

INTISARI

Penanganan pencemaran hidrokarbon dalam tanah dilakukan dengan bioremediasi menggunakan konsorsium mikroba. *Palm Oil Mill Effluent* (POME) mengandung populasi mikroba yang secara aktif terlibat dalam degradasi minyak di dalamnya. Berdasarkan similaritas struktur kimia minyak dalam POME, mikroba tersebut potensial digunakan dalam degradasi hidrokarbon. Pada penelitian ini dikaji potensi mikroba yang terkandung dalam POME untuk degradasi hidrokarbon minyak bumi dalam tanah tercemar. Proses biodegradasi diamati selama 8 minggu dengan pengujian setiap 4 minggu. Analisis penurunan sisa minyak dan komponen *Total Petroleum Hydrocarbon* (TPH) dilakukan menggunakan metode gravimetri dan *Gas Chromatography Mass Spectrometry* (GCMS). Dinamika populasi mikroba tanah dikaji menggunakan *Next Generation Sequencing* (NGS). Pada penelitian ini dilakukan pemetaan peran mikroba dalam transformasi hidrokarbon menggunakan *Canonical Correspondence Analysis* (CCA). Berdasarkan hasil yang diperoleh penambahan konsorsium mikroba POME tidak signifikan mendorong proses biodegradasi minyak pencemar. Peningkatan kemampuan biodegradasi hidrokarbon dalam tanah tercemar diduga karena adanya tambahan nutrisi dari POME sebagai stimulan bagi bakteri tanah selama proses biodegradasi. Selama proses biodegradasi struktur konsorsium mikroba tanah bergeser dari semula mirip POME menjadi mirip tanah. Terjadi dinamika populasi bakteri tanah tercemar menuju dominansi oleh filum Proteobacteria. Bacteroidota merupakan bakteri eksogen dari POME yang kemungkinan berperan dalam mendorong proses biodegradasi dalam tanah tercemar.

Kata kunci: *Palm Oil Mill Effluent*, komunitas bakteri, biodegradasi, hidrokarbon.

ABSTRACT

Hydrocarbon contamination treatment in polluted soil is carried out through bioremediation using microbial consortia. Palm Oil Mill Effluent (POME) contains microbial populations that are actively involved in the degradation of oil within it. Based on the chemical structure similarity of oil in POME, these microbes have the potential to be used in hydrocarbon degradation. This study examined the potential of microbes contained in POME for the degradation of petroleum hydrocarbons in contaminated soil. The biodegradation process was observed for eight weeks, with testing conducted every four weeks. Analysis of the reduction in oil residue and Total Petroleum Hydrocarbon (TPH) components was performed using gravimetric methods and Gas Chromatography-Mass Spectrometry (GC-MS). The dynamics of soil microbial populations were studied using Next Generation Sequencing (NGS). In this study, the role of microbes in hydrocarbon transformation was mapped using Canonical Correspondence Analysis (CCA). Based on the results obtained, the addition of POME microbial consortium did not significantly enhance the biodegradation process of oil contaminants. The increased hydrocarbon biodegradation capability in contaminated soil is believed to be due to additional nutrients from POME acting as stimulants for soil bacteria during the biodegradation process. During the biodegradation process, the structure of the soil microbial consortium shifted from initially resembling POME to resembling soil. There was a dynamic change in the bacterial population of contaminated soil towards dominance by the phylum Proteobacteria. Bacteroidota, an exogenous bacterium from POME, likely plays a role in promoting the biodegradation process in contaminated soil.

Keywords: Palm Oil Mill Effluent, bacterial community, biodegradation, hydrocarbon