Plasticity of root and root hair development in response to nutrient deficiency among modern and ancestral wheat genotypes

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Reducing the ecological costs of conventional agriculture, including fertilization and irrigation, is a major objective of research in plant science.

High-throughput phenotyping of root traits as predictors of crop performance under limited water and nutrient availability are now available but these still often ignored root hairs (RHs), although these cells provide a major contribution to plant nutrient, water uptake and interactions with soil microbes.

We have developed a non-destructive root procedure to phenotype wheat RHs development on whole root systems. A modern wheat variety *Triticum turgidum* ssp. *durum* cv. Oued Zenati and an ancestral wheat variety *T. t.* L. spp. *dicoccum* cv. Escandia. Current experiments aim at investigating the root system and root hair development and their responses to nutrient availability. The developed methodology allows for instance to analyze on a single scan root system and RH developmental responses to low P or low K conditions. Analysis of root images revealed that nutrient shortage resulted in an increase of root area that was mainly due to a large increase of root hair area. The root hair contribution to the increase of total root area upon Pi deficiency was especially significant in *dicoccum* seedlings

Such analyses pave the way to comparison of wheat genotypes that recapitulate wheat domestication in different abiotic conditions (nutrient availability) and in presence or absence of PGPR bacteria.