

Biogenesis and dynamics of lipid bodies

CJS INRA ELIGIBLE *

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Laboratory

IJPB, Equipe Développement et qualité des graines,
MIA Mathématiques et informatique appliquées
UMR 1318 INRA Agroparistech et unité MIA
Pôle Reproduction et Graines Bâtiment 2
INRA, Centre de Versailles-Grignon 78026 VERSAILLES Cedex
Director : David BOUCHEZ

PhD Supervisor

Bertrand DUBREUCQ
email : dubreucq@versailles.inra.fr
phone : +33 130833066

Subjects / Tools-Methodologies

- 1 : Lipid bodies imaging/confocal imaging, image processing
- 2 : Modeling/mathematics, informatics, computational biology
- 3 : model validation/mutant analysis, transgenic plants

* CJS INRA eligible : available funding

This project may be selected to be founded by a 5-year grant from INRA (Early stage scientist contract)

Summary of lab's interests

Our current objective is the identification and characterization of key functions and regulatory mechanisms that control seed development and maturation, and their role in seed biology. Our experimental strategy is mainly based on genetic and molecular analyses of (1) the metabolic pathways and cellular mechanisms that control the accumulation of storage compounds, and (2) the transcriptional regulatory network at stake in Arabidopsis seed. In oilseed plants, including Arabidopsis, lipids are mainly stored in the seed cotyledons in distinct intracellular organelles referred to as oil bodies (OB), lipid bodies or oleosomes. These organelles protect plant lipid reserves against oxidation and hydrolysis until seed germination and seedling establishment. Specific integral membrane proteins, namely oleosins, caleosins and steroleosins, stabilize oilbodies due to characteristic features. An unusually long stretch of hydrophobic amino acid residues and an overall negative charge supply the OBs with steric and repulsive effects providing a remarkable stability that enables them to resist coalescence when subjected to cytoplasmic repression. To better understand the early stages of the oil body biogenesis from the endoplasmic reticulum, we use confocal microscopy with fluorescent markers for lipid and proteins from oil bodies, reticulum and cytoskeleton as well as immunostaining. Our work aims to understand the structure, formation and function of oleosomes of Arabidopsis, and possibly use that knowledge to change the reserve content and/or extractability of oilseeds.

Summary of project

The main objective of the project is to unravel the mechanisms involved in the growth of the oil bodies, firstly at a cellular scale and secondly at the scale of the seed. To achieve this goal several complementary skills (biology, biochemistry, biophysics, microscopy, modeling, images analysis and statistics) will be gathered to build a bio-physical model of oil body biogenesis. The model will principally i-interconnect several mechanisms in a quantitative way, ii- emphasize on the lack of knowledge and iii- test different hypothesis relative to various factor s weight.