Asian J. Adv. Basic Sci.: **2020, 8***(1)*, 13-18
ISSN (Print): 2454 – 7492
ISSN (Online): 2347 – 4114
www.ajabs.org

Corticolous Lichens Inhabiting on Sacred Trees in Bilaspur District of Himachal Pradesh, India

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DOI: http://dx.doi.org/10.33980/ajabs.2020.v08i01.002

(Received 01 Feb, 2020; Accepted 21 May, 2020; Published 21 June, 2020)

ABSTRACT: During present investigation a total of 66 specimens of lichen were collected from three localities (Berthin, Shahtalai and Jamli) of district Bilaspur in Himachal Pradesh. A total 12 species *(Physcia dubia, Physcia crispa, Physcia integrata, Physcia sorediosa, Physcia jackii, Chrysothrix candelaris, Chrysothrix chlorina, Parmotrema andinum, Parmotrema mesotropum, Phaeophyscia hispidula, Lecanora chlarotera* and *Caloplaca* spp. of lichens were identified after morphological and anatomical investigation. Out of these, eight species are being reported for the first time from the study area. The species diversity of these twelve species was analyzed. It was found that the highest α-diversity is ten whereas lowest α-diversity is seven. *Physcia dubia* is the most common out of 12 species and was found at three localities. All the taxa have been deposited in CPUH (The Herbarium, Department of Bio-sciences, Career Point University, Hamirpur).

Keywords: Corticolous; Himachal Pradesh; Inhabiting; Lichen and Sacred trees.

INTRODUCTION: Lichens are fascinating dual organism entity, which are formed by the association of two or more entirely different types of organisms – a fungus (mycobiont) and an alga (phycobiont). Lichens are the symbiotic organisms which not only play a major role in ecosystem but also in human welfare.[1] Mycobiont, forming the major component in lichen thalli is the basis of lichen taxonomy. Lichens are thus regarded as a specialized group of fungi under lichenized fungi.[2] Lichen is a highly diverse group because of its universal distribution they play major role in the pioneer but when we compare with other group of plants they receive little scientific attention.[3] Lichens are very slow growing organism which grow just few millimeter or centimeter in a year. Due to their slow growth, they retain uniform morphology and depend on the atmosphere for their water and nutritional requirement. These are considered as most significant indicator of ecosystem fluctuations as they are more sensitive towards habitat and climatic alteration.[4,5] Lichens are classified on the basis of substratum as corticolous (on bark of trees), saxicolous (on rocks), terricolous (on soil) and foliicolous (on leaf surface). Lichens which grow on the bark of trees are called corticolous lichens. In India, more than 70% lichens are corticolous. Bark of a number of trees support the growth of epiphytic lichens. About 400 secondary metabolites are found in lichen thallus, of which 230 are unique and specifically found in the group of plants. The unique biochemical compound produced by the lichen have made them useful to people in traditional culture as food, source of dyes, fragrances and medicines.[6] Lichens are most significant indicator of forest health because they are sensitive towards habitat alteration and biodiversity change.[7] Lichens act as bio indicator of air pollution because of their sensitivity to different gases pollutant.[8] Lichens play an important role in the nutrient cycling of forest ecosystem through litter fall and decay. They are important as food, shelter and nesting materials for a variety of wild animals.[9]

The term 'sacred' has been used to define things under religious life, which remain protected from profane things. The International Union of Conservation of Nature (IUCN) has defined "Sacred Natural Sites" as those areas of land or water having special spiritual significance to people and communities.[10] The Indian sacred trees have a pre-vedic origin and most of them are associated with indigenous/ tribal communities believing in divinity of nature and natural resources. Sacred trees are considered as repository of local gene pool with native biodiversity.[11]

Lichens contribute about 8% of life forms on the earth's surface. Indian lichens are represented by 2450 species belonging to 305 genera and 74 families which is about 10% of the 20,000 lichen species reported from world over.[12] There are 3500 species of

lichens in Indian Sub-continent. Although inventory of the lichen is incomplete, India still emerges as the fifth richest country sharing 10.11 percent of 20,000 species of lichens recorded in the world. India is a rich centre of lichen biodiversity, harboring nearly 15% of total global lichen flora.[13] A lot of researchers have explored lichen diversity and documented biodiversity and conservation strategies for this Himalayan region and India.[14-67] Seventy species of lichen belonging to 36 genera and 23 families from Bilaspur, Hamirpur and Una district of Himachal Pradesh. Result reveals that out of 70 species reported from the three district, Bilaspur district has maximum diversity of lichens represented by 59 species whereas Hamirpur and Una represented by 29 and 6 species reported.[68] One hundred ninety two species belonging to 58 genera have been recorded from district Shimla about 64% of the earlier known lichen from whole of Himachal Pradesh. Foliose lichens were most abundant represented by 91 species over crustose and fruticose forms represented by 85 and 19 species respectively.[69] Keeping in view the fact that sacred trees are considered as repository of local gene pool with native biodiversity, the present investigations were carried out during January – June 2019. The objectives of the study were collect specimens of lichens growing on sacred trees, identify the specimens, preserve and prepare herbarium of identified specimen, document aspects of relationship between sacred trees and lichen species.

MATERIALS AND METHODS: Bilaspur district is situated in Shivalik range of lower Himalayas. The specimens of lichen were collected from Berthin, Jamli and Shahtalai regions of this district. Specimens of lichen growing on sacred trees (*Ficus benghalensis, Ficus religiosa* and *Mangifera indica*) were collected from Berthin, Jamli and Shahtalai regions of the study area. The specimens were collected randomly from various localities and substrates of the srudy area. The field data such as texture, size, colour, macroscopic features and form were noted in the field book during excursions.[70] Fresh specimens was observed and sun dried at the camping site. These were then brought to laboratory for further taxonomic studies. The morphological and anatomical details were compiled in the form of a description which is then compared with the published literature, authenticated taxonomic keys and monographs. Identity of specimens were confirmed by comparing their morphology, anatomy and chemistry with authenticated taxonomic keys.[71-75] Species diversity of the three locations was analysed.[76]

RESULTS AND DISCUSSION: During the present study, a total of twelve species of lichens has been enumerated from three localities of district Bilaspur for the first time (Table 1 and Table 2).

Table 1: List of lichen species growing on sacred trees in the study area.

Family	Genera	Species
Physciaceae	*Physcia*	*Physcia dubia* *Physcia crispa* *Physcia integrata* *Physcia sorediosa* *Physcia jackii*
Chrysotrichaceae	*Chrysothrix*	*Chrysothrix chlorina* *Chrysothrix candelaris*
Parmeliaceae	*Parmotrema*	*Parmotrema andinum* *Parmotrema mesotropum*
Physciaceae	*Phaeophyscia*	*Phaeophyscia hispidula*
Lecanoraceae	*Lecanora*	*Lecanora chlarotera*
Teloschistaceae	*Caloplaca*	*Caloplaca* spp.

Table 2: List of lichen species commonly growing on all sacred trees under study.

Lichen Species	Host Sacred tree
Physcia dubia	*Ficus benghalensis* *Ficus religiosa* *Mangifera indica*
Chrysothrix chlorina	*Ficus benghalensis* *Ficus religiosa* *Mangifera indica*
Phaeophyscia hispidula	*Ficus benghalensis* *Ficus religiosa* *Mangifera indica*

CONCLUSION: During present investigation a total of 66 specimens of lichen were collected from three localities (Berthin, Shahtalai and Jamli) of district Bilaspur. A total 12 species *(Physcia dubia, Physcia crispa, Physcia integrata, Physcia sorediosa, Physcia jackii, Chrysothrix candelaris, Chrysothrix chlorina, Parmotrema andinum, Parmotrema mesotropum,Phaeophyscia hispidula, Lecanora chlarotera, Caloplaca sp.)* of lichen were recorded after morphological and anatomical investigation. Eight species are being reported for the first time from district Bilaspur of Himachal Pradesh. The species diversity (α, β and γ diversity) of twelve species are calculated. The highest α-diversity is of Jamli i.e. ten. The lowest α-diversity is of Shahtalai i.e. seven. β-diversity is seven and γ-diversity is twelve. *Physcia dubia* is the most common out of 12 species and was found at three localities.

ACKNOWLEDGEMENTS: Authors are thankful to Sh. Pramod Maheshwari, Chancellor, Career Point University Hamirpur for providing the necessary laboratory facilities for the study.

CONFLICT OF INTEREST: Author declares that there is no or any conflict of interest exists.

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