

Institute: Institute of Botany

Topic: Regeneration processes in isolated endosperm of selected cultivars of *Actinidia arguta*

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Background information:

Endosperm is a unique tissue because of its origin, ploidy content and recalcitrance upon dedifferentiation in vitro. In Mini kiwi, *Actinidia arguta*, the protocol for shoot proliferation and regeneration from isolated endosperm has already been developed (Abdullah et al., 2021). We have also shown that the selected cultivars of kiwi berries differ significantly in their potential to regenerate plants from endosperm-derived calli. We observed the differences in cell wall composition between organogenic and non-organogenic pathway after several weeks of cultivation (Popielarska-Konieczna et al., 2020). In particular, our preliminary research (unpublished) showed that the cell wall composition differs between cultivars with high and low potency for regeneration at the beginning of cell differentiation. The aim of the study is to identify the key genes associated with this high regeneration potential through genetic and protein profiling. One of these is the gene RAPTOR1 that is expressed in the organogenic callus of the related species *Actinidia chinensis* (Czernicka et al., 2021).

Main research questions to be addressed in the project:

The project will on the one hand focus on the identification of key genes and proteins (collaboration with PhD Jenny Renaut, Luxembourg Institute of Science and Technology) in mature endosperm capable of dedifferentiation and subsequent shoot regeneration. On the other hand, we want to improve the efficiency of shoot bud regeneration by applying thin layer technology and new variants of plant growth regulators (collaboration with Prof. Stefaan Werbrouck, Ghent University). This aspect is important for effectively obtaining plants with a higher ploidy.

Information on the methods/description of work:

In proposed work following methods will be used: plant tissue culture techniques, histological sections for light and fluorescence microscopy, immunolabeling, RT-qPCR, proteome analysis (MALDI).

Additional information (e.g. special requirements from the student):

The candidate should be well familiar with plant biology, including histology and embryology, and should also master MS Office (PowerPoint, Excel, Corel PHOTO-Paint, CorelDraw) and Statistica, and have basic knowledge and practice of plant tissue culture and molecular methods.

Place/name of potential foreign collaborator:

Prof. Stefaan Werbrouck, Laboratory for Applied In Vitro Plant Biotechnology, Faculty of Bioscience Engineering, University Ghent, Belgium

PhD Jenny Renaut, Environmental Research and Innovation Department, Luxembourg Institute of Science and Technology, Luxembourg

References (3):

Popielarska-Konieczna et al. (2020) DOI: 10.1007/s00299-020-02530-2

Czernicka et al. (2021) DOI: 10.1007/s00299-021-02661-0

Abdullah et al. (2021) DOI: 10.1007/s11240-021-02149-5