Introduction: *Quercus suber* (cork oak) is an autochthone forest species distributed throughout the occidental Mediterranean region which deliver important ecosystem services and is also a source of huge revenue for Portugal, given the fact that our country is the major cork oak producer in the world. Cork oaks are frequently subjected to periods of water deficit during its critical growing season caused by seasonal drought which is becoming more extreme due to climate change; in fact, the global warming scenario is expected to worsen the conditions in the Mediterranean area, leading to the increase of desertification by drought and heat-related tree mortality and impacting negatively the seedling survival for afforestation and restoration of this ecosystem. Ectomycorrhizal fungi (EcM) are critically important to host plants under harsh environmental conditions by conferring several benefits such as drought tolerance, increased water and nutrient uptake capacity, growth promotion, biomass production, resistance to pathogens and enhanced photosynthetic capacity. Given these benefits the EcM have been used to efficiently enhance the tree health, growth, and resilience to biotic and abiotic stresses. The inoculation of *Q. suber* in nursery context usually results in the production of vigorous plants, but the persistence of its vigor in field is critical in the present climate change scenario.

Aim: The aim of this study was to inoculate plants with EcM fungi in nursery context and follow its development after transplantation to the field, over several years, to understand the role and importance of the inoculation.

Methods: *Q. suber* seedlings were inoculated with two types of inocula: a combination of the EcM fungus *Suillus granulatus* and the plant growth-promoting bacteria *Mezorhizobium* sp. And a commercial inoculum of EcM fungi spores. A non-inoculated control group was established as well. After transplantation to field, the biometric parameters such as height and diameter were measured over the years.

Results and Discussion: The inoculated plants before the transplantation to the field presented a bigger height and diameter compared to the non-inoculated controls. Two and four years after transplantation to the field, the inoculated plants, mainly the ones inoculate with the *S. granulatus* + *Mezorhizobium* sp., maintained a better performance in terms of biometric parameters, suggesting that the inoculation contributed to the protection of plants from post-planting stress, allowing the plants to grow easier during the first years of plantation, which for *Q. suber* are the most critical.

Conclusion: The benefits of EcM have been reported over the years in several contexts and in the present climate change scenario it seems that its role is gaining more importance. Developing sustainable and efficient strategies to improve the performance of trees is of utmost importance and the EcM inoculation during nursery can provide protection to the plants prior to its contact with the adverse conditions of the field.

Future work: There is a need to improve the efficiency of the EcM inocula and spores proved to be more resistant than mycelium, becoming preferable to be used in the field. However, sometimes the timing of inoculation differs from the availability of fruit-bodies of important fungi so strategies to preserve the spores' viability and induce its activity must be developed.