ANTAGONISTIC EFFECTS OF FUNGAL AND ACTINOMYCETE STRAINS ON SELECTED PATHOGENS

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Background: Filamentous fungi and actinobacteria are valuable biotechnological resources that play a key role in the pharmaceutical industry as sources of antibiotics effective against pathogenic bacteria and fungi. Identifying microbial strains active against opportunistic pathogens, including *Candida albicans*, *Escherichia coli*, and *Salmonella*, is essential for developing new therapeutic strategies.
The aim of this study was to select new strains with antimicrobial potential against some opportunistic pathogens and pathogens.
Materials and methods: A screening of 24 *Penicillium* and *Trichoderma* strains of fungi and 7 strains of *Streptomyces* actinobacteria was performed. The strains of fungi and actinobacteria were tested against the opportunistic pathogenic fungi *Aspergillus fumigatus*, *Fusarium solani*, *Fusarium oxysporum*, the pathogen *Candida albicans* and the pathogenic bacteria *Escherichia coli*, *Salmonella* and *Enterococcus* spp. The tests were performed by the disk-diffusion method adopted by Egorov [1].
Results: The study results showed that, out of 24 fungal strains evaluated for activity against the opportunistic pathogens *A. fumigatus*, *F. oxysporum*, and *F. solani*, as well as the pathogen *C. albicans*, 2 strains were highlighted: *Penicillium* sp. 12 and *Penicillium* sp. 14. The inhibition zones against the opportunistic pathogens varied within the range of 22–32 mm, whereas against *C. albicans*, the inhibition zones were insignificant, measuring 14–15 mm. Against the pathogenic bacteria *E. coli*, *Salmonella*, and *Enterococcus* spp. (*E. faecium* and *E. faecalis*), none of the studied fungal strains showed antagonistic activity.
Among the 7 actinobacterial strains studied for their antifungal properties against the opportunistic fungi *F. solani*, *F. oxysporum*, and *A. fumigatus*, 2 strains were identified—*Streptomyces gougerotii* CNMN-Ac-14 and *Streptomyces fradiae* CNMN-Ac-11—with inhibition zones of 23–28 mm. The strain *S. fradiae* CNMN-Ac-11 also showed antagonism against *C. albicans*, with insignificant inhibition zones of 14–15 mm. None of the actinobacterial strains tested against the pathogens *E. coli*, *Salmonella*, and *Enterococcus* spp. (*E. faecium* and *E. faecalis*) showed antagonistic activity.
Conclusions: According to the obtained results, we can conclude that the strains: *Penicillium* sp. 12, *Pencillium* sp. 14, *S. gougerotii* CNMN-Ac-14 and *S. fradiae* CNMN-Ac-11 are promising for combating opportunistic pathogenic fungi such as *A. fumigatus*, *F. solani*, *F. oxysporum*, but cannot combat pathogenic bacteria.
Keywords: fungi, actinobacteria, antagonism, pathogens, inhibition zones.
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References:

1. Egorov, N. S. (2004). *Fundamentals of the study of antibiotics*. Moscow: Nauka Publishing House. 528 p. ISBN 5-02-033595-92