RINGKASAN

Pabrik Aci 55 bergerak dalam pengolahan singkong menjadi tepung tapioka. Pabrik tersebut berdiri sejak tahun 1986. Pabrik ini mengolah singkong ± 10 ton/hari. Hasil yang diperoleh dari pengolahannya adalah tepung tapioka sebanyak ± 2 ton/hari dan limbah cair sebesar ± 50 m^3/hari yang langsung dibuang ke sungai sehingga menyebabkan pencemaran. Salah satu solusi yang dapat menangani masalah limbah cair tersebut adalah dengan cara mengonversi limbah cair tapioka menjadi biogas. Limbah cair tapioka masih banyak mengandung bahan-bahan organik yang cukup tinggi, sehingga dapat dijadikan media fermentasi cair yang sangat baik untuk meghasilkan CH_4. Penelitian ini bertujuan untuk mengetahui potensi produksi biogas dan kandungan CH_4 yang dihasilkan dari limbah cair tapioka dengan perlakuan penambahan starter kotoran sapi dan EM4.

Penelitian ini dilakukan di Laboratorium Teknik Sistem Termal dan Energi Terbarukan, Laboratorium Ilmu Tanah dan Laboratorium Lingkungan, Universitas Jenderal Soedirman, Purwokerto. Analisis kandungan CH_4 dilakukan di Balai Penelitian Lingkungan Pertanian, Pati, Jawa Tengah. Perlakuan pada penelitian ini adalah penambahan starter kotoran sapi dengan persentase yang berbeda, yaitu 5%, 10% dan 15% pada 4 liter limbah cair tapioka. Pada masing-masing perlakuan tersebut ditambahkan EM4 0,5%. Kontrol berupa 4 liter limbah cair tapioka tanpa penambahan starter kotoran sapi dan EM4. Variabel yang diamati meliputi rasio C/N, pH, temperatur, TS, VS, BOD, COD, produksi biogas dan kandungan CH_4. Hasil yang didapat kemudian dianalisis menggunakan analisis sidik ragam. Jika berpengaruh, maka dilanjutkan dengan *Duncan's Multiple Range Test* (DMRT) pada taraf 5%.

Hasil uji sidik ragam menunjukkan bahwa penambahan starter kotoran sapi dan EM4 berpengaruh pada kandungan CH_4. Hasil analisis penelitian menunjukkan bahwa jumlah produksi biogas terbaik dihasilkan oleh perlakuan penambahan kotoran sapi 15%, yaitu sebesar 25,60 ml biogas dengan produksi kumulatif mencapai 3,95 l/kg TS dan persentase penurunan TS=23,77%. Selain itu, kandungan CH_4 yang dihasilkan pada hari ke-18, 26 dan 35 sebesar 2500,69 ppm, 2909,63 ppm dan 3162 ppm. Bahan baku yang digunakan pada penelitian ini memiliki rasio C/N limbah cair tapioka sebesar 10,68 dan kotoran sapi sebesar 22,8. BOD awal dan akhir fermentasi masing-masing berkisar antara 101,66-598,00 mg/l dan 841-2135,72 mg/l. COD awal dan akhir fermentasi masing-masing berkisar antara 408-660 mg/l dan 1500-3592 mg/l.

SUMMARY

Aci 55 is a factory to processing cassava into tapioca flour established since 1986. This factory produced cassava starch ± 10 *tons/day. The result from that processing produce both of tapioca flour as much as* ± 2 tons/day *and liquid waste as much as* ± *50* m^3*/day will be spilled into the river which causes water pollution. One of solution to solve this problem is conversing tapioca liquid waste into biogas. It is because the tapioca liquid waste still contained large organics of material. Therefore, the material can be processed as liquid media fermentation properly to produce* CH_4*. This research aims to study the potential of producing biogas and* CH_4 *content, from tapioca liquid waste by additional cattle's solid waste as fermentation starter and as well as EM4.*

This research was conducted in the Laboratory of Thermal System and Renewable Energy Engineering, Laboratory of Soil Science, Laboratory of Environmental, Jenderal Soedirman University, Purwokerto. Analysis of CH_4 *content was carried out in Agriculture of Enviromental Research Centre, Pati, Central Java. Treatments in this research is the additional starter of cattle's solid waste with different percentage, such as 5%, 10% and 15%, within 4 litres of tapioca liquid waste. In any part of treatments were added by EM4 0,5%. Controlling treatment is 4 litres of tapioca liquid waste without additional starter of cattle's solid waste and EM4. Variables that obtained in this study such as C/N ratio, pH, temperature, TS, VS, BOD, COD, biogas production and* CH_4 *contents. The result were analyzed by using analysis of variance (ANOVA). If the result shows influence of the treatments, then it will be continued with Duncan's Multiple Range Test (DMRT) at 5% level.*

Analysis of variance indicates that additional cattle's solid waste and EM4 was effected on CH_4 *content. The results of analysis showed the highest production of biogas were generated by the additional starter of cattle's solid waste treatment of 15%, that is 25.60 ml of biogas with cumulative production reached 3.95 l/kg TS and TS decreasing percentage of 23.77%,. In addition the* CH_4 *content observed in certain day of* 18^{th}*,* 26^{th} *and* 35^{th} *are 2500.69 ppm, 2909.63 ppm and 3162.73 ppm respectively. Basic materials that used in this research has C/N ratio of tapioca liquid waste amount 10.68 and cattle's solid waste* 22.8*. The initial of BOD and last fermentation aproximately revolving at range 101.66-598.00 mg/l dan 841-2135.72 mg/l. The initial of COD and last fermentation aproximately revolving at range 408-1220 mg/l dan 1500-3592 mg/l.*