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## Degradation Potential of Diesel and Gasoline by Three Native Bacteria in Sri Lanka

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## Abstract

Environmental pollution due to petroleum and petrochemical products has attracted much global attention. Microbial degradation of petroleum hydrocarbons is one of the major practices in natural decontamination process due to the relatively low cost. In the present study *Enterobacter* sp. (KM455978) *Enterobacter ludwigii* (KM504128) and *Bacillus cereus* (KM504128) strains which previously reported as crude oil degraders were used to study their degradation capability of gasoline and diesel. 0.5 ml of overnight starved bacterial suspensions was introduced into medium containing hydrocarbon (gasoline and diesel) as a sole carbon source respectively. Triplicate samples were incubated at 28 °C with shaking at 100 rpm for 14 days and degradation percentages of hydrocarbon were measured using gravimetric method. The emulsification index ( $E_{24}$ ) and total viable count (TVC) were measured to evaluate the degradation potential. The gravimetric analysis after 14 days of incubation showed that *Bacillus cereus* had the highest degradation of 51% for gasoline and 80% diesel whereas *Enterobacter* sp. showed degradation of 27% for gasoline and 65% for diesel, the *E. ludwigii* had 22.6% of gasoline and 68% diesel. The population densities of all the strains increased with decreasing the gasoline and diesel concentration was detected. Bacterial cell densities were increased in the samples spiked with diesel from  $0.6 \times 10^4$  to  $2.46 \times 10^4$ ,  $3.2 \times 10^4$  and  $2.24 \times 10^4$  CFU/ml for *Enterobacter* sp., *Bacillus cereus*, and *Enterobacter ludwigii* respectively. Within 14 days cell density of three bacterial strains in gasoline samples were increased from  $0.61 \times 10^4$  to  $1.8 \times 10^4$  CFU/ml,  $2.1 \times 10^4$  CFU/ml and  $1.83 \times 10^4$  CFU/ml for *Enterobacter* sp. *Bacillus cereus* and *E. ludwigii* respectively. Increasing trend of the emulsification index ( $E_{24}$ ) for petrol was recorded from 15% to 54%, 36%, 38% for *B. cereus*, *Enterobacter* sp., *E. ludwigii* respectively. In contrast, higher  $E_{24}$  was recorded from 18% to 83.7%, 74%, 76.8% for *Bacillus cereus*, *Enterobacter* sp., *E. ludwigii* respectively for gasoline. The results of the present study revealed that the native bacteria remove considerable amount of toxic hydrocarbon by bioremediation that can be used to clean hydrocarbon contamination as environmental friendly, low cost solution.

**Keywords:** *Bacillus cereus*, Biodegradation, *Enterobacter* sp., Diesel, Gasoline,