

Lichen diversity as pollution indicators on different substances in upper valley Swat (UVS)

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Lichens a symbiotic relationship of algae and fungi, is a natural indicators of air quality. Lichens play an important role in the ecosystem, increase structural complexes in primary colonization, enhance water regimes, influencing cycling of nutrients as well as provide shelter, habitat and food materials for various animals. Approximately 17,000 species of lichens are found throughout the globe, which contribute to world significant diversity. But due to global warming and particulate matters these indicators are decreasing day by day. But still no conservation measurements and strategies are coped to preserve these natural resources. The current results showed that these species are highly sensitive to temperature and air pollution. In the present study the lichen richness, lichen diversity (LD) and mean lichen diversity value (LDV) on two different substrates (trees and rocks) as pollution indicators was investigated in 10 sampling points in Upper Valley Swat (UVS). Lichen diversity value (LDV) on trees and rocks was determined by using the method of Llop with slight modification. Two sampling points (P2 & P5) were divided in three sub-sampling points (road side, river side and mid of road and river side). Each tree was divided into four plots (North, East, South and West) while rocks were divided into three parts (Top, Middle and Bottom) for lichen distribution. Different trees and shrubs serve as lichen substrate including Diospyrus lotus, Juglans regia, Morus Alba, Morus nigra, Olea ferruginea, Pinus roxburghii, Pinus wallichiana, Quercus baloot, Zizypus sativa, Cedrus deodara and Ficus carica. These are natural growing trees while the cultivated and conventionally propagated trees including Diospyrus kaki, Malus pumila, Melia azedarach, Plantanus orientalis, Populus caspica, Prunus americana, Prunus domestica and Prunus persica. Rocks exposed in the proposed study area are of metamorphosed nature and belongs to Kamila Amphibolite Belt of Kohistan Island Arc Complex. As compared to top and middle parts, higher lichens distribution was observed on the bottom parts of most of the rocks. The mean LDV on rocks is lower than trees because of rocks at different points are exposed to grazing, traffic and polluted air. Lichen distribution showed variation at each sampling point due to different factors including grazing, traffic, deforestation and air pollution. These environmental factors significantly reduced the diversity of lichens including richness and abundance. But however lichen species easily grows on tree barks due to humidity, shade and less exposure to sunlight. On the other hand the less distribution of lichens on rocks may be due to exposure to sunlight and surfaces. In this experiment the diversity of lichens, LDV on each substrate and mean LDV at each sampling point was reported from Pakistan for the first time. These results suggested that suitable substrates for lichen growth are trees as compared to rocks and further suggested that critical strategies should be adopted to conserve these natural species because lichens are Bio-indicators of atmospheric pollution.