

**EVALUATION OF THE PERFORMANCE OF SOME NATURAL WASTEWATER
TREATMENT SYSTEMS AND THE USE OF THEIR RESULTANT EFFLUENTS FOR
IRRIGATION OF VEGETABLE FARMS IN THE ACCRA METROPOLIS**

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ABSTRACT

The study was based on the treatment of domestic wastewater in waste stabilization pond systems with specific interest in the dynamics of the contribution of algae and duckweeds, referred to as treatment agents, to the destruction of pathogenic organisms and the removal of nutrients from domestic wastewater. Domestic wastewater was fed through a bench-scale continuous flow wastewater treatment plant comprising three treatment systems namely; a Duckweed system, an Algal system and a Hybrid system comprising a combination of algal and duckweed ponds. The performance of the Hybrid system in terms of faecal bacteria destruction and removal of BOD, ammonia, nitrite, nitrate and phosphorous was assessed in comparison with the Algal and Duckweed systems. The results showed that integration of alga and duckweed ponds improved the removal of ammonia, nitrate and nitrite.

The study also assessed the optimum concentration of algae that would affect the most faecal bacteria removal from wastewater. This was done by introducing into wastewater different concentrations of algae and monitoring the faecal coliform levels over a period of 7 days. The optimum concentration for maximum faecal coliform removal was 1150 μ g/L.

The role played by attachment of faecal bacteria to suspended particles in the overall removal of faecal bacteria from the wastewater was also studied. A two-stage preliminary test on attachment was done using *E.coli* cells. The first step involved centrifugation of a culture of *E.coli* to cause attachment and in the second stage, the centrifuged *E.coli* culture was pushed through a syringe and needle to cause detachment. Based on the result of the preliminary test, the role played by attachment or the removal of faecal bacteria from the continuous-flow system was assessed. Attachment and subsequent sedimentation was found to contribute 50% - 70% to the removal of faecal bacteria from wastewater.

A survey was conducted among vegetable farmers in some parts of Accra by means of questionnaires to assess their knowledge and willingness to treat wastewater before applying it on crops. It was

found from the survey that most vegetable farmers are willing to treat the wastewater they use for watering the vegetables provided the treatment method is reliable and cost effective.

Based on the findings of this study it was recommended, among others those algal ponds in a waste stabilization system be monitored in such a way that a chlorophyll A concentration of 1150 μ g/l is maintained in order to ensure maximum faecal bacterial destruction. Also, if support in the form of capital and logistics is provided for vegetable farmers, they will be ready to treat wastewater before use.

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