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0.0.1 Fate of Extracellular DNA in Soil

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The study of the fate of extracellular DNA in soil is of extreme relevance because this DNA pool can be utilized as a source of nutrient by any heterotrophic microorganism or as genetic information by recipient eukaryotic and prokaryotic cells.

In the last fifty years the studies on the fate of extracellular DNA were focused on the interactions between the purified DNA molecule and sterilized soil components, expecially sand, clays and humic acids, in simple microcosms under laboratory conditions. In this way it has been studied the effect of type (plasmid or chromosomal DNA), molecular characteristics (molecular ends, base composition, size and molecular conformation), type of clay and humic molecules and environmental conditions (type of clays saturating cations, temperature, moisture, pH value) on these interactions. Only recently studies have been conducted to simulate more closely the *in situ* conditions by using not purified DNA molecule, mixing some soil components or partially reproducing rhizosphere conditions.

The use of molecular techniques like DGGE and real time PCR have permitted studying the persistence and movement of extracellular DNA in soil. It has been shown that extracellular DNA can move through soil profile by both percolation and vertical advection. These studies suggest that the genetic information associated to extracellular DNA could be released by microorganisms temporarily and spatially separated from competent microbial cells incorporating this genetic information. The importance of this type of gene transfer *in situ* needs to be proved**.**

Studies have also been conducted to evaluate the persistence of transgenic DNA in dead tissues. It has been shown that this persistence depends on resistance of debris with the target DNA to microbial degradation and on soil and environmental conditions.

The relative paucity of data on soil extracellular DNA should stimulate further research to get a deeper knowledge on the importance and persistence of extracellular DNA in soil.