PhD Dissertation
Department of Environmental Science and Policy
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Title: Toxicity and environmental interactions of per- and polyfluoroalkyl substances in plants: assessments from protein structural changes to seasonal absorption dynamics

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ABSTRACT

Per- and polyfluoroalkyl substances (PFAS) are widespread and persistent environmental contaminants. This dissertation investigates the impact of PFAS on plants through laboratory and field experiments. The first phase of this study focused on the toxicity of long-chain and the newly-introduced short-chain fluorotelomer alcohols (FTOHs) in the model plant Arabidopsis thaliana, showing that the short-chain PFAS exhibit higher toxicity than the long-chain ones. The second phase of this study focused on the seasonal absorption of PFAS by aquatic plants in the Chesapeake Bay, suggesting an increased uptake of PFAS by plants at the beginning of the growing season and a release in the water at the end of the growing season. These findings underscore the importance of considering short-chain PFAS when performing risk assessment.