PhD scholarship in Plant-Microbe Interactions (BestPass), ESR15

BestPass: Boosting plant-endophyte stability, compatibility and performance across scales

INOQ GmbH is offering a PhD scholarship in Molecular Plant Pathology with expected commencement 1. February 2016 or as soon as possible thereafter. The PhD will be awarded by the Faculty of Life Sciences, Humboldt University Berlin.

Project title: ESR15: Acclimatization of root-interacting fungi for improved plant nutrition and stress tolerance

Arbuscular mycorrhizal fungi (AMF) and *Piriformospora indica* are root endophytic fungi, and both have been shown to improve the plant growth, nutrient uptake, plant pathogen resistance and alleviate impact of abiotic stresses. However, chemical properties of targeted soils can impact negatively symbiotic relationship. AMF show indeed low colonization levels at high phosphate (P) content in agricultural used soils. *P. indica* colonizes plants also at high P concentrations, but it is not clear how much it contributes to P nutrition of the plant. Both types of fungi increase plant salt tolerance, but this depends also on their own performance under salinity conditions.

This PhD project will focus on the use of acclimatized endophytic fungi for improved abiotic stress alleviation and facing the high P soil problem for AMF. For this aim, innovative strategies will be developed, combining a dynamic scale-up "training" by fungal pretreatments and application of plant elicitor molecules. The role of *P. indica* in P nutrition will be also assessed, and marker genes for acclimatization processes will be studied. All cultural itineraries for endophyte growth will be tested under commercial production methods and conventional cropping systems.

Principal supervisor: Dr. Carolin Schneider schneider@inoq.de, Phone: +49 5842 981672 and Eva Lucic lucic@inoq.de, Phone: +49 5842 981672

Planned secondments: IGZ Leibniz-Institut für Gemüse- und Zierpflanzenbau, Großbeeren/Erfurt, Germany (2x2months). University of Copenhagen, PLEN – Department of Plant & Environmental Sciences, Danemark (4 months).

BestPass

We need to increase the crop yield while reducing pesticide and use of inorganic fertiliser to meet the challenges of world population growth and climate change. Plant endophytic microorganisms can improve plant yield and enhance plant tolerance to abiotic stress as well as to pathogens under experimental conditions, but these effects are often not sufficiently stable for practical application.

How do we boost the stability and reliability of the positive effects of endophytes on plants?

We need to understand the genetic basis of beneficial interactions between crops and endophytes and extend this basic knowledge of phenotypic plasticity to all interaction levels from the cellular to the field environment. This requires research into the molecular mechanisms underlying the effects of endophytes, including intra and inter-kingdom exchange and distribution of resources (nutrients). Key signalling and possibly regulatory processes between and inside the partners, the mutual induced

production of secondary metabolites and the environmental cues which influence crop-endophyte interactions will be deciphered. The genetic variation and its plasticity in host and microbe will be exploited to establish crop breeding and inoculum production processes for boosting the establishment and stability of plant-microbe mutualisms to benefit crop development, stress tolerance, pathogen resistance and quality.
In BestPass we will provide fundamental biological as well as practical knowledge about interactions between endophytes and plants. This improved understanding will pave the way for increased use of endophytes to improve sustainability and plant productivity in a reliable way.

BestPass is an International Training Network (ITN) funding by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 676480.

General information about BestPass is available on www.bestpass.ku.dk or by contacting Project Coordinator, Professor David B. Collinge.

Job description
The position is available for a 3-year period. Your key tasks as a PhD student in BestPass at Science are:

•Participate in the research environment at INOQ and the network activities of BestPass
•Manage and carry through your research project
•Take PhD courses
•Write scientific articles and your PhD thesis
•Participate in congresses
•Teach and disseminate your research

Key criteria for the assessment of candidates
•A master's degree related to the subject area of the project
•The grade point average achieved
•Professional qualifications relevant to the PhD programme
oPrimary skills: laboratory experience in molecular biology, plant bioassays/plant-fungal interaction, microbiology
oRelevant skills: bioinformatics
•Previous research publications
•Other professional activities
•Language skills: fluency in English

Formal requirements and eligibility
At the time of commencement, it is required that the candidates have not been awarded a doctorate degree and are within the first 4 years (full-time equivalent) of their research careers. Furthermore, the candidates **must not** have resided or carried out their main activity (work, studies, etc.) in Germany for more than 12 months in the 3 years immediately prior to their recruitment. Short stays, such as holidays, are not taken into account.

Terms of employment
Recruitment and terms of appointment will be done according to the rules and regulations of INOQ GmbH and according to the rules and regulations laid down by European Union's Horizon 2020 Marie Curie Initial Training Networks.

Place of Employment
INOQ GmbH, Solkau 2, 29465 Schnega, Germany.

Please notice that this PhD fellowship entails three secondments, IGZ Leibniz-Institut für Gemüse- und Zierpflanzenbau, Großbeeren/Erfurt, Germany (2x2months). University of Copenhagen, PLEN – Department of Plant & Environmental Sciences, Danemark (4 months).

Application Procedure
The application, in English, must be submitted by mail to INOQ GmbH, Solkau 2, D-29465 Schnega or online in pdf format to schneider@inoq.de

Please include
• Cover Letter, stating which PhD project you are applying for and detailing your motivation and background for applying for the specific PhD project.
•Please indicate if (and which) you have applied for other BestPass PhD fellowships
•Max 1-page proposal for research activities to pursue in the PhD study program
•CV
•Diploma and transcripts of records (BSc and MSc)
•1-3 professional referees (Name, address, telephone & email)
•Documentation of English language qualifications
•Other information for consideration, e.g. list of publications (if any)

Inoq GmbH wishes our staff to reflect the diversity of society and thus welcomes applications from all qualified candidates regardless of age, gender, race, religion or ethnic background.

The deadline for applications is 31 December 2015. Applications received later than this date will not be considered.

After the expiry of the deadline for applications, the authorized recruitment manager selects applicants for assessment on the advice of the Interview Committee. Afterwards an assessment committee will be appointed to evaluate the selected applications. The applicants will be notified of the composition of the committee and the final selection of a successful candidate will be made by INOQ GmbH based on the recommendations of the assessment committee and the interview committee.
The main criterion for selection will be the research potential of the applicant and the above mentioned skills.

Questions
For specific information about the PhD scholarship, please contact the principal supervisors Dr. Carolin Schneider schneider@inoq.de, Phone: +49 5842 981672 and Eva Lucic lucic@inoq.de

General information about BestPass can be obtained at http://plen.ku.dk/english/research/microbial-ecology-and-biotechnology/microbial-interactions/endophytic-fungal-interactions/ or by contacting Project Coordinator, David Collinge Professor David B. Collinge, Department of Plant and Environmental Sciences, University of Copenhagen, dbc@plen.ku.dk, Phone: +45 35 33 33 56