Cultivation of Electricity from Living PKL Tree's Leaf

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Abstract

It has been conducted electricity from PKL (Pathor Kuchi Leaf) using PKL extract with positive and negative electrodes. Several research papers on it have been published at home and abroad in the recognized journal. This work has expressed the electricity generation from living PKL including tree. It has been found that due to the difference of pH between soil and living PKL electricity has been produced. The performance of this electricity has been studied. Authors have been developed this work that produced electricity from living PKL without damaging the PKL tree. Especially suitable for unused land areas such as hilly areas, forest areas, and coastal areas, those could supply clean power for remote communities in the world.

Keywords: *Cultivation, Living PKL electricity, Performance, Capacity, Energy efficiency.*

I. Introduction

Pathor Kuchi leaf is known as a medicinal leaf from ancient time.Because it has a great medicinal value. It is used for different kinds of diseases like dysentery, cholera, typhoid, kidney disease etc. in West Bengal, India there is no alternative about Pathorkuchi leaf for folk medicine. People are using the leaf as a folk medicine. But now a day, it is using to generate electricity for low and medium power production [1-18]. Generally Zn and Cu metal is used as an electrode and extract of the PKL extract is used as an electrolyte [19-29].

II.Methods and Materials

The electrons are living around PKL plant roots those are a waste product of bacteria. PKL tree excretes organic matter into the soil, which is broken down by bacteria. The electrons are released in the breakdown process and then it is possible to harvest electricity by using electrodes without affecting the plant's and Leaf's growth of the PKL in any way.

(a) (b)

Fig.1 Cultivation of PKL

Fig.1 (a) shows the PKL tree in a tub and Fig.1 (b) shows the cultivation of PKL for electricity generation.

(a) (b) (c)

Fig.2 Cultivation of Electricity

Fig. 2(a) shows the cultivation of PKL electricity through PKL living tree's leaf and the Fig.(b) and Fig. (c) Shows the cultivation of tree's leaf electricity.

III. A. Define different Parameters:

(i) Open circuit voltage Voc:

The voltage without load is called open circuit voltage [36-38].
Generally, it is denoted by **Voc**.

(ii) Short circuit current Isc :

The current without load is called short circuit current.
Generally, it is denoted by Isc.

(iii)Voltage Regulation V_R

It is defined by the following equation [39-45]:

$$V_R = \frac{V_{NL} - V_{KL}}{V_{KL}} \times 100\%$$

Where, $V_R = \text{Voltage Regulation}$

$V_{NL} = \text{No load Voltage}$

$V_{FL} = \text{Full load Voltage}$

Generally, $V_R \approx 0$ is desire, which is practically impossible .

(iv) PKL power density (PD) :

It is defined as the power extraction per kg PKL (Pathorkuci leaf).

$$\text{The Power Density (PD)} = \frac{\text{Power extraction (watt)}}{\text{kg}}$$

(v) Energy Density(ED) of PKL:

$$\text{The Energy Density (ED)} = \frac{\text{Power extraction (KWh)}}{\text{Littre}}$$

It is defined as the Energy (KWh) per litter

vi) Capacity of the PKL cell (AH):

How much current you will get for long time .
Generally, it is denoted by C.

$$\therefore \quad C = AH$$

Where, $A = \text{Current in Ampare}$ and $H = \text{Time in hour}$.

vii) Energy efficiency of a PKL cell (ηc) :

It is defined by the following equation:

$$\eta_C = \frac{P_{out}}{P_{in}} = \frac{V_{out} It}{V_{in} It} = \frac{V_D I_D t_D}{V_C I_C t_C}$$

Where, $\eta_C = \text{energy efficiency}$

$V_D =$ Discharging Voltage

$I_D =$ Discharging Current

$t_D =$ Discharging Time

$V_C =$ Charging Voltage

$I_C =$ Charging Current

$t_C =$ Charging Time.

viii) Maximum Power (P_{max}) :

It is defined by the following equation :

$$P_{max} = V_{OC} I_{SC}$$

Where, $P_{max} = \text{Maximum Power}$

$V_{OC} =$ Open circuit Voltage

$I_{SC} =$ Short circuit Current

ix) Load Power (P_L) :

It is defined by the following equation:

$$P_l = V_L I_L$$

Where, $P_L = \text{Load Power}$

$V_L =$ Load Voltage

$I_L =$ Load Current

II.B. Vernacular name of the PKL[46-49] :

(i) Stone chips
(ii) Air Plant
(iii) Mircle Leaf
(iv) Mother of thousands
(v) Mother of Millions
(vi) Leaf of Life
(vii) Devil's Back bone
(viii) Pregrant Leaf
(IX) Monekey's ear
(X) Moneky ear
(XI) Solri
(XII) Sotre etc.

II.C Land situation in Bangladesh for cultivation of PKL[24, 50-58]:

Total land = 55000 sq. miles

$1\ Square\ Mile = 640\ acres$

$= 3500000 acrs / 2.5 = 14080000 hectors$

Total land (TL) in hectors

Therefore, The NAL (Non Agricultural land)

= 5580000 hectors.

The 2% of NAL

$= 111600\ \ hectors \times 7.5 = 837000\ \ Bigha\ \ \ [1\ hector = 7.5\ bigha]$

From 1 Bigha PKL, we can get $100\ kW$ electricity.

From 837000 Bigha PKL, we can get 83700000 kW electricity= 83700 MW.

The AL (Agricultural Land) is needed to cultivated foods and crops. The NAL is needed for housing, roads and other multipurpose use. So that the NAL of coastal areas, hilly areas and both sides of the road can be used for cultivation of PKL to generate electricity in Bangladesh, which would be approximately 2% of NAL.

II.D Cultivation of PKL in Bangladesh:

The cultivation of PKL is so much easy. This plants grow whether its leaf is kept on the ground and hence can be cultivated in a vested land, roof top of the house, courtyard and tubs what so ever. Its leaves can be used for producing electricity within a month after cultivation of the plants [50-64].

II. Graphical Analysis:

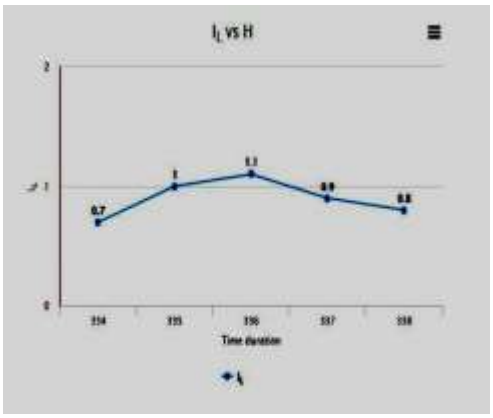

Fig.1 Load current versus time duration in hour

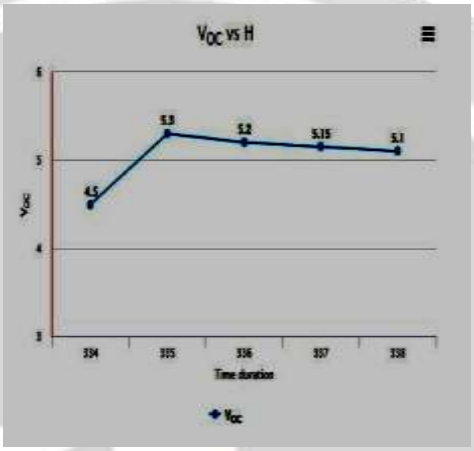

Fig.2 Open circuit voltage versus time duration in hour

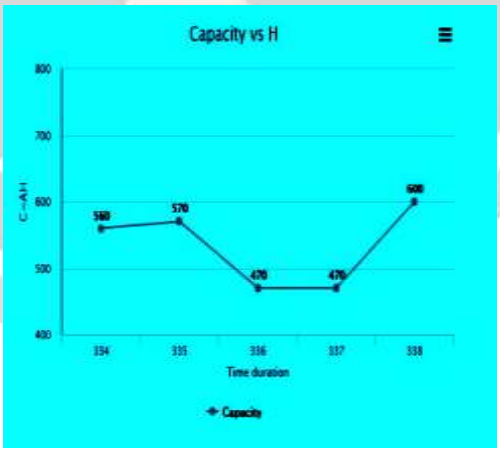

Fig.3 Capacity versus time duration in hour

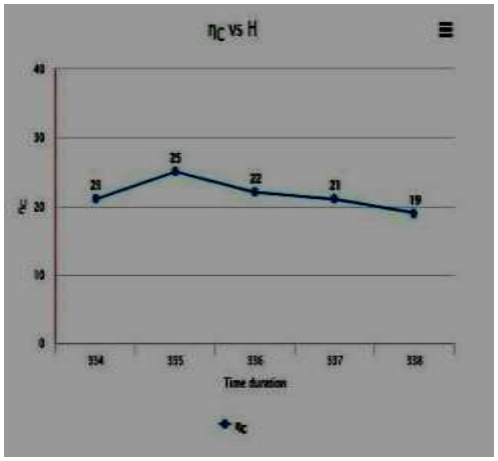

Fig.4 Energy efficiency versus time duration in hour

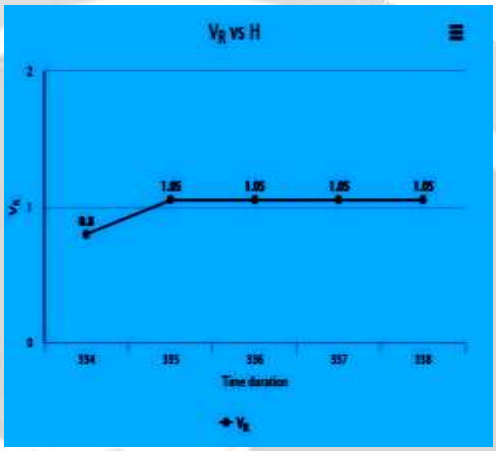

Fig.5 Voltage regulation versus time duration in hour

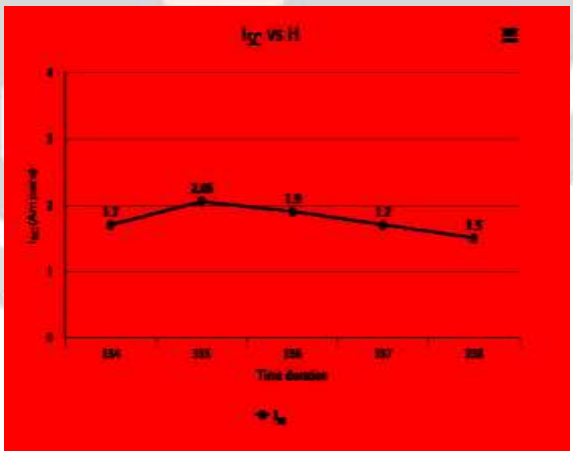

Fig.6 Short Circuit current versus time duration in hour

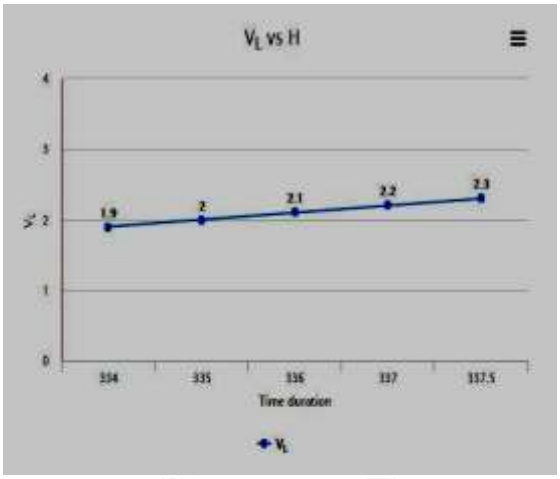

Fig.7 Load voltage versus time duration in hour

III. Results and Discussion:

Fig.1 shows the variation of load current versus time duration. It is shown that the load current varies between 0.7A to 1.1 A for the time duration 334 hr to 338 hr.
Fig.2 shows the variation of open circuit voltage versus time duration. It is shown that the load current varies between 4.5 V to 5.3 V for the time duration 334 hr to 338 hr.
Fig.3 shows the variation of capacity versus time duration. It is shown that the capacity varies between 480 AH to 600 AH for the time duration 334 hr to 338 hr.
Fig.4 shows the energy efficiency versus time duration. It is shown that the energy efficiency varies between 21% to 25% for the time duration 334 hr to 338 hr.
Fig.5 shows the voltage regulation versus time duration. It is shown that the voltage regulation varies between 0.7 to 1.05 for the time duration 334 hr to 338 hr.
Fig.6 shows the variation of short circuit current versus time duration. It is shown that the short circuit current varies between 1.7A to 2.0 A for the time duration 334 hr to 338 hr.
Fig.7 shows the variation of short load voltge versus time duration. It is shown that the load voltage varies between 1.9V to 2.3 V for the time duration 334 hr to 338 hr.

IV. Conclusion

The reading was taken after each 7 days. That is why it was zig zag form. The multi meters which were used are not calibrated properly. So that may be some errors during collection of the readings. In spite of that the authors tried to take readings very carefully.

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