

BOOK OF ABSTRACTS

FORESTS & SOCIETY
TOWARDS 2050



STOCKHOLM 2024
WORLD CONGRESS
26th **IUFRO**
FORESTS & SOCIETY TOWARDS 2050

Stockholm, Sweden
23–29 June 2024

Foliar nutrient status of main European forest tree species and its association with forest growth

S1.3 Forests in a changing world – impacts on carbon and nutrient dynamics

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Abstract: Nutrients in forest ecosystems have a significant impact on tree growth and vitality. As the capacity of forests to sequester carbon increases with nutrient availability, it is essential to consider tree nutrient status when simulating future forest carbon uptake.

In this analysis, we make use of more than three decades of foliage data as part of the ICP Forests European monitoring network to analyze the nutritional foliar status of main European forest tree species. Temporal trends of foliar phosphorous (P) concentrations exhibited significant decline in main forest tree species. Over the investigated spatial domain of around 300 European monitoring plots, the percent change of foliar P concentration was in the range of – 6.1% to – 2.9% for beech, oak, pine, and spruce over 10 years relative to the year 2012, which could result in a weakening of carbon sequestration capacity in Europe if trees become increasingly P deficient. Trends of foliar nitrogen to phosphorous (N/P) ratios were significantly positive by tendency on multiple forest monitoring plots for oak and pine. This change in N/P balance suggests an increasing degeneration of P nutrition relative to N nutrition with potential adverse progression of tree canopy defoliation and discoloration.

In a follow-up analysis, we investigate the impact of meteorological parameters such as vapor pressure deficit and precipitation on ICP Forests growth data in intensive European monitoring plots of high and low nutritional status in order to examine the nutritional effect on climate-dependent tree growth rates and advance the link of carbon and nutrient cycles.