organic acids and alcohols, liberating H_2 and CO_2 in the process. Most of the microbial hydrogen production is forced by the anaerobic metabolism of pyruvate. Pyruvate biodegradation is driven by one of two enzymes (Hallenbeck & Benemann, 2002).

1). Pyruvate: formate lyase (PFL)

$$\text{Pyruvate} + \text{CoA} \xrightarrow[\text{PFL}]{} \text{acetyl-CoA} + \text{formate}$$

2). Pyruvate: ferredoxin oxido reductase (PFOR)

$$\text{Pyruvate} + \text{CoA} + 2\text{Fd (ox)} \xrightarrow[\text{PFOR}_2]{} \text{acetyl-CoA} + \text{CO} + 2\text{Fd (red)}$$

Ferredoxin is reduced, during pyruvate oxidation. The reduced ferredoxin transfers the electrons to hydrogenase enzyme which catalyzes the production reaction of molecular hydrogen.

In dark fermentation Organic acids cannot be degraded completely due to thermodynamic limitations (reaction 1), whereas the reaction of photofermentative hydrogen production is shown in reaction 2.

$$C_6H_{12}O_6 + 2H_2O \rightarrow 4H_2 + 2CO_2 + 2CH_3COOH \qquad (1)$$

$$CH_3COOH + 2H_2O \rightarrow 4H_2 + 2CO_2 \qquad (2)$$

As shown above, in order to achieve a complete decomposition of carbohydrate integration with photofermentation can be employed.

CONCLUSSION

Isolation of hydrogen producing bacteria have been conducted using activated sludge biogas sources. Proof through DNA tests showed that the bacteria isolated were *Bacillus citrulans* .

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