

Title	Preliminary enviromagnetic comparison of the moss, lichen, and filter fabric bags to air pollution monitoring
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Journal	International Journal of Geography, Vol 192, No. 2
Abstract	<p>Air quality and anthropogenic air pollutants are usually investigated by passive biomonitoring which utilizes native species. Active biomonitoring, instead, refers to the use of transplants or bags in areas lacking native species. In Finland, the standardized moss bag technique SFS 5794 is commonly applied in active monitoring but there is still need for simpler and labor-saving sample material even on international scale. This article focuses on a preliminary comparison of the usability and collection efficiency of bags made of moss <i>Sphagnum papillosum</i>, lichen <i>Hypogymnia physodes</i>, and filter fabric (Filtrete™) in active biomonitoring of air pollutants around an industrial site in Harjavalta, SW Finland. The samples are analyzed with magnetic (i.e. magnetic susceptibility, isothermal remanent magnetization, hysteresis loop and hysteresis parameters) methods highly suitable as a first-step tool for pollution studies. The results show that the highest magnetic susceptibility of each sample material is measured close to the industrial site. Furthermore, moss bags accumulate more magnetic material than lichen bags which, on the contrary, perform better at further distances. Filter fabric bags are tested only at 1 km sites indicating a good accumulation capability near the source. Pseudo-single-domain (PSD) magnetite is identified as the main magnetic mineral in all sample materials and good correlations are found between different bag types. To conclude, all three materials effectively accumulate air pollutants and are suitable for air quality studies. The results of this article provide a base for later studies which are needed in order to fully determine a new, efficient, and easy sample material for active monitoring.</p>
Year	2014
Pages	154–163
keywords	Air pollution, Active monitoring, Bag technique, Magnetic methods, Material comparison

Title	Effect of 30 years of road traffic abandonment on epiphytic moss diversity
Author	Vítězslav Plášek & Arkadiusz Nowak & Marcin Nobis & Grzegorz Kusza & Katarzyna Kochanowska
Journal	Environ Monit Assess, Vol. 86
Abstract	Road traffic emits a cocktail of pollutants that can influence the vegetation and plant diversity in neighboring areas. However, the recovery potential of bryophytes after traffic abandonment is still little explored. In addition, the effects of the main pollutants of road verges, such as metals and salinity, on moss flora need to be investigated. In our study, we compared the moss richness and diversity in two closely related veteran tree allees of high conservation importance. The allees in Gryżów and Lubrza, Poland, were chosen because of their similarity in age, geographical location, type of surrounding areas, and tree species. The only difference was that the trees in Gryżów had not been exposed to direct road pollution for almost 30 years. The moss richness and diversity differed significantly between the sites. Altogether, 20 moss species were recorded on 229 trees, 17 species in Gryżów (abandoned road), and 13 in Lubrza (busy road). We found considerable differences between moss cover on the road-facing and opposite sides of tree trunks. In Lubrza, mosses on the road-facing side were very scarce. The moss cover in Gryżów was highly balanced between trunk sides as well as among trunk heights. Typical epiphytic species such as <i>Bryum moravicum</i> , <i>Dicranoweisia cirrata</i> , <i>Leskea polycarpa</i> , and <i>Orthodicranum tauricum</i> preferred the Gryżów tree stands, where they were present in numbers almost twice as high as that at Lubrza. The study shows that constructing a bypass road could be an effective conservation measure for veteran tree protection with their epiphytic moss flora.
Year	2014
Pages	8943–8959
keywords	Moss monitoring, Road salting, Tree conservation, Epiphytes, <i>Tilia cordata</i> , <i>Orthotrichum</i> , Poland

Title	Tissue S/N ratios and stable isotopes (d34S and d15N) of epilithic mosses (<i>Haplocladium microphyllum</i>) for showing air pollution in urban cities in Southern China
Author	Hua-Yun Xiao, Cong-Guo Tang, Hong-Wei Xiao, Yan-Li Wang, Xue-Yan Liu, Cong-

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Journal	Environmental Pollution, Vol. 158(5)
Abstract	In urban cities in Southern China, the tissue S/N ratios of epilithic mosses (<i>Haplocladium microphyllum</i>), varied widely from 0.11 to 0.19, are strongly related to some atmospheric chemical parameters (e.g. rainwater SO ₄ ²⁻ /NH ₄ ⁺ ratios, each people SO ₂ emission). If tissue S/N ratios in the healthy moss species tend to maintain a constant ratio of 0.15 in unpolluted area, our study cities can be divided into two classes: class I (S/N > 0.15, S excess) and class II (S/N < 0.15, N excess), possibly indicative of stronger industrial activity and higher density of population, respectively. Mosses in all these cities obtained S and N from rainwater at a similar ratio. Sulphur and N isotope ratios in mosses are found significantly linearly correlated with local coal d ₃₄ S and NH ₄ ⁺ - N wet deposition, respectively, indicating that local coal and animal NH ₃ are the major atmospheric S and N sources.
Year	2010
Pages	1026- 1032
keywords	d ₃₄ S; d ₁₅ N; S/N ratios; Moss; Coal; Acid rain; Industrial cities; South China

Title	Assessment of atmospheric sulfur with the epilithic moss <i>Haplocladium microphyllum</i>: Evidences from tissue sulfur and d₃₄S analysis
Author	Xue-Yan Liu, Hua-Yun Xiao, Cong-Qiang Liu, Hong-Wei Xiao, Yan-Li Wang
Journal	Environmental Pollution, Volume 157(7)
Abstract	The application of geochemical signals in mosses is more and more popular to investigate the deposition of atmospheric pollutants, but it is unclear whether records of atmospheric sulfur in mosses differ between their diverse habitats. This study aimed to investigate the influence of growing condition on tissue sulfur and d ₃₄ S of <i>Haplocladium microphyllum</i> . Epilithic and terricolous mosses in open fields, mosses under different canopy conditions were considered. We found that tissue sulfur and d ₃₄ S of mosses under different habitats were not consistent and could not be compared for atmospheric sulfur research with each other even collected at the same site, moss sulfur and d ₃₄ S records would be distorted by subsoil and upper canopies in different degrees, which possibly mislead the interpretation of atmospheric sulfur level and sources. Consequently, mosses on open rocks can be used reliably to assess atmospheric-derived sulfur in view of their identical sulfur and d ₃₄ S evidences.

	Mosses on open rocky surfaces are reliable bioindicators of atmospheric sulfur deposition.
Year	2009
Pages	2066- 2071
keywords	Atmospheric sulfur, <i>Haplocladium microphyllum</i> , Bioindicators