

CADMIUM ENRICHMENT IN COCOA BEANS – A STABLE ISOTOPE INVESTIGATION OF Cd SOURCES AND MITIGATION STRATEGIES

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The often high concentrations of toxic cadmium (Cd) in cocoa are a serious problem for cocoa producers in many developing nations, in particular because the European Union plans to enforce stricter upper limits for the Cd contents of cocoa products in 2019. This has spurred recent research into the causes of Cd enrichment in cocoa, which is particularly prevalent in Latin America. However, despite significant progress, it is still uncertain whether the observed Cd enrichments are primarily of natural origin and linked to soil characteristics or a consequence of anthropogenic processes, such as cultivation practices and fertilization.



This issue will be addressed by the current project. To this end, the research will involve coupled Cd concentration and stable isotope analyses of soil-cocoa systems for various localities in Ecuador, where cocoa beans with problematic Cd contents are harvested. In comparison to published work, which is focused on Cd concentrations only, the novel isotopic data will provide improved

constraints on whether high concentrations of plant-available Cd in soils are of natural or anthropogenic origin. As such, the project results will support on-going efforts to develop agricultural strategies that enable the sustainable production of cocoa beans with safe levels of Cd.

The research will be carried out in collaboration with scientists from the *Universidad Andina Simón Bolívar* in Quito and can involve fieldwork in Ecuador for sample collection. The sample processing and analyses that form the backbone of this project will be carried out in the *clean room and mass spectrometry facilities of the MAGIC Laboratories* at the Department of Earth Science & Engineering of Imperial College London (<http://www.imperial.ac.uk/earth-science/research/research-groups/magic/>).

The project is suitable for students with a background in geology, chemistry, biology, agronomy or equivalent experience. Further information on the planned research can be obtained directly from Mark Rehkämper at markrehk@imperial.ac.uk. Please don't hesitate to get in touch if you are interested.