

PhD open position

Identifying cadmium transport pathways and speciation in cacao (*Theobroma cacao* L) plant

RESEARCH FIELD: Environmental Sciences, Biogeochemistry

MAIN LABORATORY: [ISTerre](http://www.isterre.fr), University Grenoble Alpes, Grenoble, France

DESCRIPTION:

The accumulation of cadmium (Cd) in cocoa (*Theobroma cacao*) beans has recently become a subject of intense research, since European and WHO regulations will lower the threshold for Cd content in chocolate in 2019. About 30 to 50% of the production in South America exceeds this new limit, so there is an urgent need to find some strategies to decrease Cd content in cacao beans. This question is important both for socio-economic reasons and for human health, since some consumers may have a Cd intake close to the tolerable intake defined by the European Food Safety Agency.

Currently, the knowledge on the uptake of Cd in cacao trees and its transfer into grains is extremely limited. This project will address two questions:

1. What are the physiological pathways of Cd uptake, translocation and accumulation in the beans?
2. What is the influence of grafting in the processes of uptake and accumulation of Cd, and can this technique be used to limit Cd in the beans?

To answer to these questions, the PhD student will combine Cd stable isotope analyses and physical approaches (X-ray absorption spectroscopy (XAS) and spectromicroscopy). In task 1, we will study long term processes based on Cd isotopes at natural abundance, XAS on bulk samples and at the cellular scale. In task 2, we will study allocation on the short term using isotope tracing. Results will help to design some strategies to improve the cacao food quality by decreasing Cd content in grains, and thus to minimize the daily intake of Cd and its possible health impacts.

The project is highly pluridisciplinary. The PhD student will be based at ISTERre Grenoble, and be part of the Ecole doctorale TUE. He/she will be co-supervised by Erik Smolders (**Leuven University, Belgium**). He/she will also interact with Anne-Marie Aucour (**Univ Lyon 1 and ENS Lyon**) and Giulia Veronesi (**ESRF, European Synchrotron Radiation Facility, Grenoble**). He/she will participate to scientific missions to Trinidad and Ecuador, Leuven (Belgium) and Lyon, and to several experiments at the ESRF.

APPLICATIONS

Applicants must hold a Master's degree (or be about to earn one) or have a university degree equivalent to a European Master's (5-year duration). We are looking for a student with a solid background in environmental geochemistry and some knowledge in spectroscopic methods and plant physiology. He/she must have a very good level of English (some knowledge in Spanish is a plus), have done mobility during his/her university cursus, and be ready to do scientific missions in South America and Europe.

Applicants should sent to: Geraldine Sarret: Geraldine.sarret@univ-grenoble-alpes.fr

- A letter of motivation in English
- Their CV
- Their last diploma and the results of the first semester for the current year (Letters of recommendation are welcome).

Application deadline: May, 30, 2019

TYPE of CONTRACT: temporary-3 years of doctoral contract

Salary: between 1768.55 € and 2100 € brut per month (depending on complementary activity or not).