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Greenhouse gas emissions and plant characteristics from soil cultivated with sunflower (*Helianthus annuus* L.) and amended with organic or inorganic fertilizers.López-Valdez F, Fernández-Luqueño F, Luna-Suárez S, Dendooven L.Laboratory of Agricultural Biotechnology, CIBA, IPN, Tepetitla de Lardizábal, C.P. 90700, Tlaxcala, Mexico.
flopez2072@yahoo.com**Abstract**

Agricultural application of wastewater sludge has become the most widespread method of disposal, but the environmental effects on soil, air, and crops must be considered. The effect of wastewater sludge or urea on sunflower's (*Helianthus annuus* L.) growth and yield, the soil properties, and the resulting CO₂ and N₂O emissions are still unknown. The objectives of this study were to investigate: i) the effect on soil properties of organic or inorganic fertilizer added to agricultural soil cultivated with sunflower, ii) how urea or wastewater sludge increases CO₂ and N₂O emissions from agricultural soil over short time periods, and iii) the effect on plant characteristics and yield of urea or wastewater sludge added to agricultural soil cultivated with sunflower. The sunflower was fertilized with wastewater sludge or urea or grown in unamended soil under greenhouse conditions while plant and soil characteristics, yield, and greenhouse gas emissions were monitored. Sludge and urea modified some soil characteristics at the onset of the experiment and during the first two months but not thereafter. Some plant characteristics were improved by sludge. Urea and sludge treatments increased the yield at similar rates, while sludge-amended soil significantly increased N₂O emissions but not CO₂ emissions compared to the other amended or unamended soils. This implies that wastewater sludge increased the biomass and/or the yield; however, from a holistic point of view, using wastewater sludge as fertilizer should be viewed with concern.

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