

BOOK OF ABSTRACTS

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Effects of N deposition and climate on the foliar nutrition of European tree species

T1.23 Nitrogen Depositions in a changing climate: Trends and Implications on Forest Ecosystem Services

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Abstract: Foliar nutrient concentrations and contents are important indicators of forest trees' nutritional status. Foliar nutrients depend on nutrient availability and uptake capacity of the respective tree, which at a longer time scale is influenced by soil properties and deposition, and, at shorter time scale by temperature and precipitation. Taking climate conditions into consideration is thus important when interpreting data on foliar nutrition.

To investigate the temporal climate impact on foliar chemistry, we statistically model the effect of average temperature and precipitation sum integrated over moving time-windows on foliar nutrients. The data included in these models involve foliar nutrients (N, P, K, Ca, Mg) of temperate tree species (beech, oak, spruce, and pine) from around 300 European ICP Forests monitoring plots. We further analyze whether climatic effects on foliar nutrients are impacted by deposition rates and available water capacity.

For German Level II plots, significant effects of current or lagged climate conditions occur among nutrient concentrations and contents in all investigated tree species. In general, N, P, and K are found to be less sensitive to climate variations than Mg and Ca. For the other tree species, we find significant climate effects on both nutrient ratios and nutrient concentrations. Nutrient ratios and concentrations are generally less sensitive to climate conditions than nutrient contents and foliar mass. When a climate condition influences a nutrient concentration and foliar mass in opposing directions, the effects via foliar mass tend to dominate the resulting responses of nutrient content. Our preliminary results suggest that climate conditions should be considered for the interpretation of foliar nutrition data for specific strata of tree species and climate aspects.