**Title: $N_2O$ EMISSIONS AND BACTERIA BIODIVERSITY IN AN INTEGRATED CROP-LIVESTOCK-FOREST PRODUCTION SYSTEM IN CERRADO / AMAZON ECOTONE**

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**Abstract:**

In 2009 Brazil proposed a voluntary commitment to the Framework Convention of the United Nations on Climate Change, to reduce greenhouse gases (GHG) emissions. Use of Integration Crop-Livestock-Forest (ICLF) system is considered a technology able to mitigate GHG emissions. Seen the importance of biological attributes for the soil processes, studies to better understand the diversity of bacterias related to the N cycle can provide information for the correct land use and soil conservation. The objective of this study was to assess the $N_2O$ emissions and soil bacteria diversity in ICLF systems in Cerrado / Amazon ecotone. Samples of gas and soil were collected in a ICLF system located at Embrapa Agrosilvopastoral. The system consists of 10 treatments: T1= eucalyptus; T2= crop; T3= livestock; T4= 2 years of livestock/ 2 years of crop; T5=2 years of crop/2 years of livestock; T6= crop with eucalyptus; T7= livestock with eucalyptus; T8= 2 years of crop/2 years of livestock; T9= 2 years of livestock/ 2 years of crop, with eucalyptus and T10 = integrated crop, livestock and eucalyptus. The treatments T6, T7, T8, T9 and T10 are divided into two points, the point P3 under eucalyptus and P4 under crop/livestock. The gas samplings were collected from May/2014 up to September/2014, focused on dry season. The gas analyzes were carried out in a Gas Chromatograph FID-ECD. The soil samples were collected on September 2014, end of dry season. The evaluation of diversity was performed by DGGE technique with universal primers for the 16S region. In the $N_2O$ analyzes, it was observed that treatments containing Forest (T1, T7P3, T8P3, T9P3, T10P3) were able to sequester gas. Treatment T1 showed the highest gas consumption with a total average of -5.188 $\mu gN/m^{-2}/h^{-1}$ while the T4 higher emissions with 4,231 $\mu gN/m^{-2}/h^{-1}$. These results show that integrated systems with forestry components such as the ICLF, can contribute to $N_2O$ mitigation. The diversity, according to the Shannon index, ranged from 3,027 to 3,316 for exclusive treatments (T1, T2, T3) and 2,998 to 3,203 for integrated (T6, T7, T8, T9, T10). There was no direct correlation between $N_2O$ emissions and total bacterial diversity. However, we expect to observe significant correlation between gas emissions and bacterial diversity with specific bacteria groups of denitrification.

**Keywords:** nitrous oxide, DGGE, climate change.

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