

## **Newly isolated alkane hydroxylase and lipase producing *Geobacillus* and *Anoxybacillus* species involved in crude oil degradation**

### **ABSTRACT**

Isolation and studies of novel, crude oil biodegrading thermophilic strains may provide a wider knowledge in understanding their role in petroleum degradation. In this study, the screening of ten new thermophilic strains revealed that all strains were alkane hydroxylase producers and seven of them produced lipase concurrently. Three best strains were characterized and identified through 16S rRNA sequence analysis as *Geobacillus* sp. D4, *Geobacillus* sp. D7, and *Anoxybacillus* *geothermalis* D9 with GenBank accession numbers MK615934.1, MK615935.1, and MK615936.1, respectively. Gas chromatography (GC) analysis showed that all three strains were able to breakdown various compounds in crude oil such as alkanes, toxic poly-aromatic hydrocarbons (PAHs), organosulfur, carboxylic acids, alkene, resins, organosilicon, alcohol, organochlorine, and ester. For the first time, alkane hydroxylase and lipase activity as well as crude oil degradation by *A. geothermalis* species were reported. *Geobacillus* sp. D7 is the best alkane degrader followed by *A. geothermalis* D9 and *Geobacillus* sp. D4 with 17.3%, 13.1%, and 12.1% biodegradation efficiency (BE%), respectively. The potential of thermophiles isolated can be explored further for bioremediation of sites polluted by petroleum and oil spills.

**Keyword:** Alkane hydroxylase; Crude oil; Biodegradation; PAHs; Thermophiles; Lipase