



Microbial activity, organic C accumulation and ^{13}C abundance in soils under alley cropping systems after 9 years of recultivation of quaternary deposits

S. Nii-Annang (1), H. Grünwald (1), D. Freese (1), R.F. Hüttl (1,2), and O. Dilly (1)

(1) Cottbus, Faculty of Environmental Science and Process Engineering, Chair of Soil Protection and Recultivation, Germany (nianset@tu-cottbus.de), (2) Helmholtz Centre Potsdam, German Research Centre for Geoscience GFZ

The impact of alley cropping on post lignite mine soils developing from quaternary deposits after 9 years of recultivation was evaluated on the basis of microbial indicators, organic C and total N contents, and the isotope characteristics of soil C. Soils were sampled at the 0 to 3, 3 to 10 and 10 to 30 cm depths under black locust (*Robinia pseudoacacia* L.), poplar clone (*Populus* spp.), the transition zone and in the middle of alley under rye (*Secale cereale*). There was no significant effect of vegetation on microbial properties presumably, due to the high spatial variability, whereas organic C and total N contents at the 0 to 3 cm layer were significantly higher under black locust and poplar than in the transition zone and rye field. Organic C total N contents, and basal respiration, microbial biomass and microbial quotient decreased with soil depth. Soil organic C and total N contents were more than doubled after 9 years of recultivation, with annual C and N accretion rate of 162 g Corg m⁻² yr⁻¹ and 6 g Nt m⁻² yr⁻¹. Microbial properties indicated that the soils are in early stages of development; the C isotope characteristics confirmed that the sequestered C was predominantly from C3 plants of the alley cropping.