Impact of bacterial inoculation of *Quercus suber* on mycorrhization by *Suillus* species at early stages of tree development

Session: Plant response and adaptation to abiotic stress

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Portugal accounts for approximately 50% of the world cork production. *Quercus suber* is the second most abundant tree in Continental Portugal, covering currently 737 thousand hectares and representing 23% of the forest area. This species is of paramount importance to the country both ecologically and economically. As many other forest species, *Q. suber* forms symbiotic associations with ectomycorrhizal (ECM) fungi with the hyphae acting as fine extensions of the plant root system allowing it to capture water and nutrients in exchange for photosynthetic carbohydrates. The use of bacteria as inoculum also has great potential in forestry, whether through their capability to act as plant growth promoters (PGPB) or/and as mycohhizal helper bacteria (MHB). The latter have a direct impact in promoting fungal symbiosis and could possibly represent the third link in the mycorrhizal partnership. However, the association between all vertices of the triangle (plant-fungi-bacteria) is highly specific and needs to be further explored when aiming at the use of microbial inocula in the tuning of mycorrhization at nursery stage. The aim of this work was to study the impact of inoculating *Q. suber* with a fungus belonging to the genus *Suillus* and a bacterial strain belonging to the genus *Mesorhizobium*, proven to be PGPB in preliminary studies. The experiment was conducted in a forest nursery in Amarante. After 9 months, the impact of inoculating with each microorganism individually was compared to that of the use of the combined inoculum. Biometric parameters were determined (shoot height, primary and secondary root length, shoot and root dry weight) and mycorrhizal parameters were assessed (percentage of ECM colonisation and expansion rate). The presence of selected phytohormones was also determined by HPLC. Overall, inoculated plants had a superior performance than the non-inoculated controls, in the majority of the parameters studied. The use of the combined inoculum was more successful than any other treatment in promoting shoot height and led to the highest concentration of indoleacetic acid (IAA). The results obtained suggest that the use of bacteria in the mycorrhization of *Q. suber* may positively affect plant in its early stage of development.

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