STUDY OF ANTIMICROBIAL ACTIVITY OF FUNGAL STRAINS FROM THE GENERA *PENICILLIUM* AND *TRICHODERMA* AGAINST CERTAIN PHYTOPATHOGENS

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Background: Fungi represent an essential source of bioactive compounds used in combating antimicrobial resistance, due to their ability to produce antibiotics and secondary metabolites with strong activity against pathogenic agents. In the face of growing drug resistance, the exploration of fungi from diverse environments, including extreme ones, is crucial for the discovery of new effective antimicrobial substances. In agriculture, fungi play an important role both in plant protection through the production of antifungal and antibacterial compounds and in improving soil fertility and stimulating crop growth.
The aim of the study was to evaluate the antimicrobial activity of fungal strains against phytopathogens in order to support sustainable plant protection strategies and reduce the use of chemical pesticides.
Material and methods: The study material consisted of 20 fungal strains belonging to the *Penicillium* and *Trichoderma* genera, previously isolated from Chisinau water reservoirs. To determine their antimicrobial properties, these strains were tested against eight plant pathogens: *Alternaria alternata*, *Botrytis cinerea*, *Fusarium solani*, *Fusarium oxysporum*, *Agrobacterium tumefaciens*, *Corynebacterium michiganensis*, *Erwinia carotovora*, and *Xanthomonas campestris*.
Results: The selected fungal strains exhibited pronounced antagonistic activity against the tested phytopathogens. The largest inhibition zones were recorded for *Penicillium* sp. strains 1, 2, 5, and 6, with values of up to 24–32 mm against *Alternaria alternata* and 18–30 mm against *Botrytis cinerea*, while *Trichoderma* strains showed inhibition zones of up to 35 mm against the phytopathogenic fungi *Alternaria alternata* and *Botrytis cinerea*. In the case of phytopathogenic bacteria, the activity was lower; however, some *Trichoderma* strains (such as *Trichoderma* sp. 7, 9, and 14) demonstrated inhibition zones of 15–22 mm against *Corynebacterium michiganensis* and *Erwinia carotovora*, while *Penicillium* strains showed inhibition of up to 20 mm against *Xanthomonas campestris*, confirming the potential of these microorganisms for use in biocontrol and plant protection.
Conclusions: Fungal strains from the genera *Penicillium* and *Trichoderma* demonstrated the ability to produce bioactive metabolites with significant antifungal and antibacterial effects. In particular, *Trichoderma* sp. 3 and *Trichoderma* sp. 14 exhibited the highest antimicrobial activity, with inhibition zones of 20–34 mm against phytopathogenic fungi and 15–20 mm against phytopathogenic bacteria. These results indicate the potential of these microorganisms to inhibit pathogen development and to be used as biological control agents in agriculture and biotechnology, as an eco-friendly alternative to chemical treatments.

Keywords: Fungi, antimicrobial activity, pathogens, biotechnology.

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