

International Conference on

ENVIRONMENTAL MICROBIOLOGY AND MICROBIAL ECOLOGY

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International Conference on

ECOLOGY AND ECOSYSTEMS

September 18-20, 2017 Toronto, Canada

Immobilization of murine noroviruses in a cultivated phaeozem soil and its reversibilityVincent Tesson¹, Gael Belliot², Line Capowiez¹ and Pierre Renault¹¹INRA, France²University of Dijon, France

Wastewater reuse in irrigation may contaminate soils with human enteric viruses that can be internalized in plants via their roots. Experiments have shown that virus immobilization in soils varies with virus, soil and soil solution; results were mostly obtained at saturation and the reversibility of immobilization was not clearly assessed. Models generally use a partition coefficient, although colloid immobilization is often assumed kinetic and non-reversible. Our objectives were to explore other contexts, assess the reversibility of immobilization and the relevance of equilibrium or kinetic models. Columns of phaeozem soil aggregates were saturated with soil solutions optionally enriched with MgCl₂ or fulvic acids, under vacuum or air to affect air trapping. For immobilization, the solutions circulated at different temperatures between the columns and reservoirs contaminated with murine noroviruses. For remobilization, contaminated columns were stored between 0 and 6 days at some moistures and then rinsed by - virus-free - soil solutions, sterilized wastewater or underground water. Solutions were sampled in the reservoirs or at the column outlets; half aliquots were filtered at 0.45 µm. Viruses retained in soils were extracted. Immobilizations were also monitored on stirred soil suspensions. Viruses were quantified by RT-qPCR and cell culture. The relevancies of models combining flow and immobilization were evaluated. Except after MgCl₂ enrichment, the weak virus immobilization over 1 day - i.e. about 40% of the brought viruses - could be quantified only from remobilization experiments. When saturated conditions are kept for 6 additional days, most of viruses are progressively immobilized, only a few being remobilized later with virus free soil solution. Fulvic acids increase virus remobilization. By contrast, the partial drying of soil columns after the initial immobilization day increases the irreversibility of the immobilization. Models considering inter- and intra-aggregate pore spaces as well as reversible and irreversible virus immobilizations fitted to experiments.

Biography

Vincent Tesson has his expertise in the environmental fate of human enteric viruses. After working on the detections of equine and *Bovine coronavirus* by RT-qPCR and FTIR spectroscopy, respectively, he undertook a Ph.D on the environmental fate of human enteric viruses by analyzing their fate after wastewater discharge in river or reuse in agricultural irrigation. He has completed a work on the fate of viruses in the soil that contributes to a project on green onion contamination. He is currently working on the simulation of virus discharge in rivers from regional acute gastroenteritis epidemiological data.

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