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Some soil physical aspects target action of organic amendments in the pesticides stabilization in soil

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Chlordecone, insecticide intensively used in banana cropping systems in French Antilles, which it was restricted 30 years ago. Because it is suspected implied in the increasing incidence of prostate cancer and impaired development in children. However, chlordecone remains permanently in the soils and the environment. This means, that these soils, andosols, can be a potential reservoir of this pollutant toward other ecosystems and surrounding habitats, and so, it continues to contaminate crops, water resources and even it can reach all the food chain. The low biodegradability of chlordecone makes almost impossible a natural decontamination by leaching. Thus, a possible approach could be in taking advantage that this pesticide is tightly trapped in the soil and increase the sequestration for reducing so the bioavailability and diffusion into ecosystems. Bearing in mind that the soil organic matter plays a key role in the stabilization of pesticides in soil, thus, one chance could be the implementing of compost in soil as useful tool of chlordecone stabilization in these soils.

In view of the foregoing, the main aim was focused in analyse the compost effect added on soil physical characteristics (specially on soil microstructure) for knowing how it can slow down the chlordecone transfer from the soil matrix to other matrices (crops, water). This objective was performed in two goals: one of them, the chlordecone water leaching (CWL) and the other one, the chlordecone contamination in susceptible crops (CSC), which were radish, cucumber and lettuce. In laboratory conditions, we tested the treatment of polluted soils, characterized as andosol, with compost, at 5% of weight, that they were compared with un-treated soils (control soils). All soils (treated and non-treated) were incubated for periods ranging from 0 to 90 days. After two months, the chlordecone levels in different organs of the crops (CSC) grown in soils with compost were 3 to 10 times lower, on depending to the crop type, than those of the start of test. Moreover, CWL was 2 to 4 times less than before compost addition. This could be partly explained by an alteration of the pores characteristics in soils (specific surface area, volume and pore size distribution in soil). Further studies, in terms of fractal geometry demonstrated that clays collapse their microstructure. Therefore, the sequestrating effect of chlordecone in andosols seems a research target with future perspectives on resolving the competence mechanisms and affinity between the soil organic matter and the pesticides, which they appear to be governed by the pores size distribution (macro and micro) in the soil structure.

Key words: chlordecone, andosol, porosity, compost.
References: Woignier et al. 2012. European Journal of Soil Science. 63. 717-723.