

Title	Minor effects of long-term ozone exposure on boreal peatland species <i>Eriophorum vaginatum</i> and <i>Sphagnum</i>
Author	Sami K. Mörsky, Jaana K. Haapala, Riikka Rinnan, Sanna Saarnio, Jouko Silvola, Pertti J. Martikainen, Toini Holopainen
Journal	Environmental and Experimental Botany, Vol.72(3)
Abstract	<p>The effects of long-term ozone fumigation on two common peatland plant species, a sedge <i>Eriophorum vaginatum</i> L. and a moss <i>Sphagnum papillosum</i> Lindb., were studied applying peatland microcosms. The peat cores with intact vegetation were cored from an oligotrophic pine fen and partially embedded into the soil of an open-air experimental field for four growing seasons. The open-air ozone exposure field consists of eight circular plots of which four were fumigated with elevated ozone concentration (doubled ambient) and four were ambient controls. The results showed that <i>E. vaginatum</i> and <i>S. papillosum</i> can tolerate ozone better than expected. Elevated ozone concentration did not affect overall relative length growth of <i>E. vaginatum</i> or <i>S. papillosum</i>. <i>The leaf cross-section area of E. vaginatum leaves was 8% bigger in the ozone treatment compared to that in the ambient control. Ultrastructural variables did not show any significant treatment effect in E. vaginatum or in S. papillosum. Total chlorophyll (a + b) concentration tended to increase in early growing season under ozone exposure. During the first growing season, elevated ozone concentration decreased methanol-extractable, UV-absorbing compounds in E. vaginatum. The results suggest that E. vaginatum and S. papillosum are ozone tolerant plant species and are likely able to cope with expected increase in tropospheric ozone concentration.</i></p> <p>Research highlights <i>Eriophorum vaginatum and Sphagnum papillosum can tolerate well tropospheric ozone. Relative length growth of E. vaginatum or S. papillosum was not reduced. Ultrastructure of E. vaginatum or S. papillosum was not altered.</i></p>
Year	2011
Pages	455- 463
keywords	<i>Eriophorum vaginatum</i> ; <i>Sphagnum papillosum</i> ; Tropospheric ozone ; Peatland ecosystem; Growth; Ultrastructure

Title	Tropospheric ozone effects on chemical composition and decomposition rate of <i>Quercus ilex</i> L. leaves
Author	Daniela Baldantoni, Massimo Fagnano, Anna Alfani
Journal	Science of The Total Environment, Vol. 409(5)
Abstract	<p>We determined the effects of tropospheric ozone on the chemical composition of <i>Quercus ilex</i> L. leaves and their decomposition, with a view to assessing the influence of ozone on nutrient cycling and the sustainability of Mediterranean holm oak forests. Forming one of the most widespread thermophilous vegetation communities in the area, <i>Q. ilex</i> is a dominant and widespread evergreen oak in the Mediterranean, where concentrations of tropospheric ozone are particularly high. The dynamics of carbon, nitrogen, lignin and cellulose concentrations were monitored for six months during the decomposition of leaves from plants subjected to controlled ozone exposure in open-top chambers. Ozone -exposed leaves, compared to unexposed leaves, showed no significant differences in C, N, lignin and cellulose concentrations prior to the incubation in mesocosms. However, during decomposition, leaves from plants exposed to ozone lost C significantly more slowly and showed a higher C/N ratio than unexposed leaves. Ozone exposure significantly slowed down the decomposition rate, indicating a negative effect of tropospheric ozone on nutrient cycling, which may reduce long-term sustainability of the holm oak forest.</p> <p>Research Highlights</p> <p>Ozone exposure slows down the decomposition rate of holm oak leaves.</p> <p>Ozone exposure does not determine morphological alterations or changes in the carbon, nitrogen, lignin and cellulose concentrations of holm oak leaves.</p> <p>Ozone exposure has negative effects on litter nutrient cycling and may reduce long-term sustainability of holm oak forest ecosystems.</p>
Year	2011
Pages	979- 984
keywords	Ozone exposure; Mediterranean area; Holm oak leaves; Decaying leaf composition

Title	Moss (<i>Bryum radiculosum</i>) as a bioindicator of trace metal deposition around an industrialised area in Sardinia (Italy)
Author	M. Schintu, A. Cogoni, L. Durante and A. Contu
Journal	Chemosphere
Abstract	<p>The moss <i>Bryum radiculosum</i> (Brid.), a species typical of dry and coastal environments, was used as a bioindicator for the estimation of atmospheric trace metal deposition around the industrial site of Portoscuso (Sardinia, Italy), which includes a lead–zinc smelter, two power plants, and aluminium production factories. For Cd, Pb, Zn, and V the results showed very similar patterns with extremely high values in the immediate surroundings of the industrial area. Copper and Cr showed somewhat different patterns, but still pointing to local pollution sources. The levels of metals at distance of about 13 km from the industrial site were still higher than in background samples. In order to evaluate the suitability of <i>B. radiculosum</i> for monitoring studies, trace metal concentrations in moss were compared with bulk deposition measurements in the same area. Correlation was significant only for Pb, Cd,</p>

	and Zn. For Cr, Cu, and V the results showed high variability, mainly to be ascribed to soil factors.
Year	2005
Pages	610- 618
keywords	

Title	Effect of litter removal on species richness and acidification of a mixed oak-pine woodland
Author	Zbigniew Dzwonko and Stefan Gawroski
Journal	Biological Conservation
Abstract	Eutrophication of woodland ecosystems and disappearance of acidophilous species have often been observed in central and western Europe over recent decades. Considerable increase in air-borne nitrogen and sulphur has been invoked as responsible for these processes in most studies. Historic data indicate that for hundreds of years man removed litter and fodder from many woodlands in these areas. As a result, woodland soils became poorer and more acid than they were originally. Cessation of the removal of materials may result in soil enrichment and eutrophication of many woods. This hypothesis was tested in a 16-year litter removal experiment in an acidophilous mixed oak–pine wood in southern Poland. It was found that litter removal resulted in substantial impoverishment of soil. After 16 years soil of the litter removal plots contained significantly less P, Mg and Ca, and had a lower cation exchange capacity (CEC) in the epihumus subhorizon, and less Ca and a lower CEC in the humus and lessivage horizons than soil in the control plots. Vascular plant species and bryophytes colonized the litter removal plots much more frequently. Within 16 years species richness increased in the field layer of these plots, but abundance of dominant species and character of vegetation remained unchanged, while vegetation of the control plots changed from acidophilous to neutrophilous. Disappearance in the control plots of vascular plants species and mosses common in mixed woodlands was caused by thick litter layer which impeded seed germination and seedling development, and by competition of dominant species. The results obtained suggest that acidophilous vegetation in the field layer of the study wood was associated with material removal by man over a long time, and its eutrophication largely resulted from the cessation of traditional methods of management.
Year	2002
Pages	389- 398
keywords	