ASSESSMENT OF AIR QUALITY USING LICHENS

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Abstract

Air pollution is a major environmental issue in developing countries due to gaseous emissions from various sources. Lichens are very sensitive to gaseous pollutants (e.g.: SO_2, NO_2, HF), which damage some species while some are resistant. Distribution and diversity of lichens provide some indication of atmospheric air quality, which could be used in long-term monitoring. When funds are limited for chemical monitoring use of bio monitors would be an ideal method. Studies were carried out using lichens as bio indicators with respect to SO_2 in several places in Sri Lanka.Thirty-one sites falling on six transects radiating from Colombo city to suburbs were selected to study coverage and frequency of corticolous lichens. A similar study was done in Ritigala and Ambuluwawa also. Lichens were randomly recorded by placing 250-cm^2quadrate on three common tree species found in a 1Km^2 quadrate in Colombo sites. The area of the site was smaller in Ritigal and Ambuluwawa. Other microclimatic conditions (e.g.: light condition, bark pH) were also taken in to account in these studies. Here air quality was assessed using Index of Atmospheric Purity (IAP), which is a measure of lichen diversity based on frequency counts of epiphytic lichens species within a sampling site.

Results showed that, sites near Colombo had fewer numbers of lichens species and low IAP values. Among 31 sites, Colombo city center showed the lowest IAP value. 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 (Shimizu, 1995). Lichens belonging to families,

Thelotremataceae, Parmeliaceae and Coccoarpiaceae, were present at high frequencies in sites with high IAP values. Those were absent or recorded at lower frequencies in areas where IAP values were low.

Ritigala, with low SO_2 and NO_x contents in air had a variety of lichens. At lower elevations in shaded places lichen communities observed had *Leptogium cyanascence, Parmiella nigrocinata*, which have cyanobacterial photobiont. At mid elevation crustose with trentopholiod photobiont such as species of *Myriotrema spp, Thelotrema spp., Porina spp. Pyrenula* spp and *Anthrocothecium spp.* were common. At high elevation included photophilus species e.g. *Heterodermia, Bulbothrix* sp. and species having cyanobacterial photobiont e.g *Pseudocyphellaria sp., Sticta sp.* and *Coccocarpia spp* in shady, cool and fairly wet places. *Collema spp, Ceonogonium linkii* and *Heterodermia sp* were also recorded. The canopy in mid elevation has photophylous lichens ; *Parmotrema ticntorum, Roccella sp, Relicina sp* and *Ramalina sp.* Most of the lichens recorded from Ritigala are pollution sensitive. In Ambuluwawa lichen communities had Several *Usnea* species, which are normally found in high elevations and also which are sensitive to air pollutants. This baseline information can be used to carry out long-term air quality monitoring programs using lichens.

Results indicate the degree of air pollution that already exists in Colombo and hence would provide information needed for better planning to reduce air pollution and effects of pollution on biota when implementing future development programs.