

Analisis potensi residu Black Soldier Fly Larvae (BSFL) sebagai substrat pada pengolahan anaerobic digestion: studi kasus: fasilitas pengolahan sampah organik berbasis BSFL pada perusahaan waste4change Bekasi = Potential analysis of Black Soldier Fly Larvae (BSFL) residues as substrate for anaerobic digestion: case study: organic waste treatment facilities based on BSFL at waste4change Bekasi

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Abstrak

Permasalahan sampah organik dapat diselesaikan dengan beberapa metode misalnya menggunakan bantuan BSFL. Namun, residu dari proses tersebut masih memiliki potensi untuk diolah menggunakan anaerobic digestion. Penelitian ini bertujuan untuk menganalisis potensi substrat residu BSFL dengan tambahan residu cair dan sampah organik menggunakan proses anaerobic digestion. Campuran substrat menghasilkan 4 opsi operasional yaitu opsi A1 (residu cair:residu BSFL=2:1), opsi B1 dan opsi B2 (sampah organik:residu cair:residu BSFL=0,6:2:1), serta opsi C2 (sampah organik:residu cair:residu BSFL=1:2:1). Analisis dilakukan untuk mengetahui potensi dari opsi yang ada terhadap proses anaerobic digestion berdasarkan tingkat efisiensi reduksi TS, VSD, dan reduksi COD. Operasional penelitian dilakukan pada 2 jenis reaktor berukuran 1.000 L (reaktor 1) selama 68 hari dan 51 L (reaktor 2) selama 25 hari dalam kondisi mesofilik. Reaktor 1 digunakan terhadap operasional opsi A1 dan opsi B1, sedangkan reaktor 2 digunakan terhadap operasional opsi B2 dan opsi C2. Parameter yang diuji selama operasional anaerobic digestion adalah TS, VS, C, N, COD, SCOD, VFA, alkalinitas, dan produksi biogas. Hasil penelitian menjelaskan bahwa opsi A1 ($p < 0,05$) memiliki potensi pengolahan anaerobic digestion paling optimal dengan efisiensi reduksi TS, VSD, dan reduksi COD sebesar 84,4%, 54,2%, dan 66,3%. Opsi A1 menghasilkan biogas sebesar 0,63-3,32 L/kgVS dengan produksi metana 0,18-0,48 L/kgVS.

The problem of organic waste can be solved by several methods such as using BSFL. However, the residue generated from BSFL processing has the potential to be treated by anaerobic digestion. This study is aimed to analyze the potential of BSFL residue as substrate with additional liquid residue and organic waste for anaerobic digestion processing. The ratio of substrate consisted of 4 operational option, i.e. option A (liquid residue:BSFL residue=2:1), option B1 & option B2 (organic waste:liquid residue:BSFL residue=0,6:2:1), and option C2 (organic waste:liquid residue:BSFL residue=1:2:1). The analysis was conducted to determine the optimal ratio of the substrate for anaerobic digestion based on the efficiency of TS reduction, VSD, and COD reduction. This study was carried out with two reactors with the capacity of 1.000 L (reactor 1) for 68 days and 51 L (reactor 2) for 25 days, respectively in mesophilic conditions. Reactor 1 is used to the options A1 and B1. Reactor 2 is used to the options B2 and C2. The parameters observed in operational of anaerobic digestion process are TS, VS, C, N, COD, SCOD, VFA, alkalinity, dan biogas production. The results showed that option A1 ($p < 0,05$) was the most optimum ratio for AD process with the efficiency of TS reduction, VSD, and COD reduction of 84,4%, 54,2%, and 66,3%, respectively. This ratio also produced biogas volume and methane concentration of 0,63-3,32 L/kgVS and 0,18-0,48 L/kgVS, respectively.