

## *Summary & Conclusion*

Till 1950's Lichen was one of the neglected plants from point of view of its studies. In 50's it was shown that Lichens accumulate large quantity of metal ions irrespective of their utility in plant metabolism. Since then Lichens have been looked with new angle as indicator plants for metal pollutants and voluminous study is being carried out. Besides the lichens are adapted to extreme environment of heat and cold. Therefore, from the point of view of ecology it is also important. It is known to grow in the dessert, it is found in Alps, Antarctica which is the evidence in favour of its adaptation to the extreme environmental condition.

In the ideal condition of temperature and humidity it is known to grow luxuriantly. Western ghats are ideally accomplished with suitable environment for lichens. Uptill now several hundred species of lichens have been reported by Patwardhan and co-workers during their floristic survey. Especially the region as Mahabaleshwar, Pachgani, Kas, Bamnoli and thick forests and high mountanious ranges are rich sources of varieties of lichens.

Lichens have unique features. Unlike any other organisms lichen is an ideally accomplished symbiont, where fungi and algae are associated. Among fungi they are predominantly

ascomycetes. However, basidiomycetous fungi are also associated in some lichens. Where as in algae only green and blue green algae are associated. Among green algae species of Trebauxia and Trentipohlia are found where as among blue green algae Nostoc, is known to be associated.

With such an interesting features of lichens, such as their ability to accumulate most toxic metal ions, ecological adaptation, mechanism of symbiont formation physiological interaction of mycobionts and phycobionts and their trophic relationship, much more than that, use of lichens as pollution indicator work is being carried only in the west. India being one of the tropical countries little work in these aspects is being carried out. In the foregoing study a modest attempt has been made to investigate metal ion accumulating ability of three lichen species Usnea ghatensis, Parmelina (Parmelia) wallichiana and Leptogium cyanescens. These lichens were mainly collected from locality near Satara called Kas.

#### Methodology :

These foliose and fruticose lichens were collected at random from various localities of the regions. They were cleaned dried and acid digested in a routine way. The acid digested solutions were used for mineral analysis. For analysis of metal ions Atomic Absorption Spectrophotometer was used. The metal ions analysed are Na, K, Ca, Mn, Fe, Cu, Co, Cr, Zn, Pb, Li, Rb, Au and Cd.

The results obtained are discussed in comparison with similar work carried out earlier and exhaustive available literature. Conclusions are based on the discussion.

Conclusions :

1. The Na content in all the three lichen thalli is relatively much higher and among the three Leptogium has highest amount.
2. Relative quantity of K is also more in the three lichens and P.wallichiana and L.cyanescens have more than double the content of U.ghatensis.
3. Ca content in U.ghatensis is more than that in the other two. However, Ca content in all the three is relatively low.
4. Mn content in L.cyanescens is four times higher than in P.wallichiana and 15 times higher than in U.ghatensis.
5. Fe levels in all the three lichens are very high so as to cause toxicity. Being a member of the trace element such high content could only be explained as accumulation through atmosphere. The relative proportion of Fe in the order of magnitude is L.cyanescens > P.wallichiana > U.ghatensis.
6. Cu content of all the three is in the order of 1 to 5 mg/100 g dry tissue which is not toxic.

7. Cobalt being another trace element, it ranged in the order of 2 to 5 mg/100 g dry tissue.
8. Cr level ranged from about 3 to 5 mg/100 g dry tissue which appear to occur through atmospheric pollution.
9. Zinc is an essential trace element and found in sizable amount in all the three lichens highest being in L. cyanescens.
10. Lead is a pollutant and is found in the thalli of all the lichens but in small amount.
11. Li and Rb are also found in small quantity in all the three lichens.
12. Relatively large quantity of gold (Au) is a striking feature of all whose reason would not be explained.
13. Small quantity of Cadmium is found and its occurrence is attributed to atmosphere.
14. Many metal ions hitherto not have been traced have been traced in all the three lichens, and the reason attributed is to similar ecological conditions of all the three. However, it has been concluded that among the three lichen species investigated Leptogium is more sensitive for metal ions and has greater ability to accumulate metal ions. This observation is in conformity with the previous investigations and findings of other species of Leptogium.