



**HAL**  
open science

# Is it efficient to co-compost and co-vermicompost green waste with biochar and/or clay to reduce CO<sub>2</sub> emissions? A short-term laboratory experiment on (vermi)composts with additives.

Justine Barthod, Cornelia Rumpel, Remigio Paradelo, Marie-France Dignac

## ► To cite this version:

Justine Barthod, Cornelia Rumpel, Remigio Paradelo, Marie-France Dignac. Is it efficient to co-compost and co-vermicompost green waste with biochar and/or clay to reduce CO<sub>2</sub> emissions? A short-term laboratory experiment on (vermi)composts with additives.. EGU, European Geosciences Union General Assembly 2016, Apr 2016, Vienne, Austria. hal-01547534

**HAL Id: hal-01547534**

**<https://hal.science/hal-01547534>**

Submitted on 5 Jun 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



## **Is it efficient to co-compost and co-vermicompost green waste with biochar and/or clay to reduce CO<sub>2</sub> emissions? A short-term laboratory experiment on (vermi)composts with additives.**

Justine Barthod (1), Cornélia Rumpel (1), Remigio Paradelo (2), and Marie-France Dignac (1)

(1) Institute of Ecology and Environmental Sciences- Paris (iEES-Paris) UMR CNRS, INRA, UPMC. 78850 Thiverval-Grignon. France, (2) University of Vigo, Department of Plant Biology and Soil Sciences, Facultade de Ciencias, As Lagoas s/n, 32004 Ourense Spain

Intensive farming practices can lead to a depletion of soil organic matter, negatively impacting important soil properties such as structural stability, fertility and C storage. The addition of organic amendments such as compost and vermicompost, rich in carbon, helps maintaining soil organic matter levels or restoring degraded soils. Composting and vermicomposting are based on stabilization of organic matter through the mineralization of easily decomposable organic matter compounds, therefore releasing greenhouse gases, including CO<sub>2</sub>.

The aim of this study was to evaluate the global potential reduction of such emissions by the use of additives (2:1 clay and/or biochar): during (vermi)composting processes and after use of the final products as soil amendments. We hypothesized that the interactions between the additives and organic matter may lead to carbon stabilization and that such interactions may be enhanced by the presence of worms (*Eisenia*). We added in different proportions clay (25% or 50%), biochar (10%) and a mixture of biochar (10%) with clay (25%) to pre-composted green waste. The CO<sub>2</sub> emissions of the composting and vermicomposting processes were measured during 21 days. After that, the amendments were added to a loamy cambisol soil and the CO<sub>2</sub> emissions were monitored during 30 days of a laboratory experiment.

The most efficient treatments in terms of reducing global CO<sub>2</sub> emissions were the co-vermicomposting process with 25% clay followed by co-composting with 50% clay and with 10% biochar plus 25% clay. In this treatment (vermicompost with 25% clay), the carbon emissions were decreased by up to 44% compared to regular compost. Addition of biochar reduced CO<sub>2</sub> emissions only during composting.

Co-composting with biochar could be a promising avenue to limit global CO<sub>2</sub> emissions whereas in presence of worms clay additions are better suited. These findings suggest that the presence of worms increased the formation of organo-mineral associations and thus C protection up to a certain clay/organic matter ratio. This strategy could be used to enhance the stability of organic amendments and increase soil carbon sequestration.