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Relevance of extracellular DNA in rhizosphere

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One of the most promising areas for future development is the manipulation of the rhizosphere to produce sustainable and efficient agriculture production systems. Using Omics approaches, to define the distinctive features of eDNA systems and structures, will facilitate progress in rhizo-enforcement and biocontrol studies.
The relevance of these studies results clear when we consider the plethora of ecological functions in which eDNA is involved. This fraction can be actively extruded by living cells or discharged during cellular lysis and may exert a key role in the stability and variability of the soil bacterial genome, resulting also a source of nitrogen and phosphorus for plants due to the root's capacity to directly uptake short DNA fragments.
The adhesive properties of the DNA molecule confer to eDNA the capacity to inhibit or kill pathogenic bacteria by cation limitation induction, and to facilitate formation of biofilm and extracellular traps (ETs), that may protect microorganisms inhabiting biofilm and plant roots against pathogens and allelopathic substances. The ETs are actively extruded by root border cells when they are dispersed in the rhizosphere, conferring to plants the capacity to extend an endogenous pathogen defence system outside the organism. Moreover, eDNA could be involved in rhizoremediation in heavy metal polluted soil acting as a bioflotation reagent.