

## **Soil fauna and leaf species, but not species diversity, affect initial soil erosion in a subtropical forest plantation**

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In subtropical parts of China, high rainfall intensities cause continuous soil losses and thereby provoke severe harms to ecosystems. In woodlands, it is not the tree canopy, but mostly an intact forest floor that provides protection from soil erosion. Although the protective role of leaf litter covers against soil losses is known for a long time, little research has been conducted on the processes involved. For instance, the role of different leaf species and leaf species diversity has been widely disregarded. Furthermore, the impact of soil meso- and macrofauna within the litter layer on soil losses remains unclear.

To investigate how leaf litter species and diversity as well as soil meso- and macrofauna affect sediment discharge in a subtropical forest ecosystem, a field experiment was carried out in Xingangshan, Jiangxi Province, PR China (BEF China). A full-factorial random design with 96 micro-scale runoff plots and seven domestic leaf species in three diversity levels and a bare ground feature were established. Erosion was initiated with a rainfall simulator.

This study confirms that leaf litter cover generally protects forest soils from water erosion (-82 % sediment discharge on leaf covered plots compared to bare plots) and this protection is gradually removed as the litter layer decomposes. Different leaf species showed variable impacts on sediment discharge and thus erosion control. This effect can be related to different leaf habitus, leaf decomposition rates and food preferences of litter decomposing meso- and macrofauna. In our experiment, runoff plots with leaf litter from *Machilus thunbergii* in monoculture showed the highest sediment discharge (68.0 g m<sup>-2</sup>), whereas plots with *Cyclobalanopsis glauca* in monoculture showed the smallest rates (7.9 g m<sup>-2</sup>). At the same time, neither leaf species diversity, nor functional diversity showed any significant influence, only a negative trend could be observed. Nevertheless, the protective effect of the leaf litter layer was influenced by the presence (or absence) of soil meso- and macrofauna. Fauna presence increased soil erosion rates significantly by 58 %. It was assumed that this faunal effect arose from arthropods loosening and processing the soil surface as well as fragmenting and decomposing the protecting leaf litter covers. Thus, effects of this fauna group on sediment discharge have to be considered in soil erosion experiments.