Transnational Access Report

1. General Information

Project Acronym (ID):	EXTRAroot
Project Title	Possibility of seedling to mature root extrapolation in legume root systems
Installation used	SCREEN Root SP phenotyping platform
Name of Group Leader	Dr. Boris Rewald
Name of organization	Department of Forest and Soil Sciences, University of National Resources and Life Sciences, Vienna (BOKU), Austria

2. Duration of access

Duration of the access refers to the use of the installation only and does not include the preparation of the experiment or data analysis.

Begin of the project First day the installation was used	End of the project Last day the installation was used
03.11.2014	24.01.2015

3. Project summary (max. 250 words)

The project tested the possibility of extrapolating information for small seedling roots towards mature root systems in legumes and allowed for an increased collaboration between the recent EU FP7 projects in Legume breeding and utilization EUROLEGUME, where BOKU is participating, and LEGATO, on which Jülich is a partner institution.

There are increasing efforts to gather information on root phenology. A main problem of high-throughput root phenotyping with small seedlings is extrapolation to field grown plants (Wasson et al., 2012). Two main constrains are (i) young plants with an incompletely developed root system are used, and (ii) plants are growing in non-soil media (gel, filter paper). Although recent advances have been made (e.g. Miguel et al., 2013), studies evaluating the possibility of extrapolating mature root system traits from seedlings are still rare for different species/large sets of genotypes-especially in an European agricultural context.

Based on a set of pea, cowpea and faba bean genotypes from different European countries we will analyze the main distinctive seedling root traits in the SCREEN Root SP phenotyping platform and compare them with root traits of mature plant grown in large, sand-filled columns. We hypothesize that for dicot species it is possible to infer the main properties of mature root systems from seedling roots.

We will (i) evaluate if seedling root architecture allows prediction of deep vs. shallow root growth, and (ii) if seedling root information is sufficient to parameterize root architecture models and reproduce the main morphological features of mature root systems.

4. Main achievements (max. 250 words)

Seedlings root system of 44 legume genotypes were screened:
Important root traits for modeling were measured, total root length, lateral root length, primary root length, their distribution in different depths and lateral root angle. The modelling process is still undergoing regardless some barriers like loss of root diameter through manually tracing root images, possible artifacts by manually inserting root into agar and agar cracking. The modelling will be done and how mature plant root system architecture can be extrapolated to seeding's in a few months.