

Project Title: Identifying nutrient-status dependent elements regulating the wheat transcriptional response to neighbours

Report Title: Update on investigation of wheat roots transcriptional response to neighbour

Summary

Blackgrass is a major weed in the UK that can significantly affect winter wheat production. Our work has previously shown that in the presence of a neighbour, including blackgrass, wheat lateral roots tended to be shorter than when wheat plants were grown alone. To gain a better understanding of the wheat response to the presence of neighbour we decided to use a broad approach of the transcriptional changes. The aim of the project was to use RNAseq to investigate the transcriptional response to the presence of a neighbour, in wheat lateral roots. We have so far conducted the experiments, extracted RNA from some samples, and samples for all replicates will be sent for sequencing soon.

Report and outcomes

We have conducted the experiments where wheat plants (from the variety Hereward, known to be susceptible to blackgrass in the field) were grown in the presence of blackgrass in a gel-based sterile system that is supplemented with high or low nutrient media (as described in Finch et al. 2017, PLoS ONE 12(5): e0178176). The seeds used here were collected from the field, and despite following standard surface sterilisation procedures, some contamination did occur. Experiments were repeated to obtain the sufficient number of replicates. Whole roots were pulled out from the gel media without damage, and placed in RNA later, thus allowing to preservation and protection of RNA without the need for freezing the tissue straight away. Root systems were scanned using a flat-bed scanner, and images will be analysed for changes in root system architecture. Subsequently, lateral roots were excised and separated from seminal roots. These were then frozen until further used. An initial RNA extraction was conducted using the RNeasy Plant mini-kit (Qiagen) and showed that our procedure could allow for the isolation of sufficient amount of good quality RNA for RNAseq analysis. We are still in the process of obtaining all replicates RNA samples before sending these for sequencing.

Expenditure

So, far funds have been spent in purchasing kit for RNA extraction (£99.95) and DNase treatment (£44.95). The bulk of the fund will be spent on sequencing, and we have obtained quote from Novogene that can provide sequencing for slightly cheaper while offering a shorter turnaround time.

Follow on Plans

As we are still in the process of conducting the experiments and analysis for our original proposal, we have not planned for follow-on work yet.

Changes to team

There has been no change on the team.