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Poster 12

Biotechnological Sustainable Production of Killer Yeast Toxins for Cultural Heritage Safeguard

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The issue of biodeterioration in the preservation of Cultural Heritage has gained significant attention, underscoring the necessity for novel approaches and advancements in this field. To tackle this issue, there is a pressing demand for innovative solutions. While synthetic polymers are frequently employed to combat biodeterioration in heritage items, they exhibit drawbacks such as high toxicity, short-lived effectiveness, and the rapid development of resistance among various microorganisms to these substances [1]. Instead of using conventional products, biotechnological methods have emerged as an alternative to produce environmentally friendly biocides. These biocides are composed of bioactive compounds synthesized by microorganisms as a natural defense mechanism, often referred to as "killer toxins." Once these killer toxins are produced and purified, they can be employed to regulate the growth of microorganisms in heritage assets. The goal is to provide more efficient and sustainable alternatives that are safe for both human health and the environment, without causing any detrimental effects on the assets themselves [2]. This study was carried out within the scope of the ART3*mis* Project (2022.07303.PTDC) with the aim of producing killer toxins from yeast strains and evaluating their antimicrobial activity against different species of microorganisms isolated from Cultural Heritage. The range of antimicrobial effects exhibited by the metabolites generated from specific killer yeast strains was assessed. This assessment was carried out in both solid and liquid growth media, targeting bacterial strains like *Methylobacterium extorquens, Gordonia alkanivorans, Microbacterium foliorum* and *Bacillus firmus*. Additionally, the antimicrobial activity of these metabolites was also tested in solid medium against biodeteriogenic fungi such as *Cladosporium* sp., *Penicillium* sp., *Aspergillus* sp., and *Fusarium* sp. The results obtained are encouraging in the development of new ecological biocides, which effectively suppress the biodeterioration caused by a wide range of microorganisms commonly found in various Cultural Heritage materials. These outcomes pave the way for the implementation of novel, green, safe, and sustainable solutions derived from fast and cost-effective biotechnological processes.

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