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Redistribution of soil biota by rainfall erosion

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Soil is central to the provision of multiple ecosystem services that sustain life through a myriad of chemical, physical and biological processes. One of the greatest threats to soil is erosion, a natural process accelerated by human activities. Elevated erosion rates are common in agro-ecosystems causing both direct physical impacts (e.g. soil loss), and indirect biogeochemical consequences, which ultimately leads to impaired ecosystem functioning. The consequences of erosion on soil biota have hitherto been ignored, yet biota have fundamental roles in the provision of soil ecosystem services. To our knowledge few studies have addressed the gap between erosion and impacts on soil biota. Here we use soil nematodes as a model organism for assessing erosion impacts on soil (micro) fauna in temperate agro-ecosystems. Soil nematodes are ubiquitous, abundant, are represented at all levels in soil food webs and can be categorised into a range of trophic or functional groups. To quantify transport of nematodes and gain a better understanding of erosive mechanisms responsible, we measured their export from small erosion plots (0.0625m2) under a fixed-intensity design rainstorm (6mm min-1 duration: 3 min) over six slope angles (4^0 - 24^0) and three soil texture classes (sandy silt, silty sand, silt). Runoff and eroded sediment were collected for each plot (four replicate runs), and a suite of biological and physico-chemical parameters measured. Results confirmed that, similar to soil particles, nematodes were exported at rates influenced by slope angle and soil texture. These experiments, linked with field and catchment-scale equivalents, are designed to elucidate the links between soil erosion and provision of ecosystem services and to inform biodiversity-sensitive soil and water conservation practices.