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Role of mosses as heavy metal absorbants –an innovative tool for environmental conservation

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Abstract

Environmental pollution is increasing day by day posing serious problem for flora and fauna. Mosses are highly sensitive to pollution and are bioindicators of pollution and forest conditions.An analysis of few mosses of Kodaikanal in Southern Ghats has reveled that mosses absorb heavy metal pollutants from environment.Thus they can be used as innovative tool for monitoring and conserving environmental pollution.

Mosses are highly developed groups of bryophytes having a unique position between lower cryptogams and vascular plants prefering marshy swamps or wetland habitats for their abundant growth. Kodaikanal is a beautiful hill town in South India amidst Palni hills in Tamil Nadu characterized by heavy rainfall. Mosses grow there abundantly.

Key words: Mosses, Heavy metals, Kodaikanal, Pollution.

Bioindicators are biological agents which indicate atmospheric pollution. Environmental pollution is increasing day by day posing a serious problem for flora and fauna. A large number of pollutants including heavy metals are adversely affecting our environment. Heavy metals are emitted from solid fuel combustion from our vehicles and industrial processes. Mosses are used as bioindicators for their unique and specific responses. Some moss species are extremely sensitive to pollution and exhibit visible injury symptoms. Some moss species absorb heavy metals from the atmosphere.

1. *Area under study :*

Kodaikanal is a cool lush green hill station, 120 km from Madurai,Tamil Nadu, India. Mosses were collected from different locations in the town and its outskirts (forests).

2. *Detection of heavy metals :*

In the present investigation 4 species of mosses were selected for detection of

Table-1.

	Name of Moss species	Habitat	Heavy metals detected	
			Town	Outskirts
1	*Bryum argentums* Hedw	Terrestrial	Pb^{++} 1.5 ppm Zn^{++} 4.0 ppm	Pb^{++} 0.4 ppm Zn^{++} 0.2 ppm
2	*Hydrogonium dedcoyli* (C.Muell) Jaeg	Terrestrial	Pb^{++} 2.0 ppm	Pb^{++} 0.1 ppm
3	*Meteriopsis reclinata* (C.Muell) Fleisch	Epiphytic	Pb^{++} 5.9 ppm Cu^{++} 38.2 ppm Zn^{++} 5.8 ppm As^{++} 0.9 ppm	Pb^{++} 1.1 ppm Cu^{++} 15.4 ppm Zn^{++} 0.8 ppm As^{++} 0.2 ppm
4	*Pinatella calcutensis*Fleisch	Epiphytic	Zn^{++} 5.1 ppm Cu^{++} 28.9 ppm Pb^{++} 5.1 ppm As^{++} 0.4 ppm	Zn^{++} 0.5 ppm Cu^{++} 10.8 ppm Pb^{++} 0.7 ppm As^{++} 0.1 ppm

Pb^{++} - Lead, Zn^{++} - Zinc, Cu^{++} - Copper, As^{++} - Arsenic

heavy metals. These taxons were selected because of their abundance. Relevant literature[1-6] was consulted for the preparation of the manuscript.

Procedure used for preparing stock solution:

The substratum was removed from the plant material. Then the plant material (500 gms) was dried in folds of blotting sheets separately and then kept in shade for drying. The plant material was transferred in muffle furnace for making ash. The ash was dissolved in HCl and HNO_3 (3:1) and diluted with distilled water. The final volume was made to 500 ml. This served as the stock solution for detection of heavy metals. The instrument used was spectrophotometer. The concentraction in ppm was calculated using standard graph.

The epiphytic species absorbed more metals than terrestrial species. Also mosses recorded in the town (around hotels,tourist spots,market) had accumulated more amount of heavy metals than those in the outskirts (forest areas) It can be concluded that moss flora of a region are indicative of pollution. The monitoring of heavy metals through mosses is not only cost effective but provides efficient way to assess atmospheric pollution.

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