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

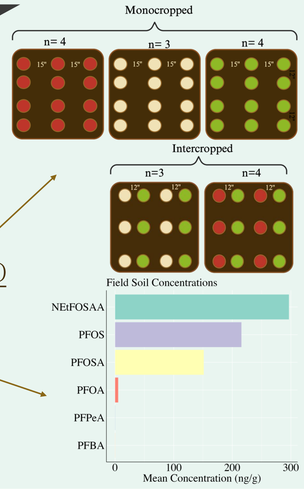
Per- and polyfluoroalkyl substances (PFAS) are carbon-fluorine compounds useful for waterproof and oil repellent products (e.g., rain jackets and non-stick pans). The chemical characteristics that make them useful also make them persistent and capable of bioaccumulation in the environment, including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

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

METHODS

Hunter Farm, Unity, Maine

- Lettuce
- Tall fescue
- Tomato

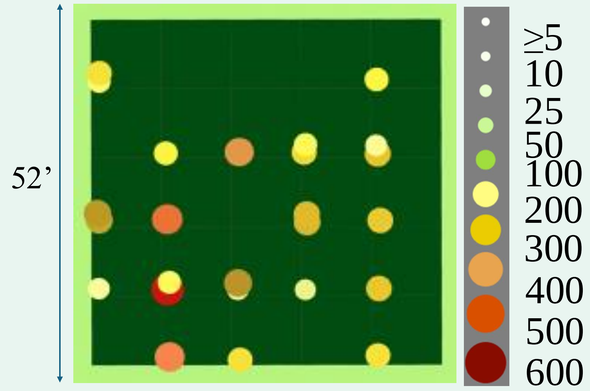


Bioconcentration Factor (BCF)

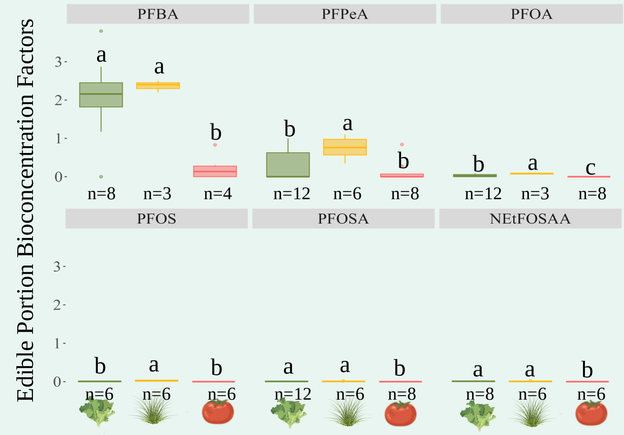
$$\frac{\textit{PFAS concentration in plant part } (ng/g)}{\textit{PFAS concentration in soil } (ng/g)}$$

RESULTS & TAKEAWAYS

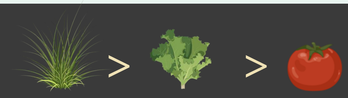
Field soil concentrations (ng/g) of NETFOSAA



Post-harvest edible portion BCFs

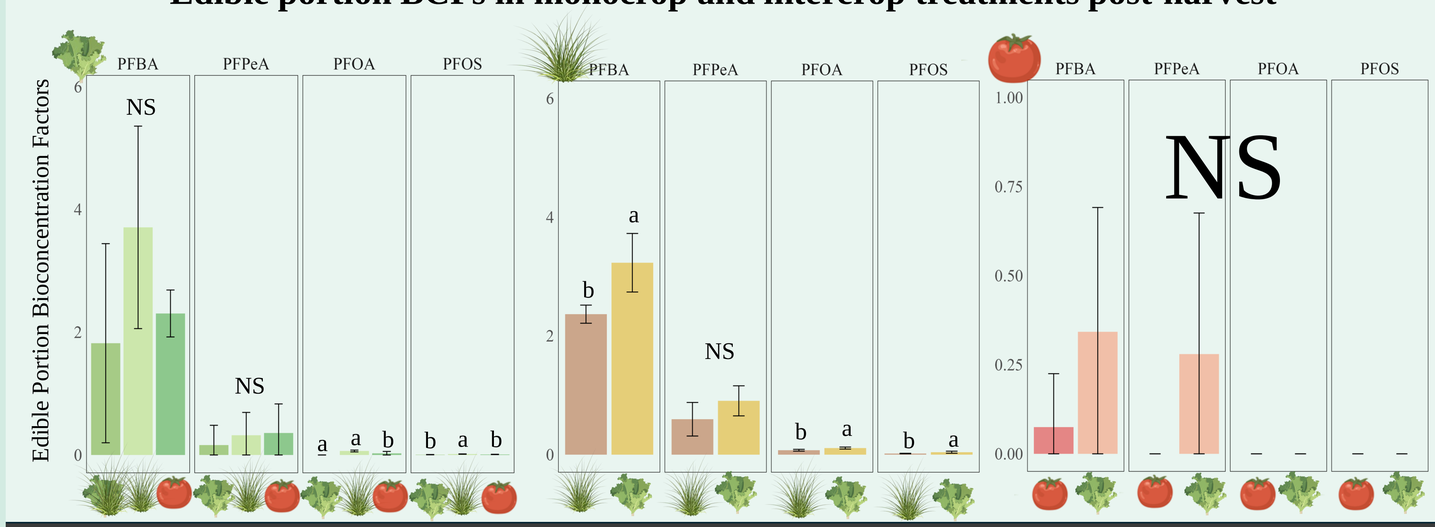


Soil concentrations were highly variable but not spatially autocorrelated.



Minimal uptake of precursors

Edible portion BCFs in monocrop and intercrop treatments post-harvest



Intercropping was not a viable phytomanagement strategy because it increased uptake into edible plant parts, potentially suggesting facilitation.

Within-field variation of PFAS soil concentrations can be as great as 3.2-fold, underscoring the need for collocated plant and soil samples.

Tall fescue takes up the most PFAS, but more information (BCFs across cuttings, biomass, plantings/acre) is needed to know if this would be a candidate for phytoextraction

Intercropping was not found to be effective for mitigation of PFAS uptake.

Thank you…

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The Agroecology Lab

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Check out our review paper here:
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