

NATURALLY GROWING GRIMMIACEAE FAMILY MOSSES AS PASSIVE BIOMONITORS OF HEAVY METALS POLLUTION IN URBAN-INDUSTRIAL ATMOSPHERES FROM THE BILBAO METROPOLITAN ÁREA

Gallego-Cartagena, Euler Morillas, Héctor; Carrero, Jose Antonio;
Madariaga, Juan Manuel; Maguregui, Maite

Abstract

In analytical chemistry, biomonitoring is known as the methodology, which consider the use of living organisms to monitor and assess the impact of different contaminants in a known area. This type of monitoring is a relatively inexpensive method and easy to implement, being a viable alternative to be developed in sites where there is no infrastructure/instruments for a conventional air quality monitoring. These organisms, having the capability to monitor the pollution, are also known as passive biomonitors (PBs), since they are able to identify possible contamination sources without the need of any additional tool. In this work, a multianalytical methodology was applied to verify the usefulness of naturally growing *Grimmia* genus mosses as PBs of atmospheric heavy metals pollution. Once mosses were identified according to their morphology and taxonomy, their ability to accumulate particulate matter (PM) was determined by SEM. EDS coupled to SEM also allowed to identify the main metallic particles deposited and finally, an acid digestion of the mosses and a subsequent ICP-MS study define more precisely the levels of metals accumulated on each collected moss. The study was focused on six sampling locations from the Bilbao Metropolitan area (Biscay, Basque Country, north of Spain). The experimental evidences obtained allowed to propose naturally growing *Grimmia* genus as PB of atmospheric heavy metals pollution and to identify the anthropogenic sources that contribute to the emission of the airborne particulate matter rich in metals, evaluating in this sense the atmospheric heavy metals pollution of the selected locations.

Keywords

Atmospheric heavy metals pollution. Bilbao metropolitan área, *Grimmia* genus mosses, ICP-MS, Passive biomonitors, SEM-EDS