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SOIL MICROSTRUCTURE AND ADDED ORGANIC MATTER: KEYS FOR CHLORDECONE SEQUESTRATION

Fernandes Paula*[1], Magalie Jannoyer-Lesueur[1], Florence Clostre[1], Alain Soler[1], Thierry Woignier[2]

[1]CIRAD-PRAM ~ Persyst ~ Lamentin ~ Martinique [2]CNRS/IRD/PRAM ~ IMEP ~ Lamentin ~ Martinique

The former application of chlordecone, a persistent organochlorine pesticide used in French West Indies until 1993, results today in a diffuse pollution in agricultural soils, which are sources of contamination for cultivated roots, tubers, vegetables, terrestrial and marine ecosystems. Chlordecone is a very though and stable molecule, mainly present in solid phase and having a strong affinity with organic matters. To prevent consumers and ecosystems exposure, it is thus necessary to evaluate the factors that influence chlordecone migration in the environment. In previous studies, we showed that andosols (containing amorphous clays), even being more polluted than other kind of volcanic soils like nitisols or ferralsols, are surprisingly less contaminant for percolating water and crops. In this research, we study the impacts of clay microstructure of andosols on chlordecone retention. We show that allophane aggregates had a greater ability to trap chlordecone mainly due to their fractal structure. Their peculiar clay microstructure is thus an important characteristic governing the fate of chlordecone. The allophane tortuous structure and the associated low accessibility could explain the low lability of chlordecone confined in andosols. Thanks to the microstructure knowledge of the volcanic soils and the large affinity of chlordecone for organic matter we modify the soil to crop and soil to water transfer by the addition of organic matter. We show that compost addition modifies the fractal structure of allophane clays favouring the chlordecone retention. These results allow us to propose a new strategy in opposition to the complete soil decontamination: chlordecone sequestration.