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# Monitoring the impact of multi-stress contamination on an environmental opportunistic pathogen, *Stenotrophomonas maltophilia*: application to antibiotics and metals

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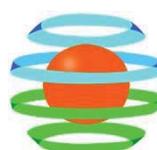
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# Monitoring the impact of multi-stress contamination on an environmental opportunistic pathogen, *Stenotrophomonas maltophilia*: application to antibiotics and metals

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## Abstract

*Stenotrophomonas maltophilia* is a ubiquitous bacterial species known to be a soil and rhizospheric inhabitant as well as a human opportunistic pathogen. Multi-drug resistant strains are frequently found in hospitals because of its ability to acquire resistance genes through horizontal gene transfer and its possession of efflux pumps. Recent data also showed the link between antibiotic resistance and metal resistance among both clinical and environmental strains. In this study, we evaluated over a 3 month study the impact of a cocktail of antibiotics (ciprofloxacin and sulfamethoxazole) and metals (Cu and Zn) on indigenous *S. maltophilia* in soil using an experimental design of soil columns exposed to manure containing various concentrations of the cocktail. In parallel, the toxicant adsorption, distribution, and migration in the soil matrix were measured to interpret the observed biological response. Data showed that regardless of the concentration of the cocktail i.e. from low (1X PEC) to high (40X PEC) doses, no changes in population abundance were observed after 7 and 100 days of exposure. Genetic diversity (REP-profile) analysis among more than 650 isolates showed that metals were the dominant stressors. Antibiotic resistance gene abundance (sulfonamide and quinolone) was unaltered and no resistance gene transfer was observed. Finally, no changes were observed on the phenotypic (antibiotic resistance) properties at low or high antibiotic doses. These data suggest the lack of a dose/response effect as well as the lack of synergic effects between metals and antibiotics on the genotypic and phenotypic evolution of *S. maltophilia* populations.

**Keywords:** Antibiotic resistance, human pathogen, bacteria, soil, multistress, dose/response

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