ENUMERATION OF POTENTIAL PETROLEUM DEGRADING MICROORGANISMS USING A MINIATURIZED MOST PROBABLE NUMBER METHOD

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ABSTRACT

Soil contamination is most often caused by the introduction of man-made chemicals into the environment. Whether caused intentionally by illegal dumping or unintentionally through a leaking underground tank, these wastes negatively alter the delicate balance of an ecosystem and can cause serious health risks. One of the most widespread soil contaminants is petroleum hydrocarbons. Bio-remediation, a process that makes use of microorganisms to consume or neutralize a specific contaminant is used for soil cleanup. The goal of this study was to determine whether any indigenous microorganisms existed locally that were capable of using hydrocarbons as a fuel source.

To examine this question, we collected water and soil samples from multiple sites in and around Aberdeen, SD. These samples were exposed to common fuel sources as the only available carbon source. A miniaturized Most Probable Number (MPN) technique was then employed to provide an estimate of the number of petroleum degraders growing in each sample. The MPN results showed a range of $10^3$ to $10^7$ degraders per gram of soil and $10^0$ to $10^1$ degraders per ml of water. These results suggest that there were significant numbers of indigenous organisms in the soil tested that were able to metabolize diesel fuel. Future studies will focus on isolating the organism, assaying for characterizing petroleum plasmids, and transferring these plasmids into an organism that lacks petroleum degrading capabilities. This work increases our understanding of the abilities of native organisms and could limit the need to introduce non-native species to clean contaminated soil.