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BIOGAS GENERATION FROM, EC AND TDS REDUCED, COIR PITH

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ABSTRACT

The natural degradation of coir pith is a slow process. An alternative solution for the disposal of coir pith is the anaerobic degradation of coconut coir pith. The anaerobic degradation of raw coir pith was conducted and very less quantity of biogas generation was noted. One of the reason for the low biogas generation was its high electrical conductivity and high total dissolved solids content in it. In continuation of this work, the anaerobic degradation of the EC and TDS reduced coir pith was conducted. There was a considerable increase in the biogas generated from anaerobic degradation of EC reduced coir pith than the anaerobic degradation of raw coir pith.

KEY WORDS : Coir pith, Anaerobic degradation, Electrical conductivity, Totasl dissolved solids

INTRODUCTION

Coir pith degrades itself taking a drawn out stretch of time and it generally stays in the soil. Its collection on the soil amid rainstorm brings about the leachate of polyphenols contaminating both ground waters and surface waters. With a specific end goal to lessen these dangers, reasonable management practices should be adopted.

Broad amounts of different chemicals are required in treating the coir pith and these may impart different symptoms instead of lessening the electrical conductivity. Microbial degradation is cheap and includes the organisms for the degradation of minimum needed supplements, in this manner limiting the soil and water pollution.

The raw coir pith gathered were treated with urea (-Chemical technique); *Clostridium perfringens* (-Natural strategy); Rock phosphate (-Organic strategy) were given trial against the investigation of pH, electrical conductivity and total Dissolved Solids. The Electrical conductivity reduction and TDS reduction was noted highest in biologically treated raw coir pith. The leachate properties were additionally diminished at a consistent interim of time (Priya, 2017).

Materials Used

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. The biological treatment was given to the Raw coir pith for the reduction of Electrical conductivity and total dissolve solids. This treated coir pith was taken to the anaerobic digester for further testing.

Experimental Setup

Anaerobic digestion of coir pith was carried out in a five liter capacity laboratory glass insitu fermenter (Lark make). The bio-fermenter has controls like pH, temperature, agitation and aeration by rotameter with air pump. Cow dung was used as seeding material. Liquid displacement method by downward displacement of gas was used to determine the amount and solubility of gas. The corrections due to the fluctuation in the atmospheric pressure and room temperature during measurement of biogas has been taken care off. The error of solubility and diffusion of biogas through the barrier solution are taken care of. The gas production volume has been corrected to standard

temperature and pressure. Every one of the investigations were conducted according to the APHA standard Methods of nineteenth version, 1995.

METHODOLOGY

The electrical conductivity and total dissolved solids reduction in coir pith was done by biological method (Priya *et al.*, 2017). Then it was taken to anaerobic digester. The particle size of raw coir pith was between 0.80 to 2 mm. The total solid to liquid ratio was 1:20. The BOD, COD, total solids, volatile solids, nutrients, VFA and the gas generated was noted.EC and TDS are one of the constraints in biogas production from raw coir pith. The presence of EC and TDS in raw coir pith delay the degradation process. Study of anaerobic digestion of EC and TDS reduced coir pith was conducted.

RESULTS

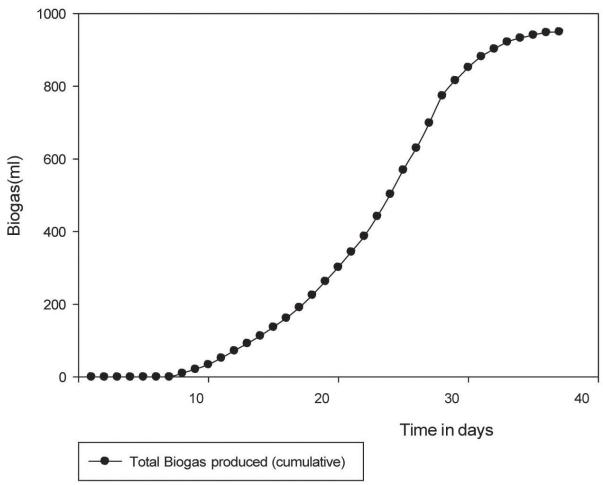

Fig. 1. Total biogas generated during anaerobic degradation (ml)

DISCUSSION

The quantity of biogas generated by the coir pith after the reduction of electrical conductivity and total dissolved solids was 950 mL. The BOD/COD ratio ranged between 0.37 to 0.41. The VS/TS ratio varied between 0.64 to 0.67. A total of 43% of reduction in BOD was noted (Fig. 3). There was 42% decrease noted in the COD (Fig. 4). There was a fluctuation in the VFA content during the beginning of the anaerobic degradation and later on there was an increase in the VFA. The VFA showed a decreasing trend after thirtieth day (Fig. 10). The methane content in the biogas was 69%. This was a better scenario than the previous biogas generation by the raw coir pith without any pretreatment. There was a increase in the sulphate, nitrate and phosphate content (33%, 39% and 24%).

The total quantity of biogas was 950 mL (Fig. 1). This increase in the biogas quantity compared to that of the biogas from raw coir pith without any pretreatment is due to the fact that almost no microorganisms can attack a substrate that has high salt content on it. When this salt content is reduced and then sent to the digester for degradation , the microorganisms present in the cow dung itself can degrade the coir pith to some extent thus increasing the biogas generated.

The maximum gas generation was noted on the 28th day. The biogas started to reduce after the 28th day drastically (Fig. 2). The total biogas generated was 950 mL. The cumulative quantity was more

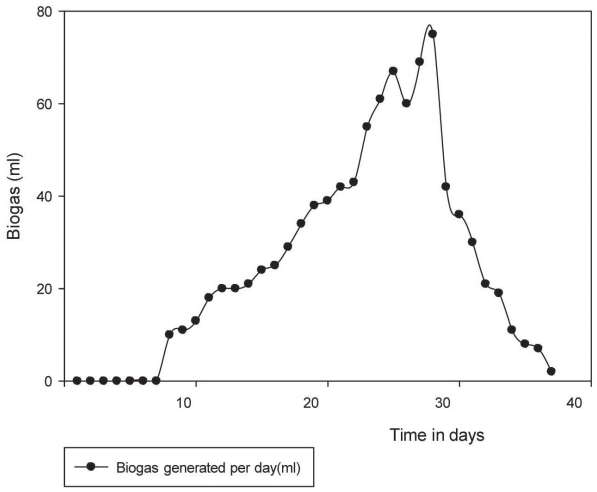

Fig. 2. Biogas generated per day(ml)

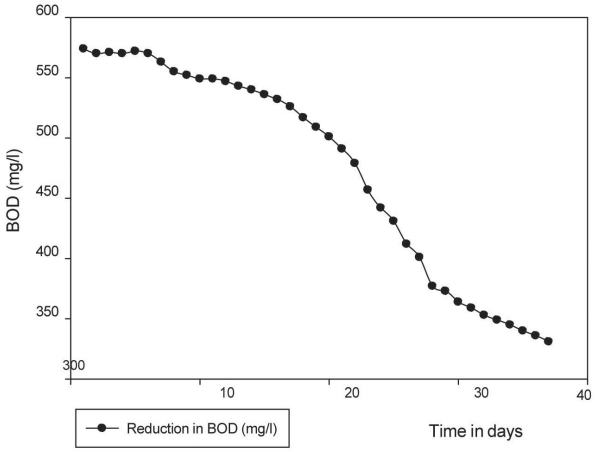

Fig. 3. Variation in BOD during anaerobic degradation

than that produced by the coir pith without electrical conductivity treatment. The biogas generated by the electrical conductivity reduced coir pith was 0.0108 m^3/Kg of VS/day. This increase in the biogas quantity can be due to the cause that with the reduction of electrical conductivity, the microorganism present in cow dung is responsible for biogas generation can easily access the surface of

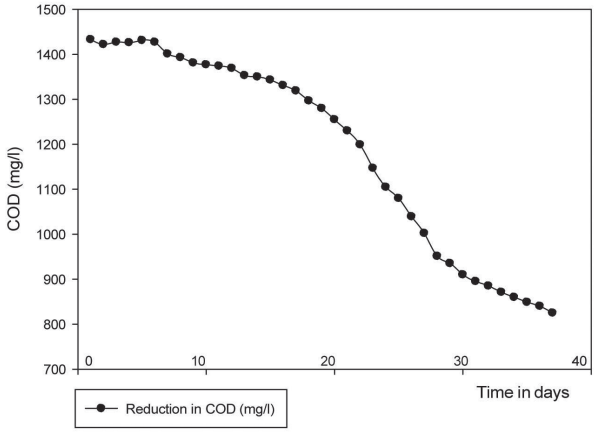

Fig. 4. Variation in COD during anaerobic digestion

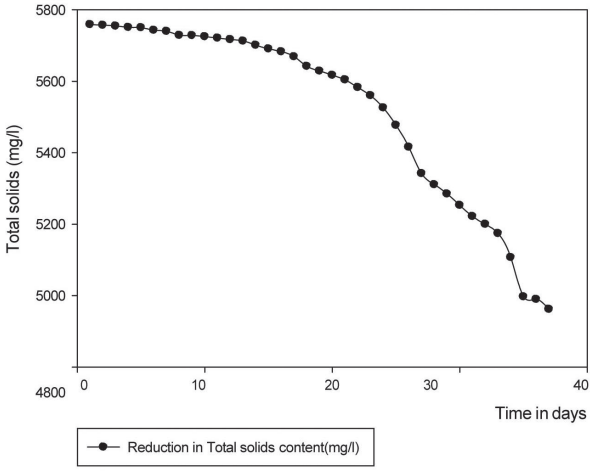

Fig. 5. Variation in Total solids during anaerobic degradation

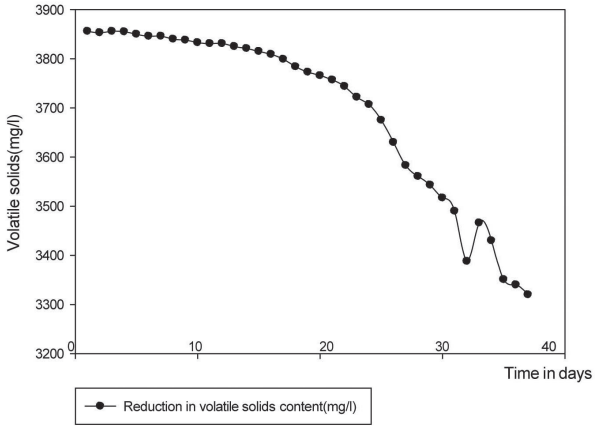

Fig. 6. Variation in Volatile solids during anaerobic degradation

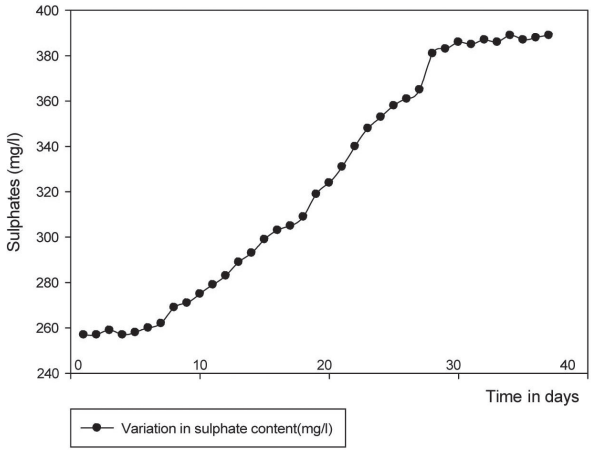

Fig. 7. Variation in Sulphates content during anaerobic degradation

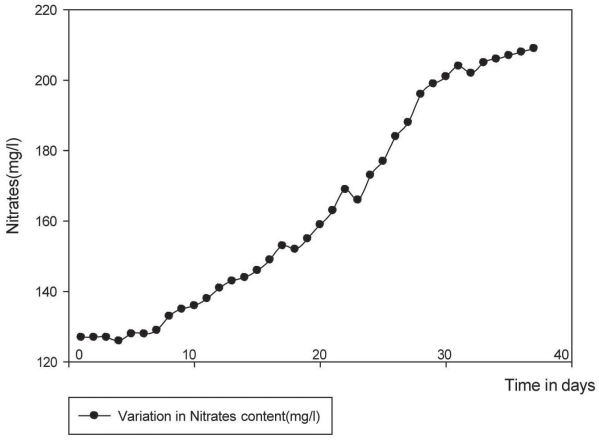

Fig. 8. Variation in Nitrates content during anaerobic degradation

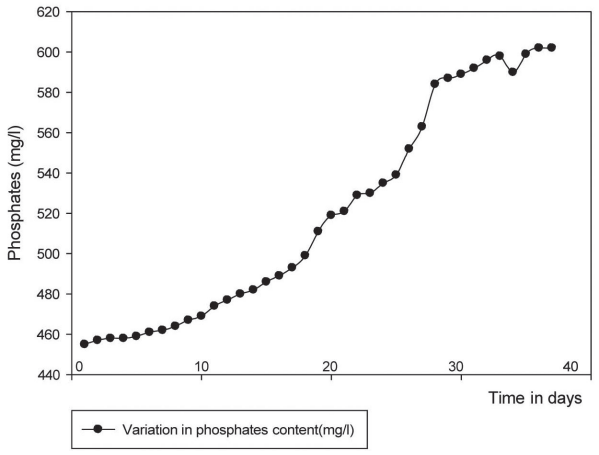

Fig. 9. Variation of Phosphate content during anaerobic degradation

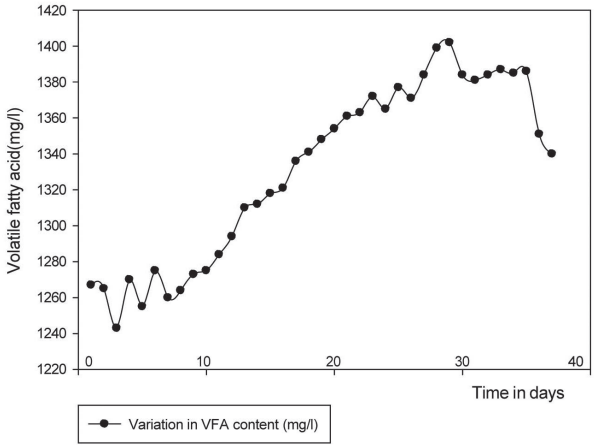

Fig. 10. Variation in VFA content during anaerobic degradation

the coir pith, thus felicitating biogas generation. The BOD/COD ratio varied between 0.4 to 0.42. The TS/VS ratio varied between 0.67 to 0.7. The methane content in the biogas generated was 63%. The VS reduction was 13% (Fig. 6) and TS reduction was 14% (Fig. 5). The sulphates value (Fig. 7), nitrates value (Fig. 8) and phosphates value (Fig. 8 and 9) increased (almost doubled its value).

CONCLUSION

- The biogas generated during the anaerobic degradation of electrical conductivity reduced coir pith was 0.1082 m3/kg-VS/day. The methane content was 63%.
- Biogas production after the EC and TDS reduction in coir pith was greater than that of the biogas production from the raw coir pith without any pretreatment.
- BOD/COD ratio varied between 0.41 to 0.42. The VS/TS (volatile solids to total solids ratio) varied between 0.64 to 0.67.

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