Effects of Root Exudates on 6:2 FTOH Biotransformation and Soil Microbiome

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Background/Objectives. 6:2 Fluorotelomer alcohol (6:2 FTOH, $F(CF_2)_6CH_2CH_2OH$) is one of the poly- and perfluoroalkyl substances (PFAS) that has been intensively used as raw materials in synthesizing surfactants and fluorinated polymers. Although the environmental concentration of 6:2 FTOH is relatively low, understanding its biotransformation efficiency and pathways are particularly important because this pathway served as the central degradation pathway of many PFAS. While biodegradation of 6:2 FTOH has been reported, little is known about the effects of root exudates on the fate and transformation of 6:2 FTOH and the impact on the microbial community in the soil environment.

Approach/Activities. This study examined the effects of root exudates produced from dicot (*Arabidopsis thaliana*) grown under different nutrient conditions (nutrient-rich, sulfur-free, and potassium-free) and bioaugmentation of RHA1 on biotransformation of 6:2 FTOH. A batch experiment of soil microcosms contained 6:2 FTOH, root exudates and bioaugmentation were set up. The biotransformation of 6:2 FTOH in soil and the impact of treatments on microbial community were then evaluated by LC/MS/MS and next generation sequencing, respectively.

Results/Lessons Learned. Spiking root exudates collected from these three nutrient conditions enhanced the 6:2 FTOH biotransformation in soil microcosms. Interestingly, a higher humic-like substance in the root exudates was linked to higher defluorination of 6:2 FTOH. Spiking both RHA1 and root exudates facilitates the transformation of 6:2 FTOH, producing diverse metabolites. Microbial community analysis revealed that *Rhodococcus* was predominant in all RHA1 spiked treatments. The presence of different root exudates changed the diversity and the composition of microbial communities. Overall, this study provides new insight into 6:2 FTOH biotransformation. Root exudates amendment and bioaugmentation can serve as a potential method for remediation of PFAS-contaminated sites.