

Comparison of Hydrocarbon-Degrading Consortia from Surface and Deep Waters of the Eastern Mediterranean Sea

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ABSTRACT

Background information

The Eastern Mediterranean Sea (EMS) has attracted great interest in recent years due to large oil and gas reservoirs that have been discovered in deep and ultra-deep waters. Although drilling technologies are advancing towards deeper waters, increasing the danger of a Deepwater Horizon like accident, effective bioremediation protocols to combat a potential oil spill in the EMS have not been developed yet.

Methodology

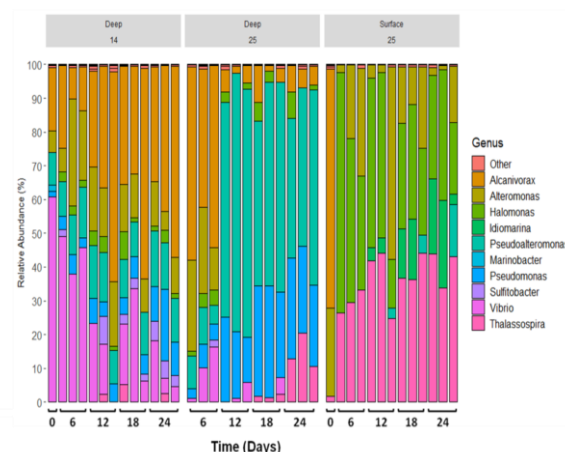
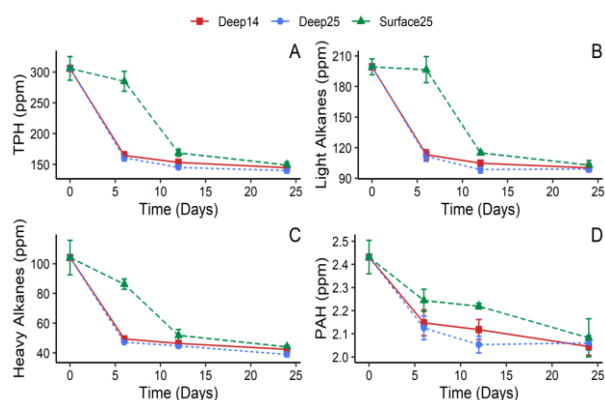
In this study, the hydrocarbon degradation capacity and diversity of consortia enriched from surface (10m) and deep (1040m) waters of the EMS were investigated in a series of experiments. Surface and Deep consortia were incubated in ONR7a medium at *in situ* temperatures, 25°C and 14°C respectively with crude oil as the sole source of carbon. In addition, the Deep consortium was investigated at 25°C in order to directly compare the degradation rates to the Surface consortium.

Main Results

Approximately 50% of alkanes and 15% of polycyclic aromatic hydrocarbons (PAHs) were degraded in all treatments by the end of the experiment. The Deep consortium carried out the ~95% of the total biodegradation within 6 days regardless of temperature, whereas the Surface consortium reached comparable levels of degradation on day 12. Surface consortia were dominated by *Thalassospira* and *Idiomarina*, while temperature altered significantly the Deep consortia communities with *Alcanivorax* dominating at 14°C and *Pseudomonas-Pseudoalteromonas* dominating at 25°C.

Conclusions

Overall, the Deep sea consortium exhibited a higher efficiency for hydrocarbon degradation within the first week upon contamination which is critical during an oil spill. Thus, further investigation of this consortium is required under field environmental conditions in order to be applied in bioremediation technologies in the EMS.



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