

Title	Monitoring of ozone pollution and the physiological activity of <i>Pinus halepensis</i> (Mill.) by electron paramagnetic resonance and other parameters
Author	Athanasios Valavanidis and Minas Ganotidis et al
Journal	Trees - Structure and Function
Abstract	An investigation of selected Aleppo pines in the forests of Mt Hymettus and Mt Parnis near Athens (Greece) was undertaken at three different sites in the period 1999–2003, because a considerable proportion of pine trees showed visible signs of chlorotic mottle. This condition is characteristic of high and prolonged levels of ozone exposure. Needles from Aleppo pine trees (<i>Pinus halepensis</i> Mill.) were analyzed for their manganese content in combination with Electron Paramagnetic Resonance (EPR) spectra of Mn ²⁺ , involved in photosystem II. Manganese is considered as an important bioindicator for the vitality of trees. Also, we investigated the EPR spectrum of the needles in the region of g=2.0045 for healthy and diseased trees. The antioxidant capacity of the needles extract was measured from trees by the DPPH method. Finally, seasonal changes in chlorophyll concentration in the needles were measured to evaluate the effects of ozone. Measurements of ozone concentrations at the three sites showed that there were elevated levels during the summer months. Our experimental results suggest that the concentration of manganese in the needles was lower in the area with higher ozone concentrations, supported by EPR measurements. Higher ozone concentrations also affected the antioxidant potential of the needles and their chlorophyll content during summer months. Our findings also confirmed the resilience of Aleppo pines under stressful conditions and recovery in winter months. Despite the experimental problems, EPR spectra of Mn ²⁺ in combination with other methods can be used as a sensitive bioindicator for ozone pollution, and is the result of oxidative stress affecting the growth cycle of the pine trees and their photosynthetic mechanisms.
Year	2004
Pages	630- 638
keywords	

Title	Biomonitoring of metal deposition in northern Spain by moss analysis
Author	J. A. Fernández, A. Ederra, J. Martínez-Abaigar and A. Carballeira et al
Journal	The Science of The Total Environment
Abstract	The results of the first survey carried out in northern Spain to determine atmospheric deposition of metals by analysis of terrestrial mosses, are described. Samples of different mosses, mainly <i>Hypnum cupressiforme</i> and <i>Scleropodium purum</i> , were collected from 134 sampling sites, between 1995 and 1996. Levels of Al, As, Cr, Cu, Fe, Hg, Ni, Pb and Zn, were determined by flame atomic absorption or atomic fluorescence spectrophotometry. Regression analysis was used to compare the capacity of the selected moss species to accumulate the elements, and intercalibration of accumulation in these species was carried out where necessary. Distribution maps were prepared to allow the zones most affected by

	metal deposition to be identified and to relate this to known sources of contamination: electricity power stations and other industries (e.g. Hg and Ni), edaphic contamination (e.g. Al and Cr) and road traffic (Pb). Background levels of metals in each species were also determined for the study area.
Year	2002
Pages	115- 127
keywords	