Analisis Kandungan Unsur Hara Makro, Mikro, dan Logam Berat serta Potensi Aplikasi Lumpur Padat Hasil Pengolahan IPLT Pulo Gebang sebagai Kompos = Analysis of Macronutrient, Micronutrient, and Heavy Metal Content with Potential Application of Sludge Processed from Pulo Gebang Sludge Treatment Plant as Compost

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Abstrak

Lumpur padat merupakan endapan suspensi limbah cair dan mikroorganisme yang berasal dari pengolahan air limbah pada IPLT. Pembuatan pupuk kompos merupakan salah satu alternatif yang dapat dilakukan sebagai upaya dalam pemanfaatan lumpur padat karena kandungan yang dimiliki oleh lumpur padat tersebut. Penelitian ini bertujuan untuk menganalisis unsur hara makro dan mikro serta logam berat dan menganalisis potensi aplikasi lumpur padat hasil pengolahan IPLT Pulo gebang serta menganalisis risiko pencemaran logam berat terhadap tanah, tanaman, dan manusia. Pembuatan kompos menggunakan bahan baku berupa lumpur padat hasil pengolahan IPLT Pulo Gebang dan bahan pendukung kompos berupa sampah organik dan dedaunan kering. Metode pengomposan yang digunakan adaah metode open bin composting dengan wadah kompos berupa compost bag 200 L yang dimodifikasi. Pengomposan dilakukan dengan 3 variasi kompos selama 50 hari dimana dilakukan pengamatan suhu, pH, dan kelembapan setiap 2 hari sekali serta pengamatan warna dan bau setiap 1 minggu sekali. Seluruh reaktor kompos berhasil melewati proses pengomposan dengan baik, yaitu berhasil mencapai fase mesofilik, termofilik, dan pendinginan. Berdasarkan hasil uji laboratorium, kompos II dengan perbandingan lumpur padat : sampah organik : dedaunan kering sebesar 50 : 25 : 25 mempunyai kandungan yang paling baik dengan kandungan C-organik sebesar 36,75%, N-Total sebesar 3,57%, rasio C/N sebesar 10,29, P2O5 Total sebesar 2,45%, K2O total sebesar 0,38%, Fe total sebesar 1,97%, Mn sebesar 0,03%, Cu sebesar 33,6 ppm, dan As sebesar 13,09 ppm. Proses pengomposan dapat menaikkan kadar unsur hara makro dan mikro serta menurunkan kadar logam berat. Analisis risiko paparan logam berat terhadap manusia dilakukan dengan 2 metode, yaitu berdasarkan nilai HQ (Health Quotient) dan ECR (Excess Cancer Risk). Kandungan logam berat pada kompos matang mempunyai potensi untuk menimbulkan efek kesehatan dan efek kanker pada 23 – 106 orang dari 10.000 orang.

.....Sludge is a liquid waste suspension and microorganisms precipitate from wastewater treatment at WWTP. Compost is an alternative that can be done as an effort to utilize sludge because of the content possessed by the sludge. This study aims to analyze macro and micronutrients as well as heavy metals and analyze the potential application of solid sludge from Pulo Gebang WWTP processing. In addition, also analyze the risk of heavy metal contamination to soil, plants, and humans. Compost production uses raw materials in the from of sludge from Pulo Gebang WWTP processing and compost supporting materials in the form of organic waste and dry leaves. The composting method used is the open bin composting method with a modified 200 L compost bag. Composting was carried out with 3 variations of compost for 50 days where temperature, pH and humidity were observed every 2 days and color and odor observations were made once every 1 week. All of the compost reactors successfully passed the composting process well, successfully achieving the mesophilic, thermophilic, and cooling phases. Based on laboratory test results,

compost II with a ratio 50 : 25 : 25 of sludge: organic waste: dry leaves has the best content with C-organic content of 36.75%, N-Total of 3.57%, ratio of C /N 10.29, P2O5 Total 2.45%, K2O total 0.38%, Fe total 1.97%, Mn 0.03%, Cu 33.6 ppm, and As 13, 09 ppm. The composting process can increase levels of macro and micronutrients and reduce levels of heavy metals. Analysis of the risk of heavy metal exposure to humans was carried out using 2 methods, namely based on HQ (Health Quotient) and ECR (Excess Cancer Risk) values. The content of heavy metals in mature compost has the potential to cause health effects and cancer effects in 23-106 people out of 10,000 people.