

Biochar mineralization and priming effect on SOM decomposition in two European short rotation coppices

Maurizio Ventura (1), Giorgio Alberti (2,3), Maud Viger (4), Joseph Jenkins (4), Cyril Girardin (5), Silvia Baronti (6), Alessandro Zaldei (6), Gail Taylor (4), Cornelia Rumpel (5), Franco Miglietta (2,6,7), Giustino Tonon (1,2)
(1) Free University of Bolzano/Bozen, Faculty of Science and Technology, Bolzano/Bozen, Italy (maurizio.ventura@unibz.it), (2) MountFor Project Centre, European Forest Institute, Via E. Mach 1, San Michele a/Adige (Trento), Italy, (3) Department of Agricultural and Environmental Sciences, University of Udine, Italy, (4) Centre for Biological Sciences, University of Southampton, Life Science Building, Highfield Campus, Southampton, SO17 1BJ, UK, (5) BIOEMCO, UMR 7618, CNRS-INRA-ENS-Paris 6, Bâtiment EGER, Aile B, 78820 Thiverval-Grignon, France, (6) IBIMET-CNR Institute of Biometeorology, National Research Council, via Caproni, 8, 50145 Firenze, Italy, (7) FoxLab, Forest & Wood Science, Fondazione E. Mach, Via E. Mach 1, San Michele a/Adige (Trento), Italy

As studies on biochar stability in field conditions are lacking, the carbon sequestration potential of biochar application to agricultural soils is still unknown. Through the continuous soil respiration monitoring and $\delta^{13}\text{C}$ periodic measurements, the present study assessed, for the first time, the stability of biochar in field conditions, the effect of plant roots on biochar stability and the effect of biochar on original soil organic matter (SOM) decomposition in two (Italy and UK) short rotation coppice systems (SRCs). Where the root growth was excluded, only the 7% and 3% of the carbon originally added by biochar was decomposed in Italy and UK, respectively. In the presence of roots this percentage has increased to 9% and 8%, suggesting a positive priming effect of roots on biochar decomposition. On the other hand, a decreased decomposition rate of original SOM was observed at both sites after biochar incorporation, suggesting a protective effect of biochar on SOM. This study confirmed the carbon sequestration potential of biochar and highlighted the role of the root activity on biochar decomposition, questioning the applicability of laboratory incubation studies to assess biochar stability