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RHIZODEPOSITION PLANT-PROPERTIES AND PREVIOUS LAND-USE CONTROL BOTH MICROBIAL COMMUNITIES AND SOIL CARBON ADDITIONNAL STORAGE

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Soil carbon storage can both mitigate climate change while enhancing food security. A recent study identified that pearl millet lines with large rhizosheath of root adhering soil contribute significantly to increased carbon supply into soil compared to pearl millet lines with small rhizosheath (Ndour et al. 2022). The aim of this work is to compare the effects on rhizospheric microbiota and soil carbon storage for two millet lines with contrasting rhizodeposition properties and for two soils with significantly different initial carbon content.
We grew two lines (L220 and L132, Ndour et al. 2017) of pearl millet on a 28-day growth cycle in a Mediterranean arenosol under different previous land-use: vineyard (carbon poor) and forest (carbon rich) (Quéro et al. 2022). We conducted metabarcoding analyses to characterize the microbiota in roots, root-adhering soil, and unplanted soil. Additionally, soil organic carbon content was quantified using elemental analysis across various compartments: root-adhering soil, rhizosphere (non-root-adhering soil), and control unplanted soil.
The rhizosphere effect is illustrated by the decreasing trend of alpha diversity across compartments for both soils: unplanted soil > root-adhering soil > roots. Additionally, the carbon content increased following the ranking: root-adhering soil > not root-adhering soil > unplanted soil. However, the land-use has a great impact on both carbon gain and microbial communities. Notably, the carbon gain is more than 4-fold greater in root-adhering soil already rich in carbon (forest soil) compared to vineyard one. At the same time, there were significant variations in microbial composition as a function of land-use. These unexpected result will be presented and thoroughly discussed from a soil carbon storage perspective.

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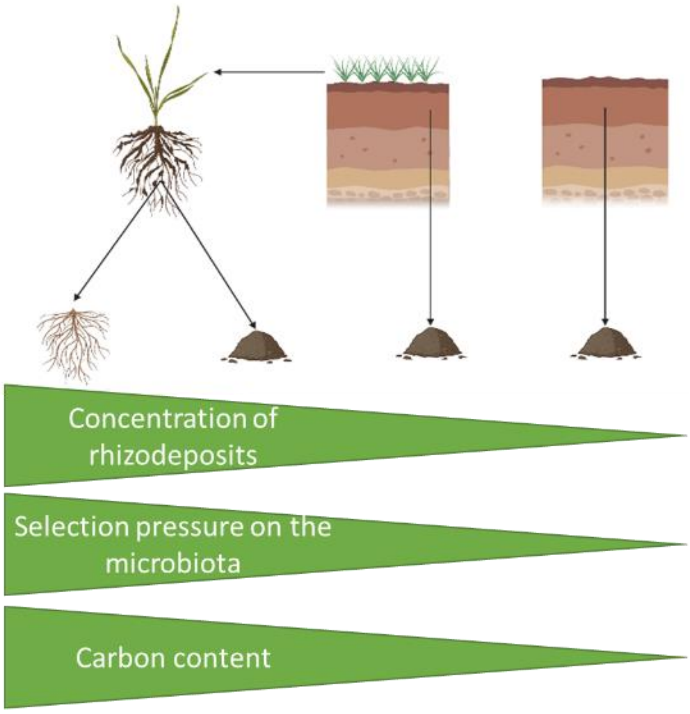
Concentration of rhizodeposits
Selection pressure on the microbiota
Carbon content