

## SEQUENTIAL EXTRACELLULAR ORGANIC MATTER-TREATMENT BOOSTS BIOREMEDIATION EFFICIENCY

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### Abstract

Used lubricant oils (ULOs) often accumulate harmful compounds such as heavy metals and polycyclic hydrocarbons, causing persistent soil contamination that impairs habitat functions and future use [1–2]. Under these conditions, microorganisms, including hydrocarbon degraders, may enter a viable but non-culturable (VBNC) state with low or absent activity [3]. Thus, the outcome of bioremediation largely depends on sustaining microbial activity or reactivating VBNC cells via biostimulants. Resuscitation-promoting factors (Rpfs) have proven effective in the early stages of ULO bioremediation [2]. In this study, we aimed to extend the stimulatory effect of Rpf-containing extracellular organic matter (EOM) from *Micrococcus luteus* to improve ULO biodegradation. *Ex situ* soil microcosms were supplemented with EOM at the start (day 0) and after the first biodegradation phase (day 20). After 60 days of biostimulation (BS), extractable petroleum hydrocarbons (EPHs; 30,300 mg/kg) decreased by 56% with repeated EOM application (BS+2×EOM), compared to 46% with a single dose (BS+EOM). BS+2×EOM also enhanced colony-forming units (CFUs), respiration, and soil enzyme activities (dehydrogenase, catalase, sucrase, fluorescein diacetate hydrolase) relative to controls. Although BS+2×EOM and BS+EOM achieved the most effective hydrocarbon removal, the germination index of oilseed rape (*Brassica napus* L.) still decreased to 43% and 42%. These results indicate that improved microbial activity and pollutant reduction do not necessarily mitigate soil phytotoxicity.

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### References

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