S07.05-P -11

MEASURING BELOW-GROUND CARBON INPUTS USING THE 13C NATURAL ABUNDANCE METHOD: COMPARISONS BETWEEN DIFFERENT LAND USE TYPES

Martinez Cristina*[1], Rodeghiero Mirco[2], Camin Federica[3], Cotrufo Francesca[4], Zanotelli Damiano[5], Gianelle Damiano[2]

[1]CNR ~ IBIMET ~ Firenze ~ Italy [2]Fondazione Edmund Mach ~ DASB ~ San Michele All'Adige, Trento ~ Italy [3]Fondazione Edmund Mach ~ DQAN ~ San Michele All'Adige ~ Italy [4]Colorado State University ~ Department of Soil and Crop Sciences ~ Fort Collins, CO ~ United States [5]Free University of Bolzano ~ Faculty of Science and Technology ~ Bolzano ~ Italy

Quantifying temporal changes in C storage is challenging due to the large quantity of C present in topsoils relative to the amount of plant C inputs and CO2 outputs. Traditional methods for quantifying soil C changes are limited due to: (1) their inability to detect small changes in C stocks given their insensitivity; and (2) the inherent spatial variability associated with soils. Alternative methods are required to quantify soil C changes in soil-plant systems. The 13C natural abundance method is based on the premise that during CO2 fixation, plants discriminate between C isotopes (13C and 12C), and thus contain a smaller proportion of 13C (?13C -26‰) compared to atmospheric CO2 (?13C -7‰). Furthermore, different plant species (C3 and C4) discriminate between C isotopes differently, which is reflected in the isotopic composition of SOM. This provides an 'in-situ' method by which to calculate the relative contribution of new C in soil-plant systems where the 13C signal of the C input is different to the native SOM. We used this method to quantify differences in below-ground C inputs in four different land use types: forest, grassland, apple orchard, and vineyard. The fraction of new C (fnew) inputs following one year of incubation of a C4 soil were calculated for both surface (0-15cm) and deeper (15-30cm) soil layers. Changes in ?13C in soil and roots, root biomass, %C, %N, were also analyzed. Results, presented in this paper, indicate differences within and between sites. The value of this relatively new method is discussed.