Long-term biosolids use in agricultural lands in a circular economy model: Effects on selected chemical properties and the fate of triclosan and sulfamethoxazole

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Human and environmental health concerns over the use of biosolids in agricultural lands as fertilizers are rising. This study investigated the long-term effects of biosolids use in agricultural lands on a) selected soil chemical properties, b) sulfamethoxazole and triclosan accumulation in the soil, and c) uptake of sulfamethoxazole and triclosan by maize crop and their resulting risk to human health. A long-term field trial (> 15 years) consisting of rainfed and rainfed-irrigated maize plots treated with biosolids at different rates was used to achieve the aims. Biosolid applications significantly ($p \leq 0.0001$) improved soil organic matter and total nitrogen, but also resulted in soil acidity and salinity. Long-term biosolids applications did not result in traceable concentrations of triclosan and sulfamethoxazole in the soil. However, it has resulted in the detection of triclosan in aerial parts of maize though not high enough to cause appreciable risks to human health via dietary intake.