Assessment of air quality using lichens as bioindicators

A M N P Attanayake and S Chandrani Wijeyaratne*
Department of Botany, University of Sri Jayewardenepura, Nugegoda

Air pollution is a major environmental issue in developing countries due to gaseous emissions from various sources. Lichens are recognized as being very sensitive to air pollution. Gaseous pollutants (e.g.: SO_2, NO_2, HF) are known to bring about damaging effects on many lichens species. As all lichens are not equally sensitive/ resistant to different air pollutants, distribution and diversity of lichens provide some indication of atmospheric air quality. The present study was carried out using lichens as bioindicators of air pollution with respect to SO_2 in Colombo and suburbs.

Thirty-one sites falling on six transects radiating from Colombo city to suburbs were selected for this study. Coverage and frequency of corticolous lichens were randomly recorded by placing 250-cm^2 quadrat on three common tree species found in a 1 km^2 quadrate in each site. Other microclimatic conditions (e.g.: light condition, bark pH) were also taken in to account in this study.

Air quality was assessed by means of Index of Atmospheric Purity (IAP), which is a measure of lichen diversity based on frequency counts of epiphytic lichens species within a sampling site.

The results of this study showed that, sites near Colombo city had fewer numbers of lichens species and low IAP values. Among 31 sites, Colombo city showed the lowest IAP value. A gradual increase of IAP values were observed along all transects from Colombo city to suburbs, except in few cases. This indicates the low purity level of the air in the city compared to suburbs. Increase in IAP value suggests a better air quality in the area studied.

Lichens belonging to families, Thelotremataceae, Parmeliaceae and Coccoarpiaceae, were present at high frequencies in sites with high IAP values, but those were absent or recorded at lower frequencies in areas where IAP values were low. This baseline information can be used to carry out long-term air quality monitoring programs using lichens.

Results indicate high degree of air pollution already exists in the city center but becomes much less when moving out of Colombo. This information could be correlated with lichen distribution, which in turn would provide some base-line data needed for better planning when implementing future development programs.

Tel: 011 2801414