



## Ratio of Above-ground NPP to Fine Roots Biomass Increases with Soil Organic Carbon and Nitrogen Stocks in Pedunculate oak Chronosequence

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Trees growing on sites with poorer nutrient availability allocate greater share of carbon into roots, at the expense of aboveground biomass growth. Consequently, a link between the ratio of aboveground net primary productivity (ANPP) and fine root biomass (FR) and soil organic carbon (SOC) and total soil nitrogen (TSN) should exist.

We set a chronosequence experiment was set up in April 2010, consisting of eight stands aged from 5 to 168 years with pedunculate oak (*Quercus robur* L.) as a dominant tree species. In 32 plots (four per stand), on approximately 640 trees in total, dendrometer bands were installed and measured for assessing  $NPP_{wood}$  while  $NPP_{leaves\&seeds}$  was determined from litterfall traps.

At the beginning of 2012 we took 128 soil cores (16 per stand) down to 40 cm depth in the mineral layer with a split-tube sampler. The soil sampling was repeated in May 2017. Each soil core was divided into four subsamples according to predetermined depths (5, 10, 20 and 40 cm) Roots were extracted from soil samples and washed. Fine roots ( $0.25\text{ mm} < d < 2\text{ mm}$ ) were separated, dried, weighed and analysed for C and N in elemental analyser. SOC and TSN stocks were calculated for each soil core, while ANPP was calculated at each subplot. Additional experiment of fine root production was set in March 2016 in one stand (45 y. old) yielding the estimate for the average annual production of fine roots of  $0.57\text{ tC ha}^{-1}\text{ yr}^{-1}$ .

ANPP ranged from  $3.4$  to  $8.8\text{ t C ha}^{-1}\text{ yr}^{-1}$  (excluding 5 yrs. old stand), while FR stocks ranged from  $1.1$  to  $5.7\text{ t C ha}^{-1}$ , with highest values observed in two youngest stands. SOC and TSN stocks ranged from  $55.9$  to  $122.4\text{ t C ha}^{-1}$  and  $3.9$  to  $13.7\text{ t N ha}^{-1}$ , respectively, with C/N ratio ranging from  $8.8$  to  $16.4$ . Results confirmed our hypothesis, namely the ratio ANPP : FR significantly positively correlates with SOC and TSN in pedunculate oak forest.