Evaluation of greenhouse gas emissions from fertilized grassland

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Agriculture contributes 10–12 % of the total global anthropogenic GHG emissions or about 6.8 Gt of CO2 equivalent (eq) per year (UN FCCC, 2008). During 1990 - 2005, emissions from agriculture increased by about 17 % and are projected to increase further due to expected increases in food demand and diet changes as the global population continues to grow. Agricultural land occupied 5023 Mha in

Grassland (1.2 mln ha, or 50 % of agricultural lands in Lithuania) and fertilized areas occupy about 20% of the Earth's land surface generating considerable GHG emissions and increasing global climate change.

Objectives of this investigation were to determine impact of mono and complex fertilizers, their rates and combinations on

Methods. Field experiments were carried out on fertilized natural sward and cultural pasture at Training Farm of Lithuanian University of Agriculture (54.52 N, 23.50 E) Kaunas district, Calc(ar)i-Endohypogleyic Luvisol, clay loam topsoil over silt loam. N and NPK application scheme in semi natural sward see Fig. 1. Cultural pasture was fertilized with $N_{180}P_{120}K_{150}$. P and K applied before vegetation in early spring, N fertilizer applied in 2 times: end of April and after 1st cut (beginning of July). GHG emissions were monitored by the chamber method (r=0.43 m, 0.05 m^{-3}), with 6 replicates. The measurements were done every 1-3 weeks between July and September in absence of frosts stress. The gas samples were analyzed in the laboratory by infrared gas analyzer (MGA3000). Daily net ecosystem CO_2, CH_4 and N_2O exchange (mg h^{-1} m^{-2}) were calculated by integrating the 60-minute fluxes determined by the meteorological measurements over each day.

Results

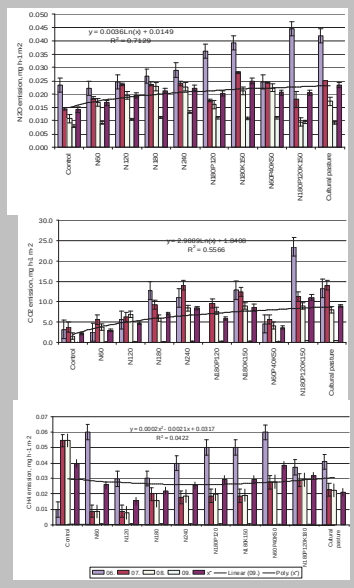

Figure 1. N_2O, $CO_2$and CH_4 exchange between crops and atmosphere in natural sward (Control N180P120K150) and cultural pasture (N180P120K150) (mean±SE)

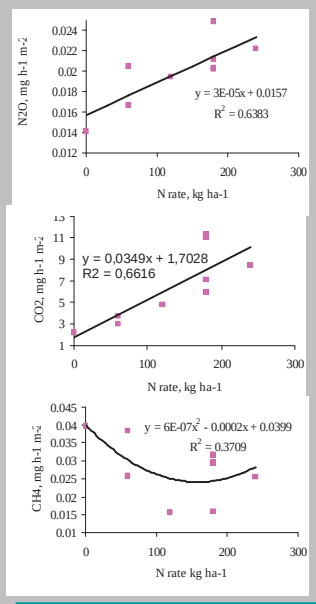

Figure 2. Correlation (p<0.05) between N fertilizers rates and GHG emission

Conclusions. CO_2, N_2O and CH_4 emissions were nearly the same in natural and cultural grasslands and statistically significant correspond with fertilizing and abiotic environment factors. Employing natural sward would not to exceed $N_{60}P_{40}K_{50}$ fertilizing rate due to extensiveness of forming species.

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