Geophysical Research Abstracts
Vol. 19, EGU2017-1184, 2017
EGU General Assembly 2017

CO_2 efflux from soil under influence of cadmium and glucose

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Soil is the largest pool of organic carbon. Any anthropogenic activity may change the soil organic carbon stock resulting in the atmospheric carbon concentration increase. Organic wastes and sewage sludge are often used for soil fertilization. These amendments often contain not only organic compounds stimulating soil microflora but also toxic compounds e.g. metals inhibiting them. The question about the influence of such amendments on soil carbon stock still remains open.

The aim of this study was to evaluate individual glucose and cadmium (Cd) additions and their combined effects on carbon mineralization and microbial community structure in forest soil sampled from different depths (0-20 cm, 20-40 cm and 40-60 cm). We incubated soil samples for 14 days after the addition of: glucose (10000 mg kg^{-1}), Cd (300 mg kg^{-1}) and their mixture. CO_2 efflux was measured by CO_2 trapping in NaOH, at the 3^{rd}, 7^{th} and 14^{th} days of incubation DNA was extracted from soil samples for assessment of microbial community structure via real-time PCR and Illumina sequencing.

Glucose addition induced the increase of soil respiration and fungal-bacterial ratio. However, bacterial alpha-biodiversity decreased as glucose addition caused the dominance of *Proteobacteria* (0-20 cm, 20-40 cm and 40-60 cm), *Actinobacteria* (20-40 cm) and *Acidobacteria* (40-60 cm) phyla. Single Cd addition did not have any effect on parameters studied. In case of simultaneous addition of glucose and Cd, soil respiration and microbial community structure mainly depended more on glucose amendment as compared with metal.