



Investigating the impact of the earthworms *Lumbricus terrestris* and *Allolobophora chlorotica* on water stable aggregates and soil water holding capacity

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In order to investigate the impact of two different adult earthworm ecotypes – the vertical burrowing, anecic *Lumbricus terrestris* and the horizontal burrowing, endogeic *Allolobophora chlorotica*, mesocosms of 300 g of moist soil were established with and without either 2 *L. terrestris* (9.04 ± 0.52) or 8 *A. chlorotica* (2.16 ± 0.11). Three different soil types (a loam, silt loam and sandy loam) were used with four replicates per treatment. Earthworm densities were greater than those typically found in the field in order to clearly establish possible earthworm effects. After 40 days at 15 °C, the soil was divided into two depths and soil from each depth was measured for its water holding capacity and water stable aggregates.

Both species impacted on soil properties. They significantly increased the percentage of water stable aggregates, 1 – 2 mm aggregates, in all the soil samples, from 16% to 56 % for *L. terrestris* and from 19% to 63 % for *A. chlorotica*. Water stable aggregates were significantly higher in sandy loam upper soil than lower soil of *L. terrestris* treatment. *L. terrestris* activity also increased soil water holding capacity significantly for the sandy loam soil, but not the other two soil types, from 0.39 ± 0.01 to 0.44 ± 0.02 g H₂O /g soil in the upper soil samples where their casts were present. In contrast, *A. chlorotica* activity led to significant increases in soil water holding capacity of 7 to 16 % in all the soil samples.

Typically, when earthworms are thought of in the study of soil hydrology, the focus is on the effect of their burrows on soil drainage. However, our study shows the potential for earthworms to impact on the amount of water that soils can hold, possibly because of changes in soil structure brought about by earthworm-facilitated aggregation. Further, and importantly for modelling, earthworms that occupy different ecological niches have differing effects, not all earthworms are the same.