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Research Article

The Study Of The High Potential Of The Electric Voltage At Ripeness Level Of Banana Variats With Carbon Waste Utilization

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Abstract

The energy requirement to fulfill the daily needs is really substantial so that battery innovation has been doing. This journal worked the study for learning of the voltage potential impact at the ripeness level of variation of banana with utilization of carbon waste from the bar carbon of used battery and graphite pencil (PGE) as the cathode and the anode used an iron sheeting (Zn). Banana variant that was used is Cavendish, Feather Plantain (musa ā paradisiaca), Local Cavendish (musa acuminata cavendish) , "Muli" (musa paradisiaca L) with different level of ripeness such as fresh ripe and too ripe. The result which has been got of this study was the gained voltage after stable for ZnC and graphite pencil are fresh ripe level of Feather Plantain is 1,07 V & too ripe level is 1,08 V; fresh ripe level of Cavendish is 1,03 V & too ripe level is 1,07 V; fresh ripe level of Local Cavendish is 1,04 7 too ripe level is 1,05 V; fresh ripe level of "Muli" is 1,00 V & too ripe level is 1,02 V. Furthermore, a gained voltage after stable for ZnC with carbon bar of used battery are fresh ripe level of Feather Plantain is 1,26 V & too ripe level is 1,28 V; fresh ripe level of Cavendish is 1,24 V & too ripe level is 1,27 V; fresh ripe level of Local Cavendish is 1,23 V & too ripe level is 1,26 V; fresh ripe of "Muli" is 1,21 V & too ripe level is 1,24 V.

Keywords
Banana, Carbon, Graphite, Bio-Battery

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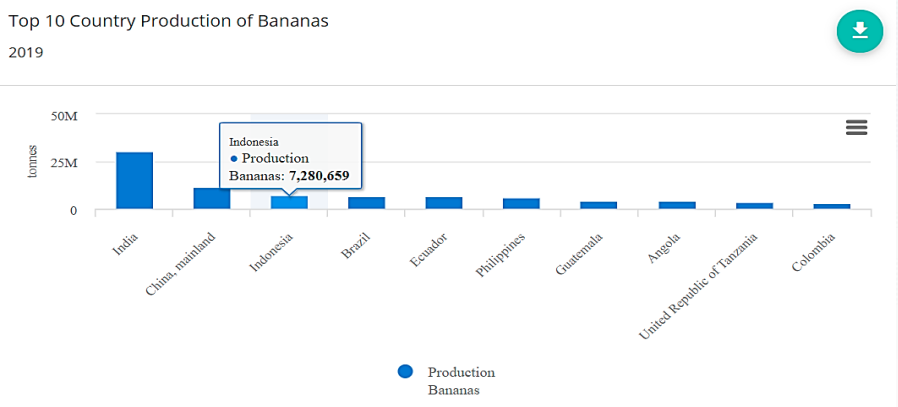
Introduction

Indonesia is one of countries which produces many bananas. Based on data from FAO in 2019, Indonesia is in third position. To notice there are abundant and easy resources to be found, the banana can be one choice alternate material from bio-battery (Nupearachchi & Perera, 2019).



Picture 1. 10 Biggest Countries Production of The Banana (http://www.fao.org/faostat/en/#rankings/countries_by_commodity)

With increasing battery innovation to fulfill the daily energy needs so there are many waste from the battery which is produced. The conventional battery generallny contains heavy metal such as mercury, lead, cadmium, and nickel. This battery waste is classified to waste of B3 (harzadous and toxic substances) so it is hard to be parsed by nature and decomposing microbes (Nupearachchi & Perera, 2018).
Bio-battery is a battery which produces the energy with an alternate source that is gained from fruits and vegetables, not like conventional battery in common (Mahmoodi & Ensafi, 2018).
This journal will make the study with utilising the variation of banana which is easy to be found and also the waste of used battery which will compare with another carbon type such as graphite pencile (PGEs) which is easy to be found.

The Method

The conventional battery is consist of iron sheeting (Zn) as an anode and carbon (C) as a cathode and then it is fulfilled of electrolyte paste to make chemical reaction worked so that it can produce the energy. In this experiment, chemical paste in battery will be changed with banana paste.Using banana in this study, because of the quantity are large and easy to be found. The banana which are used in this study had 4 variants which is in each variant has different ripeness level, there are fresh ripe and too ripe. The variants are Cavendish, Feather Plantain (musa ā paradisiaca), Local Cavendish (musa acuminata cavendish) , "Muli" (musa paradisiaca L).

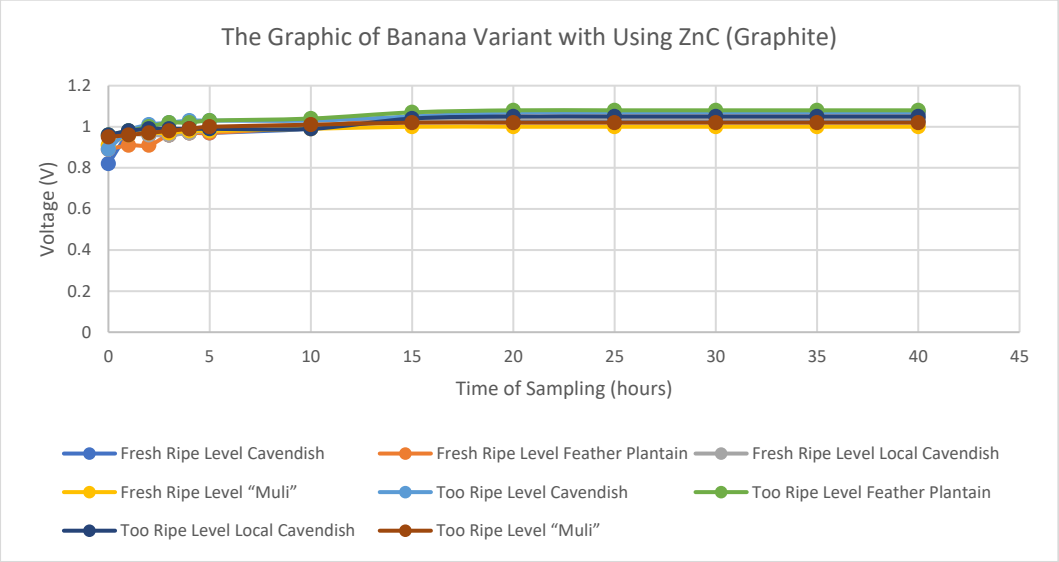
(a) (b) (c) (d)

Picture 2. (a) Cavendish: (b) Feather Plantain: (c) Local Cavendish: (d) "Muli"

For anode is used iron sheeting (Zn) and the selection of cathode is used 2 type of carbon, there are graphite pencile and carbon bar from used battery.

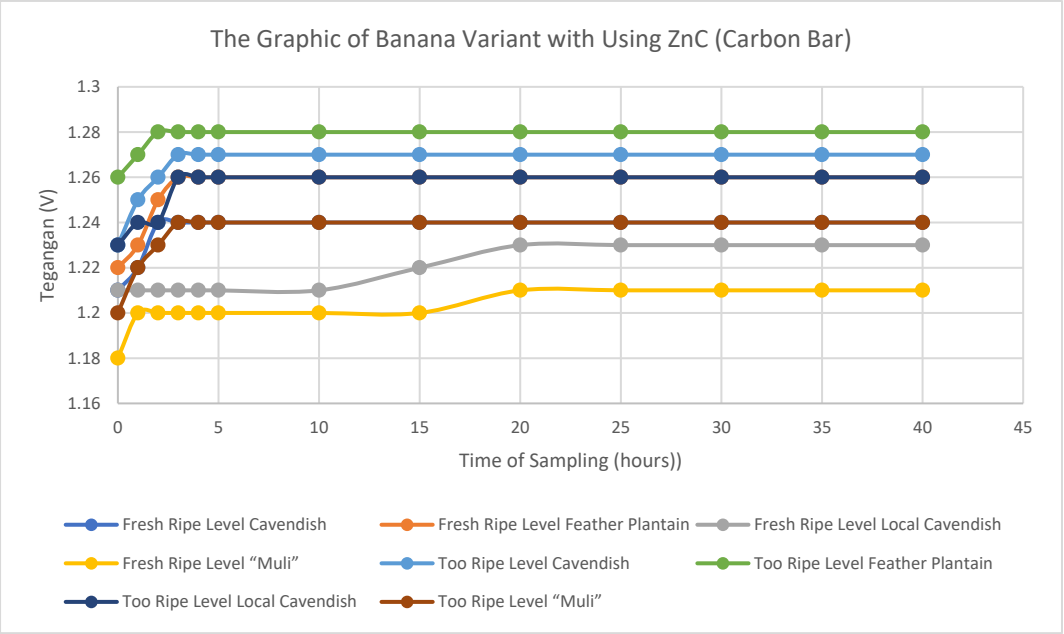
The Result and Discussion

The data of experiment result which had been done has been gained that the data of electric voltage (V) which is produced from any variants of banana and the ripeness level with the different type cathode selection.



Picture 3. The Graphic of Banana Variant with Using ZnC (Graphite)

On table 3, it could be seen that the data of voltage acquisition of banana variant with using ZnC (Carbon Bar). The voltage in banana which has too ripe level had bigger voltage than banana in fresh ripe level. The graphic can be seen on picture 4.



Picture 4. The Graphic of Banana Variant with Using ZnC (Carbon Bar)

Table 1.
The electric voltage of the variation of banana based on ripeness level and different cathode

Ripeness Level	**Fresh Ripe**								**Too Ripe**							
The Time of Sampling (Hours)	Type of Banana Cavendish		Feather Plantain		Local Cavendish		"Muli"		Type of Banana Cavendish		Feather Plantain		Local Cavendish		"Muli"	
	ZnC (Graphite)	ZnC (Carbon Bar)	ZnC (Graphite)	ZnC (Carbon Bar)	ZnC (Graphite)	ZnC (Carbon Bar)	ZnC (Graphite)	ZnC (Carbon Bar)	ZnC (Graphite)	ZnC (Carbon Bar)	ZnC (Graphite)	ZnC (Carbon Bar)	ZnC (Graphite)	ZnC (Carbon Bar)	ZnC (Graphite)	ZnC (Carbon Bar)
0	0.82 V	1.21 V	0.89 V	1.22 V	0.91 V	1.21 V	0.91 V	1.18 V	0.89 V	1.23 V	0.96 V	1.26 V	0.96 V	1.23 V	0.95 V	1.20 V
1	0.96 V	1.22 V	0.91 V	1.23 V	0.96 V	1.21 V	0.96 V	1.20 V	0.98 V	1.25 V	0.98 V	1.27 V	0.98 V	1.24 V	0.96 V	1.22 V
2	0.96 V	1.24 V	0.91 V	1.25 V	0.96 V	1.21 V	0.97 V	1.20 V	1.01 V	1.26 V	1.00 V	1.28 V	0.99 V	1.24 V	0.97 V	1.23 V
3	0.96 V	1.24 V	0.96 V	1.26 V	0.96 V	1.21 V	0.97 V	1.20 V	1.02 V	1.27 V	1.02 V	1.28 V	0.99 V	1.26 V	0.98 V	1.24 V
4	0.97 V	1.24 V	0.97 V	1.26 V	0.97 V	1.21 V	0.98 V	1.20 V	1.03 V	1.27 V	1.02 V	1.28 V	0.99 V	1.26 V	0.99 V	1.24 V
5	0.97 V	1.24 V	0.97 V	1.26 V	0.98 V	1.21 V	0.98 V	1.20 V	1.03 V	1.27 V	1.03 V	1.28 V	0.99 V	1.26 V	1.00 V	1.24 V
10	0.99 V	1.24 V	1.00 V	1.26 V	1.00 V	1.21 V	0.99 V	1.20 V	1.03 V	1.27 V	1.04 V	1.28 V	0.99 V	1.26 V	1.01 V	1.24 V
15	1.03 V	1.24 V	1.05 V	1.26 V	1.03V	1.22 V	1.00 V	1.20 V	1.05 V	1.27 V	1.07 V	1.28 V	1.04 V	1.26 V	1.02 V	1.24 V
20	1.03 V	1.24 V	1.07 V	1.26 V	1.04 V	1.23 V	1.00 V	1.21 V	1.07 V	1.27 V	1.08 V	1.28 V	1.05 V	1.26 V	1.02 V	1.24 V
25	1.03 V	1.24 V	1.07 V	1.26 V	1.04 V	1.23 V	1.00 V	1.21 V	1.07 V	1.27 V	1.08 V	1.28 V	1.05 V	1.26 V	1.02 V	1.24 V
30	1.03 V	1.24 V	1.07V	1.26 V	1.04 V	1.23 V	1.00 V	1.21 V	1.07 V	1.27 V	1.08 V	1.28 V	1.05 V	1.26 V	1.02 V	1.24 V
35	1.03 V	1.24 V	1.07 V	1.26 V	1.04 V	1.23 V	1.00 V	1.21 V	1.07 V	1.27 V	1.08 V	1.28 V	1.05 V	1.26 V	1.02 V	1.24 V

40	1.03 V	1.24 V	1.07 V	1.26 V	1.04 V	1.23 V	1.00 V	1.21 V	1.07 V	1.27 V	1.08 V	1.28 V	1.05 V	1.26 V	1.02 V	1.24 V

From the table 2 can be seen the data of voltage acquisition of banana variant with using ZnC (Graphite). The voltage in banana which is too ripe level had more voltage than fresh ripe level. The graphic can be seen on picture 3.

Table 2.
The Variation of Banana with Using ZnC (Graphite)

Time of Sampling (Hours)	Fresh Ripe Level				Too Ripe Level			
	Cavendish	Feather Plantain	Local Cavendish	"Muli"	Cavendish	Feather Plantain	Local Cavendish	"Muli"
0	0.82 V	0.89 V	0.91 V	0.91 V	0.89 V	0.96 V	0.96 V	0.95 V
1	0.96 V	0.91 V	0.96 V	0.96 V	0.98 V	0.98 V	0.98 V	0.96 V
2	0.96 V	0.91 V	0.96 V	0.97 V	1.01 V	1.00 V	0.99 V	0.97 V
3	0.96 V	0.96 V	0.96 V	0.97 V	1.02 V	1.02 V	0.99 V	0.98 V
4	0.97 V	0.97 V	0.97 V	0.98 V	1.03 V	1.02 V	0.99 V	0.99 V
5	0.97 V	0.97 V	0.98 V	0.98 V	1.03 V	1.03 V	0.99 V	1.00 V
10	0.99 V	1.00 V	1.00 V	0.99 V	1.03 V	1.04 V	0.99 V	1.01 V
15	1.03 V	1.05 V	1.03V	1.00 V	1.05 V	1.07 V	1.04 V	1.02 V
20	1.03 V	1.07 V	1.04 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
25	1.03 V	1.07 V	1.04 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
30	1.03 V	1.07V	1.04 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
35	1.03 V	1.07 V	1.04 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
40	1.03 V	1.07 V	1.04 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V

Table 3.
Banana Variant with Using ZnC (Carbon Bar)

Time of Sampling (Hours)	Fresh Ripe Level				Too Ripe Level			
	Cavendish	Feather Plantain	Local Cavendish	"Muli"	Cavendish	Feather Plantain	Local Cavendish	"Muli"
0	1.21 V	1.22 V	1.21 V	0.91 V	0.89 V	0.96 V	0.96 V	0.95 V
1	1.22 V	1.23 V	1.21 V	0.96 V	0.98 V	0.98 V	0.98 V	0.96 V
2	1.24 V	1.25 V	1.21 V	0.97 V	1.01 V	1.00 V	0.99 V	0.97 V
3	1.24 V	1.26 V	1.21 V	0.97 V	1.02 V	1.02 V	0.99 V	0.98 V
4	1.24 V	1.26 V	1.21 V	0.98 V	1.03 V	1.02 V	0.99 V	0.99 V
5	1.24 V	1.26 V	1.21 V	0.98 V	1.03 V	1.03 V	0.99 V	1.00 V
10	1.24 V	1.26 V	1.21 V	0.99 V	1.03 V	1.04 V	0.99 V	1.01 V
15	1.24 V	1.26 V	1.22 V	1.00 V	1.05 V	1.07 V	1.04 V	1.02 V
20	1.24 V	1.26 V	1.23 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
25	1.24 V	1.26 V	1.23 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
30	1.24 V	1.26 V	1.23 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
35	1.24 V	1.26 V	1.23 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V
40	1.24 V	1.26 V	1.23 V	1.00 V	1.07 V	1.08 V	1.05 V	1.02 V

From the result of experiment could be concluded that carbon use from the waste of battery used as cathode has obtained voltage which had bigger than using graphite pencil.
In each variant of banana had a different voltage rise, it is caused of a differentiation of water content (H2O) from each different variant. Besides that, every reaction in bio-battery will be polarized impact from release of oxygen gas. According to the result of the study of feather plantain had the biggest voltage depend on another variant, there are Cavendish, Local Cavendishn and "Muli". The gained voltage after stable for ZnC with graphite pencil are, Feather Plantain in fresh ripe level is 1,07 V & too ripe level is 1,08 V ; Cavendish in fresh ripe level is 1,03 V & too ripe level is 1,07 V ; Local Cavendish in fresh ripe level is 1, 04 V & too ripe level is 1,05 V ; "Muli in fresh ripe level is 1,00 V & too ripe level is 1,02 V. Moreover, the gained voltage after stable for ZnC with carbon bar of battery used are; Feather Plantain in fresh ripe level is 1,26 V & too ripe level is 1,28 V; Cavendish in fresh ripe level is 1,24 V & too ripe level is 1,27 V; Local Cavendish in fresh ripe level is 1,23 V & too ripe level is 1,26 V; "Muli" in fresh ripe level is 1,21 V & too ripe level is 1,24 V (Onwuka & Onwuka, 2005; Williams, Raghavan, Golden, & Gariepy, 2003).

Conclusion

Based on the result of research can be concluded that banana can be an alternate material for making an electrolyte paste for bio-battery which is ecofriendly (biodegradable) and easy to be gotten. And then graphite pencil and carbon bar utilization from battery used which can being still used to be an alternative of cathode material. The different of banana variant will produced a different voltage also. Feather plantian has thi highest voltage in this research compared with another variant; cavendish, local cavendish, and "muli". Other than that, the ripeness of the banana has a role to the gained voltage. More ripeness level of the banana so it will have a big voltage compared to the fresh ripe level

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