MASTER THESIS OFFER OF CEPLAS

(FOR COMPUTATIONAL MASTER STUDENTS FROM TECHNICAL UNIVERSITY OF MADRID, UPM)

Title of Master Thesis

Microbiome manipulation by the soil-borne fungal plant pathogen *Verticillium dahliae*

Description of student´s tasks

An organism's microbiota, the totality of microbes it associates with, is an important determinant for its health. Plants actively shape their microbiota and recruit beneficial microbes upon pathogen attack. Traditionally, plant disease research focuses on interactions between one plant and one pathogen, while ignoring the biotic environment. As a consequence, pathogen-secreted effectors that support host colonization are almost exclusively studied in the context of host immunity suppression. However, considering the protective role of host microbiota one could speculate that disease establishment by a plant pathogenic microbe is the result of a successful interaction with its host as well as with the host-associated microbial communities, collectively termed the plant holobiont. We recently showed that the soil-borne broad host-range fungal plant pathogen *Verticillium dahliae* exploits antimicrobial effector proteins to modulate the beneficial microbiomes of its hosts to promote host colonization, indicating that the role of effector proteins extends beyond the direct interactions between a pathogen and its host (Snelders et al., Nature Plants, 2020). In this project, you will investigate the manipulation of host microbiome compositions by *V. dahliae* in more depth by analyzing shotgun-metagenome sequencing data obtained from healthy and *V. dahliae*-colonized plants. You will characterize the compositions of these microbiomes in order to identify microbial co-inhabitants that are repressed or stimulated by *V. dahliae*. Hence, your project aims to contribute to our understanding of the microbial interactions within the plant holobiont that underly successful disease establishment by *V. dahliae*.

Prerequisites (*languages, informatics skills, bioinformatic skills, other knowledge, etc*)

- Proven proficiency in programming (e.g., Python and/or R)
- Basic knowledge on microbiology and/or microbial ecology

Training Project

EXTERNAL PRACTICES/MASTER THESIS. The fundamental goal of the external practices is to guide the student in applying his previously acquired knowledge to real tasks in a group work environment the realistically represents the work conditions the students will encounter in their future roles. In this way, the student will be able to get familiar with a working environment (work schedule, responsability, attitude, organization, etc.), and with the adequate working methodology in professional reality, contrasting and applying the acquired academic knowledge.

Activities that will be performed in the academic internship/Master Thesis:

- Metagenome analyses

Nº of positions offered:	1
Has the student dealings with underage persons?	NO
Starting date:	01-02-2021

End date:	flexible
Weekly hours *(only for internship in CEPLAS lab):*	flexible
Working hours *(only for internship in CEPLAS lab):*	flexible
Fellowhips *(if any, NOT REQUIRED):* **Remuneration (€/month):**	
Academic tutor (UPM/CBGP): *(you need a Tutor from UPM Master, not involved in the research activity)* **Email**:	
Department/Research Group of UPM/CBGP Academic tutor:	
CEPLAS Internship/Master Thesis Tutor/Director:	Prof. Bart Thomma
Email CEPLAS tutor:	bthomma@uni-koeln.de
Department CEPLAS tutor:	Institute for Plant Sciences, University of Cologne
Location of the internship (telecommuting?):	Telecommuting possible, but visiting Cologne and working with experimental colleagues at the UoC would be preferred for at least some of the internship.
CEPLAS Institution:	University of Cologne
To be completed by Internship Office ETSIAAB-UPM: Number of ECTS (Nº ECTS):	

Send by email to: international.cbgp@upm.es (Pablo Gómez)