Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.17833

Enhanced Weathering in the Tropics. A southern world solution for the global climatic cathastrophe.

PROF. JUAN CARLOS SILVA-TAMAYO, PHD[1] AND DANIEL DUQUE[2]

[1]IE Universidad
[2]Cementos Argos
Presenting Author: juancarlos.silva@ie.edu

Enhanced Chemical Weathering ECW has become one of the most effective, cost efficient and sustainable carbon removal technologies given the variety of cobenefits that it has for the environment. The use of mineral aggregates (Ca-Mg silicates) as agricultural amendments has been one of the most traditional ways of exploring the potential of ECW to remove the anthropogenic carbon dioxide from the atmosphere at Gigatons scales. Although the laboratory works suggest that this carbon removal technology can be a potential solutions from the ongoing climate crisis, its carbon removal efficiency has not been assessed at real scale under relevant productive environemts. Questions that are still open about the implementation of this technique in agricultural soils are: how climate variability and temperature affects its carbon removal capacity? What is the fate of atmospheric carbon on agricultural soils after their application? Which potential environmental problems can result from its implementation? Which cobenefits it can have for the environment and the society?

In this work use mine tailings from the aggregates production of the cement industry in Colombia in order to answer these questions. We use mine tailings left behind from the exploitation of two ultramafic massifs from Colombia as mineral amendments in avocado and coffee plantations from Colombia. We also used sustainable agricultural practices; including the use of arbuscular mycorrhizas during the course of the experiments to assess how these practices contribute to the atmospheric carbon removal. Results from these experiments show that both crops increase their growth rate as a result of the combined use of the mineral amendments and arbuscular mycorrhizas. It also shows that the originally acid inseptisols have increased their pH as a result of the precipitation of Mg-Ca calcium carbonate. Initial quantification of the carbon removal capacity suggests a carbon removal capacity through carbonate mineralization of c.a. 20% per ton of mineral amendment used and a carbon removal throughout the increase in soils water alkalinity of ca 75%. These values vary depending on rainwater regime and temperature. The implementation of this technology was rapidly adapted by agricultural small holders. No evidence of water quality deterioration was observed.