

Botanica Based Small Scale Power Generation and Analysis

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Abstract: In this paper, small scale clean electricity generation has been proposed for household decoration purpose from the relieving plant. The experimental work carried out for small scale power generation, utilizes different types of electrodes as well as several plants to harness maximum electrical power to glow LED lights. It is observed that copper and magnesium along with water hyacinth gives the highest power output in comparison to other combinations.

Keywords: Renewable energy; Organic energy; Energy harvesting system; living plants

1. Introduction

In these days we used the hydrocarbon resource such as petrol, coal and gas and the global economic currently hinges on increasing rate of production of these fuels. And the back side of hydrocarbon resources also released large amount of CO₂ gas and other harm full gas into atmosphere. And day by day our atmosphere pollution rate is increase and this is also responsible of green house effect. Green house gases gradually increase the temperature of the earth's surface and also warmer our atmosphere and collapsing our global environment. Therefore government increase use of renewable energy. And in this research we generated electricity through living plant we find that the photosynthesis process is responsible for generation of electricity. In the photosynthesis process plant absolved CO₂ and released O₂. And the reaction of CO₂ and water it form glucose and the glucose is store in the root of plant and pant root are also store many active bacteria this bacteria feed on sloughed off plant cell and bacteria release of electrons and we collect all electrons by pair of metal. In this process plant not released any harmful gas and chemical. And switching to renewable energy sources for electricity generation provides beneficiary management strategies from the economic, as well as environment point of view. [1] The solar energy captured by living plant converted into chemical energy and during this photosynthesis process the splitting of water molecules donates the electrons which can be transferred to the LFC anode (zinc) and as an addition electrons flow (photosynthetic current). [2] It is understood that under sunlight, a plant produces electrons. [3] The plant root system produces and releases different types of organic compounds in the soil, which include (1) exudates: sugars, organic acids, etc. (2) secretions: polymeric carbohydrates and enzymes; (3) lysates: dead cell materials(4) gases: ethylene and CO₂. [4] It is found that voltages are produced to greater or lesser extents by all tests where combination of copper-zinc and aloe vera produces the highest voltage. [5] that Aloe Vera (0.945 V) produces the highest open circuit compared with Pulai tree (0.8V) and banana tree (0.913 V). It can be seen that the output voltage obtained from banana and Aloe Vera is 0.913V and 0.945V. [6] Living plant power output is highly influenced by physiochemical parameters (pH, temperature, moisture, light, soil nutrition, conductivity and

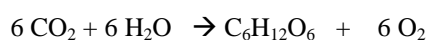
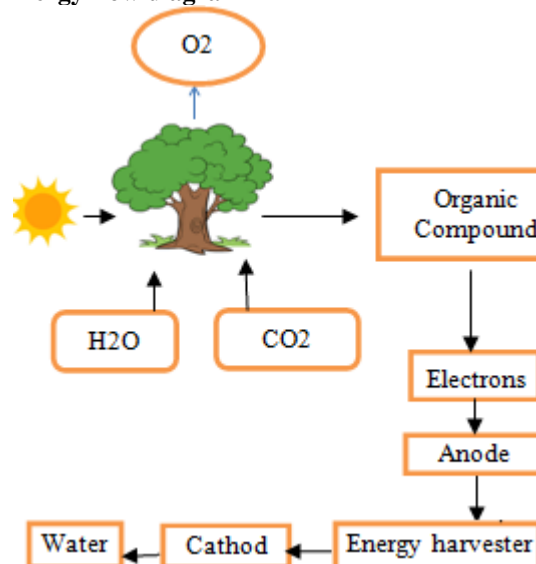
etc.) and environmental climate. [7] with the help of plant we get energy but it is few of millivolts to hundreds of millivolt.

2. Experimental Details

(a) Electricity production

The main process which helps plants to function as source of electricity is photo synthesis the electrochemically active bacteria assists the release of electrons. We know that "photosynthesis" is a process in which plant absorb co₂ and released O₂ into the atmosphere and plant converted light energy in fact solar energy is converted into chemical energy. The plant root system produces and releases different types of organic compounds in to the soil, which include sugars, organic acids, carbohydrates and enzymes, dead cell materials, ethylene and CO₂ It is help to generate energy.

(b) Energy flow diagram



3. Process

After planting a hyacinth tree on a pot if the pair of magnesium and copper is applied in it and the tree is kept

in the sun, and the process of photosynthesis starts in it. In the process of photo synthesis, the tree takes up CO₂ and releases oxygen. When the tree takes up CO₂ reacts with water to form glucose. The glucose that produced in stored in roots of plant. And we know the roots of plants are present in rhizosphere the rhizosphere is the narrow region of soil that is directly influenced by root secretion the rhizosphere contains many bacteria that feed on slowghed – off plant cell and the proteins and sugars released by roots. The electrons thus liberated are attracted toward anode since the electrons are negatively charged and anode is positive and e- flow from anode to cathode.

4. Investigation on the Potential Application

Investigation shows that we can use the small amount of electricity received from plants to do LED light billing or to run digital clock or calculator and we can use it to consume low amount to use electrical equipment.

5. Result

We have obtained different output using different type plants and different types pairs of metal as shown below. We have used copper, zinc, aluminium, magnesium and iron metal in this research and we have tried to achieve electricity by making different pair. We have the highest voltage from the hyacinth plant and pair of magnesium and copper. Which is around 1.9V and the lowest output from the copper and iron pair which is 0.3V.



Figure 1: A LED powered by organic energy source

Hyacinth plant:

- Mg-Cu = 1.9 V
- Cu- Fe = 0.3 V
- Al- Zn = 0.4 V
- Cu- Al = 0.6 V

Similarly, the highest voltage is obtained from Aloe Vera plant from magnesium and copper pair which is approx. 1.5 V and lowest voltage is obtained from iron and zinc pair which is 0.4V nearest.

Aloe Vera

- Cu-Zn = 0.9V
- Mg-Cu = 1.5V
- Cu-Fe = 0.5V
- Cu-Al = 0.4-0.5V
- Al-zn = 0.4V

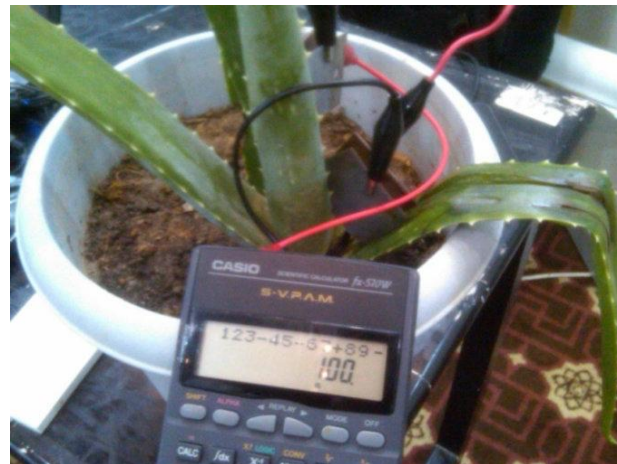


Figure 2: A scientific calculator showing numerical calculation

Similarly, in the banana tree we get the highest voltage from magnesium and Zinc, which is 1.4V and the lowest voltage we get from the copper and iron pair 0.3V.

Banana plant:

- Mg-Cu = 1.4V
- Zn-Cu = 1V
- Fe-Cu = 0.6V
- Al-Cu = 0.4V
- Zn-Al = 0.3V

6. Test on Some Practical Application



Figure 3: A led light powered by organic energy source

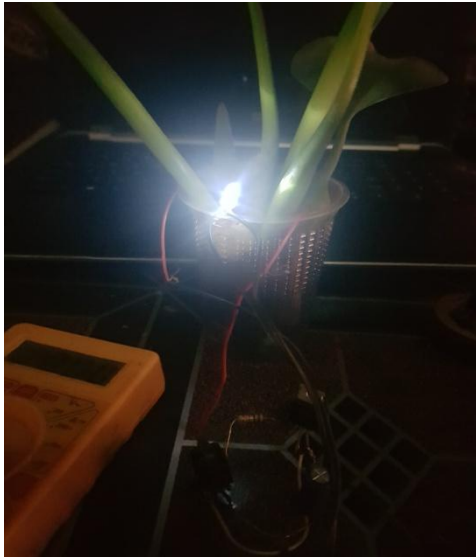


Figure 4: A LED light powered by plant energy

7. Conclusion

In this paper, experimentally shown that we get clean power from the living plant. The observation shows that proper selection of electrode combination and plants influence the harvested power output. However, the amount electrical power is small in quantities and recommended to use for low per consuming LED lights for decoration purpose even inside house, since power production having almost negligible pollutant emission. In future further research can be carried out in association with power electronic devices to increase its voltage level along with optimal output power.

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