

Elimination of Fungi Harmful to Human Health, Inhabiting Historic Fabrics, Using a New Technique of Fogging with Ethanol and Antibiotics (Benzylpenicillin and Streptomycin)

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Abstract:

Aim: Aim of the study was to assess the biocidal efficacy of a new decontamination technique of 90% ethanol with the addition of antibiotics (streptomycin and penicillin) applied in the form of a mist on the surface of textile materials from historical objects in the collections of the Auschwitz-Birkenau State Museum in Oświęcim, Poland (A-BSM).

Materials and method: Microorganisms used for the study *Alternaria alternata*, *Aspergillus niger*, *Aspergillus ochraceus*, *Aspergillus versicolor*, *Cladosporium cladosporoides*, *Chaetomium elatum*, *Mucor plumbeus*, *Penicillium chrysogenum*, *Aspergillus flavus* were isolated from the surfaces of textile objects in A-BSM. A strain from the American culture collection *Chaetomium globosum* ATCC 6205 was also used for the study. The fungi were inoculated on solid SDA medium. Incubated for 7 days at 25°C. Suspensions of mould spores were prepared in distilled water to obtain a density above 1×10^6 cfu/ml. Samples of model cotton fabrics and historical fabrics were inoculated with microorganisms at a concentration of 104 CFU/ml.

A mixture of antibiotics was prepared: 0.4056 g/100 ml benzylpenicillin and 0.0512 g/100 ml streptomycin. Antibiotics in 90% alcohol solutions for testing the killing effect were applied using a VE 0707 airbrush with a pressure of 0.2 MPa and a PA HEAD VLH-5 nozzle with a tip diameter of 1.05 mm. In order to obtain more effective disinfection after the application of ethanol mist, the samples were stored in PE foil at 21 ± 1 °C for 22 ± 1 h.

Result: The reduction of the number of microorganisms on modern cotton fabric and on historical fabric after the use of ethanol in the form of a mist of 90% ethanol with the addition of streptomycin and penicillin eliminated 100% of the tested 9 species of mold fungi and one species of fungus from the American Culture Collection (ATCC 6205).