

Anaerobic Degradation of Raw Coconut Waste for Biogas Production



Priya V, Sampath kumar M.C

Abstract: Disposal of coconut coir waste has been a difficult task for the coir industry. Coir pith is being piled up in the outskirts of the coir industry. A solution to the coir pith disposal is the biogas production from it. Raw coir pith without any treatment was tested for its potential to produce biogas. There was very little biogas generated from raw coir pith. Due to the constraints of high electrical conductivity and high lignin content, direct anaerobic treatment of raw coir pith cannot be an efficient solution. Treatment of coir pith is required for increasing the quantity of biogas produced.

Keywords: Raw coir pith, Kinetics, methane, biogas, coir industry commas.

I. INTRODUCTION

In Anaerobic digestion, specific sorts of microbes digest biomass in an oxygen free condition. Diverse sorts of microorganisms cooperate to separate complex organic wastes in stages, bringing about the generation of biogas. Bacteria (Symbiotic group) perform diverse functions at various phases of the digestion procedure.

II. METHODOLOGY

The coir pith obtained immediately during separation of fibers is referred to as raw coir pith in all the experiments. Raw coir pith was collected from the TANCI, Coir industry situated in Krishnagiri district.

III. EXPERIMENTAL SETUP

Anaerobic digestion of coir pith was carried out in a five liter capacity laboratory glass insitu fermenter (Lark make).The experiment was conducted at room temperature. The mixing was done at a rate of 100-120rpm [2].Liquid displacement method by downward displacement of gas was used to determine the amount and solubility of gas.



Fig 4.1 Anaerobic digester with Tedlar bag

The anaerobic degradation of raw coir pith without giving any treatment was conducted. Cow dung was used as seeding material.

IV. RESULTS:

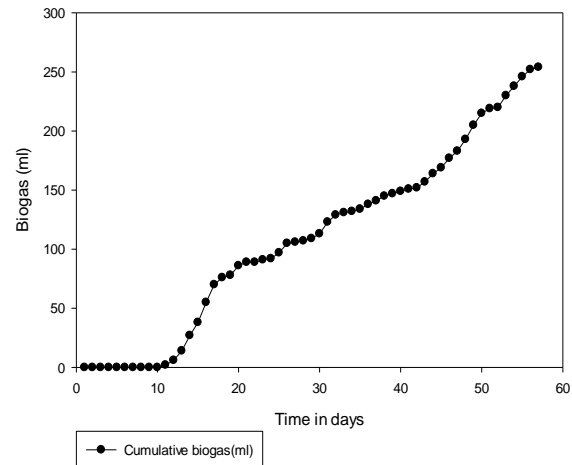


Fig 4.3 Total amount of biogas generated(Cumulative)

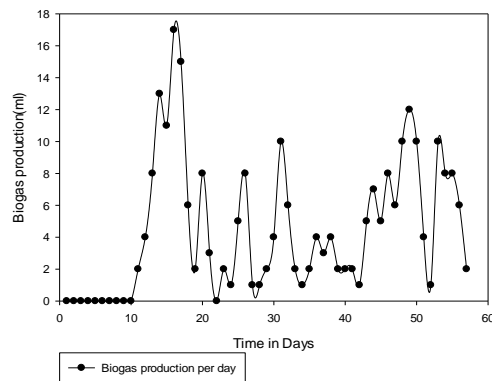


Fig 4.4 Biogas production per day

V. DISCUSSION

49% of the total gas collected was methane. The biogas gas generated was 254ml. The amount of biogas generated on daily basis was too very small quantity and very much fluctuating. This indicates that the biogas being generated was being contributed by the cow dung and that the coir pith was not participating in the biogas generation process. The hindrances for biogas generation by the coir pith could be the high amount of electrical conductivity and the total dissolved solids in it. The biogas was generated for 57 days and the frequency of generation of biogas generated was seen to vary each day (Fig 4.4).

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The total cumulative biogas generated was around 250ml (Fig 4.3) which was very little. This small amount of biogas generation from coir pith was due to the fact that coir pith is having huge quantity of lignin, electrical conductivity and total dissolved solids. The huge quantity of electrical conductivity and total dissolved solids do not allow any microorganisms to access the substrate surface thus delaying its degradation. The high quantity of lignin provides constraints for microorganisms to access the cellulose present in coir pith. The biogas generation during the anaerobic degradation is due to the cow dung (seeding material) that is added in the digester.

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VI. CONCLUSION:

The biogas generated from the raw coir pith with cow dung as seeding material was 0.033 m³/Kg of VS/day. The methane content in the generated biogas was 48%. The slow degradation rate of coir pith was due to the presence of electrical conductivity, total dissolved solids and lignin. Anaerobic digestion can be an efficient method as it gives a way out to the disposal of the coir pith (ligno-cellulosic waste), but direct anaerobic treatment of the raw coir pith cannot be an efficient source to produce biogas

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