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Microbial fuel cell (mfc) application for generation of electricity from dumping rubbish and identification of potential electrogenic bacteria

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Microbial fuel cell (MFC) is a device in which microorganisms consume organic compounds as their nutritional source and discharge electrons to the electrode, thereby generating electricity. In this study, double chamber MFCs and multiple chambers MFCs were constructed for the generation of electricity from microorganisms present in organic waste samples. After constructing double chamber MFCs, samples were collected from organic wastes from local garbage dumping area in wetland and electricity was generated by the oxidation of endogenous microbes present in samples. Electricity production was gradually increased with the growth of organisms, which was decreased after time interval due to depletion of organic matter. A steady state for electricity generation was maintained by adding external glucose. In total, 44 bacteria were isolated from the anodic biofilm. The electrogenic activity of each isolate was observed using artificial wastewater (without organic matter) as substrate. A significant generation of electricity (Maximum 5.78 V and 5.03 mA in multiple chambers MFC) was attained connecting multiple chambers containing MFCs. Microbial diversity on anodic biofilm was observed by scanning electron microscope (SEM) image analysis. Morphological, biochemical and molecular characterization of the anodic biofilm bacterial community suggested that 54.54% of electrogenic bacterial community belonged to the Enterobacteriaceae family. In addition, the non-fermentative genera *Pseudomonas, Moraxella, Vibrio, Burkholderia, Escherichia, Enterobacter, Photobacterium, Obesumbacterium, Sphingomonas a*nd *Raoultella* also played an important role in the MFCs operation. Microbial fuel cell (MFC), a renewable method for electricity generation from biodegradable compounds without emission of carbon dioxide, is crucial for sustainable electricity production in countries like Bangladesh as an environmentally friendly approach.

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