THE DIRT ON PFAS UPTAKE: SOIL TO CROP MOVEMENT OF PFAS IN LETTUCE, TALL FESCUE AND TOMATO AND THE EFFECT OF INTERCROPPING

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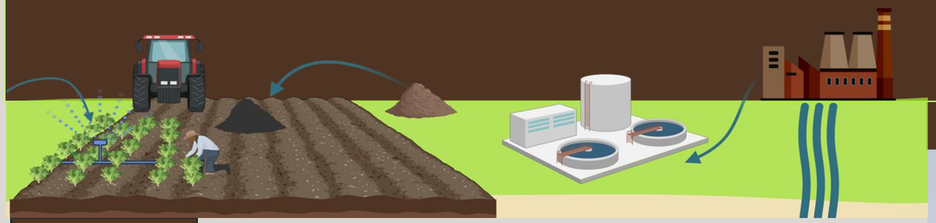


Introduction

Per- and polyfluoroalkyl substances (PFAS) are carbon-fluorine compounds useful for waterproof and oil repellent products (e.g., rain jackets and non-stick pans). The chemical characteristics that make them useful also make them persistent and capable of bioaccumulation in the environment, including human bodies. This has been linked to adverse health impacts to humans ingesting crops grown on PFAS-contaminated land.

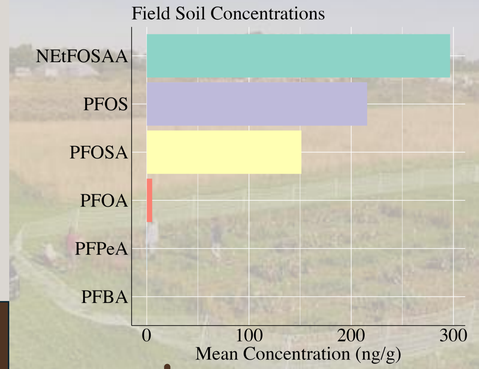
OVERARCHING RESEARCH QUESTION

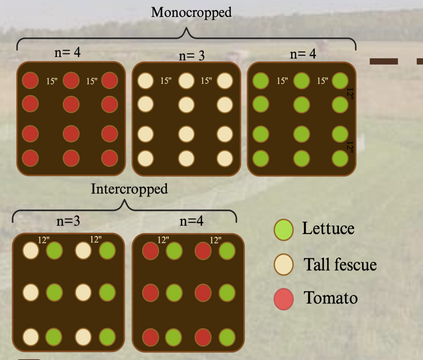
What crops can be grown safely in PFAS-contaminated soil to maintain farm viability?

Methods

Bioconcentration Factors (BCFs) of lettuce, tall fescue, and tomato plants were measured using collocated plant and soil samples. Crops were in monocropped and intercropped conditions.

$$BCF = \frac{PFAS\ concentration\ in\ plant\ part\ (ng/g)}{PFAS\ concentration\ in\ soil\ (ng/g)}$$





Hunter Farm, Unity, Maine

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3. What crop was most vulnerable in monoculture?

LETTUCE: *Lower* levels of PFOA and PFOS than in tall fescue. BCFs in leaves from this study were *lower* than other reports of lettuce transfer.

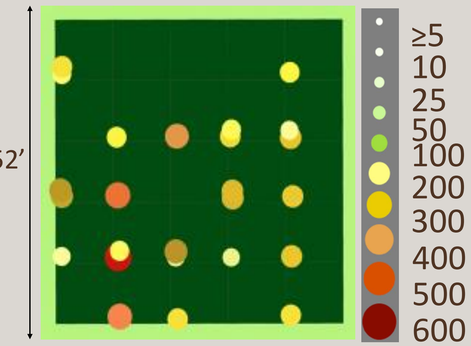
FESCUE: The crop with the *highest* transfer for each compound.

TOMATO: Fruit BCFs showed the *largest* variation in PFBA uptake, and *zero* transfer of PFOA and PFOS.

1. Was there a spatial structure to the contamination?

Field soil concentrations (ng/g) of NEtFOSAA

Moran's I p-values ≥ 0.05 for all compounds, including NEtFOSAA (left), indicate no spatial autocorrelation, suggesting that distributions of concentrations have no spatial structure.



No. Intercropping was actually associated with an *increase* in uptake, if any effect was observed at all.

*icons indicate crop neighbor

2. Does intercropping reduce uptake into edible parts of these crops?