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Carbon and nitrogen loss during initial erosion processes under litter cover

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Soil erosion translocates carbon (C) and nitrogen (N) from the soil pool. In natural or near-natural ecosystems like forests the soil is usually covered by litter. It can be assumed that litter decomposition and dust particles adhered on the surface of the leaves contribute to C and N fluxes during erosion processes as well. To our knowledge, the contribution of these compartments to the C and N balance of soil erosion is not yet known. As part of the "New Integrated Litter Experiment" within the DFG research unit "Biodiversity and Ecosystem Functioning (BEF)-China" we conducted a rainfall simulation experiment to quantify the role of litter cover for C and N fluxes during soil erosion in subtropical China.

96 mini runoff plots (40cm x 40cm) were established and divided into four blocks, two of them replicates. Seven different domestic litter species were used in this study combined to 1-species, 2-species and 4-species mixtures and complemented by none species plots (bare ground). Erosion processes were initiated by artificial rainfall using a rainfall simulator with a continuous and stable intensity of 60 mm/h. Sediment discharge and runoff volume were measured every 5 minutes for 20 minutes of rainfall duration and filtrated in the laboratory. Two time steps of rainfall simulation were carried out (summer 2012 and autumn 2012). Total C and N content were quantified from the solid sediment and the liquid runoff volume. Leaf decomposition rates were calculated based on the mass, leaf litter coverage was measured and loss of C and N contents from the decomposing leaves were provided by other project members. Additionally, C and N content of corresponding soils were designated.

Lab work and statistical analysis are still ongoing. First results show that C and N concentrations of runoff and sediment are slightly higher for plots covered by litter than bare plots during the first run in summer 2012. It seems that 4-species plots have the highest C and N flux during rainfall simulation. Further analysis will focus on the role of litter diversity on C and N concentration and fluxes during initial erosion processes.