host tree species were identified by using standard floras and also analysed bark texture, pH, moisture and nature of peeling. Ethnobotanical survey was conducted by regular field with and by using standard questioner. Based on the medicinal usage we selected six species of lichens for antimicrobial studies. The antimicrobial study was carried by agar well diffusion method and determines the minimum inhibitory concentration.

The most lichens species dominated on the main stem (49%) followed by twig (25%). Among the terricolous lichens *Cladonia* and *Cetraria* were represented. Saxicolous lichens *Dirinaria appplanata*, *Endocarpon* sp., *Parmotrema grayanum*. Corticolous lichens were represented by *Parmotrema* sp. *Heterodermia* sp. *Usnea* sp. and *Ramalina* sp. and squamulose lichens such as *Collema* sp. and *Coccocarpia* sp. *Roccella montagnei* reported only from *Mangifera indica*, *Physma byrsaeum* were specific to host *Mangifera indica*. *Leptogium chloromelum*, *Coccocarpia palmicola* common in forests of Agumbe and Kodachadri regions *Heterodermia incana*. *Parmotrema stuppeum* occurred in Hosnagara and Sagar regions. In the study area lichens act as good indicator of change in species richness and turnover along different forest types.

The Detrended Correspondence Analysis (DCA) analysis indicated that the forest type and lichen diversity are significantly correlated but overall the environmental factors and study site have no correlation. Cluster analysis of lichen species emphasized that there are 4 to 5 major clusters largely formed in relation with forest type. They can be used as indicator species of forest healthiness. Now a days due to the illegal activities like encroachment, fuel wood collection and over harvesting activities affect lichen diversity in these areas.

The results indicated that these areas are rich in lichen diversity and could be identified as micro climatically important area with lichen rich diversity and should be given a preference for conservation of lichens and also to declare some areas as lichen rich areas for their conservation measures. In depth understanding of the patterns of distribution of the many different parameters that can be used to characterize abundance and diversity at different taxonomic hierarchies and at different spatial scales. Higher altitude montane forest were relatively species poor, they harbour geographically restricted and taxonomically distinct taxa of macrolichens.

A total of 90 traditional practitioners in the study area were interviewed and documented the information on method of preparation, utilization values and collection method of lichens. Most of the practitioners collect lichens from forest when they are necessary. Among the interviewed people, 70 per cent people used *Parmotrema* species for medicine and 20 percent people used *Usnea* for medicinal use and only 10 percent people used *Ramalina* and *Heterodermia* species for medicine. Among the reported species, most of them belong to Parmeliaceae (75%) followed by Physciaceae and Ramalinaceae. Preliminary phytochemical analysis showed that *Parmotrema tinctorum*, *Ramalina pacifica* *Ramalina taitensis* contains alkaloids, saponins, tannins. *Rocella Montagnei* and *Usnea galbinifera* extract showed presence of tannin.

The results showed that higher inhibitory potential of the methanol extract followed by chloroform and petroleum ether extracts. *Parmotrema tinctorum* showed good results against all tested bacteria at 5 per cent of lichen extract. *Heterodermia diademata* had showed lower activity. There was no inhibition in case of DMSO which was used as negative control. *Parmotrema tinctorum* had showed good activity of zone of

inhibition against *E. coli* followed by *Ramalina pacifica* at 25 per cent concentration. This inhibition zone of bacteria is attributed because of presence of usnic acid and salazinic acid in *R. pacifila* and usnic acid and barbatic acids in *U. galbinifera*. The lichen extracts had showed less activity against selected fungal species. *Parmotrema tinctorum*, *Ramalina taitensis* and *Roccella montagnei* had showed some activity against plant pathogens *Candida albicans*. *Ramalina pacifica*, *Roccella montagnei*, *Ramalina taitensis* and *Usnea galbinifera* had showed activity at 250 mg/ml against *Trichophytum rubrum*.

Conservation of the whole spectrum of biological diversity is a new challenge. We have been provided few scientific guidelines for conservation and sustainable management of lichen diversity in the study area.