

BIO-C-VITE

Assessment and valorization of biochar amendment for promoting soil health, carbon storage and sustainable viticulture

The recent EU Soil Mission and the forthcoming Common Agricultural Policy support Europe's path to sustainable soil management towards a green transition in urban and rural areas, will require specific actions aiming to increase soil health and C sequestration while maintaining high productive standards. These actions complement the EU Strategies for Climate Change Mitigation, Biodiversity Strategy, Soil Strategy, Zero Pollution Strategy, Forestry Strategy, and Long-term Vision for Rural Areas. However, despite the intensity of the policy response, the Intergovernmental Panel on Climate Change (IPCC) report (https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf) indicates that climate change will impact agriculture more intensely than expected over the next two decades, undermining our food security and agricultural productivity and farmers' income. Biochar, a fraction of the biomass pyrolyzation process, incorporated into agricultural soils can increase the plant productivity, maintain or enhance the soil fertility, and allows carbon (C) sequestration with no adverse effects on soil biota. Biochar is admitted as a component material category in the EU Regulation on Fertilizers (2019/1009) as a 'pyrolysis product made from a wide variety of organic materials of plant origin', and it is listed in Annex I, of the Regulation EC 889/08 on organic farming. Though in Italy the registration of biochar in the Annex 13 of Legislative Decree 75/2010 is still awaited, its use in agriculture can potentially increase in the next few years. Positive effects of biochar on crop production and soil fertility, C sequestration and GHG soil emission can contribute to the above-mentioned EU objectives, but data have been mostly obtained from short term or pilot scale experiments, with weak scientific evidence to support new policy. This project will elucidate the effects of biochar amendment as long-term sustainable and regenerative soil practice in the key sector of viticulture, by taking advantage of four field trials with a duration spanning from 4 to > 12 years, located in important wine production districts in Central and North Italy. The project will assess the effects of biochar on soil health, C sequestration in soil, vine productivity, and will assess the sustainability of biochar use in agriculture by a complete analysis of soil health indicators and vine productivity combined with C modelling, life cycle analysis and environmental economics

approaches. The project will capitalize skills, know-how and research infrastructures of the University of Padua, the CNR Institute of Bioeconomy of Florence, University of Bologna, and the Free University of Bolzano in collaboration with wine Companies, to produce guidelines on the use of biochar as a practical solution towards a more efficient, profitable and sustainable Italian viticulture, in line with the EU Adaptation Strategy Soil Mission and Mission on Adaptation to Climate Change.

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