

Trends and events – Drought, extreme climate and air pollution in European forests



8th ICP Forests Scientific Conference
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Tree pollen modifies throughfall biochemistry during spring

Arne Verstraeten¹, Elena Gottardini², Nicolas Bruffaerts³, Bruno De Vos¹, Elena Vanguelova⁴,
Fabiana Cristofolini², Gerrit Genouw¹, Anita Nussbaumer⁵, Mathias Neumann⁶

¹ Research Institute for Nature and Forest (INBO), Belgium, arne.verstraeten@inbo.be

² Department of Biodiversity and Molecular Ecology, Research and Innovation Centre, Fondazione Edmund Mach (FEM), Italy

³ Sciensano, Mycology & Aerobiology, Belgium

⁴ Forest Research, Alice Holt Lodge, United Kingdom

⁵ Nussbaumer Anita Swiss Federal Institute on Forest, Snow and Landscape (WSL), Switzerland

⁶ Institute of Silviculture, University of Natural Resources and Life Sciences, Austria

The aim of this study is to get a better view on the effects of pollen on throughfall biochemistry for the main tree species groups in Europe (oak, beech, spruce, pine, fir).

A pilot study was conducted for five Level II plots in Flanders, Belgium using long-term data on fruiting/seeds biomass in litterfall, throughfall chemistry and crown condition in combination with data on pollen air concentrations from nearby aerobiological monitoring stations. This study is being spatially extended using data from a large number of Level II plots and pollen monitoring stations across Europe. In parallel, dissolution experiments are performed to study processes under controlled conditions, and a chemical characterisation of the pollen is performed with TGA. A further chemical analysis is done on 200 throughfall samples from a subset of plots sampled during spring 2018. Finally, a quantitative analysis of the pollen collected with membrane filters from these samples is done.

Preliminary results indicate a positive relationship between airborne pollen concentrations and both throughfall dissolved organic carbon (DOC) flux in May and biomass of fruiting/seeds in the same year, at least for beech and oak. On the contrary, throughfall nitrate (NO_3^-) flux in May is reduced in most years. Simultaneously, peaks of nitrite (NO_2^-) are occasionally observed. For coniferous species these relationships are not that clear. Dissolution experiments using commercially available birch (*Betula pendula* L.) pollen in a 50 mg/L NO_3^- solution showed that pollen can remove NO_3^- and release DOC, NO_2^- , potassium, calcium, magnesium, sulphate and phosphate in throughfall samples. Tree pollen likely is an important in-canopy source of nutrients during spring, which should be considered in the quality control of analytical results of for example throughfall measurements and in the calculation of nutrient budgets.