



BioISI - Biosystems & Integrative Sciences Institute

Plant Growth Promoting Rhizobacteria for enhancing cork oak sustainability

Place of work/: University of Minho (BioISI pole)

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Abstract / MSc thesis project proposal

Cork oak (*Quercus suber* L.) is a Mediterranean forest tree species with great socio-economic importance. Portugal has the largest worldwide area of cork oak forest (50%), being also the leading producer (52%) and processor of cork. Drought and high temperature are factors that dramatically decrease cork oak productivity. The use of beneficial plant-microbe associations, such as those involving plant growth-promoting bacteria (PGPR), may allow better development of plants in adverse environmental conditions. The main aim of this project is the selection of PGPR with high potential for mitigating the adverse effects of drought on cork oak. A collection of PGPR from cork oak forest soils had been previously isolated and characterized regarding their biochemical features. In this work, *in vitro* most promising PGPR will be validated for their potential on promoting cork oak development under harsh conditions in greenhouse assays. The impact of PGPR inoculation on rhizosphere microbial communities will be also studied by using metabarcoding approaches. With this work we intent to find the best bacterial consortia that promotes cork oak development and recruits the most useful microbes to the rhizosphere.

Thesis plan:

- 1 – Three-months-old cork oak plantlets will be inoculated with different consortia of PGPR under greenhouse conditions;
- 2 – Cork oak plantlets biometric and physiological data will be determined along time;
- 3 – Soil samples (including rhizospheric and rhizoplane soil samples) will be collected for extracting DNA, which will be sent for sequencing services (Illumina MiSeq, 2 x 250).
- 4 - Raw Illumina files will be processed using already optimized bioinformatics tools.
- 5 - Microbial composition and diversity between samples will be compared, combining the information on richness and relative abundance in different ways.