Transnational Access Report

1. General Information

Project Acronym (ID):	Bend it like Beckham2
Project Title	Characterization of the gravitropic bending response of *Arabidopsis thaliana* roots
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2. Duration of access

Begin of the project First day the installation was used	End of the project Last day the installation was used
1st of February 2013 11th of February 2013	21st of March 2013 1st of March 2013

3. Project summary (max. 250 words)

My PhD research focuses on the identification and characterization of genes involved in root gravitropism in *Arabidopsis thaliana*. Root gravitropism is hypothesized to result from higher auxin concentrations accumulating at the lower side of the root. We recently validated this prediction using a novel auxin sensor (DII-VENUS) in combination with a mathematical model that quantifies auxin concentration, revealing that auxin asymmetry between the lower and upper side of a gravistimulated root develops 1-2 minutes after the gravity stimulus. It was shown before that the Auxin Response Factor pair ARF7/ARF19 plays a critical role in auxin-dependent root gravitropism. To understand how growth can be reoriented upon gravistimulation, a microarray analysis was performed to profile the global expression profile in the meristem and elongation zone of wild-type and the agravitropic *arf7arf19* double mutant upon gravistimulation. This was done to compare their two transcriptomes across seven time points after a gravity stimulus. 800 genes were found to be differentially expressed in *arf7arf19* relative to the wild-type. To perform a reverse genetics approach their respective T-DNA insertion lines were ordered, genotyped and their root bending response was studied. These phenotypic screens identified 30 T-DNA insertion lines that showed agravitropic phenotypes between the 1st and 10th hour after a gravity stimulus. The aim of my project is to find out how roots bend upon a gravitropic stimulus, which genes play an important role in this and how these achieve this.

5. Main achievements (max. 250 words)

The image analysis in the light and in the dark allowed the identification of agravitropic phenotypes and identified five T-DNA insertion lines corresponding to five different genes. According to the root behavior in the light/dark, three groups were formed that all showed a reduced gravitropic response. Firstly, mutant lines with an altered gravitropic response irrespective of light (a leucine-rich repeat receptor-like kinase and an aspartyl protease). Secondly, mutant lines only defective in their gravitropic response (a bHLH transcription factor and a calcium-dependent protein kinase). Thirdly, a mutant line only defective in the phototropic response (a GSDL-lipase). As expected, other independent T-DNA insertion lines for these five genes showed the same subtle phenotype strongly suggesting that the root behavior is due to the gene mutation. The use of the robotised imaging setup coupled to RootTrace allowed me to gather and analyse a huge amount of data in the form of digital images.