

2017 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project:

Root phenotyping and genotyping of *Poaceae* species under nitrogen and beneficial bacteria treatments to discover traits for future cereal crop productivity

Helmholtz Centre and institute:

Forschungszentrum Jülich, Institute of Bio- and Geosciences (IBG), Plant Sciences (IBG-2)

Project leader: Prof. Dr. Michelle Watt

Web-addresses:

- <http://www.fz-juelich.de/ibg/ibg-2/>
- http://www.fz-juelich.de/ibg/ibg-2/EN/About_us/Staff/Watt_Michelle/_node.html
- http://www.fz-juelich.de/ibg/ibg-2/DE/Mitarbeiter/_IBG-2/Arsova_Borjana/Arsova.html?nn=548888

Description of the project:

Nitrogen (N) is the most abundant plant macronutrient taken up from soil, and its uptake and use efficiency is critical for plant performance and sustainable agriculture. Plant roots encounter complex abiotic and biotic conditions whose interplay influences the uptake of N from soil. Breeders require cereal root traits for effective N fertiliser use. *Poaceae* species include the cereal crops, e.g., wheat, maize and rice, supplying about 50% of human calories. This project aims to discover root traits of wheat and the model grass *Brachypodium* under limiting N conditions, using unique technology for non-invasive phenotyping, and Next Generation Sequencing at the research center in Jülich. In addition to N treatments, a beneficial bacteria that improves plant vigor under limiting N condition will be tested in custom-made temperature-controlling facility that mimic near-field conditions.

The successful post-doctoral fellow will join two already established postdocs in the group of Prof. Dr. Michelle Watt: Dr. Borjana Arsova (Nitrogen, beneficial bacteria, *Brachypodium*) and Dr. Andong Shi (influence of temperature on root growth in winter wheat), and will play a central role in researching root and rhizosphere traits for breeding crops for effective N fertilizer use and productivity.

Working environment: The research institute in Jülich is a world renowned leader in plant phenotyping, which specializes in state of the art, non-invasive phenotyping technologies especially for roots. Platforms such as: Soil and agar rhizotrons, MRI- PET and Grow Screen-

PAGE are developed here and can be made use of in the project. Experience within the group covers methodologies for systemic responses using genome and/or proteome analyses, as well as directed molecular analyses to account for multileveled profiling of plant response and linking genotype to phenotype.

Description of existing or sought Chinese collaboration partner institute:

We are seeking a collaboration partner that focuses their research on agricultural sustainability, especially using plant phenotyping. Work on microbial communities and their potential use in future agriculture, as well as strong performance in Next generation sequencing technologies is also sought.

An example would be the Institute of Subtropical Agriculture (ISA), Chinese Academy of Sciences as the leading agricultural research institution in China, but applications from other institutions that fulfill the research focus are also welcome.

Required qualification of the post-doc:

- PhD in Biology related to either plants or host-microorganism interactions, including but not restricted to, Biochemistry, Plant Physiology, Molecular Biology, Marine biology, Microbiology
- Experience with plant phenotyping, RNASeq (library preparation and data analysis), statistical knowledge for analysis of large datasets, and working with microorganisms.
- Knowledge of nutrient exchange processes in biological systems that include host-microorganism interactions
- Knowledge of R or similar is advantageous.

PART B

Documents to be provided by the post-doc:

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae, copies of degrees
- List of publications
- 2 letters of recommendation

PART C

Additional requirements to be fulfilled by the post-doc:

- Max. age of 35 years
- PhD degree not older than 5 years
- Very good command of the English language
- Strong ability to work independently and in a team