A study of the Suitability of Epiphytic Lichens to Monitor Airborne Microplastic Depositions: A Case Study in Kanadola, Sri Lanka

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This study mainly focuses on the comparison of airborne microplastics (AMPs) deposition between the surface of epiphytic crustose lichens and the bark of trees in the surrounding area of an open dumpsite and a plastic crusher plant in Kanadola, Sri Lanka. Epiphytic crustose lichen samples and bark samples were collected at three sampling zones by using stratified random sampling techniques at different distances from the center of the plastic crusher plant: the close zone (n=4, 50 m), the intermediate zone (n=3, 100 m), and the remote zone (n=3, 200 m). Background control samples (n=3) were collected from the Kumbalgama area (undisturbed forest). At each sampling point, epiphytic crustose lichens were collected carefully, removing them from selected trees (bark Type-Smooth). Each sampling point corresponds to a tree. Additionally, bark samples were collected from the area adjacent to where the lichen samples were removed from the tree. Epiphytic crustose lichen and adjacent bark samples were collected from the tree, covering the area from ground level up to a height of 1.5 m. Anthropogenic microplastics were visually inspected with a microscope after acid digestion of lichen and bark samples. A hot needle test was used to identify microplastic in the quantification of the AMPs. The total number of microplastics found per 1 g of the dry weight of lichen and bark was compared using one-way ANOVA (with a 95% confidence interval). Results revealed a statistically significant difference ($P<0.05$, $P=0.024$) in microplastic deposition between lichen and bark, and lichen showed a higher deposition level of airborne microplastics. This study demonstrates, for the first time in the world, the potential of epiphytic crustose lichens as a biomonitor for airborne microplastics.

Keywords: *Airborne microplastics (AMPs), Biomonitor*, *Epiphytic crustose lichens, Hot needle test, Stratified random sampling*