THE EFFECT OF BIOCHAR ON BIOLOGICAL PROPERTIES OF LOAMY SAND SPODOSOL AND EFFICIENCY OF NUTRIENTS USE BY PLANTS

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The field experiment was conducted at the loamy sand Spodosol with different soil fertility to study the influence of biochar on soil biological properties and efficiency of nutrients uptake from soils by barley. Basal and substrate-induced respiration, and microbial biomass carbon were investigated. Also the accumulation of nitrogen, phosphorus and potassium in grain and straw of barley, and barley yield were measured. Biochar application resulted in increased basal respiration rate: up to 1,2 times and 1,3 times in soil with medium and high fertility level, respectively. Also the biochar application in the soil increased microbial biomass carbon content by 22% in the soil with medium fertility level and by 74% in the soil with high fertility level. Amendment of the soil with the combination of biochar and mineral fertilizer led to 200% increase in the soil microbial biomass carbon content for both levels of soil fertility. The most positive impact of biochar on nitrogen content in barley was observed on the soil with medium fertility level, where nitrogen concentration in barley grain increased by 1,1 times and in the straw by 1,2 times compared to soil control. Changes in phosphorus and potassium removal by the grain and straw of barley from the soil amended with biochar were not significant compared with the soil without biochar. As a result of biochar application the grain yield increased by 61% in the soil with medium level of fertility and by 49% in the soil with high level of fertility.

Key words: biochar, basal respiration microbial biomass carbon, nutrients uptake, barley, medium and high level of soil fertility.