

IN VITRO SENSITIVITY OF MICROFUNGAL STRAINS TO GLYPHOSATE

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Background: Glyphosate (N-(phosphonomethyl)glycine, GP) is one of the most widely used herbicides globally. It inhibits 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS), a key enzyme of the shikimate pathway present in plants, algae, bacteria, fungi, and apicomplexan parasites. Disruption of this pathway blocks the biosynthesis of aromatic amino acids and essential secondary metabolites, which is lethal to target plants and may affect non-target microorganisms. Fungi are of particular interest in this context: sensitive species may experience growth inhibition, whereas tolerant strains can survive and utilize glyphosate as a nutrient source.

The aim of this study was to assess the *in vitro* sensitivity of 15 microfungus strains to glyphosate (50 and 100 mg/L) using an agar block assay.

Materials and methods: The strains, representing *Ascomycota*, *Basidiomycota*, and *Mucoromycota*, were isolated from plastic-contaminated soil and the external surfaces of saproxylic beetles and their larvae from the “Plaiul Fagului” Nature Reserve (Moldova). Fungal growth on control and GP-supplemented Czapek agar was evaluated by measuring colony diameters at days 3 and 7; sensitivity was quantified using the inhibitory activity index (IA, %).

Results: GP induced a wide range of responses, from growth stimulation (-8.00%) to strong inhibition (71.33%). *Peniophora cinerea* showed the highest sensitivity, with inhibition increasing from 40.0% (50 mg/L, 3 days) to 71.33% (100 mg/L, 7 days). *Alternaria tenuissima* demonstrated a consistent increase in inhibition from 29.08% to 42.61% under intensified exposure. *Penicillium citreonigrum* exhibited a hormetic-like response, with initial growth stimulation (-8.00%, 50 mg/L, 3 days) followed by inhibition at higher concentration and longer exposure (13.33%, 100 mg/L, 7 days). *Trichoderma* sp. 1 showed no inhibition under any tested conditions, whereas *T. harzianum* exhibited minor and variable responses (12.78% to 0.56%). *Fusarium* sp. 1 showed a decrease in inhibition over time at 100 mg/L (from 13.95% to 0%), suggesting potential adaptive responses. In several strains, inhibition increased after 7 days, indicating a time-dependent effect, and was generally higher at 100 mg/L.

Conclusions: Overall, the results reveal pronounced inter-strain variability in glyphosate susceptibility, with implications for microbial ecology and the selection of fungal strains for bioremediation of herbicide-contaminated environments. The observed hormetic and adaptive-like responses warrant further investigation.

Keywords: micromycetes, inhibitory activity, organophosphorus pesticide

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