Voltage Production by Geobacter Sulfurreducens as a New Source of Renewable Energy

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The bacterium Geobacter sulfurreducens is part of anaerobic soils and sediments that couples organic compounds and converts them into electricity. Soil is the superficial part of the Earth's crust and has different types of nutrients. When nutrient levels decrease, chemical and natural fertilizers are necessary. Could a new source of renewable energy be obtained by increasing the production of voltage of Geobacter sulfurreducens by adding nutrients (natural and chemical fertilizers) in different types of soils (Inceptisol and Mollisol) to turn on a 3V LED? The hypothesis was: A natural fertilizer which contains nitrogen, calcium, iron, and nutrients derived from biosolids (organic compounds), which are the main source of the fertility of the soil, will be more effective than chemical fertilizers (which don’t contain organic compounds) increasing the production of voltage by Geobacter Sulfurreducens in different types of soil. Samples of 600g of each type of soil were collected. An analysis of macronutrients, pH and fertility was performed, and 200g of natural and chemical fertilizers were individually applied. Then, 600g of soil were placed in the fuel cell and the voltage produced for one week was measured. The hypothesis was accepted because all the studied types of soil increased the production of voltage with the natural fertilizer. The Inceptisols produced 11.2V and the Molisols 16.4V. The group with the chemical fertilizer did not produce voltage and the pH decreased. The importance of this research is that the implementation of this system can help to reduce the electricity bill up to 40%.

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