

PLASOBINU



Plant infection by plasmodiophorids and their influence on soil biodiversity and nutrient flow

Plasmodiophorids are soil dwelling protist that rely on host plants to multiply. The best known species of this group is the clubroot pathogen *Plasmodiophora brassicae* causing tumorous root growth on host plants. Clubroot is a major threat of cruciferous crops worldwide. Control possibilities of this soil-borne disease are limited due to the long persistence of the *P. brassicae* resting spores in the soil, limited sources of plant resistance genes and lack of chemical control agents. Plants are affected by interactions with the rhizosphere microbiome, which has the potential to control soil-borne diseases. Here as the first international survey of clubroot-related microorganisms, I will assess the microbiome of bulk and rhizosphere soils associated with roots of healthy and clubroot-infected plants in samples across Europe. A holistic microbiome analysis approach will be used to simultaneously characterize bacterial, fungal, nematode and protistan communities. I aim to correlate the microbiome structure and keystone taxa to the pathogen existence and plant infection and abiotic factors. In this context, temporal dynamic changes in the microbiome as well as in carbon flow using ^{13}C -stable-isotope labelling should reveal trophic interactions between the host plant, *P. brassicae* and the soil microbiome. Thereby potential biocontrol agents against this notorious pathogen could be identified. The gained information will be used to manipulate soil parameters and its microbiome in greenhouse experiments and field trials, aiming to construct disease suppressive soils. This is a unique approach of clubroot research that leads towards new sustainable disease biocontrol possibilities that could be extendable to disease-management of other soil-borne plant pathogens.

Project Duration: 36 months (18M Wageningen University & Research + 18M Teagasc)

Collaborating Institutions: Teagasc, Ireland
Wageningen University & Research (WUR), the Netherlands

Project Team:

RL2025 Fellow

Dr Arne Schwelm

Teagasc Supervisor

Dr Fiona Brennan
Teagasc, Ireland

Outgoing Phase Supervisor

Dr Stefan Geisen
WUR, the Netherlands

Third Supervisor

Dr Michael Gaffney
Teagasc, Ireland