Effects of two earthworms from two ecological groups on organic matter dynamics of a constructed Technosol

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Constructed Technosols are the result of pedological engineering in order to rehabilitate derelict land. Soil horizons are then the combination of materials usually considered as wastes (*e.g.* papermill sludge, treated industrial soil). Furthermore, it is demonstrated that in "natural" soils, soil fauna (*e.g.* earthworms) participates to soil functioning, contributing to ecosystem services. Is then soil fauna (presence and diversity) involved in the functioning of constructed Technosols?

The objective of this study is to assess the impact of two earthworms on organic matter evolution of a constructed Technosol. The constructed Technosol used is made of a thin upper layer (green waste compost, GWC) and a deep lower layer (mixture of papermill sludge and treated industrial soil, TIT/SPP). An epi-anecic earthworm (*Lumbricus terrestris*, *Lt*) and an endogeic one (*Aporrectodea caliginosa*, *Ac*), were added to microcosms containing the Technosol. Four treatments were designed: 1) control without earthworms, 2) with *Ac*, 3) with *Lt* and 4) with both *Ac* and *Lt*. Microstructures of the burrows of earthworms were assessed by transmission electronic microscopy characterization. Soil carbon content (TIT/SPP) and mean height of the GWC layer were measured.
Burrows presented similar global microstructures with an external mineral cutan and an internal organic cutan. Compared to the control, they displayed higher microbial activity and some stable organo-mineral aggregates with bacteria. Differences occurred between the burrows of the earthworms concerning organic matter proportions, nature of aggregation and localization of mucus. At the cosm-scale, *L. terrestris* buried significantly GWC. Whatever the combination of earthworms, their effects on soil carbon contents were low. High carbon contents of the initial materials masked the effects in spatial and time scales of the experiment.

Local observations confirmed, in the case of a constructed Technosol, the concepts of "ecosystem engineer" and "ecological groups" for earthworms. However, a kind of "buffering capacity" masked the effects of these organisms on organic matter. The question of similar "buffering capacities" for other soil formation processes remains in constructed Technosols. Better knowledge linking soil fauna diversity and constructed Technosols is then required to improve ecological restoration by soil engineering.