Live and death of streptomycetes in soil - what happens to the biomass?

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Details

Abstract

The formation of soil organic matter (SOM) has been proposed to depend on fragmentation of biomass after cell death. However, this is hard to mimic in laboratory experiments showing the process directly. We used heavy metal contamination in order to provide an environment in which one *Streptomyces* strain, the heavy metal resistant *S. mirabilis* P16B-1, could survive while the sensitive strain *S. lividans* TK24 was expected to die and disintegrate; the necromass fragments would then contribute to SOM formation. Both strains were grown for 30 d in sterile mesocosms containing either highly metal-contaminated soil from a former uranium-mining site in Ronneburg, Germany, or control soil from a municipal park, Jena, Germany. The fate and morphology of living and dead bacterial biomass (necromass) was observed using scanning electron microscopy. Attachment of soil particles to the intact mycelium as well as decay of dead biomass was observed. Dead bacterial biomass was identified in form of patchy fragments while the superordinate filamentous structure of the hyphae was still visible and obviously stabilized in soil. The fate of cytosolic compounds was followed using the example of a nickel-containing superoxide dismutase (NiSOD) which was found to be released after death of cells grown in liquid soil-extract medium. Activity of the enzyme was proven for concentrated media supernatant by a gel-based

qualitative activity assay. This indicates that NiSOD remains active in soil after cell death. Hence, bacterial cell death results in the release of cytosolic compounds, *e.g.,* intact proteins, as well as the formation of residual cell-envelope fragments contributing to SOM formation.

Beteiligte Forschungseinheiten

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