

ENHANCING SOIL HEALTH USING WHEAT DIVERSITY: THE WISH-ROOTS PROJECT

DIMATTIA B. G.*, HERNANDEZ-SORIANO M.***, TASSINARI A.*, RABBONI D.*,
PIERBATTISTA S.*, BITTELLI M.*, MACCAFERRI M.*, TUBEROSA R.*, SALVI S.*

*) Department of Agricultural and Food Sciences (DISTAL), University of Bologna

***) Department of Biochemistry and Metabolism, John Innes Centre

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Soil degradation poses a significant challenge to sustainable agriculture, and innovative strategies are required to enhance soil health while preserving crop productivity. The WISH-ROOTS project (<https://www.wishroots-ejpsoil.net/>), focusing on soil structure and nitrogen (N) cycling, aims to identify wheat landraces capable of improving the soil microbiome and resource use-efficiency in wheat-based agroecosystems. The WISH-ROOTS project will work with a complementary pore-aggregate perspective to explore the impact of wheat roots on soil structure and functions. Root traits, including architecture and microbiome interactions, play a pivotal role in soil structure and formation. Advanced techniques such as X-ray computed tomography (CT) and high-throughput systems are employed to assess soil structure and pore networks.

The project will leverage this knowledge in order to test if root traits diversity observed among wheat cultivars is associated with variation in soil health parameters including soil structure, microbial communities in the rhizosphere, and/or N cycling. Broad wheat genetic diversity, including both bread and durum wheat will be assayed. By investigating the intricate interplay between plants, microbiomes, and soil, the project will try to understand the conditions leading to better soil structure and nutrient cycling, thereby ensuring sustainable food production while mitigating environmental impact. For this purpose, a shovelomics - based wheat root analysis protocol has been optimized.

The findings from the WISH-ROOTS project will potentially contribute

valuable insights into innovative agricultural approaches to address soil degradation while meeting the growing global food demand.