# Analisis penambahan enzim selulase terhadap dinamika populasi mikroorganisme dan bio-stabilisasi pada biodrying sampah organik = Cellulase enzyme addition analysis on microbial population dynamics and bio-stabilisation in organic waste biodrying

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Abstrak

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Biodrying merupakan proses MBT Mechanical-Biological Treatment yang dapat mengurangi kadar air sampah organik menggunakan panas dari hasil penguraian mikroorganisme. Namun, kandungan nutrisi kompleks di dalamnya dapat memperlambat aktivitas mikroorganisme tersebut, sehingga penambahan aditif berupa enzim selulase perlu dilakukan. Selain itu, biodrying diketahui menghasilkan produk akhir yang hanya terbio-stabilisasi sebagian. Maka dari itu, penelitian ini dilakukan untuk menganalisis pengaruh penambahan enzim selulase terhadap dinamika populasi mikroorganisme, keterkaitannya dengan perubahan suhu, kadar air, dan zat organik berupa VS/volatile solid , dan pengaruhnya terhadap bio-stabilisasi. Penelitian ini dilakukan melalui penambahan enzim selulase dengan rasio 0:1:1,5 ke tiga reaktor berbeda yaitu R1, R2, dan R3. Hasilnya, R3 memiliki rata-rata suhu tertinggi 46,95 C , pengurangan kadar air tertinggi 26 serta penurunan kadar VS tertinggi kedua 25 . Selain itu, R3 dapat menghasilkan nilai kadar air terendah 36 dan nilai kalor berkualitas RDF Kelas 4 >2.400 kal/g dalam waktu tercepat 19 dan 14 hari . Jumlah dan pertumbuhan mikroorganisme nilai k reaktor 3 juga merupakan yang tertinggi. Namun, R3 menghasilkan bio-stabilitas terendah yang tidak memungkinkan produknya untuk melalui kegiatan pasca-operasional dengan durasi yang lama serta produknya tidak sesuai digunakan untuk aplikasi lahan.
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ABSTRACT<br>
Biodrying as an MBT Mechanical Biological Treatment process is used to reduce moisture content in organic solid waste with bio heat produced by microbial degradation. Therefore, presence of microorganisms in the process becomes crucial as they may also bio stabilize the waste. On the other hand, organic waste contains complex nutrients that may slow down microbial activities, and hence an additive, in the form of cellulase enzyme, is needed for the process. Therefore, this study aims to analyze the effect of cellulase enzyme addition on microbial population dynamics, changes in temperature, moisture content, and organic content, and the effect of microbial population dynamics on bio stabilization in the biodrying process. This was done by adding different amounts with a 0 1 1,5 ratio of cellulase enzyme to each of three laboratory scale biodrying reactors R1, R2, and R3. The highest temperature profile was reached by R3, along with the highest and second highest reduction in MC moisture content 26 and VS volatile solid content 25 respectively. R3 also reached its lowest MC 36 and Class 4 RDF specification 2.400 cal g the fastest 19 and 14 days . In addition, R3 had the highest mean of microbial population with the highest mean growth rate k . However, it produced the lowest bio stability of the product. Hence it would not be able to undergo a long term period post treatment and be used for land application.