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

Armelle Crouzet, Géraldine Depret, Justine Thiot, David Lejon, Alain Hartmann, Lorenzo Spadini, Sabine Favre-Bonté, Sylvie Nazaret

EcotoxicoMic 2017

1st International Conference on Microbial Ecotoxicology

21st-24th November, 2017
Lyon, FRANCE

ecotoxicomic

The emerging Network of Microbial Ecotoxicology

Book of Abstracts

https://ecotoxicomic.sciencesconf.org

ecotoxicomic@sciencesconf.org

FONDATION ROVALTAIN
RECHERCHE EN ECO-TOXICOLOGIE
Pour un monde sans pollution

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

Armelle Crouzet*† , Géraldine Depret[1], Justine Thiot[2], David Lejon[2], Alain Hartmann[1], Lorenzo Spadini[3], Sabine Favre-Bonté[4], and Sylvie Nazaret[4]

[1]Agroécologie – Agrosup, Institut national de la recherche agronomique (INRA) : UMR1347, Université de Bourgogne – BP 86510, F-21000 Dijon, France

[2]Rovaltain Research Company – Rovaltain Research Company – France

[3]Institut des Géosciences de l'Environnement (IGE) – Institut de Recherche pour le Développement, Institut Polytechnique de Grenoble - Grenoble Institute of Technology, Centre National de la Recherche Scientifique, Université Grenoble Alpes – UGA - IGECS 4070038 058 Grenoble Cedex 9, France

[4]Ecologie Micorbienne – Universite Claude Bernard Lyon1, CNRS : UMR5564 – Campus de la Doua 43 Bd du 11 Novembre 1918 69622 Villeurbanne, France

Session MULTI-STRESS Talk

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

*Speaker

†Corresponding author: armellecrouzet@gmail.com