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Fluxes of N_2O in pasture of *Urochloa* spp. under integrated crop-livestock management

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Introduction Nitrous oxide (N_2O) is an important greenhouse gas. Despite its low concentration in the atmosphere, this gas stands out due to its long time of permanence in the atmosphere and to its high global warming potential. Fourty three percent of the direct emissions of N_2O from agricultural soils originate due to animals in grassland (MCTI, 2013). The objective of this study was to evaluate soil N_2O fluxes in a bracharia (*Urochloa* spp.) pasture in an integrated crop-livestock system (iCL) and identify the physical and chemical soil attributes that influence the fluxes.

Material and Methods The study was conducted at Fazenda Capivara of Embrapa Rice and Beans, located within the municipal limits of Santo Antônio de Goiás, GO, Brazil. The investigated integrated crop-livestock (iCL) system was consolidated in 2000. The study was carried out between Feb and Sep 2013 when *Urochloa* spp. was in the field. The studied area occupied 10,000.00 m^{-2} within a 7.5 ha field. The area was used to create beef cattle (Nelore "BRGN"). Synthetic nitrogen was applied twice, 45 kg N ha^{-1} during the rainy season (Feb – Apr) and another 100 kg N ha^{-1} during the dry season (May - Sep). Nitrous oxide was sampled using 25 closed static chambers in the pasture and 5 in the reference area (native forest fragment). Sampling was done between 9:00-11:00 in the morning, being the sampling times 0, 15 and 30 minutes. The N_2O concentration was determined by gas chromatography.

Results and Conclusions The N_2O the fluxes in the pasture varied from -21.10 µg $N\text{-}N_2O$ m^{-2} h^{-1} (EP ± 3.01) to 1045.22 µg $N\text{-}N_2O$ m^{-2} h^{-1} (EP ± 155.61) and were higher when compared to the soil under native vegetation, what varied from -30.08 µg $N\text{-}N_2O$ m^{-2} h^{-1} (EP ± 8.42) to 55.01 µg $N\text{-}N_2O$ m^{-2} h^{-1} (EP ± 27,39). Under pasture and native vegetation the daily average fluxes were of 50.83 µg $N\text{-}N_2O$ m^{-2} h^{-1} (EP ± 31.06) and -8.82 µg $N\text{-}N_2O$ m^{-2} h^{-1} (EP ± 2.17), respectively. The N_2O fluxes under pasture showed significant positive correlation with the water filled pore space (WFPS) of the soil in the rainy season, and with the soil ammonium (NH_4^+) and nitrate (NO_3^-) levels in the dry season. It is reported in the literature that higher N_2O fluxes occur when the WFPS is above 60%, that was also observed in this study in the rainy season. In the dry season, larger magnitudes of N_2O fluxes were favored by the occurrences of rains after dry periods, as also reported by Lessa et al. (2014). The positive correlations observed between N_2O fluxes and both soil NH_4^+ and NO_3^- suggest that both processes, nitrification and denitrification contribute to the formation of N_2O and occur parallel in the soil.

References cited
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