African Learning Design

Sustainable Aquaponics Systems in South African Slums: Water Use Efficiency and Feed Conversion Ratios

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Abstract

Sustainable aquaponics systems integrate fish farming with hydroponic vegetable cultivation in urban settings where water resources are limited and expensive. The study employed a mixed-methods approach including hydroponic and fish farming trials. Data were collected through automated sensors measuring water quality and flow rates, alongside manual observations of plant growth and fish health indicators. A notable trend observed was that the average feed conversion ratio for tilapia in our aquaponics systems was approximately 2.5:1, indicating improved efficiency compared to traditional fish farming practices. The findings suggest potential cost savings and environmental benefits from implementing sustainable aquaponics solutions in urban slum areas. Further research should be conducted on scaling up these systems for wider implementation in South African cities. aquaponics, water use efficiency, feed conversion ratios, urban agriculture, South Africa The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African Geography, Aquaponics, Hydroponics, Methodology, Sustainability, Urbanization, Water Management*

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