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Application of Surfactant to *in situ* Bioremediation

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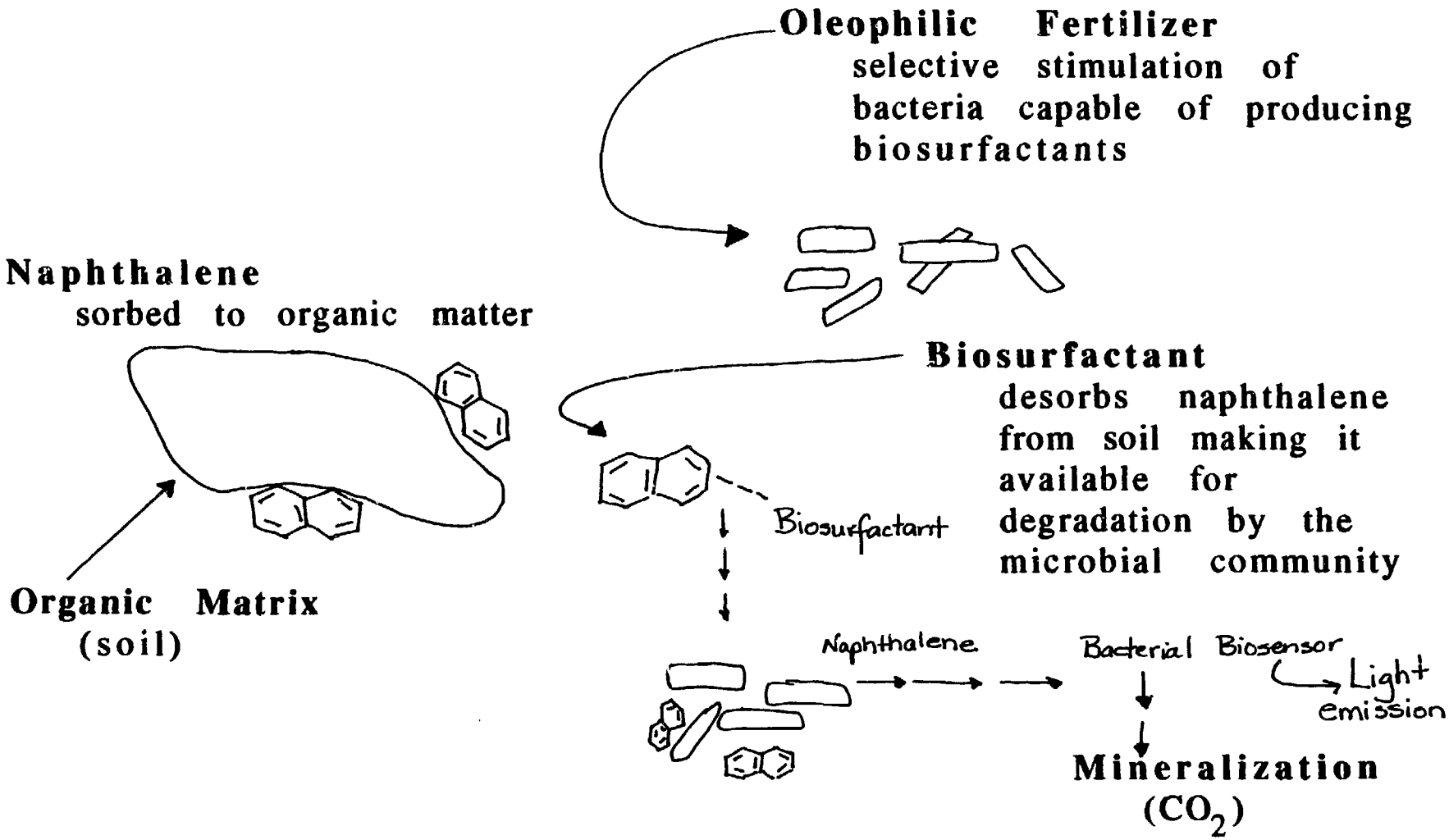
OBJECTIVE: The main objective of this research was to evaluate the potential use of biosurfactants to increase contaminant desorption from the soil matrix, thereby increasing contaminant bioavailability and degradation rates. A secondary objective was the evaluation of the bioluminescent lux bacterial biosensors to measure the bioavailability of contaminants. Various microbial isolates were assayed for biosurfactant production and growth conditions optimized. A hydrophobic fertilizer was used to examine the its ability to selectively stimulate biosurfactant producing bacteria within the microbial community.

CONCEPTUAL MODEL



RESULTS

- Identified five bacterial isolates that produce biosurfactants.
- Hexane and oleophilic fertilizer treatments increased biosurfactant production.
- Surfactants were able to increase the bioavailability of naphthalene in a soil slurry as measured by a bioluminescent lux microorganism (*Pseudomonas putida* 1351).
- Preliminary evidence suggests that a combination of surfactant producing microorganisms and oleophilic fertilizer increases contaminant bioavailability and will thus increase rates of biodegradation.
- These results indicate that a two-step remediation design of biosurfactant producing microorganisms and selective stimulation with oleophilic fertilizers may be very beneficial to *in situ* remediation. However, additional work (and funding) is necessary to demonstrate the feasibility of this approach for field application.