

Title

Management of nursery practices for efficient ectomycorrhizal fungi application in the production of *Quercus ilex*

Authors

Rui S. Oliveira ¹, Albina R. Franco ¹, Miroslav Vosátka ², Paula M. L. Castro ¹

Affiliations

¹ CBQF/Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Rua Dr. António Bernardino de Almeida, 4200-072 Porto, Portugal

² Research Centre of Bioindication and Revitalisation, Institute of Botany, Academy of Sciences of the Czech Republic, 252 43 Pruhonice, Czech Republic

Abstract

The application of ectomycorrhizal (ECM) fungi on forest nursery production is regarded as part of good management practice. However, before employing large scale inoculations in a nursery the interaction between ECM symbionts, growth substrate and fertilisation input should be studied to select the most suitable nursery practices for promoting plant growth and ECM colonisation. In this study, seedlings of *Quercus ilex* were inoculated with *Paxillus involutus*, *Hebeloma mesophaeum* or *Cenococcum geophilum* and grown in three different substrates commonly used in forest nurseries: peat-based compost, forest soil or composted pine bark. The effect of various fertilisation regimes was also studied. The choice of substrate had a significant effect on

plant growth and ECM colonisation. The most appropriate combination of substrate and ECM fungus for *Q. ilex* growth and nutrition was peat and *H. mesophaeum*. Plants grown on a peat-based compost and inoculated with *H. mesophaeum* had a significantly greater biomass and leaf phosphorus concentration without fertilisation. Composted pine bark was found not to be suitable for growth or for mycorrhization. If the appropriate growth substrate is selected, it is possible to replace the use of chemical fertilisers by inoculation with selected ECM fungi. This results in a significant increase in plant development, and thus ECM fungi can be recommended as a more environmental friendly biotechnological approach to plant management in the nursery.

This work was supported by the FCT Project PTDC-AGR-CFL-111583-2009. The authors wish to thank Fundação para a Ciência e a Tecnologia, POCI 2010 and FSE, Grant SFRH/BPD/23749/2005.