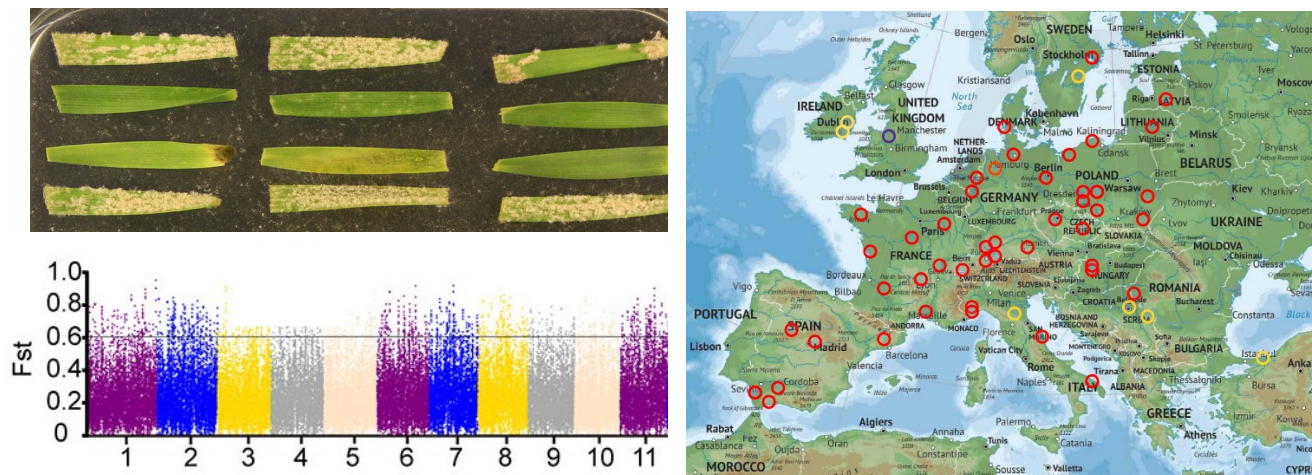**Master thesis. Thermal adaptation of wheat powdery mildew (*Blumeria graminis*) in Europe.**

Agricultural pathogens cause substantial crop losses each year. To control pathogens, modern agriculture relies on pesticide treatments and breeding of resistant crop varieties. Climate change represents an additional challenge to food security, as it affects yields both directly and indirectly. Changing environmental conditions can cause the emergence of new pathogens, and their expansion to regions previously unaffected. Understanding the evolutionary and epidemiological dynamics of pathogen populations is crucial to develop sustainable control strategies.

This project will investigate the thermal adaptation of a fungal pathogen of wheat and other cereals using a mix of experimental and bioinformatic methods. The goal is to understand whether pathogen strains that have been collected in different European regions are adapted to local climatic conditions, to identify genetic loci that are involved in local adaptation, and to determine whether pathogen strains adapted to warmer temperatures have moved from southern towards northern Europe in the recent past.

During this project the Master student will learn to:
- conceptualize research questions in evolutionary biology and population genetics
- design experiments
- sample wheat powdery mildew and maintain fungal strains in the lab
- phenotype and evaluate fitness of fungal strains at different temperatures
- work on a high performance computing cluster
- write scripts in python and R
- use image analysis software
- analyze next generation sequencing data
- perform different population genetic analyses

Previous experience with programming is useful, but not necessary.

How to apply
The start date for this project will be in spring or summer 2023.
If you want additional information, or you would like to visit the lab, please contact fabrizio.menardo@uzh.ch.