SCIENCES & BIOENGINEERING SCIENCES

The Research Groups
Plant Genetics and Microbiology

has the honor to invite you to the public defence of the PhD thesis of

Janne Swinnen

to obtain the degree of Doctor of Bioengineering Sciences

Title of the PhD thesis:

The role of CDF-family transporters in zinc homeostasis of ectomycorrhizal fungi

Supervisor:
Prof. dr. Joske Ruytinx (VUB)

The defence will take place on
Tuesday, June 9, 2026 at 5 p.m.

VUB Etterbeek campus, Pleinlaan 2, Elsene,
In auditorium D2.01

Members of the jury

Prof. dr. ir. Wim Versées (VUB, chair)
Prof. dr. Charles Van der Henst (VUB)
Prof. dr. Kim Roelants (VUB)
Prof. dr. Nathalie Verbruggen (ULB)
Dr. Annegret Kohler (INRAe, FR)

Curriculum vitae

In 2019, Janne obtained her Master's degree in Bio-Engineering Sciences: Cell and Gene Biotechnology at the Vrije Universiteit Brussel. Soon after, she started doctoral research in the Plant Genetics and Microbiology research groups under the supervision of Prof. Dr. Joske Ruytinx. Here she investigated zinc homeostasis in ectomycorrhizal fungi.

Janne successfully combined her PhD research with major contribution at educational programs. She was teaching and coordinating several practicals and guided five master thesis students. Janne presented her work at scientific conferences and won two FEMS travel grants. She is the author of a co first-author publication, has another first author publication under revision and contributed to two additional peer reviewed papers.

Abstract of the PhD research

Ectomycorrhizal (ECM) symbioses are among the most widespread and ecologically important mutualistic interactions in forest ecosystems, where they play a key role in plant nutrient acquisition and stress tolerance. However, these interactions are increasingly challenged by anthropogenic soil contamination, among which metal pollution. Although metals such as zinc (Zn) are essential micronutrients, elevated concentrations are toxic, making the regulation of Zn homeostasis critical for the fitness of both the fungal and plant partner. Despite their ecological relevance, the molecular mechanisms underlying Zn homeostasis in ECM fungi remain poorly understood. Therefore, this PhD research investigates the diversity of Zn homeostasis networks across different fungal ECM models, with a focus on the role of Zn transporters and intraspecific variation in Zn tolerance phenotypes.

Results show that ECM symbiosis can be established and retained under Zn stress, although several key symbiotic parameters are impacted. Two Zn transporters, LbCDF-A and LbCDF-B, were identified as central regulators of Zn trafficking during symbiosis of *Laccaria bicolor* and its host tree. In addition, adaptive Zn tolerance in *Suillus luteus* was found to be a complex quantitative trait associated with a single SNP at genome wide scale. However, detailed analysis of the SNP region revealed that these phenotypes are shaped by variation in gene copy number and promotor genotypes to result in the constitutive differential expression of a CDF family gene. Together, this work advances our understanding of fungal Zn homeostasis, its role in plant nutrition and metal stress tolerance and highlights the potential of ECM symbioses in providing sustainable solutions for waste land.