Carbon and Nitrogen Controls on Bacterial EPS in Unsaturated Biofilms. (S03-holden130506-Oral)

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Abstract:

Most soil bacteria are associated with solid surfaces where they grow as biofilms containing extracellular polymeric substances (EPS). EPS is rich in carbonaceous and nitrogenous biopolymers whose abundances may shift with changing proportions of available carbon to nitrogen (C/N). The microbe-scale allocation of C under high C/N conditions is of interest for at least two reasons: 1) the potential to sequester plant-propagated, elevated atmospheric carbon dioxide belowground, 2) the biodegradation of C-rich hydrocarbon pollutants. We cultured and analyzed Pseudomonas aeruginosa PG201 unsaturated biofilms for seven C/N conditions ranging from 1 to 200 with either glucose-C or hexadecane-C, and, for C/N of 12, with either ammonium-N or nitrate-N. EPS, measured as either total carbohydrate or uronic acid relative to either cellular DNA or cellular protein, was significantly more abundant for C/N 200. More EPS was produced with glucose versus hexadecane, and with ammonium versus nitrate. Our results indicate that the available C/N, as well as carbon and nitrogen quality, affect EPS production in soil-like bacterial biofilms.

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