

TRACKING THE FATE AND RECYCLING OF ¹³C HEXADECANE IN A CAPTINA SILT LOAM

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Stable isotopes coupled with phospholipid fatty acid (PLFA) analysis can be useful in determining the microorganisms responsible for actively degrading petroleum hydrocarbons. Once the active degraders at a crude-oil bioremediation site are identified, conditions can be optimized to enhance bioremediation. This study examined the fate of hexadecane in Captina silt loam. The soil was amended with ¹³C-labeled hexadecane at 600 ug/g, nitrogen at 50 ug/g, and incubated at 18 or 28 C. Moisture potentials were maintained at -33kPa. Samples were analyzed for quantity and stable isotope composition of PLFA. The hexadecane degradation rate was greater at 28 C than 18 C with k values of 0.591 and 0.371/day, respectively. After one day of incubation ¹³C enrichment was observed in three PLFA 14:0, 16:0, and 16:1 at both temperatures. Bacterial PLFA 15:0 and a17:0 were also enriched after 1 day at the higher temperature. After two days additional PLFA biomarkers become enriched in ¹³C, including those indicative of Actinomycetes (10Me17:0 and 10Me18:0). The isotopic composition of fungal biomarker 18:2 indicates they did not participate in hexadecane degradation until it was cycled through other community components. At the end of the incubation period all PLFA resolved isotopically had become enriched in ¹³C indicating hexadecane C had been recycled through the microbial community.