

# PHENOLOXIDASE ACTIVITY OF MICROSCOPIC FUNGI FOUND IN OLD-GROWTH FORESTS: DIVERSITY AND LIGNIN DEGRADATION POTENTIAL

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Lignin is natural aromatic heteropolymer that is difficult to degrade due to its complex structure. The main sources of lignin as a by-product include pulp and paper production, agriculture and biorefineries. In these areas, physical and chemical methods are generally used to remove it. However, these approaches are costly, energy-intensive and environmentally harmful due to the formation of toxic products. An alternative method for lignin degradation is biological processes carried out by microorganisms that produce lignin oxidizing enzymes known as phenoloxidases.

Despite the ecological significance of lignin degradation, the diversity and characteristics of microscopic fungi in Punios Šilas Strict Nature Reserve and Plokštinė Strict Nature Reserve have not yet been studied. To fill this gap, we investigated the phenoloxidase activity of fungi colonizing four tree species – *Pinus sylvestris*, *Picea abies*, *Betula pendula*, *Quercus robur* – in two old forests of Lithuania.

In the summer of 2023, a total of 311 fungal cultures were obtained from the wood of two coniferous and two deciduous tree species. After dividing the isolates into 84 morphological groups, their phenoloxidase activity was determined [1]. According to the enzymatic activity index, the isolates were divided into strong, medium and weak activity groups [2]. It was also found that 0.2 % gallic acid had different effects on fungal growth. In some cases, it promoted growth, while in others it inhibited it or had no significant effect. These results contribute to a better understanding of fungal diversity and their possible role in lignin degradation in the protected forest ecosystems of Lithuania.

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[2] Saroj P., Manasa P., Korrapati N., 2018. Characterization of thermophilic fungi producing extracellular lignocellulolytic enzymes for lignocellulosic hydrolysis under solid-state fermentation. *Bioresources and bioprocessing*, 5 (1): 1-14. <https://doi.org/10.1186/s40643-018-0216-6>