

## Changes in physicochemical and microbial community during co-composting of oil palm frond with palm oil mill effluent anaerobic sludge.

### ABSTRACT

The aims of this study were to investigate the physicochemical changes and microbial population during co-composting of 1 ton oil palm frond (OPF) with 1,000 L palm oil mill effluent (POME) anaerobic sludge. In the first 30 days of composting, the temperature of the composting piles was observed in the thermophilic phase, within a range of 50 - 56 °C. Meanwhile, the oxygen level, moisture content, and pH profiles of the compost were maintained at 2.0 to 12%, 60 to 70%, and 7.9 to 8.5, respectively, throughout the composting process. The total bacteria count was estimated to be about  $55 \times 10^{10}$  CFU/mL in the mesophilic phase, and then it increased up to  $66 \times 10^{10}$  CFU/mL in the thermophilic phase, and finally decreased to  $9.0 \times 10^{10}$  CFU/mL in the curing phase. The initial C/N ratio, 64, decreased to 18 after 60 days of composting process, indicating the maturity of compost product from OPF-POME anaerobic sludge. The diversity of the bacterial community was investigated using polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE) analysis. The results suggested that the co-composting process of OPF with POME anaerobic sludge was dominated by *Pseudomonas* sp.

**Keyword:** Oil palm frond; Palm oil mill effluent (POME) anaerobic sludge; Composting; DGGE.