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The Antifungal Activity of Essential Oils against some Species of Micromycetes, Isolated from the Air of the YSU History Museum

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ABSTRACT

High levels of air pollution by micromycetes can damage valuable works of art, museum exhibits, and cause various fungal diseases in humans. Currently, the study of the air mycobiota of various cultural centers and the search for effective, environmentally friendly biological control measures is very relevant. We studied the air mycobiota of the YSU History Museum, determined the degree of air pollution, and evaluated the antifungal activity of various essential oils against some opportunistic fungi. Studies of the air mycobiota were carried out with a PU-1B aspirator apparatus, which states the number of colony-forming units (CFU) in 1 m^3 of air. The antifungal activity of essential oils of mint (*Mentha piperata* L.) and clove (*Syzygium aromatum* L.) against microscopic fungi *Aspergillus niger, Cladosporium herbarum, Penicillium cyclopium* was assessed using the disk diffusion method. As a result of the studies, 22 species of micromycetes belonging to the Mucoromycota (1 species), Ascomycota (19), Basidiomycota (2) divisions were identified, most of which are opportunistic species and can cause allergic and fungal diseases. It was found that the air pollution level in the storage room (1392 CFU/m^3) and the corridor (604 CFU/m^3) exceeded the permissible limit (500 CFU/m^3). Clove essential oil showed the highest antifungal effect on the *Penicillium cyclopium* (inhibition zone diameter: 55 mm), and mint essential oil showed the highest antifungal effect on the *Cladosporium herbarum* (37 mm). The antifungal effect of clove essential oil against *Penicillium cyclopium*, *Cladosporium herbarum*, and *Aspergillus niger* was 3.5, 1.4, and 1.2 times higher, respectively, than that of mint essential oil. Thus, essential oils of *Mentha piperata* and *Syzygium aromatum* possessing antifungal activity and being safe for human health, can be used as natural methods for cleaning the air of various rooms.

Keywords: micromycetes, air pollution, antifungal activity, essential oils

References:

1. Tullio, V.; Roana, J.; Scalas, D.; Mandras, N. Evaluation of the Antifungal Activity of Mentha x piperita (Lamiaceae) of Pancalieri (Turin, Italy) Essential Oil and Its Synergistic Interaction with Azoles. *Molecules* **2019,** *24*, 3148. DOI:10.3390/molecules24173148
2. Borrego, S.; Molina, A.; Manso, Y.; López, L. Distribution and Diversity of the Fungal Pollution in Repositories of the Provincial Historical Archive of Villa Clara, Cuba. *J. Microbiol. Exp.* **2022,** *10*, 109–120. DOI:10.15406/jmen.2022.10.00360

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