

Transnational Access Report

1. General Information

Project Acronym (ID):	Pearl
Project Title	Characterization of pearl millet root architecture
Installation used	MicroCT & RootTrace (UNOTT
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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
October 20, 2013	November 30, 2013

3. Project summary (max. 250 words)

Pearl Millet is one of the major cereal crops for food and forage production in arid and semi-arid areas such as sub-Saharan Africa. It can grow in marginal soils and under precipitation ranging from 200-800 mm/year where other crops such as maize or sorghum would fail. It therefore plays an important role for food security in large part of the World. Root system architecture in particular determines water and nutrient uptake, as roots respond to biotic and abiotic factors to optimize their growth. Very little is known about the genetic factors controlling pearl millet root architecture and its response to environmental factors.

The first objective of the PEARL project was to analyse pearl millet root architecture diversity using state-of-the-art phenotyping facilities at the University of Nottingham. A collection of 90 inbred lines of pearl millet has been generated and genetically characterized in our institute (Saidou et al., Genetic, 2009). We selected a subset of 23 lines that cover a large genetic diversity (Fig 1) for this first phenotyping experiment.

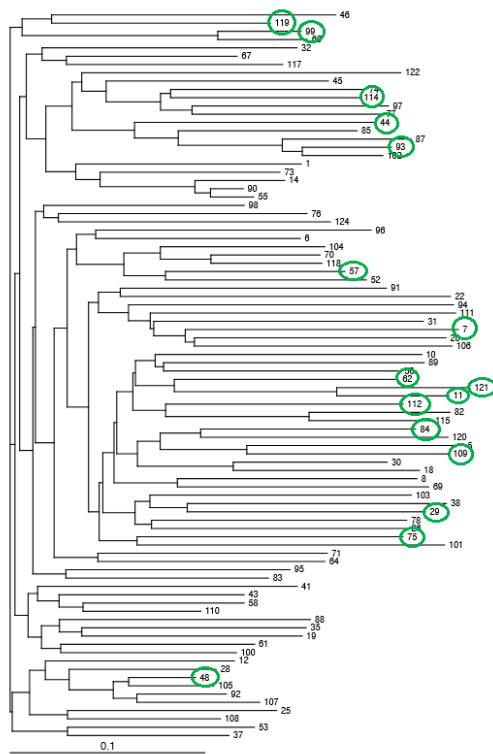


Figure 1: Neighbour-joining tree of the inbred lines available at IRD (adapted from Saidou et al, 2008). The lines used for root phenotyping are indicated by green circles (16 lines with a high number of plants analysed out of the 23 initially selected).

5. Main achievements (max. 250 words)

In conclusion, this first phenotyping experiment demonstrated that we can use the RootTrace platform to analyse early root development in pearl millet. Using this system, we were able to detect a significant diversity in a subset of pearl millet inbred lines. This work therefore served as a proof of concept and will form the basis of a genetic study to identify loci associated with interesting early root development traits. We are in particular very interested in early seminal root growth as it is a very important agronomical trait in Sahel for the young plants to settle in conditions of early drought stress. We are currently collecting new inbred lines from different partners (ICRISAT, ISRA) to obtain a larger collection of lines to conduct a genome wide association study (GWAS). We therefore plan in the near future to run another phenotyping experiment at the RootTrace facility on less plants/line (about 10) and more lines (about 120) for GWAS. Most of these lines have already been genotyped by GBS. We obtained funding from the Agropolis and Cariplo foundations to genotype the remaining lines by sequencing (GBS).