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Inhibitory Effect of Essential Oils on Growth and Physiological Activity of Deteriorated Fungal Species Isolated from Three Archeological Objects, Saqqara excavation, Egypt

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Abstract

The inhibitory effect of three essential oils (thyme, clove, and geranium) on the dry weight, enzymatic activities (amylase, cellulase, and protease), polysaccharides, and nitrogen contents, and citric acid productivity of three deteriorated fungal species (*Aspergillus niger* MH557084*, A. flavus* MH557083, and *Rhizopus oryzae* MH557082) which isolated and identified from archeological objects, in Saqqara excavation, Giza, Egypt were investigated. Thyme oil was the most efficient essential oil, which causes the maximum significant inhibition in all physiological processes of the three isolated fungal species followed by clove and geranium, where thyme oil significantly inhibited the growth and physiological processes of *Aspergillus niger* at 0.75 µl/ml, while *A. flavus* and *Rhizopus oryzae* were inhibited completely at 0.5 µl/ml. Application of the three essential oils on the difference in the color of the three artificial aging experimental models was carried out. The thyme oil has the most acceptable difference in color ($\Delta E < 3$) on the three tested experimental models accompanied with the highest antimicrobial activity, so it is a promising eco-friendly treatment for the preservation of archeological objects.

Keywords: Archeological objects, bacteria, fungi, essential oils, enzymes, microbial deterioration, microorganism, physiological process

Additional information

Disclosure statement

No potential conflict of interest was reported by the author(s).

Efficacy of Essential Oils on Fungi Isolated from Archaeological Objects in Saqqara Excavation, Egypt ›

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