

Effect of pretreatments on compost production from shredded oil palm empty fruit bunch with palm oil mill effluent anaerobic sludge and chicken manure

ABSTRACT

Rapid co-composting of lignocellulosic oil palm empty fruit bunch (OPEFB) and palm oil mill effluent (POME) is a cost-effective and sustainable way to eliminate biomass residues. In this study, suitable pre-treatments and co-substrates for an accelerated composting treatment process were investigated. A steam pre-treatment was performed prior to composting. The composting mixtures were placed in plastic drums under a roofed area. They were regularly turned for aeration and measured for temperature, oxygen, moisture content, bulk density, carbon to nitrogen (C/N) ratio, and fiber tensile strength. C/N ratio is the main parameter measured as a maturity indicator for the compost. The compost temperature was above 60 °C during the thermophilic phase after the steam pre-treatment, based on the heat produced by the microbes. Steam-treated OPEFB and untreated OPEFB co-composted with chicken manure achieved the same maximum temperature of 62 °C and C/N ratios of 8.76 and 9.58, respectively. Steam pretreatment did not have significant effect when the treated OPEFB was co-composted with POME anaerobic sludge due to insufficient steam pressure at 40 psi and 140 °C. Steam-treated OPEFB and untreated OPEFB co-composted with POME anaerobic sludge achieved 54 °C and 60 °C, respectively, while the C/N ratios were 12.41 and 10.14, respectively.

Keyword: Steam; Pre-treatment; Palm oil mill effluent; Oil palm empty fruit bunch; Co-composting