PROCEEDINGS OF ABSTRACS III. INTERNATIONAL BIOLOGICAL & LIFE SCIENCES CONGRESS BIOLIC 2025

16-19 NOVEMBER, 2025

Megasaray Westbeach Hotel, Antalya, Turkey

PROCEEDINGS OF ABSTRACS III. INTERNATIONAL BIOLOGICAL & LIFE SCIENCES CONGRESS BIOLIC 2025

16-19 NOVEMBER, 2025

Megasaray Westbeach Hotel, Antalya, Turkey

Organized by
Trakya University
International Researchers Association

ISBN #:
978-625-95132-7-0

ANTIFUNGAL POTENTIAL OF SOIL BACTERIAL ISOLATES FROM CLAY LOAM SOIL AGAINST FUSARIUM OXYSPORUM

Jelena Maksimović [1,], Marina Jovković [2], Aneta Buntić [3], Marina Dervišević Milenković [4], Jelena Pavlović [2], Mira Milinković [2] & Magdalena Knezevic [3]*

[1] Department of Soil and Water Protection and Management Institute of Soil Science, Serbia
[2] Department of Agrochemistry and Plant Nutrition Institute of Soil Science, Serbia
[3] Department of Microbiology Institute of Soil Science, Serbia
[4] Laboratory of Applied Entomology Institute of Pesticides and Environmental Protection, Serbia

jelena.maks@yahoo.com

ABSTRACT

Climate change and its associated environmental shifts have contributed to the increased prevalence and persistence of phytopathogenic fungi in agricultural ecosystems. The widespread use of chemical fungicides, while effective, poses risks to environmental and human health and often leads to the development of resistant fungal strains. As an eco-friendly alternative, native soil bacteria—particularly those adapted to specific local soil types, many of whose physical and chemical properties are influenced by soil texture—represent a promising source of biological control agents for plant protection. Among phytopathogenic fungi, Fusarium oxysporum stands out as a globally distributed species that infects a wide range of economically important crops, resulting in significant yield losses. In this study, we evaluated the potential of a specific soil type to serve as a reservoir of bacterial strains with antifungal activity against F. oxysporum. The soil sample was collected from the region of Čačak, Republic of Serbia. Physical analysis of the sample included particle size analysis, determination of textural class, particle density, and water content on a mass basis. Bacterial strains were isolated using a standard dilution plating method on nutrient agar. Antagonistic activity against F. oxysporum was assessed using the dual culture method: 20 µL of bacterial suspension was spotted onto PDA plates, followed by placement of a 5 mm fungal mycelial plug in the center. Plates were incubated for five days, after which fungal growth was measured and the percentage of growth inhibition calculated. The most efficient isolate was identified based on partial 16S rRNA gene sequencing using universal primers P0 (5′-GAGAGTTTGATCCTGGCTCAG-3′) and P6 (5′-CTACGGCTACCTTGTTACGA-3′), with sequencing services provided by Macrogen Europe. Of all isolates, 12% exhibited moderate antifungal activity, ranging between 10% and 32% fungal growth inhibition. The most effective isolate, BHC8.4, inhibited fungal growth by up to 90%. This isolate was genetically identified as Bacillus pseudomycoides. The results indicate that Clay loam soil, with a particle size distribution of 52.8% sand, 31.3% silt, and 15.9% clay, may represent a promising reservoir of bacterial strains with antifungal potential. Given that a considerable number of isolates displayed at least moderate activity, and one isolate demonstrated a high level of inhibition, soils of this texture class warrant further investigation as a potential source of novel biocontrol agents suitable for development into bio-based plant protection products.

Funding: This research was funded by the Ministry of Science, Technological Development and Innovations of the Republic of Serbia, contract Nos. 451-03-136/2025-03/200011, 451-03-136/2025-03/200214 and by the Science Fund of the Republic of Serbia, GRANT No. 10815,

The necessity of healthy crops: Development of a multifunctional bacterial inoculant for the biological protection of cereals - BioHealCrop.

Keywords: soil bacteria, antifungal activity, Fusarium oxysporum, Bacillus pseudomycoides, biocontrol, Clay loam, PGPR, 16S rRNA identification, sustainable agriculture