Development of gentic markers monitoring plant water potential

OBJECTIFS

Is very difficult to directly measure in plants, which prevents one to develop straightforward strategies to decipher gene regulatory networks (GRN) controlling it. The current project proposes to tackle this limitation by finding sentinel genes reporting rapid changes in water potential (or ??). The main objective is to develop new dynamic biosensors based on genetic markers that quantitatively indicate the drop in water potential of a plant organ or cell.

ACTIONS

Actions planned consist in the characterization of early transcriptomes from samples of roots treated with a range of water potentials. Data will be analyzed to find genes which expression quickly and quantitatively reflects P, ? and/or ??.
A deep analysis of short term regulation of the turgor pressure has been performed on root cortical cells with a cell pressure probe.
This allowed us to calibrate our experimental system prior to plant treatment for RNA extraction.
A transcriptomic analysis has been performed on the samples, revealing the early (15 min) transcriptional changes upon water stress in roots.

RESULTATS

About 500 genes are significantly regulated upon water stress imposed by various solutes (PEG, NaCl, sorbitol, EG). Among which a few show a very good correlation between expression level and solution water potential/ turgor pressure. Those will serve as a basis to develop plant water stress sensors.

PERSPECTIVES

Our work provide the basis to monitor early plant water stress. We now aim at developping genetic sensors to understand how crop plants perceive water stress and at deciphering what are the underlying molecular mechanisms.

Responsable :

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