

**EARLY COLONISATION OF A CONSTRUCTED TECHNOSOL BY SOIL ORGANISMS
AFTER INDUSTRIAL SITE RECLAMATION**

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Technosols (USS Working Group WRB 2006) are soils, whose properties and pedogenesis are dominated by artificial or transported materials. In the case of industrial brownfield management, constructed Technosols can be used intentionally to reclaim ecosystem. These Technosols are made of anthropogenic materials that are legally considered as wastes or by-products.

Sponsored by the French National Soil Programme GESSOL, and within the GISFI (Groupement d'Intérêt Scientifique sur les Friches Industrielles, www.gisfi.fr), a consortium of soil biologists has been constituted to study a model constructed Technosol ecosystem at the field scale on a derelict brownfield in the Lorraine Region (France). The studied Technosol, implemented in 2007, is made of a layer of green-waste compost at the surface, a layer of a mixture of treated industrial soil and paper-mill sludge, and a bottom layer of pure paper-mill sludge. The pedogenesis of this Technosol has been studied for several years demonstrating its capacity to perform basic soil functions (Séré, Schwartz *et al.* 2008). The working group comprised soil ecologist specialists of various biota (bacteria and mycorrhiza, nematodes, microarthropods, macroarthropods and earthworms), agronomists, and soil bio-physicians. Sampling has occurred each year at spring time since 2008.

The main question of the project focuses on the capacity of the Technosols to fulfill essential functions of a natural soil, particularly vegetation development, which means restoration of physical and chemical fertility. Our hypothesis is that soil organisms, by their diversity and functional complementarities, are essential actors in the system for the main physical (aggregation, bioturbation) and chemical (carbon and nitrogen cycles) processes. In this context, our objective is to assess the colonisation dynamic of the Technosol by soil biota and their impact on several soil functions.

The results obtained within the 4 first years (2008 to 2011) of the project indicate that the initial system is typical of pioneer ecosystems, with the presence of bacterivorous nematodes and the absence of macrofauna. Initial Collembola communities are mainly influenced by the initial materials (origins of the composts) and the borders of the field, showing a centripetal colonisation during the first 2 years. However, an increase of species richness, particularly concerning nematodes, is

observed between 2008 and 2009. Furthermore, in 2011, an explosion of earthworm densities is observed, showing a fast colonisation of soil engineers. Finally this soil biota development can be strongly linked with the evolution of the soil structure and leads to a biomass production similar to a “natural” pasture, which conducts to the occurrence of a brumifer horizon.