Evaluation of the effect of different soil amendment additions on changes in the soil ecosystem

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Nowadays, agriculture addresses multiple challenges to meet the criteria for higher crop production. The primary purpose of soil amendment application is to improve soil physicochemical properties, water retention, nutrient utilization, alteration of pH and increase soil organic carbon. All these changes influence the diversity of soil microbial communities, which are crucial for overall soil health, plant fitness and productivity. Despite all of the benefits above, their application on agronomic soil may cause adverse side effects, for example, an increase of pathogenic microorganisms in treated soils or the spreading of antibiotic resistance genes. Changes in physical-chemical properties and the impact on bacterial and fungal soil and endophytic communities were evaluated in soils repeatedly and regularly fertilized over 20 years. Our data indicate that the application of stabilized sludge and manure under thermophilic conditions influences the structure of bacterial and fungal communities, which respond differently to various soil amendments (Kracmarova et al., 2022). Furthermore, the relative abundance of amplicon sequence variants (ASVs) assigned to potentially pathogenic bacteria was not increased in soils with organic fertilizers opposite to the antibiotic resistance genes (Kracmarova et al., 2021; Stiborova et al., 2021).

Apart from organic (manure and sludge) and inorganic fertilizers, biochar belongs to the most extensively studied soil amendments, which can improve soil properties. However, the impact of biochar on soil strongly depends on the type of material, the temperature of pyrolysis and the application rate. Therefore, we compared the effect of biochar prepared from two different feedstock (plant biomass and waste from poultry slaughterhouse) under two different temperatures (300°C and 500°C), which were applied to soils at two ratios, 2% and 5% (w/w). Their impact on soil within the 12 months (in terms of soil enzyme activities, diversity and microbial community structures and physical-chemical properties of treated soils) and on the growth and root endophytes of *T. aestivum* L. was evaluated.

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