PROPOSITION DE STAGE M2 RECHERCHE 2019-2020

TITRE : Deciphering the molecular and cellular mechanisms of iron storage and remobilization in seeds

Responsable du stage : Sébastien THOMINE

Adresse, tél, e-mail : sebastien.thomine@i2bc.paris-saclay.fr

Nombre de thèses en cours : 0

Possibilité de poursuite en doctorat : ■ OUI ☐ NON

Présentation de la proposition de stage : ■ OUI ☐ NON

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INTRODUCTION, CONTEXTE SCIENTIFIQUE : In plants, iron (Fe) fulfills many functions as the cofactor of a wide range of proteins involved in photosynthetic and respiratory electron transfer chains and biosynthetic pathways. Iron acquisition by plants is not only crucial from an agronomical point of view, but also for human health since seeds represent the main dietary source of iron for humans. More than 2 billion people are affected by Fe deficiency, caused by the consumption of grains with low quantity and availability of Fe. **Biofortification** (*ie* increasing vitamins and micronutrient contents by breeding or biotechnologies) has been proposed as a sustainable solution to this problem[1]. The major bottleneck of biofortification strategies is the lack of knowledge on the **genes involved in the control of Fe storage and availability in seeds**. The objective of the project is the identification and the characterization of new genes controlling iron storage and remobilization in seeds using a genetic approach in the model plant *Arabidopsis thaliana*.

PROJET DE RECHERCHE : To identify genes that control iron storage in seed vacuoles and its remobilization, our team performed a screen for "suppressor" mutations in the *nramp3nramp4* mutant, which is unable to retrieve vacuolar iron and to develop under iron deficient conditions[2]. We name such suppressor mutants *isv* for "bypass *i*ron *s*torage in *v*acuoles". This screen already identified mutations in *VIT1*, the transporter responsible for Fe influx in vacuoles during seed formation[3,4]. In this project, we propose to characterize other confirmed mutants identified in the same screen.

APPROCHES METHODOLOGIQUES : Plant culture *in vitro*, Segregation analysis, analysis of NGS data, Arabidopsis genetic transformation, Arabidopsis crosses, elemental analysis by atomic emission spectrometry, histochemical detection of Fe.

REFERENCES BIBLIOGRAPHIQUES (maximum 5)

1-Murgia et al., 2012, TIPS 17(1), 47-55

2-Lanquar et al., 2005, EMBO J 24: 4041-4051

3-Kim et al., 2006, Science 314: 1295-1298

4-Mary et al., 2015, Plant Physiol 169: 748-759)