



Greenhouse gases emission as affected by dairy manure fall-applied to a Silvopastoral system based on Pecan in Argentina

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INTRODUCTION

Silvopastoral systems (SS) are circular since they incorporate woody perennial plants along with grasses and animals, increasing nutrient cycling and beneficial interactions between the components. Pecan (*Carya illinoensis*) has been little studied under SS; however, we do know that pecan nut growth and quality are sensitive to nitrogen (N) addition, a nutrient highly circulated by the SS. Adding N derived from cattle manure to pecan orchards increases nut yield, but we know little about its effect on GHG. Thus, this study aims to assess the GHG emissions after the application of dairy manure to pecan under a SS

MATERIAL AND METHODS

The experiment was conducted at the INTA Balcarce Research station (37°45'48.96''S; 58°17'26.49''W), Argentina, from April to June 2022 (late fall) in a nine years old SS pecan-based. The treatments consisted of the application of dairy cattle manure in the trees (MT), the alley pasture with no manure application (NMP) and no manure application in the trees (NM), with four repetitions each one. The soil had 2.68% of carbon (0-30 cm) and the dairy manure applied had 1.8% of N. The GHG were sampled with the static chamber method 3 consecutive days after manure application. We used 20 mL plastic syringes to withdraw the air after 0, 14, 28 and 42 minutes past chamber deployment. Nitrous oxide (N₂O) and methane (CH₄) were analyzed through a gas chromatograph and the difference among treatments across time was assessed by a multivariate analysis of variance (p<0.05).

RESULTS AND DISCUSSION

The peak of GHG emissions occurred in the second day after manure application but we found no significant effect of dairy manure addition (p<0.05) (Figure 1). But more researches and field experiment should be repeated in other seasons and longer period to check the impact on GHG emissions.

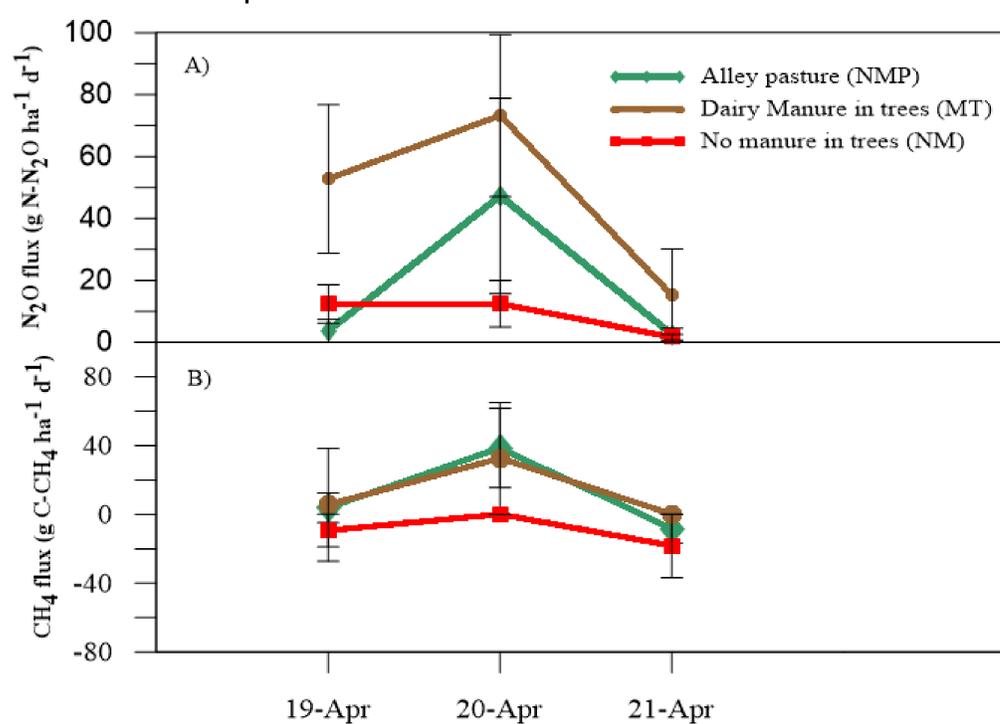


Figure 1: Emissions of a) Nitrous Oxide (N-N₂O ha⁻¹ d⁻¹) and b) Methane (C-CH₄ ha⁻¹ d⁻¹) after the application of dairy manure in a SS system.

CONCLUSION

This trend suggest that there is little impact on GHG emissions for dairy manure addition to pecan during late fall. Thus, that practice could be effective for farmers, with few impacts in the environment, enhancing SS circularity. But more researches should be conducted to check the impact in a long term.

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