

ENOCHAR

Tebano, Ravenna (Italy)



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
CAMPUS DI RAVENNA

Environmental
Management
Research
Group



The ENOCHAR project intends to evaluate the effects of the application of biochar to the soil, alone or mixed with compost, on **fertility** and physical properties of the soil, on the vegetative-productive response of the plants in the medium-long term, as well as on the finished product "wine". Also the **carbon storage** effect will be quantified.

The project involves **all the strategic players in the wine production chain**. First, the winemakers for the supply of residues and the use of soil improvers, the processing industry for biochar production, the filtering and **recovery phase of nutrients from wastewater** and the co-maturation with compost, as well as the research centers to monitor the expected effects.

The duration of the experiment is planned for 8 years.



SITE DESCRIPTION

The field experiment was set in a new vineyard planted in March 2019 (cv. Sauvignon; rootstock SO4), in Emilia Romagna, at CRPV farm. Trellis system is Guyot with plant-row spacing of 1 and 2.6 m respectively; rows orientation is East-West. The vineyard is equipped for emergency irrigations. The soil is a sandy clay loam (USDA, 2005) with a neutral pH of 7.5 (1:2 soil: 0.01 M CaCl₂).

BIOCHAR AND ITS APPLICATION IN THE FIELD

The used biochar will be exclusively obtained from the thermochemical valorization of vineyard pruning residues.

The applied treatments distributed in furrow before shoots transplanting and located closely to the growing roots are:

- Vineyard pruning residues biochar (VPRB) at a dose of **22 t_{dm} *ha⁻¹**.
- Blend of mature compost and VPRB (CB) with a ratio in dry matter of 10:3 at a dose of **13 t_{dm} *ha⁻¹**
- Blend of fresh compost constituents and VPRB (CBf) with a ratio in dry matter of 10:3 at a dose of **13 t_{dm} *ha⁻¹**
- Mature compost at a dose of **10 t_{dm} *ha⁻¹**.
- Farm management

Apart VPRB, the other treatments will be repeated every year, applying the matrices closely to the row of the vineyard using a spreader and then incorporated into the soil using a rotary harrow at 0.15 m depth.

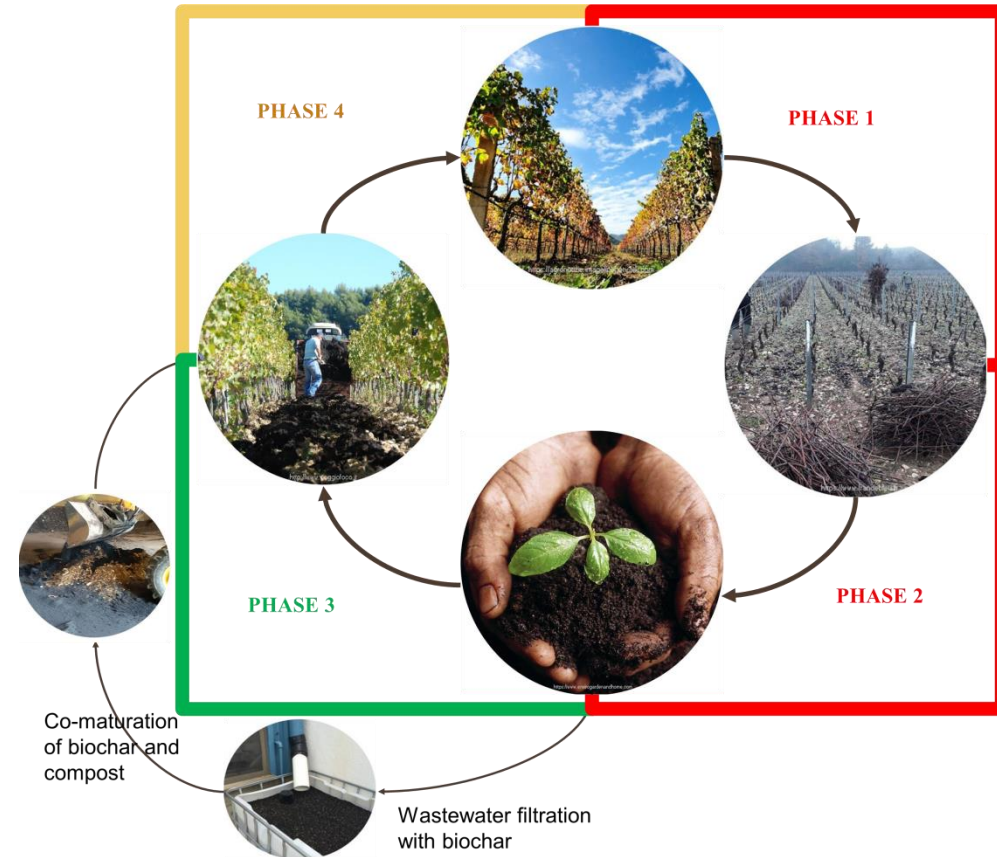


MEASURED PARAMETERS

- Continuous monitoring by 5TE Decagon probes of temperature, salinity and water content at 2 different depth: -0.15m and -0.3m;
- Phenological phases monitoring ;
- Weather parameters by a weather station included in the regional official network;
- Annual nutritional state of leaves and plants;
- Annual pruning biomass yield;
- Biochemical analysis of grapes;
- Production surveys at harvest (100 plants);
- Carbon and nitrogen soil dynamic;

PLANNED ACTIVITIES:

- Evaluate the effect of conditioning on soil properties (e.g. water retention capacity, structure, workability, etc.) as well as on plant response (nutritional status, productivity and quality of wines);
- Monitoring of the transformation of biochar and compost in the soil, decomposition and aging also with modeling;
- Laboratory tests to analyze biochar filtering properties on wastewater nutrients and organic substance.
- Laboratory experiments through column tests to verify the absorbent and retention capacities of nutrients in the soil mixed with the various matrices;
- Laboratory experiments to evaluate the co-maturation processes phases in compost and biochar blends.
- Development and organization of communication activities and dissemination of results (e.g. visits to the experimental field, scientific and popular publications)



WORKING GROUP

The project is carried out by the Environmental Management Research Group (EMRG), with the participation of Centro Ricerche Produzioni Vegetali (CRPV) and Caviro. CRPV (<http://www.crpv.it/>) participated by providing the field on which the experiment is taking place. Caviro (<https://www.caviro.com/>) assisted in the production of the biochar / compost mixture and for the storage of the matrix. The spreading in the field of the matrix and the analyzes are carried out by researchers from EMRG (<http://www.cirsa.unibo.it/en/research/environmental-management-research-group-emrg>) and the University of Bologna.

BIBLIOGRAPHY

Greggio, N., Balugani, E., Carlini, C., Contin, A., Labartino, N., Porcelli, R., ... & Marazza, D. (2019). Theoretical and unused potential for residual biomasses in the Emilia Romagna Region (Italy) through a revised and portable framework for their categorization. *Renewable and Sustainable Energy Reviews*, 112, 590-606.

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