

# #139

## Deciphering the response of winter oilseed rape to nitrogen inputs: fine roots do matter in Nitrogen Use Efficiency!

ADDRESS

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Breeding winter oilseed rape varieties with high yields under reduced nitrogen inputs is essential to make agriculture more competitive and sustainable. One of the current breeding challenges is to improve Nitrogen Use Efficiency (NUE), which represents the plant capacity to valorize nitrogen inputs into biomass or yield. The genetic variability of NUE results from both nitrogen uptake efficiency (NUpE) and nitrogen utilization efficiency (NUE) processes. Most studies have focused on the genetic diversity of nitrogen remobilization efficiency, which contributes to NUE, but processes related to nitrogen accumulation in the plant throughout the crop cycle, such as NUpE or root growth, remain relatively unexplored. However, under low nitrogen inputs, vegetative growth could play an important role in determining the yield potential and NUE, due to differences in nitrogen accumulation capacities between genotypes. Thus, our objective is to test the impact of NUpE variability during the vegetative phase on seed yield and NUE at harvest, and by identifying which plant traits, especially root traits, underlie this effect.

Seven contrasted winter oilseed rape genotypes for seed yield response to nitrogen inputs were cultivated in a semi-controlled field-like device under limiting and non-limiting nitrogen inputs. Over the whole plant cycle, growth, biomass and nitrogen content of shoot, fine roots and tap roots were measured. Our results showed that seed yield was strongly correlated with NUpE as well as with whole plant nitrogen quantity at the end of the vegetative growth, suggesting that plant growth and nitrogen acquisition during the vegetative growth might explain the relative performance of contrasted genotypes at harvest. Genotypes exhibited contrasted dynamics of fine root growth rate and fine root contribution to the whole root system. These traits were correlated with NUpE, especially under limited nitrogen inputs. Thus, targeting the vegetative growth has proven to be successful in identifying traits, such as NUpE and fine root ratio, relevant to improve NUE and seed yield at harvest. These results provide promising proxy traits to understand nitrogen impact on seed yield elaboration and to go further into the identification of the main genetic determinants involved in NUE control, under field-like conditions.

PLENARY TALKS

ORALS

POSTERS

WORKSHOPS