

Predicting Nitric Oxide Emissions from Cover Crop Management in Brazilian Cerrado with DNDC model

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Abstract: Nitric oxide (NO) is a component of photochemical smog and participates in tropospheric photochemical reactions that produce ozone. The impacts of agricultural management on soil NO emissions remain poorly characterized for many practices and many regions of world, including Brazil, one of the most important crop producers. Mathematical models can help fill these data gaps but most models have not been widely validated in several ecosystems and agricultural systems, such as those carried on the Brazilian Cerrado. We compared soil NO emissions data collected between March 2002 and June 2003 from a long-term experiment by Embrapa Cerrados in Planaltina, Brazil, to the predicted emissions for this experiment obtained by a process based model, Denitrification-Decomposition (DNDC). The experiment comprised *Crotalaria juncea*, *Mucuna pruriens* and natural fallow, under no-tillage and conventional systems. For cover crop in the conventional systems, predicted emissions were very similar to the collected data (mean, 0.8 kg NO-N ha⁻¹ yr⁻¹, T test = 0,69). On the other hand, for no-tillage system, predicted data (mean, 0.7 kg NO-N ha⁻¹ yr⁻¹) were lower than collected data for *Mucuna pruriens* (mean, 1.3 kg NO-N ha⁻¹ yr⁻¹) and were higher than emissions from natural fallow (mean, 0.59 kg NO-N ha⁻¹ yr⁻¹, T test = 3,65). Therefore, results reveal that the DNDC model yet requires calibration for no-tillage systems in Brazilian Cerrado.

Keywords: Agricultural management, no-tillage system, conventional system, NO emissions.