Electricity from Living Water Hyacinth Plants Enhanced Biogas Production

Chirara, Macdonald (School: ZRP High School)

Biogas has the potential to provide clean renewable source of energy and facilitate a sustainable development of energy supply for Zimbabwe and Africa at large. However, certain constrains such as long retention time and low gas production are associated with it. The project aimed at improving the efficiency of biogas production using methanogenic bacteria in fibrous roots of live water hyacinth plants (Eichhornia crassipes) and generation of electricity by heating a thermoelectric module using the biogas produced. 5 Kilograms of cow dung and 5 Kilograms of cooked cornmeal remains were collected and mixed with 10 litres of water in a mixing chamber. The slurry formed was added to a bio digester under batch feeding system. Water hyacinth plants were made to grow within the bio digester through small holes with their roots submerged inside the slurry for twenty days. The bio digester with the water hyacinth plants was labelled A. A second bio digester was prepared using the same method and was labelled B. The biogas produced was then directed to the thermal unit where it was used to heat the lower side of a thermoelectric module whilst the upper side being cooled by a heat sink integrated with water pipes and the voltage produced was measured. Experiment A with the water hyacinth plants gave the highest volume of biogas per day. A maximum voltage of 1.5 Volts was measured using one single 40x40 mm module in the thermal unit, when the temperature difference was 60 degrees Celsius.