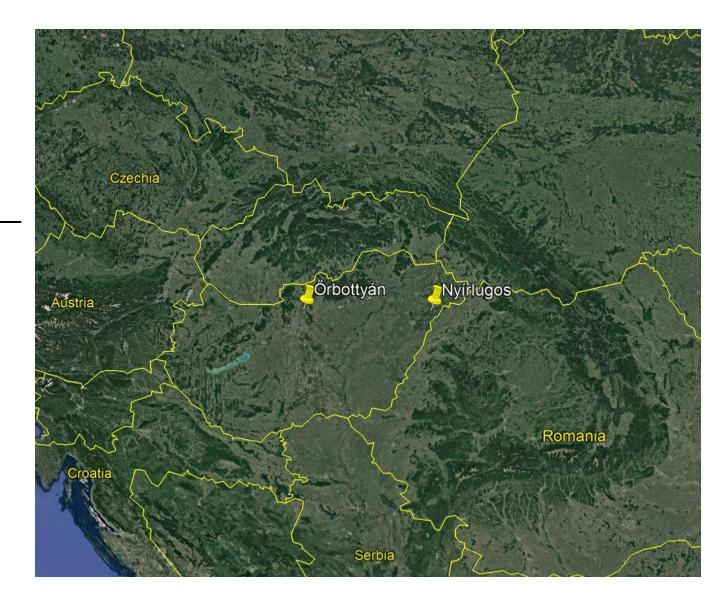
Őrbottyán - Nyírlugos (Hungary)

EXPERIMENT GOALS

This paper presents a long-term field study, being the final step of a scale-up technology development, on grain husk and paper fibre sludge biochar application for soil improvement with focus on two degraded soil types of a temperate region. The aim was to compare the short- and long-term effects of biochar treatments on the discussed soils.

2.5-years experiment





SITE DESCRIPTION

The field experiment took place simultaneously at two sites: at Őrbottyán (47°40′N, 19°14′E) with calcareous sandy soil Mollic Umbrisol (Arenic) and at Nyírlugos (47°43′N, 22°00′E) with acidic sandy soil (Lamellic Arenosol).

Field plots of 20 m2 (4 × 5 m) area each were established including a 1 m wide margin all along, thus resulting plots of 6 m2 net area.

The experiment was carried out in a random block design at both sites and each treatment was applied in 4 replicates. Soil samples were taken from the 0–25 cm layer within the net area of each small plot (6 m2)

BIOCHAR AND ITS APPLICATION IN THE FIELD

Applied biochar (BC) was produced from **grain husk** and **paper fibre sludge feedstock** (the ratio of components is 1:1) and was provided by Sonnenerde Gmbh Austria.

The biochar addition rates at both sites were the following: 0 t/ha (code: C+NPK), 3 t ha⁻¹, 15 t ha⁻¹, 30 t ha⁻¹.

Each plot was fertilized with half of the recommended NPK mineral fertilizer dose (acidic sand: 61 kg N ha⁻¹, calcareous sand: 54 kg N ha⁻¹).



Measured parameters

Soil analysis and interactions with biochar: soil analysis at T0, periodic soil analysis, pH, WHC, OM, NH_4^+ , NH_3^- , C:N, CEC, EC

Other production parameters: AWCD (Average Well Colour Development), Substrate Richness and Shannon diversity index

Plant-soil dynamics and interactions: aerobic heterotrophic bacterial and fungal cell concentrations

Key findings

- Effect of biochar in soils was dependent on soil pH, OM and carbonate content.
- Biochar addition had favorable effects mainly in the acidic sandy soil.
- Long-term positive effect of biochar on the availability of P and K was revealed.
- Biochar increased microbiological activity and provided good habitat for white worm.

Planned activities or potential experimental activities

During the 2.5-year long field experiment samples were taken on 7 occasions: 1 month, 3 months, 5 months, 13 months, 18 months and 30 months after the start. Since the aim was to compare the short- and long-term effects of biochar treatments.



PRESENTATION OF THE WORKING GROUP

The work was supported by the EEA Grants and the Norway Grants within the "Green Industry Innovation Programme" (Terra Preta project, registration number HU09-0029-A1-2013), the BMEBiotechnology FIKP grant of EMMI (BME FIKP-BIO) and by the National Research, Development and Innovation Fund in the frame of the K_16 Program (K_16 120464 project 2016–2019).

Bibliography and publications of the experiment, online information material, websites

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