

## **Assessment of nitrous oxide flux from sugarcane fields in Fiji**

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Due to increasing use of synthetic nitrogen (N) fertilizers, the amount of nitrous oxide (N<sub>2</sub>O) released from agricultural soils is a significant contributor to the Greenhouse Gas (GHG) burden. The amount of N<sub>2</sub>O released from soils depend on the type of fertilizer used along with environmental factors. Due to lack of studies being conducted in tropical countries, as opposed to the temperate regions, these countries lack specific emission factors (EF) which could be used in estimating their National Greenhouse Gas Inventory (NGGI). The Intergovernmental Panel for Climate Change (IPCC) has reported a default EF of 1% of total N-applied for countries which do not have specific EF's. Due to lack of studies done in Fiji, this study aims to calculate the amount of N<sub>2</sub>O emitted from sugarcane fields in Fiji. The static-chamber method and a gas chromatograph equipped with an electron-capture detector were used to calculate the average daily flux of 0.484 mg N<sub>2</sub>O-N m<sup>-2</sup> day<sup>-1</sup>. The daily flux is correlated with environmental factors such as the average soil organic matter (5.88%) and pH (4.60). Low pH is indicative of highly acidic conditions in the soil and is favored by n-fertilizer application, thus increasing the N<sub>2</sub>O flux from the soil. Furthermore, using the IPCC guidelines, the EF was found to be 10.49% which has also been observed in other studies conducted in Australia with similar climatic and soil conditions. It can be deduced that the current N<sub>2</sub>O NGGI for sugar cane is underestimated by a factor of 10. Using the annual data for fertilizer usage by cane-growers and the calculated EF, the amount of N<sub>2</sub>O emitted from sugarcane fields is estimated to be 1.51 Gg of CO<sub>2</sub>-equivalent whereas the default EF gives an under-estimated value of 0.145 Gg of CO<sub>2</sub>- equivalent. Therefore, since the average EF for sugarcane in Fiji is much higher compared to the default EF of 1 %, it suggests that a higher EF must be considered when estimating the NGGI for sugarcane agricultural systems in Fiji.