MOLECULAR INSIGHTS INTO MYCOTOXIN PRODUCTION AND IMPLEMENTATION OF TECHNOLOGICAL APPROACHES FOR MYCOTOXIN DETECTION IN THE WORKPLACE

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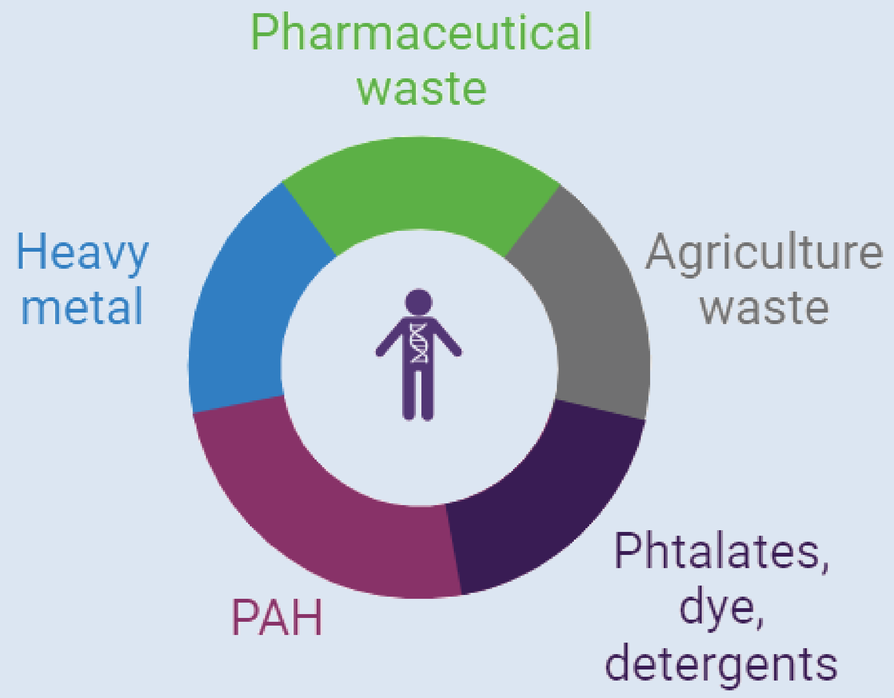
Nano 2023 Innovation Conference & Exhibition — Rome, 18-22 September

Here, we report a biotechnological research on bioremediation conducted to devise advanced strategies for degrading pollutants at contaminated sites. Among bioremediation procedures, mycoremediation based on the use of microfungal species markedly reducing pollutants is one of the most promising approaches. However, mycotoxin concentration associated with potential mycotoxigenic strains from contaminated soil and the correlations with environmental factors have not been established yet. Mycotoxins from contaminated soil are of great concern as they may adversely impact human health. In particular, mycotoxin levels in indigenous mycotoxigenic microfungal species during applications of mycoremediation might impact human health, at least occasionally. Little research has been reported on the appropriate limits (i.e., safety levels) and regulation of even the most common mycotoxins that pose a threat to human health in the workplace, which provides room for developing advanced and cost-effective technological approaches for mycotoxin detection.

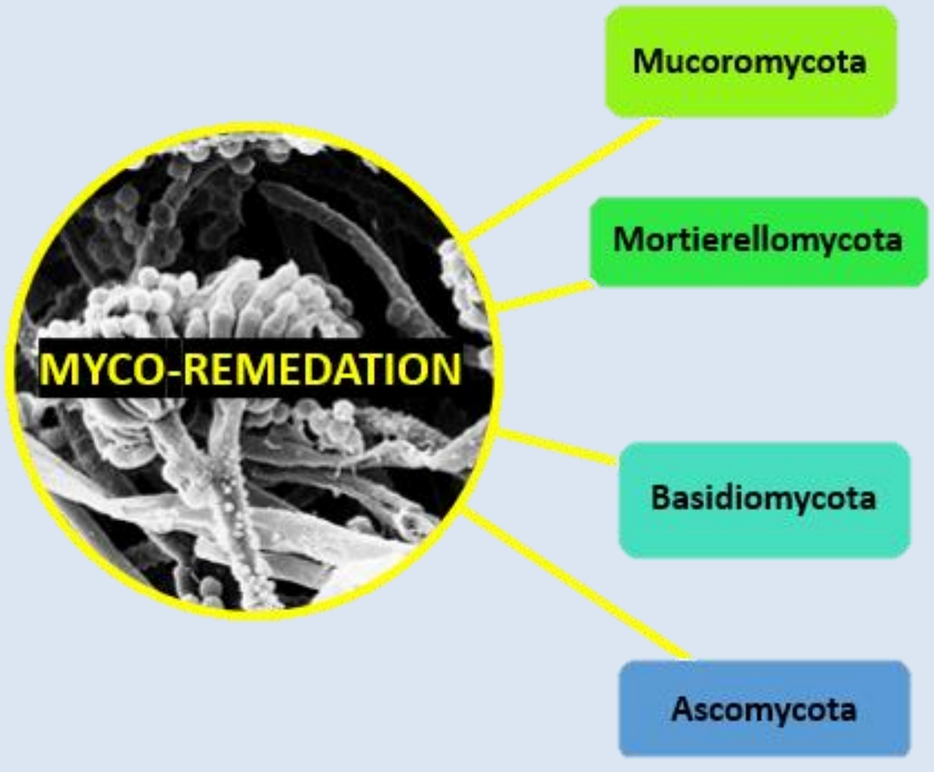
Problem:

A broad array of aquatic and terrestrial ecosystems suffer from pollution caused by human activities. The main pollutants in natural and man-made environments encompass compounds like acids, pesticides, polycyclic aromatic hydrocarbons (PAHs), plastics, dyes, and heavy metals [1]. These contaminants, often seen as foreign molecules by organisms, impact individual physiology, population dynamics, species interactions, productivity, and overall ecosystem functions, including organic and inorganic nutrient cycles [2].



Possible solutions:

- Pollutant treatment to remediation techniques that involve the removal and disposal of contaminated soil, as well as in situ and ex situ physical-chemical or thermal treatments: effective for high-concentration pollutants but require significant energy consumption or the use of large quantities of chemicals, with the risk of generating toxic byproducts .
- **Bioremediation techniques primarily utilize microorganisms and plants, harnessing their abilities to absorb, immobilize, or metabolize one or more pollutants, resulting in a more vital and functional soil after treatment [3].**



Our idea:

The aim of the present study is to review the molecular basis of mycotoxin production as well as the implementation of innovative and cost-effective nanotechnological approaches to test mycotoxin levels in the workplace.

1. **Classical analytical methods (e.g., HPLC) and nanotechnological approaches with the potential to demonstrate low, medium, and high risks of mycotoxin contamination associated with mycotoxigenic microfungal strains are compared.**
2. **Validation parameters such as precision, accuracy, limit of detection and limit of quantification are discussed.**
3. **Finally, the role of preventive measures and inactivation strategies that could minimize the formation of mycotoxins in soil are analyzed.**

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