Live Imaging of Reproductive Development in Sexual and Apomictic Grasses

OBJECTIFS

To test our morphogenetic hypothesis, the main objective is to set up a live imaging protocol of maize early ovules and anthers, to compare wild-type and apomixis-like mutants, identified in our team. This protocol must be flexible enough to be adapted to study natural apomictic, such as aposporous Paspalum, a forage plant of agronomical importance in Latin America.
This project is related to the ANR-SNF collaborative project IMAGO, focusing on Arabidopsis early ovule architecture. Using this model, we have shown a functional link between perturbations of cellular growth parameters of the ovule and apomictic-like development.

RESULTATS

The project exploits an original imaging tool developed in Labex Agro, combining multiphoton microscopy and serial sectioning (Partner 2, PHIV, CIRAD). This combination greatly optimizes multiphoton live-imaging capacity for large samples, mainly by avoiding dissection steps and sample drift.

Using this approach, further improved by the construction of a custom imaging chamber, we aim at monitoring the dynamics of the first developmental events diverging between sexual and apomictic programs.

In this project, we will address different classes of apomictic development, i.e. aposporous and diplosporous development, taking advantage of maize mutants mimicking apomixis we recently described.
We aimed at generating the following datasets:
1. Time-series of early ovule development during MMC specification, in sexual wild-type maize and mutants developing multiple female germ cells, thus mimicking apospory.
2. Time-series of early anthers and ovules during meiosis, in wild-type maize and a mutant with abnormal mitosis-like meiosis, mimicking diplospory.
The genericity of the protocol will be then tested in Paspalum.

PERSPECTIVES

The live images datasets generated during the project will serve thereafter as templates to adjust computational models, which we are currently developing for Arabidopsis in collaboration with C. Godin's group (Virtual Plants, Labex NUMEV), to identify the key cellular growth parameters governing plasticity in grasses reproductive development, toward a better understanding of the morphogenetic events underlying apomictic development.

Responsable :

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