An Assessment of Airborne Microplastic Distribution in Sri Lanka by Using Lichens

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Airborne microplastics (AMPs) have been found in our atmosphere, and they have currently received significant global attention since they can enter the human body through inhalation, dermal contact, or ingestion and may pose a serious potential threat to human life in the future. This study was carried out based on an open dumpsite and a plastic crusher plant located in Kanadola, Sri Lanka, which have a high potential as a source for anthropogenic microplastic contamination in the air. Lichen samples were collected by using stratified random sampling, and this area was divided into three zones based on the distance from the plastic crusher plant; a close contact zone (50 m), an intermediate zone (50-100 m), and a remote zone (100-200 m). Background control samples were collected from the Kumbalgama area. Lichen samples were digested with acid digestion, and visual inspection of microplastics was carried out using a stereomicroscope. Identification of microplastics was performed using a hot needle test. The total number of AMPs per 1 gram of dry weight of lichen in each sampling zone was statistically analyzed using one-way ANOVA (95% confidence interval) to compare sampling zones. The results showed that each sampling zone has statistically significant difference ($P > 0.05$), and a post hoc test using the Tukey test revealed that the close contact zone, remote area, and control zone have statistically significant difference ($P > 0.05$), but the close contact zone and intermediate zone do not ($P > 0.05$). Overall, it was found that the lichens can be used as a bioindicator and passive depositional sampler for qualitative and quantitative analysis of AMPs.

Keywords: Airborne Microplastics, Atmosphere, Lichen, Passive Depositional Sampler, Stratified Random Sampling