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The genetic and functional diversity of bacterial community in soils contaminated with crude oil

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Soil contamination with crude oil, especially in the area of oil wells, is a serious environmental problem. Restoring the long – term pollution soil to its original state is very difficult. Under such conditions, the unique group of bacterial communities develops in the soil. This communities are adapted to the contamination conditions. Analysis of the structure and function of these microorganisms can be a source of valuable information. The aim of the study was to evaluate functional and structural diversity of bacterial communities in soils with long term impacts from crude oil. Samples were taken from four oil wells: one oldest and still working (W01, working from 1888) and three younger (W02, W03, W04, working from the beginning of 20th century) still working but with periodic breaks – these oil wells works only few months every years. Soil samples were collected at two distances: within a radius of 0.5 m of the oil wells (W01R, W02R, W03R, W04R) and within a radius of 3 m from the oil wells (W01, W02, W03, W04). The next generation sequencing technique (V3-V4 16S rRNA) was accompanied with the community level physiological profiling (CLPP) method in order to better understand knowledge of both genetic and functional structure of soils collected under several oil wells. The significant differences of bacterial community structure between soils were obtained. The soils taken directly from oil wells were characterized by different composition of bacteria. The highest activity of carbon utilization patterns were observed in soils taken directly from oil wells.

Recent Publications:

1. Gałązka A., Król M., Perzyński A. 2012. The Efficiency of Rhizosphere Bioremediation with *Azospirillum* sp. and *Pseudomonas stutzeri* in Soils Freshly Contaminated with PAHs and Diesel Fuel. Polish Journal of Environmental Studies Vol. 21, No. 2, 345-353.

2. Gałązka A., Gałązka R. 2015. Phytoremediation of polycyclic aromatic hydrocarbons in soils artificially polluted using plant-associated-endophytic bacteria and Dactylis glomerata as the bioremediation plant. Polish Journal of Microbiology, 64(3): 239-250.

3. Gałązka A., Grządziel J. The Molecular-Based Methods Used for Studying Bacterial Diversity in Soils Contaminated with PAHs (The Review). Soil Contamination - Current Consequences and Further Solutions. Edited by Marcelo L. Larramendy and Sonia Soloneski, ISBN 978-953-51-2816-8, Print ISBN 978-953-51-2815-1, 354 pages, Publisher: InTech, Chapters published December 21, 2016. http://dx.doi.org/10.5772/64772.

Biography

Anna Gałązka is a head of the Department of Agricultural Microbiology at IUNG (since 2013). She is specialized in the evaluation of microbial diversity of soils associated with agricultural practice and environmental protection (research in molecular biology; evaluation of genetic differentiation and identification of microorganisms and characterization of metabolic profile of bacteria and fungi). She is participating in international and several national projects in IUNG, coordinating research project on biological activity and determination of microbial diversity of soil. She was a task manager in Aiming Project „Developing New system of tillage for sustainable agriculture" WND-POIG. 01.03.01-00-042/09 (2010-2013) – Determination of biological activity in soils and executor in projects: N305 080 32/2776 Evaluation of usefulness of *Azospirillum* spp. and *Pseudomonas stutzeri* inoculum in increasing of phytoremediation; project CZ.3.22/1.2.00/12.03445, Risk and benefits of application of exogenous organic matter on soil. Operational programme of cross-border co-operation Czech Republic – Poland 2007-2013. She was training of „Genomic of Nitrogen-Fixation Organisms" in 2008, Ghent, Belgium and participated in numerous courses and trainings in the field of molecular biology and microbiology. She works with NJF Nordic Association of Agricultural Scientists (keynote speakers on Seminar (483) 22-25.09.2015 Vezaiciai, Lithuania "Application of soil biological and biochemical parameters as indicator of soil health and fertility as influenced by different agrotechnical practices"). Member of Polish Microbiological Society since 2004 and author over 50 publications.

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