Forest fine root biomass and soil CNP stoichiometry across three different biogeographical regions in Croatia

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Fine root biomass (FRB) is a small but important forest ecosystem pool due to its direct role in ecosystem functioning through belowground carbon and soil nutrient cycling. At the global scale there is evidence that FRB correlates with meteorological parameters, e.g. precipitation and air temperature. Moving from global to regional and local scales other environmental parameters, primarily related to site soil characteristics, become more important.

In this research, we investigated which soil parameters are important as drivers of fine root biomass in three different biogeographical regions in Croatia, namely the Continental, the Alpine and the Mediterranean. We collected data on soil and site characteristics at 242 locations. Soil parameters include bulk density, texture, pH and C, N and P content, while site parameters were latitude, longitude, elevation, precipitation, air temperature and forest type (Coniferous, Broadleaves, and Maquis/Garigues). Fine root biomass was estimated from soil samples collected at 2-8 positions at each location. Soil was sampled down to 30 cm depth in the mineral layer with a split-tube sampler, and analysed for three depths, i.e. 0-10 cm, 10-20 cm, and 20-30 cm depth.

Across entire dataset, FRB was affected by precipitation, elevation, forest type, soil depth, and soil C/P and N/P relations. Moving down to each biogeographical region separately, a stronger effect of soil phosphorus was observed for the Mediterranean region.