Transnational Access Report

1. General Information

Project Acronym (ID):	RICEROOT
Project Title	Below-ground aspects of rice abiotic stress resistance
Installation used	UNOTT MicroCT, University of Nottingham
Name of Group Leader	Prof. Harro Bouwmeester
Name of organization	Laboratory of Plant Physiology, Wageningen University

2. Project summary (max. 250 words)

Abiotic stresses, such as drought, are primary causes of reduced yield in rice. One of the mechanisms that plants use to cope with drought is a change in their root structure architecture (RSA), which was recently shown to be also mediated by the novel plant hormone, strigolactones (SLs), in addition to other hormones. The SLs are also rhizosphere signalling molecules and stimulate the growth of arbuscular mycorrhizal (AM) fungi which provide plants with nutrients and water. With this experiment, we propose to answer the following research questions:

- What is the genotypic variation in the adaptation of rice RSA to drought
- How do AM fungi affect rice RSA and plant fitness under drought

We will compare the output of this study with SLs measurements coming from the same rice lines.

3. Description of work (max. 250 words)

In our lab we have a panel of rice varieties which will be used in this experiment. All these lines have been evaluated for SL production, drought tolerance, ABA production under drought and AM colonisation (or will be). In the proposed experiment, we will assess the root architecture under drought stress and control conditions, and under inoculation with mycorrhizal fungi for two of these genotypes. The treatment will be: mild drought (50-60% of field capacity), inoculation with AMF *Rhizophagus irregularis* (1000 spores/plant) and control conditions (half-strength Hoagland's nutrient solution and field capacity water regime). Three replicates per line/treatment will be sown in 10 cm columns, filled with loamy sand soil, and the replicates will be sown with one day difference, to keep them at the same phenological stage when measured. We assume that for this sample size, one scan can be performed in 1 hour with a 20 µm voxel resolution (see Tracy S.R. *et al*, 2012), which means 8 scans in one day are feasible.
During the growing period, we will analyse RSA in 3 time points for the following parameters: lateral root number, lateral root length (LRL), maximum root length (MRL), adventitious root number (ARN), root branching, total root volume and total surface area. The impact of drought and AMF on RSA and the interaction with SLs will be analysed.

4. Main achievements (max. 250 words)

From our results we observed that both rice genotypes (Rice1 and Rice2) differed on their root width and number of crown roots, under control conditions and under drought stress, 14 days after sowing (Fig.1). We also found an effect of AMF inoculation on the root width and number of crown roots, especially in one of the genotypes (Rice1) (Fig.1). Even the differences are not statically significant, we do see a trend. We did not find differences regarding to other traits such as root area, volume, convex hull or root depth.

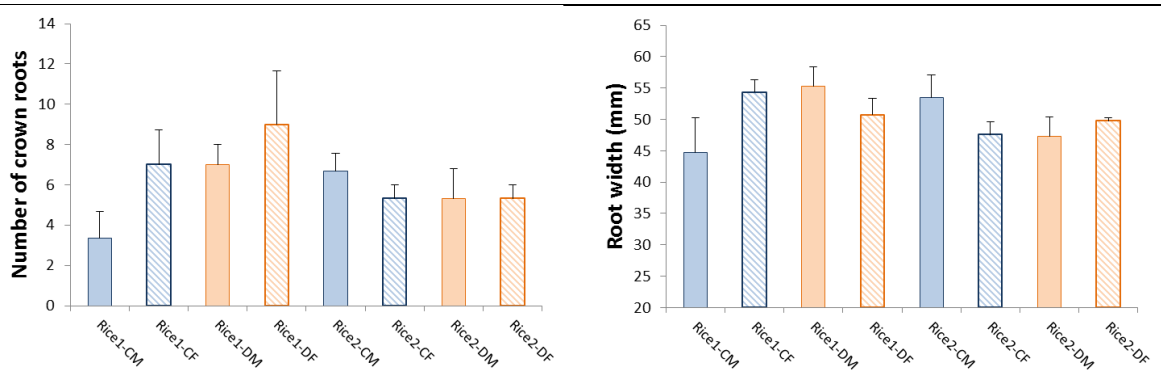

Fig.1. Number of crown roots (left) and root width (right) measure in 14 days old plants. Blue bars: control conditions; orange bars: drought conditions; fill bars: mock conditions; stripped bars: AMF inoculated. We compared two rice genotypes: Rice1 and Rice2.

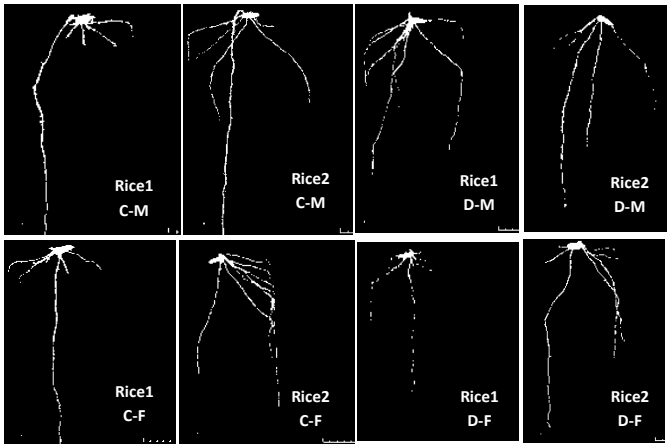

Fig.2. Images reconstruction from the different genotypes and treatments. C: control; D: drought; M: mock; F: AMF.

8. Publications related to the access granted, acknowledging the support by EC.

We are working on the data and they will be included in a manuscript together with other results coming from related experiments.