Dolná Malanta (Slovakia)

**EXPERIMENT GOALS**
The aim of this work was to quantify the extent of the effect of applied biochar during the fourth and fifth year after its application in combination with N-fertilization on soil pH, sorptive characteristics and soil organic matter parameters, including humus as well as crop yields.

4-year experiment
SITE DESCRIPTION
The experimental site of the Slovak University of Agriculture in Nitra is in Dolná Malanta (lat. 48°19’00”; lon. 18°09’00”). The study area is characterized by a warm lowland climate with long, warm, dry summers, short dry winters, and only a very short duration of snow cover (14–30 days). The mean long-term air temperature and precipitation according to the 30-year climatic normal for the period 1961–1990 was 9.8 °C and 540 mm, respectively. The experiment was established on a loamy Haplic Luvisol. The crop were Maize and Spring barley. Nine different treatments were organized into a randomized block design at 27 plots of agricultural land (4 x 6 m) representing one of three replications.

BIOCHAR AND ITS APPLICATION IN THE FIELD
The biochar was produced by pyrolyzing paper fiber sludge and grain husks (1:1 w/w) and had particle sizes between 1 to 5 mm. Biomass was pyrolyzed at 550 °C for 30 min in a Pyreg reactor (Pyreg GmbH, Dörth, Germany). Riedlingsdorf, Austria). The biochar was manually applied into the top of the soil (0–10 cm) at rates of 10 and 20 t ha\(^{-1}\). The treatments performed in each site were: \textbf{B0N0} (no biochar, no N fertilization), \textbf{B10N0} (biochar at rate of 10 t ha\(^{-1}\), no N fertilization) \textbf{B20N0} (biochar at rate of 20 t ha\(^{-1}\), no N fertilization), \textbf{B0N1} (no biochar combined with first level of N fertilization: doses of N were 160 and 40 kg N ha\(^{-1}\) in 2017 and 2018, respectively), \textbf{B10N1} (biochar at rate of 10 t ha\(^{-1}\) with N: doses of N were 160 and 40 kg N ha\(^{-1}\) in 2017 and 2018, respectively), \textbf{B20N1} (biochar at rate of 20 t ha\(^{-1}\) with N: doses of N were 160 and 40 kg N ha\(^{-1}\) in 2017 and 2018, respectively), \textbf{B0N2} (no biochar combined with second level of N fertilization: doses of N were 240 and 80 kg N ha\(^{-1}\) in 2017 and 2018, respectively), \textbf{B10N2} (biochar at rate of 10 t ha\(^{-1}\) with N: doses of N were 240 and 80 kg N ha\(^{-1}\) in 2017 and 2018, respectively) and \textbf{B20N2} (biochar at rate of 20 t ha\(^{-1}\) with N: doses of N were 240 and 80 kg N ha\(^{-1}\) in 2017 and 2018, respectively).
Measured parameters
Field conditions: rainfall / meteorological data,
Soil analysis and interactions with biochar: total organic C, pH, Ha (hydrolytic acidity), SBC (sum of basic cations), CEC, Bs (base saturation), HS (humic substances), HA(humic acids), CL (Labile carbon),
Crop production: maize and spring barley
Production data: nutritional status of the plant, quality and quantity
Plant-soil dynamics and interactions: carbon and nitrogen soil-plant dynamics

Key findings
• Through the application of biochar, the soil pH and soil organic carbon content both increased.
• The hydrolytic acidity decreased, while the sum of basic cations and cation exchange capacity increased because of the application of biochar.
• The positive effect of biochar application on the alternation of crop yields in the third and fourth year after biochar application was visible only for a higher application rate of biochar with a combination with N fertilizer.

Planned activities or potential experimental activities:
studying the effects of biochar (0, 10 and 20 t ha⁻¹) and its combinations with N-fertilization on improving soil characteristics and crop yield.
**PRESENTATION OF THE WORKING GROUP**

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


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