Analysis and Characterization of Bio-Slurry: Pesticide and Herbicidal Potential from Biogas Anaerobic Digestion Systems.

Gitonga Gitonga*†[1]

[1]Maasai Mara University – Kenya

Résumé

This study focused on harnessing bio-slurry, a residual biomass from anaerobic digestion (AD) systems, for sustainable chemical applications. It addressed the pressing need for eco-friendly solutions within green chemistry and the circular economy framework. By analyzing bio-slurry produced by AD biogas systems, the research investigated its elemental compositions and physicochemical attributes across different AD plants and feedstocks like pig manure, mixed substrates, and cow dung. Using advanced analytical techniques like GC-MS, the study revealed bio-pesticide and biofuel potentials in the bio-slurries. Notably, GC-MS analysis identified significant compounds in pig waste bio-slurry, including nitrogen-containing heterocycles and pesticide-relevant chemicals like cis-2, 5-dimethylpiperazine and Gramine, highlighting the slurry's potential in agricultural pest control. Gramine was identified from the MS spectrum. The structure was observed in both the mixed waste and the pig waste bio-slurry samples, with a greater concentration in pig waste bio-slurry, 2.58% followed by 1.47% in the mixed waste slurry sample. N, N-dimethyl-1H-indole-3-methylamine (Gramine), an indole alkaloid that was first discovered from Arundo donax, and typically serves a protective function in plants against herbivores (Korbag et al., 2020). Gramine alkaloid has also been reported in Lupinus luteus, a leguminous species used in feeding fish as a protein supplement (Szczepański et al., 2022). Gramine has been reported to exhibit toxic effects against rice brown planthoppers (Yang et al., 2021). These findings showed the usefulness of bio-slurry in green and sustainable chemistry applications, supporting its integration into waste management practices and fostering advancements in eco-friendly chemistry within agroecosystems.
KEYWORDS; Anaerobic Digestion; Grass; Bio-slurry; Green Chemistry; GC-MS Analysis

reference

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*Intervenant

†Auteur correspondant: luckymarxy@gmail.com

Mots-Clés: Anaerobic Digestion, Gramine, Bio, slurry, Green Chemistry, GC, MS Analysis