A broadleaf species alters and evenly distributes soil organic carbon chemical composition in a *Pinus massoniana* planted forest in southern China

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There are potential effects of planted forest type conversions from conifer to broadleaf or mixed-species on the soil organic carbon (SOC) chemical composition, and the evenness of its distribution remains uncertain. An afforestation experiment with different tree species (*Pinus massoniana*, *Erythrophleum fordii*, and mixed *P. massoniana* and *E. fordii*) was conducted in a clear-cutting site of *P. massoniana* planted forests in a subtropical region. Topsoil organic C quality and microbial diversity were assessed after eight years of afforestation. The proportions of alkyl C and carbonyl C in SOC, as well as alkyl C/O-alkyl C ratios and the evenness of the SOC chemical composition distributions were higher in monospecific *E. fordii* and mixed-species planted forests than the monospecific *P. massoniana* planted forest. The positive relationship of SOC chemical composition distribution with litter as well as fine root C quality was observed. Microbial biomass C was positively correlated with the labile SOC. Fine root C had a closer correlation with the chemical composition of SOC than litter. The present results are not consistent with our previous findings in a 25-year afforestation site, in which soil microbial community composition rather than litter quality was linked with SOC chemical composition, suggesting plant C chemical composition would better predict belowground C sequestration functioning in the early afforestation system. These results highlight that mixing native N fixing broadleaf species into conifer forests probably enhance the SOC chemical stability and resistance to climate change by increasing the recalcitrant C components and the evenness of SOC distribution.

Allometric models to estimate biomass aboveground in forest recovery areas

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Quantify carbon stock on forest restauration areas is a global interest, since this area provide the important environmental service of mitigating climate change. It is crucial have more studies on allometry to help on predicting biomass and carbon stocking for those areas. Thus, the objective of this study was to quantify forest biomass and carbon content to a 5-year-old region under restoration process, so models could be fitted to the area and also used to similar sites. Three sites nearby Itu city, SP, Brazil, were studied, 5 years after the restoration process was implemented. In each site, three 900 m²-plots were installed, and a forest inventory was done, measuring tree height and circumference at breast height. Sub-plots (25 m²) were randomly selected in each 900 m²-plots and all trees inside it were cut and had its volume measured, stratified into foliage, roots and stem pools. Carbon content was determined on the Isotopic Ecology Laboratory for each species and pool. This data was used to fit models to estimate biomass. The best model was selected using the adjusted coefficient of determination (R^2), residual charts and Akaike's information criterion (AIC). Mean biomass for the area was 20.19±0.146 Mg ha^{-1}, mean Carbon stock was 9.73 Mg C ha^{-1}, and average carbon content was 45.3%.

N_2 fixing trees (*Acacia mangium*) introduce in eucalypt plantations modify rapidly the pools of organic P and low-molecular-weight organic acids (LMWOAs) in tropical soils contrasted for their C/P stoichiometry

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In this study, soil organic P (Po) and low-molecular-weight organic acids (LMWOAs) were quantified under different land uses in order to investigate the effect of N_2 fixing tree introduction on phosphorus cycle. Soils were collected from plantations of pure acacia (Ac), pure eucalyptus (Euc) or both species (50/50) and original savannahs (S) that were located in Brazil (low P, high N and high C soil) and in Congo (high P, low N and low C soil). Po and LMWOAs were identified in sodium hydroxide soil extracts with ion chromatography (IC). Phosphate monoesters as AMP and glucose-6-phosphate (G6P) were the main Po forms in both sites. Phytate, ATP and fructose-bisphosphate (FrucbisP) were also present as well as the mineral form of pyrophosphate (PrP). Malate, oxalate and malonate were the major components of LMWOA fraction in the two soils. Citrate was also present at low concentrations. Interresingly, phytate concentrations were always decreased under acacia plantations. This could result from a better mineralisation or lower inputs into these soils. In mixed stands, the effect of acacia introduction on Po and LMWOAs composition is more pronounced in high P than in low P soil, due to a much better N_2 fixation. Our results highlight that the introduction of a legume tree is able to strongly modify the composition of Po and LMWOAs in soil even after a first short-time rotation, especially when the rate of N_2 fixation is high.

Microbial enzymatic activities and community-level physiological profiles (CLPP) in subsoil layers are altered by harvest residue management practices in a tropical *Eucalyptus grandis* plantation

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Harvest residue management is a key issue for the sustainability of Eucalyptus plantations established on poor soils. Soil microbial communities contribute to soil fertility by the decomposition of the organic matter (OM), but little is known about the effect of whole-tree harvesting (WTH) in comparison to stem only harvesting (SOH) on soil microbial functional diversity in Eucalyptus plantations. We studied the effects of harvest residue management (branches, leaves, bark) of Eucalyptus *grandis* trees on soil enzymatic activities and community-level physiological profiles in a Brazilian plantation. We measured soil microbial