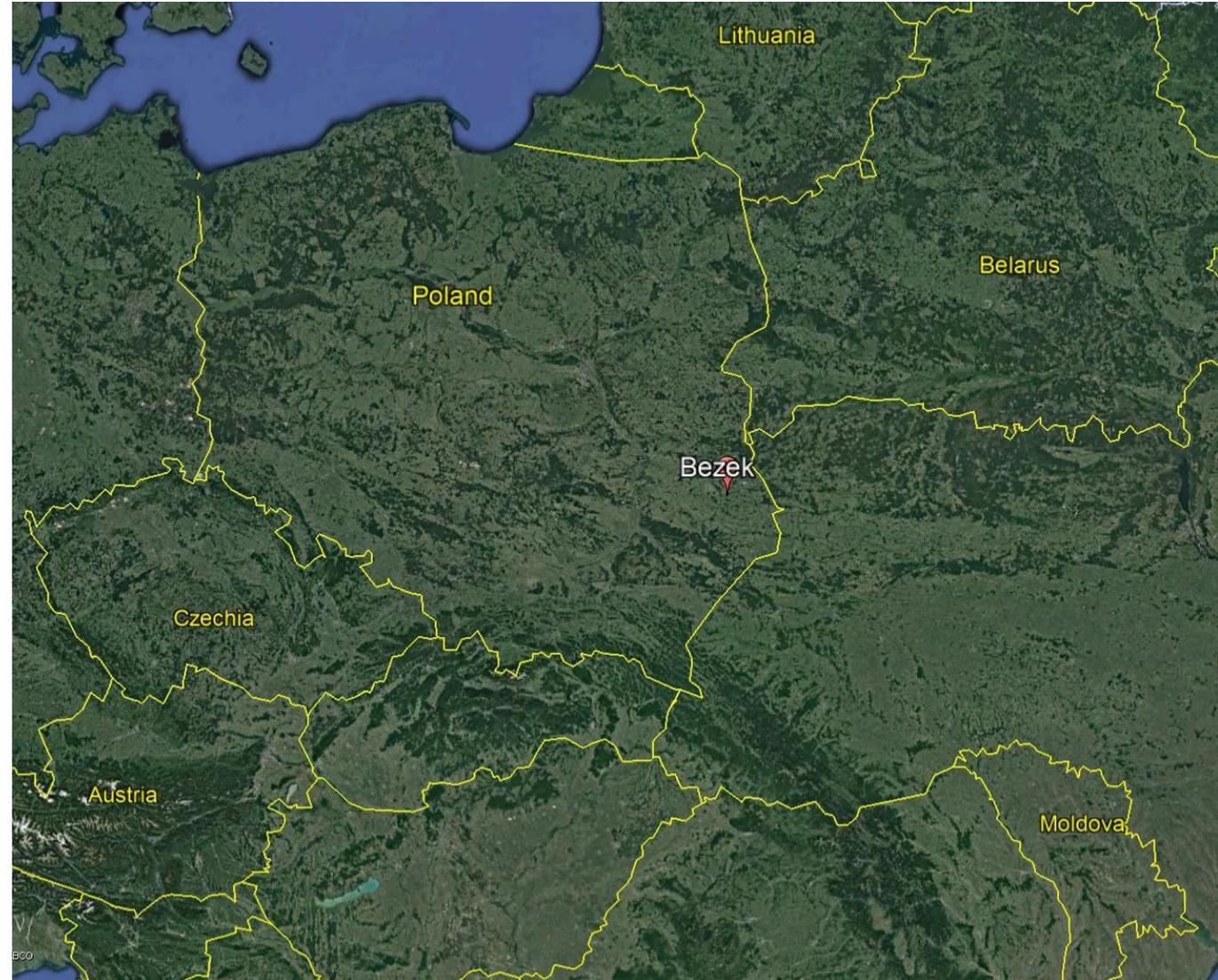


Bezek (Poland)

EXPERIMENT GOALS

The research hypothesis assumes that biochar added to soil will change selected physicochemical and biological properties of soil. The aim of the study was to determine the effect of different biochar rates on soil enzymatic activity, mineral nitrogen, TOC, and pH over a period of several years after biochar amendment.

Six-year experiment



SITE DESCRIPTION

The field study was established in 2011 at the Experimental Farm in Bezek (51°19' N, 23°25' E), Poland. Weather conditions were described on the background of the multiyear period 1974–2010 based on the average monthly air temperature (°C) and total precipitation (mm). The experiment was established on a Haplic Podzol (PZha) originating from glaciofluvial fine-grained loamy sand. The experiment compared the effect of three biochar rates in the cultivation of **winter rye** cultivated in a monoculture.

BIOCHAR AND ITS APPLICATION IN THE FIELD

Biochar applied to soil was provided by Mostostal Sp. z o.o. (Wrocław, Poland). Biochar was produced by process of pyrolysis from wheat straw at temperature 650 °C (maximum applied temperature) in an oxygen-poor atmosphere (<2% O₂). Biochar made from wheat straw was in the form of ash. At the beginning of September 2011, biochar at rates of 10 (**BC₁₀**), 20 (**BC₂₀**), and 30 (**BC₃₀**) t ha⁻¹ was applied to the soil, and then the soil was ploughed. The plot without biochar was the control treatment (**BC₀**).

Elemental composition of biochar was: 53.87% C, 0.91% N, and 1.76% H.

Measured parameters

Field conditions: rainfall, meteorological data,

Soil analysis and interactions with biochar: soil analysis at T0, periodic soil analysis, pH, TOC, Nt, C:N, NH_4^+ , NH_3^-

Other production parameters: dehydrogenase activity (ADh), Phosphatase Activity (Aph), Urease Activity (UA)

Key findings

- Application of biochar to the soil resulted in a significant increase of TOC and Nt as well as N-NO_3^-
- It is possible to use biochar to improve soil biological activity, in particular **during the initial period** after biochar application.
- The positive impact on enzymatic activity is limited and weakens as a result of biochar aging.

Planned activities or potential experimental activities

Agricultural application of different biochar rate to evaluate its potential on different parameters.

PRESENTATION OF THE WORKING GROUP

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

Futa, Barbara, Patryk Oleszczuk, Sylwia Andruszczak, Ewa Kwiecińska-Poppe, and Piotr Kraska. 2020. 'Effect of Natural Aging of Biochar on Soil Enzymatic Activity and Physicochemical Properties in Long-Term Field Experiment'. *Agronomy* 10 (3): 449. <https://doi.org/10.3390/agronomy10030449>.

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