

Utilization of Natural Made Compost as Potential Source of Electricity

Maria Eva E. Diongco Ed. D., Catherine Del Rosario

College of Teacher Education –Graduate Studies and Applied Research
Laguna State Polytechnic University Sta. Cruz Campus
Laguna, Philippines

Abstract: Utilization of natural made compost from fruits and vegetable scraps, saw dust and fish entrails in producing electrical energy was the focused of the study. Determination of Electric potential, LED brightness and Time Duration interval of the Natural Made Compost as possible source of energy using distilled and potable water and identification which proportions of the compost and the type of water significantly affect the potential source of energy were considered. This study utilized Experimental research design and Analysis of Variance (ANOVA) and mean in testing and gathering of data. The results revealed that 2 kg of compost diluted in potable water produces 7.82V electric potential than distilled water. Moreover, in lighting up an LED, 2kg compost took 30-20.67 days as compared to 1kg and 1.5kg, which are 9.67; 11.33; 13.33; 14.33 days respectively which means that Electric Potential and Time duration interval were significantly affected by the amount of compost and type of water used but not in terms of LED brightness.

Keywords: natural made compost, source of electricity, fruits and vegetable scraps

1. Introduction

Rapid technological change required people to be greatly dependent in electricity thus demand for higher energy consumption and adding to an irresolvable problem in global warming and waste mismanagement. And as long humans exist, wastes are present. In the long run, these wastes become harmful if not properly disposed. Nevertheless, these unwanted stuffs can produce electricity, heat, compost materials or fuel. Awareness of the usability of organic wastes as alternative source of energy can help achieve a basic sustainable community development. With these existing issues, the researcher decided to conduct a study on the utilization of natural made compost as an alternative source of electricity.

2. Statement of the Problem

The study specifically intended to answer the following questions: What proportions of Natural Made Compost will produce the highest electric source in terms of Electric potential, LED Brightness, Time Duration Interval; What level of potential electric source from the different proportions of Natural Made Compost using potable water in terms of Electric Potential, LED Brightness, Time duration interval; and Do the proportions of natural made compost and type of water significantly affect the potential source of electricity in terms of electric potential, LED Brightness and Time duration interval?

3. Review of Related Literature

A myriad of science researches have made and tested over the years yet very few have utilized organic materials such as vegetable and fruit scraps saw dust, and fish entrails as an alternative source of energy. In this review, studies examined were a combination of keen observation, review and adaptation of previous researches and data obtained from qualitative studies. Omer (2007) stated in his review of organic waste treatment for power production and energy supply these

organic wastes contain stored energy from the sun called bioenergy. These organic materials include plants matter and animal waste, known as biomass. While, Van Camp et.al., (2007), said that composts can be made from most organic byproducts. Common feed stocks are poultry, hog and cattle manures, food processing wastes, sewage sludge, municipal leaves, brush and grass clippings, saw dusts, and other by-products of wood processing. Moreover, Ogunleye et.al., (2010), said that saw dusts are produced as small discontinuous chips or small fragments of wood during sawing of logs of timber into marketable sizes. The chips flow from the cutting edges of the saw blade to the floor during sawing operation, hence its name Sawdust has hitherto been classified as a waste and a nuisance to man and its environment, but in recent years, researches have shown that saw dusts can be used in the production of biogas, packaging fillers, as lagging materials etc.

Tchoukanova et.al., (2012), mentioned that the majority of fish entrails are disposed of in the ocean. The aerobic bacteria present in the water break the organic matter in the presence of Oxygen leading to a considerable reduction of Oxygen in water. There are also overloads of Nitrogen, Phosphorous and Ammonia, which lead to pH variation, increased turbidity of the water and as a result of the decomposition of algae. The reduction in water oxygen content creates an anaerobic condition that leads to the release of foul gases such as Hydrogen Sulfide and Ammonia, organic acids and greenhouse gases such as Carbon Dioxide and Methane. And according to Rader (2013), fish guts and other discarded fish parts are a good source of Nitrogen if handled correctly. Fish wastes, including entrails, backbones (sometimes referred to as “racks”), heads, and fins can be composted with minimal odor and without attracting animals and other pests, including flies.

On the other hand, The American Heritage Dictionary defines electric potential as the work per unit of charge to move a change from a reference point to a specified point,

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measured in joules per coulomb or volts. The static field is the negative of the gradient of the electric potential. Scatena (2010) both mentioned that electrical conductivity pertains to the ability of the soil water to carry an electrical current. The presence of dissolved solids such as calcium, chloride, and magnesium in water samples carry the electric current through water.

Islam et. al., (2013) concluded that in order to determine user acceptance for light-emitting diode (LED) for office lighting, a full-scale experiment was conducted in two mock-up office rooms with different light spectra at two different illuminances. Six LED spectra and two fluorescent lamp spectra were used for the study. The observers' preferences showed that spatial brightness was affected by illuminances and SPDs. The lighting with a SPD having higher values of a reference-based metric (CQS Colour Preference Scale) and an area-based metric (CQS Gamut Area Scale or Gamut Area Index) was preferred most at a CCT of 4000 K. It was also found that the lighting with the fluorescent lamp was least preferred among the other SPDs at the CCT of 4000 K.

4. Methodology

In implementing this research, the following shall be utilized:

- A. Organic wastes such as vegetable and fruit scraps saw dust, and fish entrails converted into natural made compost as potential source of electricity.
- B. Experimental method of research to show how organic materials developed into natural made compost that can be a potential source of electrical energy.
- C. Applied quantitative approach in data gathering procedure on the potential of the natural made compost as alternative source of energy

5. Results and Discussion

Electric Potential

Table 5: Mean level of different proportion of natural made compost in distilled and potable water in terms of Electric Potential

| Amount of Natural made compost (kg) | Electric Potential (V) | |
|-------------------------------------|------------------------|---------------|
| | Distilled water | Potable water |
| 1 | 6.38 | 7.26 |
| 1.5 | 6.52 | 7.40 |
| 2 | 7.0 | 7.82 |

Table 6: ANOVA Table with Electric Potential as the Response Variable

| Source Value | F | p | Remarks |
|-----------------------------------|--------|--------|-----------------|
| Amount of compost | 129.87 | < .001 | Significant |
| Type of water | 35.72 | < .001 | Significant |
| Amount of compost * Type of water | 0.38 | 0.547 | Not Significant |

Table 7: Coefficients of Natural made compost As Potential Source of Electricity

| Term | Coefficient | t | p | Remarks |
|-------------------------------------|-------------|-------|-------|-----------------|
| Constant | 6.1853 | 77.51 | <.001 | |
| Amount of Compost | 0.5850 | 11.40 | <.001 | Significant |
| Type of water Distilled | -0.4769 | -5.98 | <.001 | Significant |
| Amount of Compost * Distilled water | 0.0317 | 0.62 | 0.547 | Not Significant |

The tables above showed results of the Electric Potential Test of Natural Made Compost as an alternative source of energy. Table 5 revealed that electric potential distilled in potable water is higher than in distilled and that the amount of compost increases as the potential energy also increases. It is further supported by the statistical analysis in table 6 and coefficients results in table 7.

LED Brightness

Table 8: Mean level of different proportion of natural made compost in distilled and potable water in terms of LED Brightness

| LED Brightness (cm ²) | Type of water | |
|-----------------------------------|------------------------|---------|
| | Amount of Compost (kg) | |
| | Distilled | Potable |
| 1 | 12.56 | 12.56 |
| 1.5 | 12.56 | 12.56 |
| 2 | 12.56 | 12.56 |

The tables above illustrated that LED lights up because its forwarded 3.4Volts is sustained by the natural made compost regardless of the amount and the type of water used.

Table 9: Mean level of different proportion of natural made compost in distilled and potable water in terms of Time Duration Interval

| Time Duration Interval (days) | Type of water | |
|-------------------------------|------------------------|---------|
| | Amount of Compost (kg) | |
| | Distilled | Potable |
| 1 | 9.67 | 11.33 |
| 1.5 | 13.33 | 14.33 |
| 2 | 20.67 | 30.00 |

Time Interval

Table 10: ANOVA Table with Time Duration (Days) as the Response Variable

| Source Value | F | p | Remarks |
|-----------------------------------|--------|-------|-----------------|
| Amount of compost | 102.36 | 0.000 | Significant |
| Type of water | 2.71 | 0.122 | Significant |
| Amount of compost * Type of water | 6.84 | 0.020 | Not Significant |

Table 11: Coefficients of Amount of Compost and Electric Potential

| Term | Coefficient | <i>t</i> | <i>p</i> | Remarks |
|-------------------------------------|-------------|----------|----------|-----------------|
| Constant | -5.69 | -2.50 | 0.026 | |
| Amount of Compost | 14.83 | 10.12 | 0.000 | Significant |
| Type of water Distilled | 3.75 | 1.65 | 0.122 | Significant |
| Amount of Compost * Distilled water | -3.83 | -2.61 | 0.020 | Not significant |

As shown in table 10, there was a marginal improvement for all three organic wastes and that the voltage output of these samples could be sustained for seven days while table 11 significantly revealed that for every 1kg increase in the amount of compost, there is a corresponding 14.83 day increase in time duration.

6. Summary, Conclusion and Recommendations

The findings of the study presented the difference the mean level of the natural made compost as potential source of electricity as to Electric Potential and Time Duration Interval in both potable and distilled water were significant unlike the LED brightness revealed that natural made compost can be utilized as an alternative source of energy. Hence, the research hypothesis is rejected.

Furthermore, it can be concluded that people can use vegetable and fruit scraps saw dust, and fish entrails as a substitute energy source to avoid improper waste disposal, lessen garbage pollution, reduce global warming and promote a healthy environment. This proved that protecting the environment while promoting innovation takes resourcefulness, initiative coupled with advocacy for change. As the great Mahatma Gandhi said: "Be the change you want to see in the world."

In view of the findings and conclusion presented it was recommended that utilization of highest proportion of natural made compost should be utilized to produce higher and longer electric potential; Use a more sensitive instrument in determining LED brightness; Design an in-house compost power unit for larger electrodes tanks enabling to light 20W-40W fluorescent lamp; Introduce the designed in-house compost power unit to the community as pilot project; and encourage future studies using waste products as raw materials.

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