UNIL | Université de Lausanne
Centre intégratif de génomique
bâtiment Génopode bureau GEN-4008
CH-1015 Lausanne

PhD Fellowships in Life Sciences 2021/2022

Host laboratory: Soyk lab at the Center for Integrative Genomics

Project title: Modulation of stem cell control during crop domestication

Project abstract: The product of most major crops is derived from flowers, which develop when small groups of stem cells (called meristems) cease the production of vegetative organs and transition to reproductive growth. Meristem maturation, the process in which meristems differentiate and terminate, finely balances vegetative and reproductive growth for optimized flower, fruit, and seed production. Not surprisingly, humans selected for modified meristem maturation schedules during domestication and breeding to customize when, where and how many flowers develop. However, the genomic consequences of this selection process and the molecular effects on stem cell development are still poorly understood.

Aim of the project: The aim of this PhD project will be to identify and characterize genes and gene networks that are involved in stem cell control and were selected during crop domestication and breeding.

Experimental approach: The Soyk lab recently started to screen a diversity panels of domesticated and wild tomatoes for alterations in flowering time and plant architecture to identify natural gene variants that affect stem cell development. Depending on the candidate's interest, the project will aim at the characterization of genes that we isolated from this genetic screen. The candidate will explore natural variation using resequencing data of tomato wild species, landraces, and domesticated accessions. The candidate will evaluate the effects of natural and induced alleles on flowering time and/or shoot architecture by genetic crosses and quantitative phenotyping. The candidate will functionally characterize the consequences of allelic variation at the molecular level by transcriptome analyses. Depending on gene identity, the candidate will also conduct other molecular and biochemical analysis such as protein-protein-interaction and/or DNA-protein-interactions. This project will expose the candidate to a variety of approaches in plant genetics, genomics, molecular biology, and biochemistry.

Significance: Characterizing the genetic basis of domestication will reveal fundamental signaling pathways and mechanisms that contribute to stem cell control, and potentially advance our ability to fine-tune plant architecture for improved crop yields.

Tél.+41 21 692 39 19 | sebastian.soyk@unil.ch | https://www.unil.ch/cig/soyk