world congress on integrated crop-livestock-forest systems
3rd International Symposium on Integrated Crop-Livestock Systems
towards sustainable intensification • brasilia • brazil • 2015

N_2O fluxes using the flux-gradient method and a tunable diode laser trace gas analyzer in an integrated crop-livestock system in the Brazilian Cerrado

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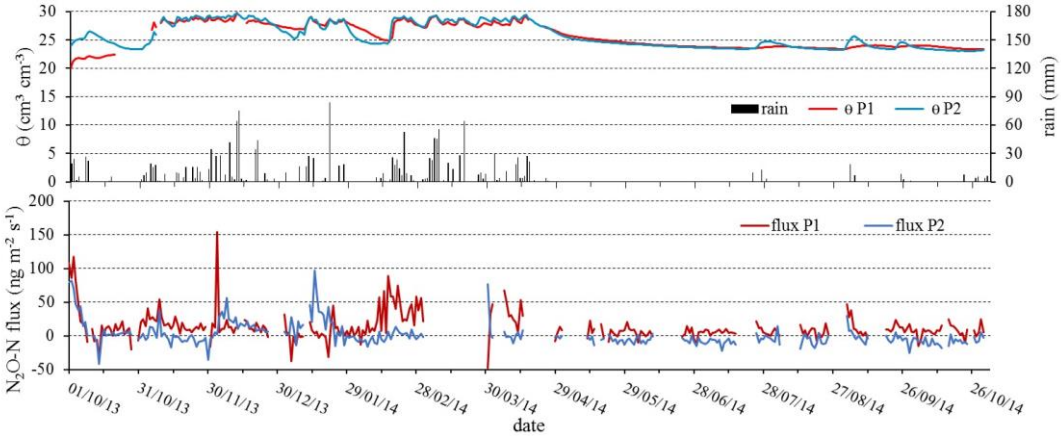
Introduction The integrated crop-livestock (iCL) system comply with many conservation objectives, such as the recovery of degraded pasture, the intensification of agricultural production per unit area and agricultural production intensification. The potential of mitigating greenhouse gases emissions is another important characteristic of the system (Salton et al., 2014). In this study, measurements of N_2O fluxes measured using infrared absorption spectrometry and the flux-gradient method are presented.

Material and Methods The N_2O concentrations were measured in two plots of an iCL system located at Fazenda Capivara, in Santo Antônio de Goiás, GO, Brazil. The soil was a clay Rhodic Ferralsol (Oxisol), using a tunable diode laser trace gas analyzer (TGA200, Campbell Sci.). The measurement period presented here (Oct 2013 to Oct 2014) included a rainy and a dry season, typical of the regional climate. The fluxes calculated using the flux-gradient method were obtained in a soybean–fallow area (P1) and in a 3-years-old pasture (P2), along with rainfall and soil water data.

Results and Conclusions

Fig. 1. N_2O fluxes (B) and soil water and precipitation (A) at a soybean/fallow (P1) and at a 3-years-old pasture (P2) area within an integrated crop-livestock system, in Santo Antonio de Goiás, GO.



Throughout the presented measurement period, a greater emission of N_2O-N was observed during the rainy season, from Oct 2013 to Mar 2014, compared to the dry season (Fig. 1A and 1B). This observed variation of fluxes, mainly depending on soil water content, is expected due to its influence on soil microbial activity and inorganic N availability (Glenn et al., 2010). In P1, after soybean harvest, the daily mean fluxes (8.887 ng m^{-2} s^{-1}, error: 1.029) were higher than in P2, under pasture (-5.963 ng m^{-2} s^{-1}, error: 0.652). Comparisons of fluxes for longer periods will be important to be able to make adjustments in iCL management (e.g. rotation) to reduce its N_2O emissions.

References cited

Salton et al. (2014) Agr. Ecosyst. Environ.; Glenn et al. (2010) Agric. For. Meteorol.

Acknowledgements to Embrapa (02.11.05.001; 01.11.01.002; 01.10.06.001.06.04), CNPq (562601/2010-4), FAPEG and CAPES.