

Sources of Cd in Cocoa crop Soils of Santander, Colombia

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Cacao is the second crop of production and export in Colombia. Starting January 2020, the European Union enforced a new regulation on the content of Cadmium (Cd) in cacao-derived products. This is of great concern for colombian producers since cacao in the area of Santander present high Cd levels¹ that would hindering export. The high content of Cd in these the grains of cacao is directly linked to high concentrations of Cd in soils².

In order to determine the origin of the Cd in soils we analized, 23 soils, 12 source rocks and 2 fertilizer (inorganic and organic) samples collected at differet farms in the study area using XRF. We also dtermined soil pH and organic matter and carbonate content all of which have been linked to Cd content in soils². Petrological analysis of rocks and soil was performed to determine the mineral origin of the metal. In all the soils, rocks and fertilizer samples, high levels of Cd were found. The great majority of them exceeded by far the limits stated by the international regulation.

The results relate the concentration of Cd in the soil mainly with the organic matter content, the addition of organic fertilizers, the primary Cd contents in rocks and the Ca content of soils. In order to reduce the concentration of Cd in the final product only low Cd concentration fertilizers should be used. Additionally, farmers use cocoa plant debry to fertilize the crops which recycles the Cd absorbed by the plant back to the soil and may explain the strong correlation observed between Cd levels and orgaic matter. In the future the project aims to identify other strategies in order to make Cd less available for the plant, like adding Mg or carbonates that can potentially sequester Cd reducing adsortion by the cacao plant.

[1] Bravo, D., Pardo-Díaz, S., Benavides-Erazo, J., Rengifo-Estrada, G., Braissant, O., & Leon-Moreno, C. (2018). *Journal of applied microbiology*, 124(5), 1175-1194.

[2] Engbersen, N., Gramlich, A., Lopez, M., Schwarz, G., Hattendorf, B., Gutierrez, O., & Schulin, R. (2019). *STOTEN*, 678, 660-670.