

A Comparative Assessment of Phytoremediation and Slow Sand Filtration Technologies for the Secondary Treatment of Sewage Effluent and Public Views on the Use of Treated Effluent

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ABSTRACT

This study evaluated and compared the performance efficiency of both technologies for treating sewage effluent from a Biogas facility at Valley View University (VVU) and also assessed public perception about the use of the treated effluent. Samples of the sewage effluent from the VVU Biogas facility were subjected to slow sand filtration over a ten week period using river bed sand and gravels, and phytoremediation using two plants, *Pistia stratiotes L* and *Ipomoea aquatica Forsk*. *Pistia stratiotes* survived in the raw effluent for five days, while *Ipomoea aquatica* survived longer (four weeks). The findings revealed that both plants reduce contaminant levels. However, *Ipomoea aquatica* had higher removal efficiency for phosphates (16.07%) and nitrates (100%). *Pistia stratiotes* on the other hand was more efficient at improving electrical conductivity (55.45%). The study showed that both slow sand filtration and phytoremediation using *Ipomoea aquatica* are equally efficient at improving turbidity and Chemical Oxygen Demand (COD). There were significant differences in values obtained for dissolved oxygen (DO), nitrates and phosphates. Based on the differences, SSF performed better at removing nitrates and phosphates while *Ipomoea aquatica* did better at enhancing dissolved oxygen. No significant differences were recorded for electrical conductivity (EC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), colour, and Biochemical Oxygen Demand (BOD). However, when the means were compared, SSF was better at removing TSS, BOD and colour whilst *Ipomoea aquatica* was better at removing EC and TDS. Both technologies were successful at reducing microbial load. This study also revealed that the parameters analyzed on the effluent discharged from the VVU Biogas facility fell within acceptable guidelines with the exception of EC. Majority of respondents agree that water is a scarce resource and that the Millennium Development Goal (MDG) on water cannot be achieved. Majority of people interviewed support the use of wastewater for medium contact options such as fire-fighting (71.6%), industry (52.9%), construction of buildings (71.6%), toilet flushing (81.4%), commercial car wash (46.1 %), public parks and sports field irrigation (54.9%). Support for high contact options such as swimming pool, aquifer augmentation and laundry was low; 10.7%, 29.4% and 34.3% respectively and this is because respondents consider the treated water to be detrimental to health. Respondents supported the idea of wastewater reuse for reasons of water conservation and minimization of dependency on treated water

whilst environmental protection ranked as the least frequent response. Education is needed to sensitize the public on treatment and use of wastewater.

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