

Effect of fungal colonization on mechanical performance of cork

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Abstract

The industrialization of traditional processes relies on the scientific ability to understand the empirical evidence associated with traditional knowledge. Cork manufacturing includes one operation known as stabilization, where humid cork slabs are extensively colonized by fungi. The implications of fungal growth on the chemical quality of cork through the analysis of putative fungal metabolites have already been investigated. However, the effect of fungal growth on the mechanical properties of cork remains unexplored. This study investigated the effect of cork colonization on the integrity of the cork cell walls and their mechanical performance. Fungal colonization of cork by *Chrysonilia sitophila*, *Mucor plumbeus*, *Penicillium glabrum*, *P. olsonii*, and *Trichoderma longibrachiatum* was investigated by microscopy. Growth occurred primarily on the surface of the cork pieces, but mycelium extended deeper into the cork layers, mostly via lenticular channels and by hyphal penetration of the cork cell wall.

In this first report on cork decay in which specific correlation between fungal colonization and mechanical properties of the cork has been investigated, all colonizing fungi except *C. sitophila*, reduced cork strength, markedly altering its viscoelastic behaviour and reducing its Young's modulus.

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