epiDT

Project title: Deciphering the molecular switch of seed desiccation tolerance to improve plant stress tolerance

Acronym: **epiDT**

Project duration: 18 months - Start date: 01/10/2019 End date: 31/03/2021

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Summary:

Drought has challenged food security worldwide, urging the development of drought-tolerant crop varieties. Crops do not withstand severe drought at the vegetative stage, but produce seeds that survive extreme dehydration. The ability to tolerate extreme dehydration **(desiccation tolerance, DT)** is tightly regulated, being switched on during seed maturation and off shortly after germination (DT switch). Seeds can remain alive in the dry state for years and resist extremes of temperature and drought. While major efforts have focused on unravelling the nature of the protective compounds promoting DT, the mechanisms that regulate their expression/accumulation during seed development are poorly understood. In the last few years, new tools have become available enabling the investigation of a yet unexplored level of molecular regulation for DT, the epigenetic landscape.

The **epiDT project aims at unravelling the molecular regulation of the DT switch at the epigenetic level.** Based on preliminary evidence that a specific histone modification tightly represses the regulatory networks responsible for DT in *Arabidopsis thaliana* and *Medicago truncatula* vegetative tissues. We propose combining cutting-edge molecular methods on developing seeds and our capacity to re-induce DT in germinating seeds of the model legume, *Medicago truncatula*, to understand the nature and timing of the DT switch. Then, using the same experimental models, we intend to characterize the minimal core set of genes associated with the DT mechanisms, including regulatory genes and pioneer genes to switch on/off desiccation tolerance in plants.

By unravelling the DT switch activation/repression, our project will target several pivotal agricultural issues, such as **food security and crop adaptation to climate change**, with potential improvement of plant stress tolerance, and conservation of genetic resources, with easier management of short-lived seeds.