Geophysical Research Abstracts
Vol. 18, EGU2016-9109, 2016
EGU General Assembly 2016

Biochar mineralization and priming effect on SOM decomposition. Results from a field trial in a short rotation coppice in Italy

Maurizio Ventura (1), Giorgio Alberti (2,4), Pietro Panzacchi (1), Gemini Delle Vedove (2), Franco Miglietta (3,4,5), Giustino Tonon (1,4)

(1) Faculty of Science and Technology, Libera Università di Bolzano, Bolzano/Bozen, Italy, (2) Department of Agricultural and Environmental Sciences, University of Udine, Udine, Italy, (3) IBIMET-CNR, National Research Council, Firenze, Italy, (4) MountFor Project Centre, San Michele all′Adige (Trento), Italy, (5) FoxLab Forest & Wood Science, Fondazione E.Mach, San Michele all′Adige (Trento), Italy

Biochar application to soil has been proposed as a promising strategy for carbon (C) sequestration and climate change mitigation, helping at the same time to maintain soil fertility. However, most of the knowledge on biochar stability is based on short-term lab incubation experiments, as field studies are scarce. Therefore, little is known about the interactions between biochar and roots and the related effects on biochar stability in field conditions.
The present study aimed to assess the stability of biochar, its effect on original soil organic matter (SOM) decomposition, and the effect of plant roots on biochar stability in field conditions in Northern Italy, for a three-year monitoring period within the EuroChar project. The experiment was conducted in a poplar short rotation coppice (SRC). Biochar produced from maize (δ13C = -13.8‰) silage pellets in a gasification plant was applied in a poplar short rotation coppice (SRC) plantation in Northern Italy. Root exclusion subplots were established using the trenching method to measure heterotrophic respiration. Total (Rtot) and heterotrophic (Rh) respiration were measured every 2 hours in control and biochar-treated soil, with a closed dynamic soil respiration system. δ13C of the soil-emited CO_2 was periodically measured using the Keeling plot method. The percentage of biochar-derived soil respiration (fB), was calculated using an isotopic mass balance. Results showed that fB varied between 7% and 37% according to the sampling date, and was generally higher in the presence of roots than in trenched plots where the root growth was excluded. Without roots, only the 14% of the carbon originally added with biochar was decomposed. In the presence of roots, this percentage increased to 21%, suggesting a positive priming effect of roots on biochar decomposition. On the other hand, biochar decreased the decomposition of original SOM by about 17%, suggesting a protective effect of biochar on SOM.