



# Agronomic value of biodigester digestate for market garden crop production in Sèmè-Podji, Benin: case of lettuce (*Lactuca sativa* L.) And cucumber (*Cucumis sativus* L.)

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## 1 ABSTRACT

Mineral fertilizers remain the primary input in market gardening across sub-Saharan Africa, yet their long-term use degrades soil organic matter and poses environmental risks. Biodigester digestate, a by-product of anaerobic digestion, represents a promising organic amendment that could reduce dependence on synthetic inputs while closing nutrient cycles. This study evaluated the agronomic performance of liquid digestate produced by the Biogaz Benin biodigester on two widely consumed vegetable crops namely lettuce (*Lactuca sativa* L.) and cucumber (*Cucumis sativus* L.) under field conditions in Sèmè-Podji, southern Benin. A Completely Randomized Block design with three treatments and three replications was implemented: digestate treatment (TD, 1 L/m<sup>2</sup>), conventional treatment (TC, NPK mineral fertilizer combined with poultry manure), and an unfertilized control (TT). For lettuce, digestate produced the highest values across all measured growth and yield parameters: leaf number (6.57 ± 2.41), stem diameter (8.18 ± 3.88 cm), plant height (142.27 ± 3.84 mm), canopy diameter (100.94 ± 12.01 mm), and fresh weight yield (26.67 ± 2.31 t/ha). For cucumber, digestate also yielded the best results for leaf number (3.31 ± 3.37), seed emergence rate (97.78 ± 3.85%), stem diameter (4.55 ± 4.04 cm), and stem length (352.65 ± 554.77 mm), although the highest mean fruit number (1.22 ± 0.69) was recorded under conventional treatment. Statistical analysis showed that TD and TC were not significantly different for most parameters, yet both consistently outperformed the unfertilized control. These findings demonstrate that biodigester digestate can effectively substitute mineral fertilizers for lettuce and cucumber production, supporting its promotion as a sustainable organic amendment in the context of West African urban and peri-urban agriculture.