Bringing nitric oxide to the agricultural field:
understand how nitric oxide modulates grain yield and seed quality under challenging climate conditions
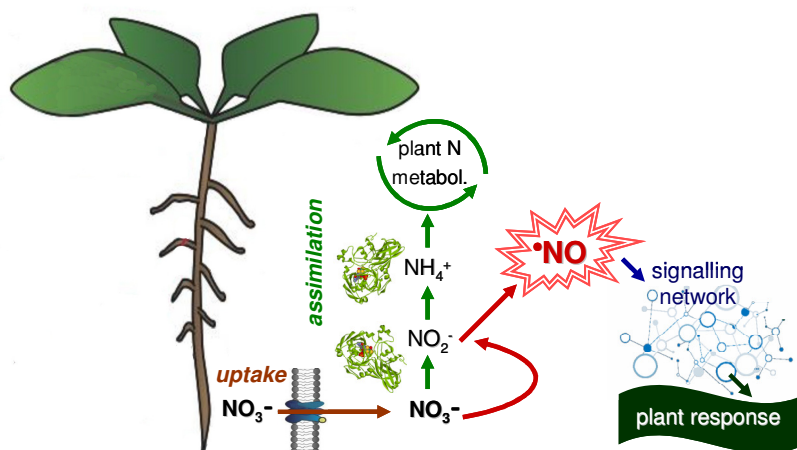
One of humankind's greatest challenges will be to feed the ever-increasing population under the adverse climate conditions foreseen for the near future. Drought, flooding, heat and cold waves are environmental stresses that negatively impact plant growth and, therefore, our crop productivity and quality. To withstand the unpredictable changes in their surroundings, plants use sophisticated signalling networks, where nitric oxide (NO) stands out as a key player in the plant response to temperature, salt and drought stresses. NO is involved in breaking seed dormancy, germination, root development and flowering, among several other key physiological processes. In spite of its importance, NO formation, its targets and mode of action are still poorly understood in higher plants.

Being seeds crucial to meet our food needs, this PhD Project will focus on the role of signalling NO in their formation, development and germination, aiming to understand how to enhance grain yield and improve seed quality under environmental challenging conditions. The main objectives will be to determine the NO formation and NO-mediated post-translational modifications (PTM) and evaluate how they impact seed quality and productivity, *in vivo*, using *Arabidopsis thaliana* as model organism. Different nitrogen sources and supply regimes will be studied to critically evaluate plant nitrogen use efficiency (NUE) under normal and drought stress conditions. The enzymatic systems responsible for NO generation will be reconstructed *in vitro*, using *A. thaliana* purified enzymes and the NO formation will be characterised under different physiologically-relevant conditions. The formation and effect of NO-mediated PTM will be addressed, focusing on proteins that participate in signalling networks.

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Supervisors

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