Tuning the wheat root microbiome to improve soil health and optimize rhizosphere nitrogen cycling and availability

CONSORTIUM: United Kingdom, Italy, South Africa, China, Germany, Belgium, Spain

OBJECTIVE

The main **objective** of the WISH-ROOTS project is to **restore and preserve soil health through wheat root traits.**

For this, we aim to:

1) identify key traits associated with functionality of microbial guilds in the rhizosphere and root system architectural traits;
2) find the genes, genomic regions or metabolic pathways in wheat that benefit soil health;
3) develop genetic tools for breeding to introduce these beneficial traits in commercial cultivars and
4) develop a predictive model for soil health.

These **aims** will provide advantageous varieties for farmers that support a more sustainable use of land improving soil microbial biodiversity, nutrient cycling and soil structure.

EVIDENCE LEADING TO THE WISH-ROOTS CONCEPT

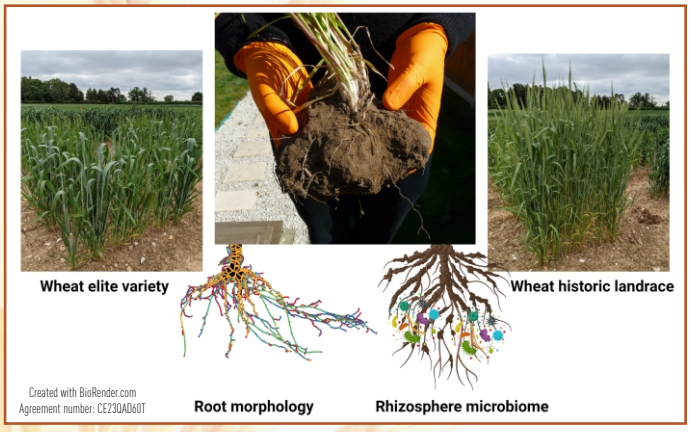

Figure 1. *The WISH-ROOTS concept builds in root architectural traits identified in durum wheat and traits in historic bread wheat landraces linked to root exudates that can control nutrient cycling in the rhizosphere.*

CONCEPT AND APPROACH

The WISH-ROOTS concept, improvement of soil health by wheat root traits, is driven by the hypothesis that root morphological and functional traits in wheat landraces can preserve and improve target soil health markers. These beneficial traits, likely lost through wheat domestication, can be introduced in modern wheat cultivars and will be the base of an innovative strategy to restore and preserve agricultural soils.

PROJECT OVERVIEW

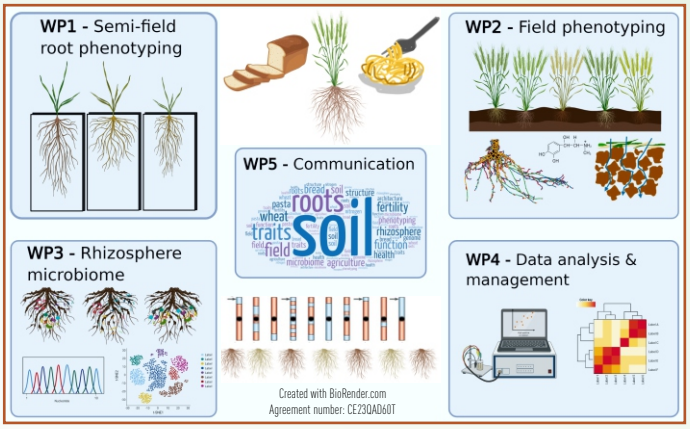

Figure 2. *The WISH-ROOTS approach. Root traits with potential to improve soil health markers will be identified in semi-field conditions and tested in field trials. Physical, chemical and ecological (microbiome functions) parameters will be measured to develop predictive models for soil health and introduce beneficial root traits in wheat agrosystems.*

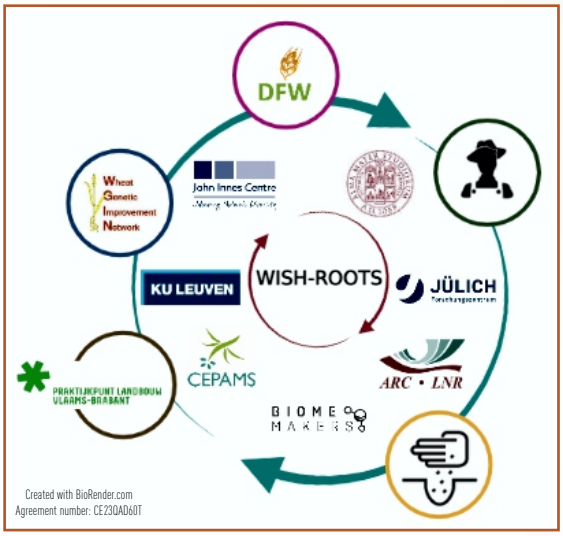

Figure 3. *Partners and selected stakeholders.*

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For more information on the project please access our website (https://www.wishroots-ejpsoil.net/) / social media page (https://twitter.com/wish_roots) or contact:
Dr Ashira Roopnarain – RoopnarainA@arc.agric.za
Dr Busiswa Ndaba – NdabaB@arc.agric.za
Mr Michael Kidson – MichaelK@arc.agric.za

ARC • LNR

Graphic Design by Christo Lombard ARC-NRE