MICRO BIOTEC 17

CONGRESS OF MICROBIOLOGY AND BIOTECHNOLOGY 2017

7th - 9th DECEMBER 2017

PORTO, PORTUGAL

CONFERENCE PROGRAMME

SPM
Sociedade Portuguesa de Microbiologia

spbt
sociedade portuguesa de biotecnologia

CATÓLICA
ESCOLA SUPERIOR DE BIOTECNOLOGIA
PORTO

www.esb.ucp.pt

P-235 - EVALUATION OF THE IMPACT OF FERTILIZERS ON SOIL AND SOIL LEACHATES - CHEMICAL COMPOSITION AND MICROBIAL COMMUNITY ASSEMBLAGE

Carolina F.F.A. Costa[1]; Filipa V. Rocha[1]; Ana Machado[2,3]; Raquel B. R. Mesquita[1,2]; Adriano A. Bordalo[2,3]; António O. S. S. Rangel[1]

1 - Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquiteto Lobão Vital 172, 4200-374 Porto, Portugal; 2 - ICBAS/UP - Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto, R. Jorge Viterbo Ferreira 228, 4050-313 Porto, Portugal; 3 - CIIMAR/CIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, Av. General Norton de Matos, 4050-208 Matosinhos, Portugal

Background
The excessive use of fertilizers may have an important impact on surface and ground water quality, essentially due to run-off and leaching of nutrients and contaminants, with clear social and economic consequences and, ultimately affecting human health and wellbeing. The increase of nutrients availability in the soil, mail also affect their microbial assemblages. Field crops are traditionally burned in many parts of the World, but little is known how the procedure affects nutrients and microbes.

Method
Laboratory scale soil columns (LSSC) were set up to study the impact of commercial inorganic fertilizers in the chemical composition and on the microbial community present in unburnt and burnt soil, and respective soil leachates. Traditional culturable methods were used together with a molecular microbiology approach to evaluate the impact on the bacterial abundance and diversity. The structure and abundance of the bacterial community was evaluated by automated ribosomal intergenic spacer analysis (ARISA) and qPCR (*rpoB*) approaches. Furthermore, a sequential injection method, capable of real-time monitoring of the soil leaching processes was developed using spectrophotometric detection to attain a multiparametric determination of calcium, magnesium, and iron(III) content.

Results & Conclusions
The results demonstrate that the use of fire in agriculture initially reduces de number of soil bacteria (one order of magnitude), although the subsequent use of fertilizers can restore bacterial abundance to unburn soil levels. This increase can be consequence of the essential micronutrient (calcium and magnesium) amendment, that fostered a positive correlation ($p < 0.05$) with bacterial abundance in burned soil, after fertilizer application. As expected, since soil particles can act as bacterial reservoirs, the number of bacteria in soil leachates (10^2) was substantially smaller than in the soil itself (10^7). Moreover, the addition of fertilizers seems to have no impact on the microbial abundance present in the leachates. Cluster analysis of ARISA profiles revealed that soil burning changes the soil microbial composition, and that the use of fertilizers seems to be a driving force in the shape of the soil bacterial community succession. Also, the results showed that the bacterial isolates from soil and soil leachates are typically microorganisms present in the soil environment.

References & Acknowledgments
R.B.R. Mesquita thanks to Fundação para a Ciência e a Tecnologia (FCT) and POCH of FSE for the grants SFRH/BPD/112032/2015. The authors also thank the support from National Funds from FCT - Fundação para a Ciência e a Tecnologia, Portugal, through project PTDC/AAG-MAA/5887/2014 and scientific collaboration from FCT project UID/Multi/50016/2013 and UID/Multi/04423/2013.

Keywords: Agricultural soil, Soil leachates, Fertilizers impact, Microbial diversity, Chemical composition monitoring