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EPIPHYTIC LICHENS OF DALHA DAMAMI MOUNTAIN, JANJGIR DISTRICT OF CHHATTISGARH INDIA

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ABSTRACT

The diversity of lichen host tree species in the forest area of Dalha Damami hill in Chhattisgarh was investigated in this study. The study found that the diversity of lichen host tree species in the area is high, and that the most common best host tree species were *Buchnania lanzan*, *Diospyros melanoxylon*, and *Madhuca longifolia*. Total 9 lichen species *Dirinaria consimilis*, *Dirinaria aegialia*, *Rhinodina sophodes*, *Lecidella enteroleucella*, *Lecanora tropica*, *Parmotrema praesorediosum*, *Pertusaria cicatricose*, *Pyrenodesmia sp.* and *Staurothele fissa* were identified in the forest area. The distribution of lichen species was found to be influenced by the regeneration status of the host tree species, with lichens being more abundant on healthy trees than on degraded trees. The study also found that the degree of forest degradation in the area is high, with the most degraded areas being those that had been logged or cleared for agriculture. The loss of corridor connectivity between the Dalha hill and other forest patches is also a major threat to the biodiversity of the area. There are a number of things that can be done to address these issues, including creating new corridors between the Dalha hill and other forest patches promoting sustainable agricultural practices, and raising awareness of the importance of biodiversity conservation among the local community.

Key word: Tree Diversity, Lichen, forest disturbances, local community, distribution.

Introduction

Janjgir district is one of the 28 districts of Chhattisgarh. It covers a total area of 3853 km² and has a population density of 420 people per km². Janjgir district has the least forest cover out of all districts in Chhattisgarh (Agrawal *et al.*, 2010, Dixit, 2021). The forest cover is less than 1% of the total forest cover in the state. Best lichen hosts *Buchnania lanzan*, *Diospyros melanoxylon*, *Madhuca longifolia* and *Lannea grandis*, are large, deciduous trees found in tropical and subtropical forests. They are important tree species for the Indian economy, as they are used for timber, fuel wood, and fodder (Singh *et al.*, 2003). Lichens are a group of organisms that are made up of a fungus and an alga. They are found in a variety of habitats, including forests, deserts, and mountains. Chhattisgarh is renowned

for its abundance of ecologically sound natural resources with its landscape comprised of three distinct ecosystem mountains, plateaus and plains each constituting approximately a third of its geographical diversity (Shishir *et al.*, 2021, Dixit, 2005). Lichens are known for their ability to indicate the health of the forest ecosystem. They are also used to monitor forest disturbances, such as deforestation and air pollution. (Thorman, 2006).

Lichens are symbiotic organisms of algae and fungi that need host species and a substratum to survive. Earlier studies show the *Shorea robusta* as the best host species of lichens in the Chaiturgarh (Bajpai *et al.*, 2018). Satya and Upreti recorded more than 120 species of lichens in the Achanakmar area of Chhattisgarh. Nayaka *et al.*, (2007) and Bajpai *et al.*, (2017) also studied the host species of lichens in India.

Table 1: Lichen species found at Dalha Damami Forest of Janjgir District.

S.N	Name of Species	Accession No (NBRI) CSIR-LWG	Altitude	Latitude Longitude
1	<i>Dirinaria consimilis</i> (Stirt.) D.D.Awasthi	65408	300m	N- 22°06'579" E-082°23'605"
2	<i>Dirinaria aegialia</i> (Afzel. ex Ach.) B.J. Moore	65410	320m	N- 22°06'901" E-082°24'328"
3	<i>Rhinodina sophodes</i> (Ach.) A. Massal	65406	304m	N- 22°06'591" E-082°23'589"
4	<i>Lecidella enteroleucella</i> (Nyl.) Hertel	65416	320m	N- 22°06'901" E-082°24'328"
5	<i>Lecanora tropica</i> Zahlbr.	65405	292m	N- 22°06'638" E-082°23'525"
6	<i>Parmotrema praesorediosum</i> (Nyl.) Hale	65411	412m	N- 22°06'401" E-082°24'438"
7	<i>Pertusaria cicatricose</i> Mull. Arg.	65407	357m	N- 22°17'247" E-082°23'022"
8	<i>Pyrenodesmia</i> sp.	65418	320m	N- 22°06'901" E-082°24'328"
9	<i>Staurothele fissa</i> (Taylor) Zwackh	65417	320m	N- 22°06'901" E-082°24'328"

Material and Methods

Study Area

Janjgir Champa’s highest point is home to Dalha hill. There is a plateau in the Janjgir Champa area and a lot of limestone. This is also the reason why the rock of Dalha hill contains only limestone. The summit of this peak is roughly 750 m. It is a sacred and natural location. Famous temples located around the Dalha Mountain include the

Ardhnareshwar Temple, the ShriSidh muni Ashram, the Nag Nagin Temple, and the Shri Krishna Temple. It has a natural forest and a pleasant environment. Dalha Mountain is about 15 kilometers from NTPC by air. In close proximity to villages: Changori, Ooni, Amlipali, Sakari, Madua, Pondi Dalha hill. Temple is located on the north side. The present study investigated the diversity of lichen host tree species in the forest area of Dalha Damami hill. The study area was surveyed using 20 × 20m quadrats, and the GPS location of each quadrates were recorded. The biodiversity of the area was mapped, and the distribution patterns of species and their regeneration status were analyzed. The data were used to identify the distribution patterns of lichen host tree species and the degree of forest degradation in the area. Lichen samples were collected and identified following the literature of Compendium of Micro lichen of India and Macro lichen of India by (Awasthi, 1991, 1988, 2007). The samples were identified morphologically using a stereo zoom microscope and anatomical study with the help of compound microscope mounted in simple water. Chemical spot tests were performed using KOH solution (10%), C test (Calcium Hypochlorite), Pd test (Paraphenylene diamine) followed by iodine test. Thin layer



Plate-1: Site-1

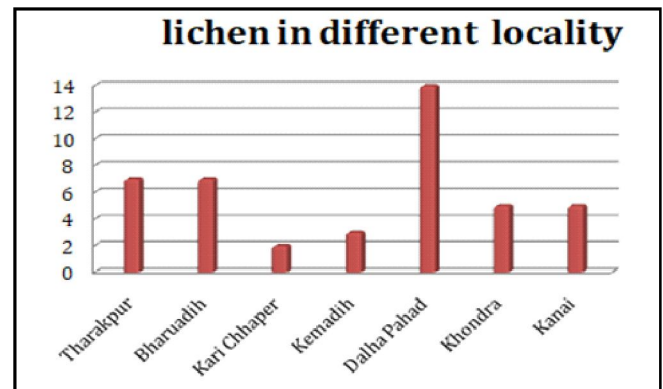


Fig. 1: Lichens in different localities.

Table 2: Lichen species distribution at Dalha Damami Forest of Janjgir District.

S. N	Lichen Genera and Species	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10	Substratum	Growth form	Host Tree species
Caliciaceae														
1	<i>Dirinaria consimilis</i> (Stirt.)D.D.Awasthi	+	+	+	+	+	-	-	-	-	-	Corticolus	Foliose	<i>Diospyrous melanoxyton</i>
2	<i>Dirinaria aegialia</i> (Afzel.ex Ach.)B.J.Moore	+	+	+	+	-	-	-	-	+	-	Corticolus	Foliose	<i>Madhuca longifolia</i>
Physiaceae														
3	<i>Rhinodina sophodes</i> (Ach.)A.Massal.	-	+	-	-	+	-	-	-	+	-	Corticolus	Crustose	<i>Buchnanian lanzan</i>
Lecanoraceae														
4	<i>Lecidella enteroleucella</i> (Nyl)Hertel	+	-	-	+	-	+	-	+	-	+	Saxicolous	Crustose	On rock surface
5	<i>Lecanora tropica</i> Zahlbr.	-	-	+	-	-	-	-	+	-	-	Corticolus	Crustose	<i>Chloroxylon swietenia</i>
Parmeliaceae														
6	<i>Parmotrema praesorediosum</i> (Nyl.)Hale	-	+	-	+	-	+	-	+	-	-	Corticolus	Foliose	<i>Mangifera indica</i>
Pertusariaceae														
7	<i>Pertusaria cicaricosa</i> Mull.Arg.	-	-	+	+	-	+	-	-	+	-	Corticolus	Crustose	<i>Buchnanian lanzan</i>
Teloschistaceae														
8	<i>Pyrenodesmia</i> sp.	-	-	-	+	-	-	-	+	-	-	Saxicolous	Crustose	On rock surface
Verrucariaceae														
9	<i>Staurothele fissa</i> (Taylor)Zwackh	-	-	-	-	-	-	-	-	+	+	Saxicolous	Crustose	On rock surface

chromatography was used for chemical identification of lichens up to species level. The Lichen samples were identified and specimens are deposited in the herbarium of National Botanical Research Institute, Lucknow, U.P., India

Result and Discussion

The study found that the diversity of lichen host tree species in the forest area of Dalha Damami hill is high.

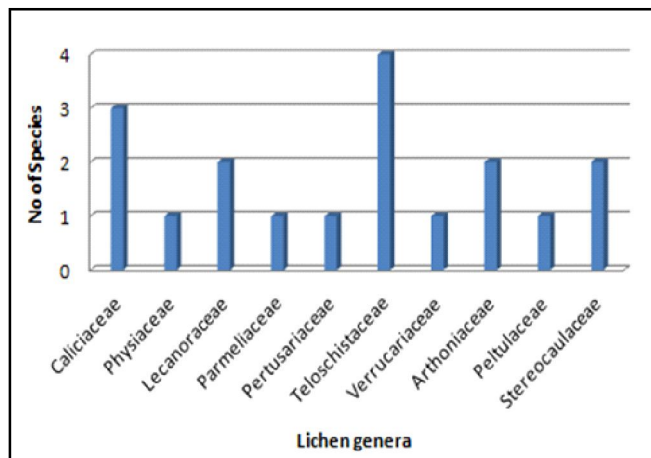


Fig. 2: Different genera of Lichens.

The most common best host tree species were *Buchnanian lanzan*, *Diospyros melanoxyton*, *Madhuca longifolia* and *Lannea grandis*. The distribution of lichen species was found to be influenced by the regeneration status of the host tree species (Dixit *et al.*, 2013). Lichens were more abundant on healthy trees than degraded trees.

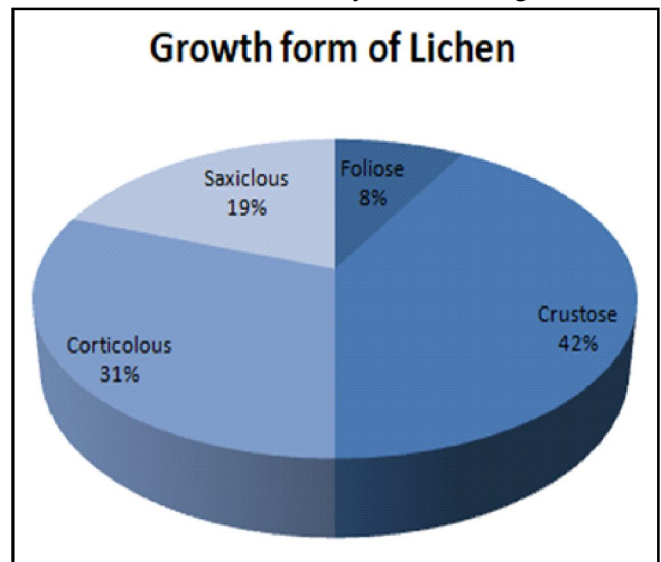


Fig. 3: Different growth forms of Lichens.

One of the main dangers to India's lichen flora has been highlighted as deforestation; comprehensive measures are required to measure and track the real impact of these changes in land use on the diversity and richness of lichens. (Prajapati, 2015). The two sites were taken for the measurement of tree diversity. Chhattisgarh main forest state of India (Dixit *et al.*, 2023). The Site- one Amlipali Dalha forest is capped with immature aged tree species with canopy density of more than 90%. The main tree species *Diospyros melanoxylon*, *Buchnania lanzan*, *Terminalia tomentosa*, *Madhuca longifolia*, *Semecarpus anacardium*, *Cleistanthus collinus*, *Anogeissus latifolia*, *Chloroxylon swietenia*, *Mangifera indica*, *Aegle marmelos*, *Phyllanthus emblica*, *Mytragyna speciosa*, *Abrus precatorius*, *Ventilago madrasptana*, *Azadracta Indica*, *Terminalia arjuna*, *Lagerstromia parviflora*, *Careya arborea*, out of which the 11 species has the highest frequency among all and one species of *Azadiracta indica* is least frequency observed, Abundance reveals the highest is *Anogeissus acuminata* followed by *Diospyros melanoxylon* and *Careya arborea* respectively. Density of the species is highest are *Diospyros melanoxylon*, *Buchnania lanzan*, *Anogeissus acuminata* were observed at Amlipali site. Total 9 species of lichens were identified from the Amlipalisite. Lichen family like, Caliciaceae, Lecanoraceae, Pertusariaceae, Parmeliaceae, Teloschistaceae, Verrucariaceae shows the best growth of lichen in the region where as, Physciaceae, are limited in distribution. The *Buchnania lanzan* bears growth of 3 lichen species and frequency of occurrence of species over the bark is high. *Diospyros melanoxylon* was good host species followed by *Lannea grandis*. The site is capped with other non-host tree species densely in the area. The place is observed very less source of natural water poor availability of water, exotic species in the region and anthropological disturbances has created ecological stress condition in the forest. The Environmental conditions at the Amlipali site are favorable for lichen growth. The site is located in a south east direction of the mountain area receives plenty of sunlight with shades of hilly terrain has increased the frequency of lichen distribution in the site. The site receives a lot of rainfall during month of mid- June to September make small water stream and storage but rest part indicates scarcity of water. Pioneer stages of lichen growth are abundant in only host species even sterile lichen growth was also observed in the site indicate lichens are adopting the local habitat gradually indicate the best lichen growth in near future. The site is also relatively mild, due to dense

forest which is another factor that contributes to best lichen growth in comparison to another location.

Second site Pondi Dalha face was occupied with the tree species of *Diospyros melanoxylon* *Buchnania lanzan*, *Cleistanthus collinus*, *Anogeissus latifolia*, *Chloroxylon swietenia*, *Tectona grandis*, *Lagerstromia parviflora*, *Eucalyptus*, *Aegle marmelos* with highest frequency and abundance species each species average height of 2-3 meter only. Very limited lichen growth observed at the site only on old tree species. Pondi Dalha site was found very disturbed due to anthropogenic pressure, illegal cutting and felling of trees. Forest department are working actively at this place through the plantation of species like *Tectona grandis*, *Eucalyptus*, *Aegle marmelos*, *Mangifera indica*, *Gamlina arborea*, *Careya arborea* etc. The forest department also constructed a road near the site and planted different local species around the road. The site was observed well protected for Soil Moisture Conservation by contour trench all over the place has increased the possibility of lichen growth in the area.

Lichens have a number of potential benefits to the pondi dalha forest ecosystem. They can help to improve air quality by removing pollutants from the air but the diversity is limited in this area. Lichens are food source for some insect, and they observed as provider of shelter for insects and other small species like spider and egg of some moths. Lichens are ecologically important for a variety of reasons. They are pioneer species and are continuously colonizing rock and over the bark of trees are in sterile condition representing the succession stages in the forest site. Lichens are sensitive to air pollution, so their presence or absence symbolize the quality of the air as the lichen observed from nearest zone from pollution source was less in count.

Conclusion

Dalha damami area is a best biodiversity place, being surrounded by the agricultural area. Dalha hill lost its corridor connectivity from other forest patch and facing a number of threats, including the loss of biodiversity. Creating a new native species corridor of artificial plantation between the Dalha hill and other forest patches are very important. Newly formed corridor would allow spreading of animals and plant species diversity more frequently between different habitats, which would help to maintain the genetic diversity of the species in the area. The study of the site found that the degree of forest degradation due to anthropogenic disturbances in the area is high. The most degraded areas were those that had been logged or cleared for their own use by local people

and practicing joint forest management with local villagers will increase the diversity of the area gradually.

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