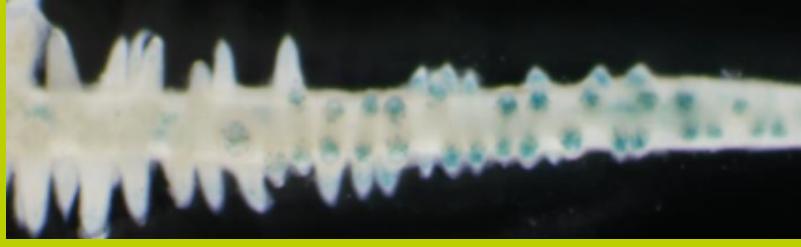
Root for ever

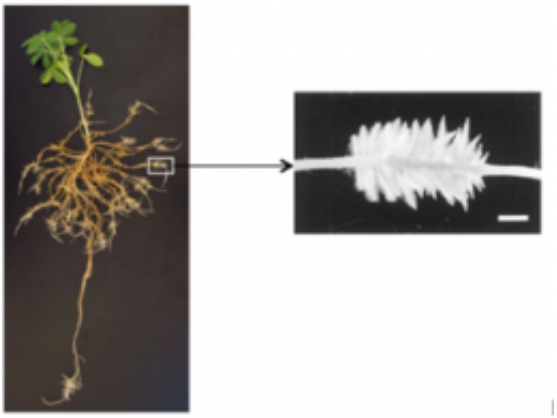


Crop root system architecture influences plant development and nutrition. Root initiation and subsequent growth are two key factors impacting the elaboration of this architecture and its adaptation to environmental cues.
Little is known about the mechanisms regulating lateral root growth plasticity in other plant species than Arabidopsis, such as white Lupin.

OBJECTIFS

The objective aims to compare two phenomena, determinate versus indeterminate root growth, to develop novel strategies to control root architecture responses. This exploratory work aims at investigating the gene regulatory network regulating lateral root meristem activation and maintenance in two biological systems and using two experimental strategies :

1. transcriptomic kinetics and inference algorithms to infer the gene regulatory network regulating lateral root meristem activation in *Arabidopsis*.
2. the transcriptome of indeterminate lateral roots versus determinate cluster roots in white Lupin to identify master genes controlling this meristem property.



ACTIONS

This project is expected to yield :

1. the predicted topology and dynamics of the gene network operating during lateral root activation in Arabidopsis,
2. the production of transcriptomic datasets covering lateral root and cluster root development in the crop model white Lupin,
3. the identification of candidate genes possibly involved in controlling the determinate or indeterminate root growth behaviour in that species.

This will bring new fundamental knowledge about developmental plasticity and especially, about the adaptation mechanisms of root developmental program to environmental constraints.

RESULTATS

It becomes an essential issue to obtain plants with an enhanced nutrient efficiency and able to grow in challenging environments. In this perspective, our project will give clues to plant breeders to optimize root growth in poor soil allowing the exploitation of new soil surfaces. Furthermore comparing the model plant Arabidopsis and the white Lupin crop is also interesting in the plant breeding perspective. White Lupin has exceptional capacities to exploit poor soils and foraging for phosphate. This specificity needs to be studied in order to exploit and develop new strategies for improving plant nutrition in challenging conditions.

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