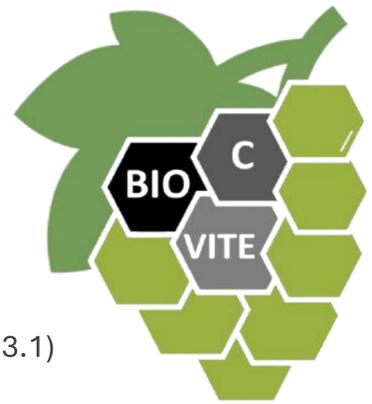




Bio-C-Vite



Project

PRIN PNRR 2022 Bio-C-Vite is aimed to the assessment and valorization of biochar amendment for promoting soil health, carbon storage and sustainable viticulture. The purpose can be achieved, based on field experiments data, by the modelling of soil C (Task 3.1) and the biochar interaction with it (Task 3.2), before applying the LCA methodology to estimate the environmental benefits of biochar amendment compared to the use of conventional fertilizer (Task 3.3).

Wineries

Field trials in Italy examine the effects of biochar and compost treatments on vineyards.

La Braccasca Estate in Montepulciano and Poggio Torselli in San Casciano focus on biochar's impact, while Tebano in Faenza explores biochar-compost blends and Labers near Merano investigates biochar's climate change mitigation potential in sandy loam soil.

Poggio Torselli, San Casciano in Val di Pesa

(Firenze, 43.6684736N, 11.1958114,17E)

The Poggio Torselli field trial is located in a commercial vineyard of Chianti Classico production area.

The soil is a clay loam with a pH value of 7.9 and the vineyard is not irrigated.

A randomized plot experiment with two treatments (biochar and control) and three replicates was setup in 2018.

The treatments are: a single biochar applied using a chisel plow tiller to 0.3 m depth at a rate of 21 t/ha (B) and a control (C). Biochar was applied in the inter-row space of the vineyard and incorporated into the soil.

The Poggio Torselli field experiment is managed by the Poggio Torselli company and the CNR-IBE partner.

The experiment was terminated in May 2024.

Labers, Merano

(Bolzano, Alto Adige, 46.6673528N, 11.1964183E)

The farm is located in Labers, 600 m a.s.l., the vine cultivar is Müller Thurgau or SO4 rootstock.

The soil is sandy loam, (64% sand), rich in skeleton, with a pH value of 6.5. Soil was amended with biochar in 2017,

with fully randomized blocks of the following treatments: N (Control), B1 (Biochar 25 t/ha), B2 (Biochar 50 t/ha),

C (Compost 45 t/ha), BC1 (Biochar 25 t/ha + Compost 45 t/ha), BC2 Biochar 50 t/ha + Compost 45 t/ha).

Measurements of greenhouse gas emissions (CO₂, CH₄, N₂O) have shown a significant reduction in N₂O emissions

in biochar amended soils, showing potential for a long-term climate change mitigation.

The field trial is managed by the Laimburg Research Centre and the UNIBZ partner.



La Braccasca, Marchesi Antinori, Montepulciano

(Siena, 43.1659083N, 11.9523669E)

The field trial is located on the vineyard at La Braccasca Estate (Marchesi Antinori srl, www.antinori.it) near Montepulciano. The vineyard (Vitis vinifera L.) was planted in 1995 (cv. Merlot, clone 181; rootstock 3309 Couderc).

Soil is acid, shallow and sandy-clay-loam textured (USDA, 2005), and it is highly compacted below 0.4 m depth.

The vineyard is not irrigated and it is fertilized with an inorganic fertilizer (15.0.26) twice per year at 120 kg/ha.

Biochar was applied on the inter-row of the vineyard in 2009 at a rate of 30 t/ha (B); a further application at the same rate was made on some of the plots in 2010 (BB). The experimental layout is concluded by a control (C).

The field trial is managed by La Braccasca Estate Company and the CNR-IBE partner.

Tebano, Faenza

(Ravenna, 44.2917024N, 11.7806531E)

The Tebano field trial was set up in a new vineyard planted in March 2019 (cv. Sauvignon) and hosts a complex

combination of biochar and sludge-based compost treatments. Biochar was applied at 22 t/ha.

The soil is a sandy clay loam with a pH value of 7.5. The field trial allows to assess the effects of soil conditioning on

water holding capacity, soil structure and workability, and responses of vine plants in terms of nutritional status,

productivity and organoleptic properties, and of the produced wine. The trials is also providing information on

weathering of biochar in soil, its decomposition and aging, and changes in the organic C stock.

The field trial is managed by the Research Center for Crop Production of Bologna (CRPV) and the UNIBO partner.

Results attended

Making use of an existing network of Long-Term field Experiments (LTEs), Bio-C-Vite will clarify the effects of biochar on soil quality and functionality, focusing on the potential of biochar to improve the productivity and sustainability of the vineyard cultivation by increasing soil fertility and grape production while preserving quality, and assessing the C sequestration potential associated with the biochar use in viticulture.

The advantages of applying biochar to agricultural soils will be quantified from the point of view of the most relevant environmental impact categories. Thereafter, the analysis will be narrowed down to the Global Warming Potential (GWP) impact category, which will be integrated with the results of soil C storage assessed by the RothC modelling of soils.

This approach will allow the estimation of the overall greenhouse gas emission balance of the biochar amended vineyards.

Biochar production technologies will be evaluated at various scales and a new circular economy pattern will be analyzed: agricultural residues will be pyrolyzed and introduced into soil to increase C sequestration, water and nutrient retention, adapting to the increase of extreme events such as drought events.

This will affect the environmental quality in many aspects: changing the value of the agricultural residues, the agro-business relationship and the value distribution, and favoring farm business diversification.



About us

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