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## Sustainable Management of Coffee By-products and Determination of Emission Factors

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### Abstract

Agriculture is the fourth largest contributor to global greenhouse gas (GHG) emissions, which include non-CO<sub>2</sub> gases, including CH<sub>4</sub>. In the coffee sector, one important criteria to consider in future assessment options is to understand the formation and determination of GHG emissions that contribute to climate change. Coffee by-products is also a contributor, such as coffee pulp which generates air, water and soil pollution, especially when coffee berries are ripe and processed by the wet method and are not properly treated generating CH<sub>4</sub> emissions.

Due this, the detection of CH<sub>4</sub> during the treatment of coffee by-products is one of the most important tools to meet the objective of methane reduction. An experimental methodology for the sustainable management this residue was developed in Costa Rica, for the transformation from a residue into a soil amendment that can be used in agricultural crops including coffee plantations. This may reflect its impact on soil fertility and agricultural productivity in the future. Within the framework of the project, tests were conducted to explore and optimise the utilisation of coffee by-products and other organic waste materials. Consequently, this project aims to improve the waste management from the coffee processing currently applied in the country, as well as the verification of CH<sub>4</sub> during composting, giving the community the opportunity to receive a positive environmental impact, emissions reduction and suggest emission factors for the coffee sector and its soil improvement. The project will generate significant environmental, economic, technological and commercial impacts, without omitting the main objective of obtaining a product from waste, which will contribute to the concept of bio-economy and circular economy. These types of initiatives enhance a sustainable development and at the same time provide a paradigm shift in high impact productive sectors and in the coffee sector and the reduction of its emissions.

**Keywords:** Coffee by-products, emission factors, emissions, methane