Geophysical Research Abstracts
Vol. 21, EGU2019-8322, 2019
EGU General Assembly 2019

Soil CO_2 and N_2O emission changes under different land uses and soil amendments

Agota Horel, Eszter Tóth, Györgyi Gelybó, Szandra Baklanov, Márton Dencső, and Imre Potyó
Hungarian Academy of Sciences, Soil Science, Budapest, Hungary (horel.agota@agrar.mta.hu)

The aim of the present study was to investigate changes in soil CO_2 and N_2O production under different land uses and biochar amendments during vegetation period. The different land uses were characterized with varying anthropogenic activities. Two consecutive years of CO_2 and N_2O production was measured on a weekly to bi-weekly basis during vegetation period (between March and October) for vineyard, maize, grassland, and forest soils. Gas samples were collected in 12mL (CO_2) or 24mL (N_2O) evacuated vials after 20 (CO_2) or 30 minutes (N_2O) incubation period using static chamber method. Gas samples were analyzed by GC-FID (CO_2) or GC-ECD (N_2O). All land use received biochar amendment, which was compared to control soils' CO_2 and N_2O emission values to examine its greenhouse gas reducing potentials. The vineyard samples included no ploughing or ploughed soils with or without organic fertilizer or biochar addition. CO_2 fluxes increased in the second year in the vineyard samples in all treatments but the absolute control (no ploughing, no fertilizer addition, and no biochar amendment) and the control (ploughing with no fertilizer and no biochar addition). During the two year study the highest CO_2 production was observed in the case of the ploughed, not fertilized, and biochar amended soils. During the second year of the study we found 8% higher CO_2 emission in the biochar amended treatment compared to control treatment in the case of maize, and 5.9% higher in the case of forest. In grassland the biochar amendment reduced overall CO_2 emission by 6.3N_2O production in the vineyard showed similar or even lower emission values with biochar amendment; however, during the second field year and consequently over the overall two year period, the N_2O fluxes increased in biochar added sites compared to the control treatment. Similar findings were observed in the maize field. During the first year biochar amendment resulted in a decrease, while during the second year we observed an increase in overall N_2O fluxes. In the forest and grassland sites, both first and second year of the experiment biochar amendment decreased the N_2O fluxes. Overall, biochar amendment resulted in increased N_2O production in the case of vineyard and maize samples, while reduced emission values were observed in the case of forest and grassland samples.