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Abstracts

enzymatic activities involved in OM decomposition and we compared the community level physiological profiles (CLPP) of the soil microbes in WTH and SOH plots. WTH decreased enzyme activities and catabolic potential of the soil microbial community. Furthermore, these negative effects on soil functional diversity were mainly observed below the 0-5 cm layer (5-10 and 10-20 cm), suggesting that WTH can be harmful to the soil health in these plantations.

Carbon sequestration and soil fertility in dryland *Acacia senegal* plantations of varying age in Sudan

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African drylands are extensively degraded as indicated by reduced soil organic carbon (SOC) contents. Restoration through management practices that increase tree cover can be expected to increase SOC contents and soil fertility. We investigated the potential of *Acacia senegal* trees for increasing SOC and improving soil fertility at two sites in Sudan. Biomass C and SOC stocks, contribution of trees and herbs to SOC, soil nutrient (N, P, available P, K, exchangeable K) contents and potential N₂ fixation by *A. senegal* in plantations of varying age (7 to 24 years) and in adjacent grasslands were determined. Total biomass C stocks increased with plantation age. While most of this increase was due to the trees, the ground vegetation C stock also increased (facilitation effect). SOC stocks (0-50 cm) increased with plantation age and were greater than in the grasslands. $\delta^{13}C$ partitioning values indicated that the age-related increase in SOC stocks was derived not only from the acacia trees but also from an increase in ground vegetation biomass. While soil concentrations of the studied nutrients were relatively low, they were positively correlated to SOC concentrations, highest in the topsoil (0-10 cm) and increased with plantation age – all indicating the importance of SOC to soil fertility. High acacia foliage $\delta^{15}N$ values indicated that N₂ fixation was not an important contributor to soil N. Our findings showed that increasing tree cover in African drylands can increase SOC stocks and thereby improve soil fertility for the benefit of local communities besides sequestering atmospheric CO₂.

Role of nitrogen availability on enhancing soil carbon sequestration in typical subtropical planted forests in Southern China

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Planted forest ecosystem is becoming a key component of the China's forest resources and timber storage and plays a key role in the context of potential carbon (C) sequestration and sustainable forest management. Information on the effects of tree species composition and diversity on soil nitrogen (N) availability and organic carbon (C) sequestration remains limited. The investigation and long-term manipulation experiment were carried out in typical subtropical planted forests. Soil under Eucalyptus mixed with N₂-fixer accumulated more soil organic C and N, and had lower CO₂ emission than in pure stands by increasing total organic C and microbial biomass C, as well as through increased soil microbial community diversity and abundance. SOC and N stocks in the *Pinus massoniana* and *Castanopsis hystrix* mixed plantation were higher than in *P. massoniana* monospecific plantation. The admixing with the higher-quality *C. hystrix* litter hastened mass loss for recalcitrant C chemical compositions and nutrient return of conifer litter. Our results also showed that tree species mixture significantly altered the soil bacterial community composition and structure, compared with single-species plantations. The C/N ratios of soil and litterfall, TOC, NH₄-N, litterfall mass and NO₃-N were key factors affecting the soil microbial community. There was a negative relationship between SOC mineralization rates and the abundance of K strategists and a positive relationship for r-strategists. These results indicated that N availability plays an important role on enhancing SOC sequestration through changing soil microbial community composition in subtropical plantations.

Forest management strategies to safeguard water supply in karst regions under climate change

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Worldwide, karst aquifers developed on calcareous bedrock are important sources of drinking water. Large karst areas of the montane and subalpine vegetation belts in the Calcareous Alps are dominated by forests. The increasing frequencies and intensities of disturbances, partly a consequence of climate change, may alter the water storage, filtering and buffering capacity of forest ecosystems, thereby threatening the continuous provision of pristine water. Safeguarding water supply from karst regions therefore requires the adaptation of forest management strategies. In the presentation, forest management and disturbance effects upon soil condition and water quality in karst regions are discussed based on case studies from the Alps. Stability- and vulnerability- indicators of karst systems and its subsystems, from tree species, the vadose zone, in particular soils, to karst water, are incorporated in a conceptual framework for adaptive forest management strategies in view of water protection.

E8q: EFFECTS OF FOREST MANAGEMENT PRACTICES ON SOIL PROPERTIES AND ECOSYSTEM PROCESSES

Teor de carbono e nitrogênio no solo em função da adubação em um sistema de integração Lavoura-Pecuária-Floresta e Plantio Direto

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A prática de adubação, quando necessário, promove ganho de produtividade até três vezes maior em comparação a sua não adoção. O uso de fertilizantes orgânicos pode resultar em ganhos econômicos e ambientais, potencializando a diversidade do sistema. Este trabalho objetivou avaliar o teor de carbono e nitrogênio no solo no sistema de produção integração lavoura-pecuária-floresta (iLPF) e plantio direto (PD) após 3 anos com fertilizantes orgânicos ou minerais. O experimento foi conduzido no município de Concórdia-SC, onde o delineamento experimental foi blocos casualizados, com 3 repetições, em fatorial 2 x 4, sendo dois tipos de sistemas de produção (iLPF e PD) em interação com três tipos de fertilizantes (dejeito de suínos, cama de aves e mineral) e o controle (sem adubação). As amostras de solo foram coletadas até 100 cm, e analisadas através do analisador elementar (CNHOS). Não houve efeito da adubação sob o teor de carbono nas diferentes camadas para o sistema iLPF, enquanto que para o PD houve diferença para a adubação cama de aves e mineral nas camadas superficiais.