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Pastures and forage

Emission of greenhouse gases from soil in pear cactus crops under different planting densities

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Agriculture is an important sector that emits greenhouse gases (GHG) into the atmosphere. However, there are some management practices, such as planting density, planting system and fertilization, that can mitigate GHG emissions. In the semi-arid region, the pear cactus presents itself as a forage capable of maintaining the productivity of the herd with the availability of water and nutrients. However, the effect of dense cactus cultivation on greenhouse gas emissions is not available in current literature. In this way, the objective was to evaluate the effect of cultivation densities of the forage cactus clone IPA-200016/Orelha de Elefante Mexicana (*Opuntia stricta* Haw.) on greenhouse gas emissions from the soil. The experiment was conducted at the Caatinga Experimental Field, belonging to Embrapa Semiárido, in Petrolina, Pernambuco. The soil in the experimental area is classified as Argisol with flat relief. Two pear cactus cultivation densities were evaluated: 30,000 and 75,000 plants ha⁻¹ planted in double rows distributed in a randomized block design with four replications. During the experimental period (18 months of cultivation), three GHG collections were carried out with static chambers installed in the center of the experimental plot and taken to the laboratory for reading on an Agilent gas chromatograph, model 7890A, with an injection oven at 60°C, to determinations of carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) concentrations. The data were subjected to analysis of variance and the means were subjected to the Tukey test at 5% probability for type I error. Planting densities changed (P=0.016) CO₂ emissions with lower emissions for the density of 75,000 plants ha⁻¹ with 33.32 mg C.m⁻².h⁻¹ while the density of 30,000 plants ha⁻¹ obtained emissions of CO₂ of 47.72 mg C.m⁻².h⁻¹, being higher at 14.40 mg C.m⁻².h⁻¹. Lower CH₄ emissions (P<0.001) were observed in cultivations of 75,000 plants ha⁻¹, demonstrating a negative flux of 15.38 ug C.m⁻².h⁻¹, and the density of 30,000 plants ha⁻¹ showed a positive CH₄ flux of 7.36 ug C.m⁻².h⁻¹. However, densities of 75,000 plants ha⁻¹ promoted greater N₂O emissions (P=0.020) with a flow of 7.24 ug N.m⁻².h⁻¹, whereas the density of 30,000 plants ha⁻¹ demonstrated a flow negative 14.28 ug N.m⁻².h⁻¹. In this way, pear cactus (*Opuntia stricta* Haw.) cultivation systems at densities of 75,000 plants ha⁻¹ reduce the emission of carbon dioxide and methane into the atmosphere, becoming more sustainable systems when compared to less dense cultivation.

Keywords: carbon, forage farming, methane, nitrous oxide

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