I SEMINAR ON NATURE BASED SOLUTIONS IN AGRICULTURE AND FORESTRY:

Strategies for Carbon Capture and Reduction of GHG Emissions in Brazil

September 4th and 5th, 2023

Research Centre for Greenhouse Gas Innovation

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PROGRAMME AND BOOK OF ABSTRACTS

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NITROUS OXIDE AND METHANE EMISSIONS FROM SOIL UNDER PASTURE FERTILIZED WITH NITROGEN

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Keywords: Carbon footprint; Climate change; Greenhouse gas (GHG).

Impact: Quantify the fluxes of nitrous oxide (N_2O) and methane (CH_4) from soil under nitrogen-fertilized pasture, to improve the N_2O emission factor and, consequently, contribute to the quality of greenhouse gas (GHG) emission inventories.

Highlights: Improvement of regional and national GHG emission inventories. Characterize tropical pasture soils as the CH_4 drain. Appropriate fertilization strategies allow better use of nitrogen inputs.

Abstract: The contemporary global development model has been changing in order to reconcile productivity and sustainability. Harmonizing the environment and production fundamentally depends on the development and adoption of conservationist and sustainable agricultural practices. Livestock accounts for more than 60% of GHG emissions from the agricultural sector in Brazil, while nitrogen fertilization accounts for 35%, which are important aspects for promoting actions to reduce national emissions. The study will be divided into two parts: one in the field and another in the laboratory. In the field experiment, four nitrogen fertilization rates will be evaluated (0, 75, 150 e 300 kg $N.ha^{-1}$, in addition to a treatment with a dose of 150 kg $N.ha^{-1}$ split (50+100 kg $N.ha^{-1}$), regarding GHG emissions. The source of N will be ammonium nitrate, used in experimental plots of 14 x 14 m, with established pasture of *Urochloa brizantha cv.* Marandu. GHG emissions will be monitored using static chambers and periodic sampling after fertilization, until fluxes stabilize. The collected samples will be analyzed by gas chromatography. Next, the daily flows will be integrated and the data will be processed in order to verify the effect of N rates and split of fertilization on N_2O flows and emission factor of this gas and the effect on CH_4 emissions or consumption. For the laboratory research, 12 sources of N will be incubated with soil, under potentially favorable conditions for N_2O emission (temperature of 28ºC and soil moisture corresponding to 80% of the total pores filled with water).

Nitrogen sources will include animal excreta (urine and feces), conventional mineral fertilizers, use of inhibitors and slow-release fertilizers. For about 90 days or until the gas flows stabilize, N_2O and CH_4 will be monitored. It is expected that the results generated in the research will be incorporated into the literature that supports more regionalized and customized N_2O emission factors, contributing to the improvement of emission inventories and to the carbon accounting of livestock production systems.