

Research Stays 2017

Allocation of carbon and nitrogen in size-fractions of a pasture soil after simulated pasture renovation including biochar addition

February 28th, 2017 | June 23rd, 2017

Objectives

The aim of this study was to assess the impact that biochar addition had in the distribution of C in size-fractions of a soil under intensive grazing management, at two different depths (topsoil-subsoil) and under two contrasted pastures (ryegrass – Rye; a mixture of red clover and cocksfoot – Mix).

Methodology

Pasture renovation was simulated by inverting the original 0–10 cm depth topsoil, with or without the addition of 10 Mg/ha of pine biochar (Biochar vs Nil), at 10–20 cm depth in a lysimeter and vice versa. Topsoil (0-2 cm depth) and Subsoil (14-16 cm depth) samples were taken after 26 months of growing pastures .

Soils were fractionated after dispersion by sonication and wet sieving. C and N was determined in each particle size fraction (i.e. 2000-250, 250-53 and <53 μm) using a vario MACRO cube CHNS elemental analyser. Each fraction was additionally treated with potassium dichromate to obtain two chemical fractions: oxidisable-C (major contributor to the soil organic C in each fraction; Cox) and non-oxidisable C (mainly aliphatic C and biochar-C; Cnox).

Results

Soil C accumulated preferentially in the <53 μm size fraction (Figure 1a).

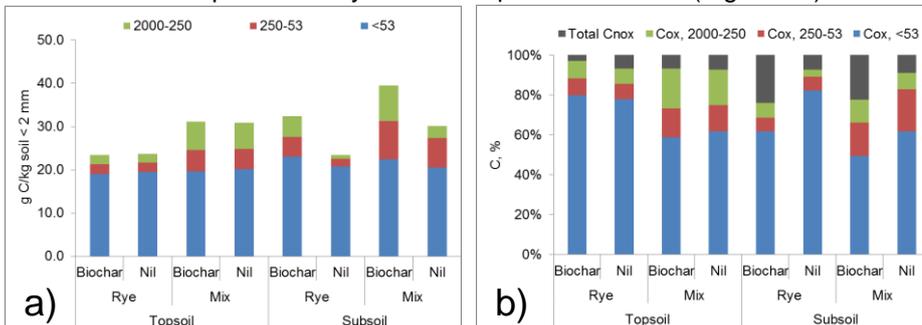


Figure 1 (a) Total C (g/kg soil <2mm) for the different soil fractions considered (2000-250, 250-53 and <53 μm); (b) C distribution (%) as Cox (for each of the soil fractions) and Total Cnox (as sum of Cnox detected in each of the soil fractions).

The distribution of soil C in the different fractions, at both depths, was mainly influenced by the pasture type.

Biochar amendment increased significantly the amount of Cnox (Figure 1b).

Highlights

Application of pine biochar at depth influenced the accumulation of C (mainly as Cnox) after 26 months of growing contrasted pastures.

Researcher

Ruth Saiz Rubio



Group AMBIOSOL

University of Santiago de Compostela

Responsible: Prof. Felipe Macías

Host Institution

New Zealand Biochar Research Centre

Massey University (New Zealand)

Responsible: Prof. Marta Camps and Dr. Roberto Calvelo



UNIVERSITY OF NEW ZEALAND



Contact Network details

Chair of the Network REGATA

Juan M. Lema
Professor of Chemical Engineering
Univ. Santiago de Compostela, Spain
Juan.Lema@usc.es

Research stays Coordinator

Carmela Monterroso
Professor of Soil Science.
Univ. Santiago de Compostela, Spain.
carmela.monterroso@usc.es