NC STATE UNIVERSITY AND CUMBERLAND COUNTY

Beyond the Tap:

PFAS in Your Home and Garden

COMMUNITY MEETING WITH A SHORT INTRODUCTION TO PFAS RESEARCH FOLLOWED BY AN OPEN Q&A SESSION WITH NC STATE SCIENTISTS

THURSDAY FEBRUARY 20 | 5:30-7:30PM

CROWN COMPLEX,
1960 COLISEUM DR. FAYETTEVILLE

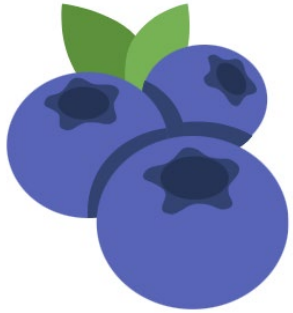
NC STATE UNIVERSITY

Superfund Research Program

CUMBERLAND COUNTY NORTH CAROLINA

CHHE Center for Human Health and the Environment

FREE. REGISTRATION NOT REQUIRED.



Beyond the Tap: PFAS In Your Garden

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Owen W. Duckworth[3], Detlef R.U. Knappe[2], Christopher Higgins[4]

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[2] Department of Civil, Construction, and Environmental Engineering, North Carolina State University

[3] Department of Crop and Soil Sciences, North Carolina State University

[4] Department of Civil and Environmental Engineering, Colorado School of Mines

US EPA set drinking water standard for six PFAS

Compound	Ideal level for human health	Final MCL (enforceable levels)
PFOA	Zero	4.0 parts per trillion (ppt or ng/L)
PFOS	Zero	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

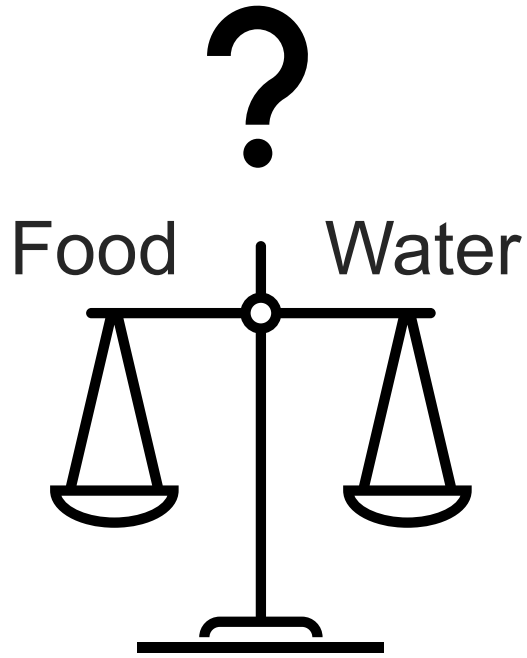
https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

The importance of PFAS human exposure through food remains poorly understood

Drinking water

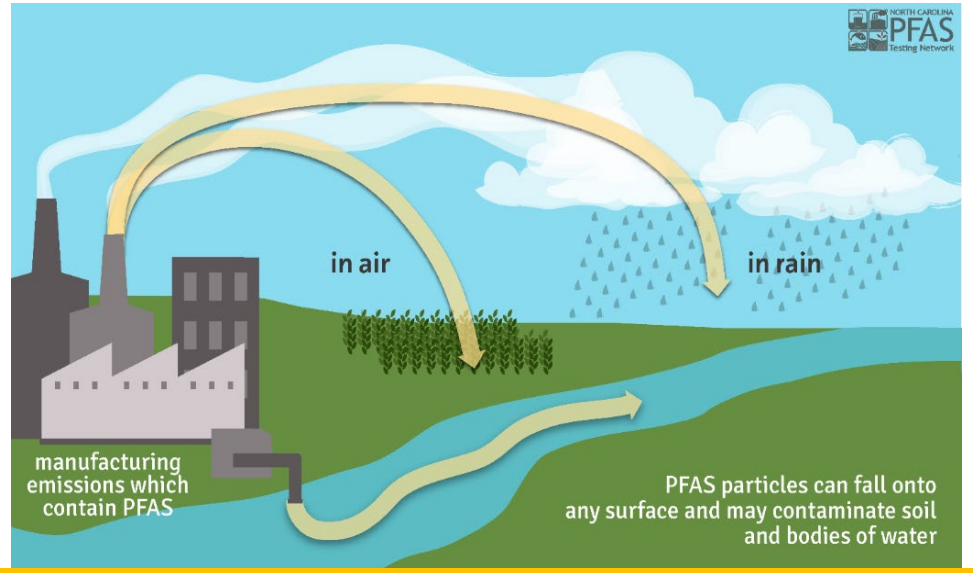
Food

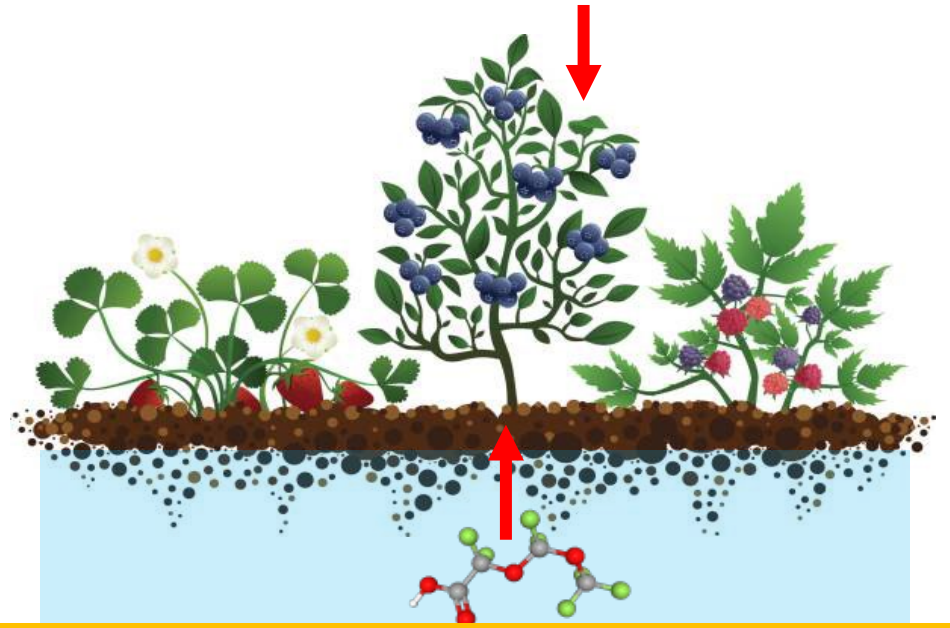
Air



Sunderland et al., 2018

Novel PFAS in North Carolina

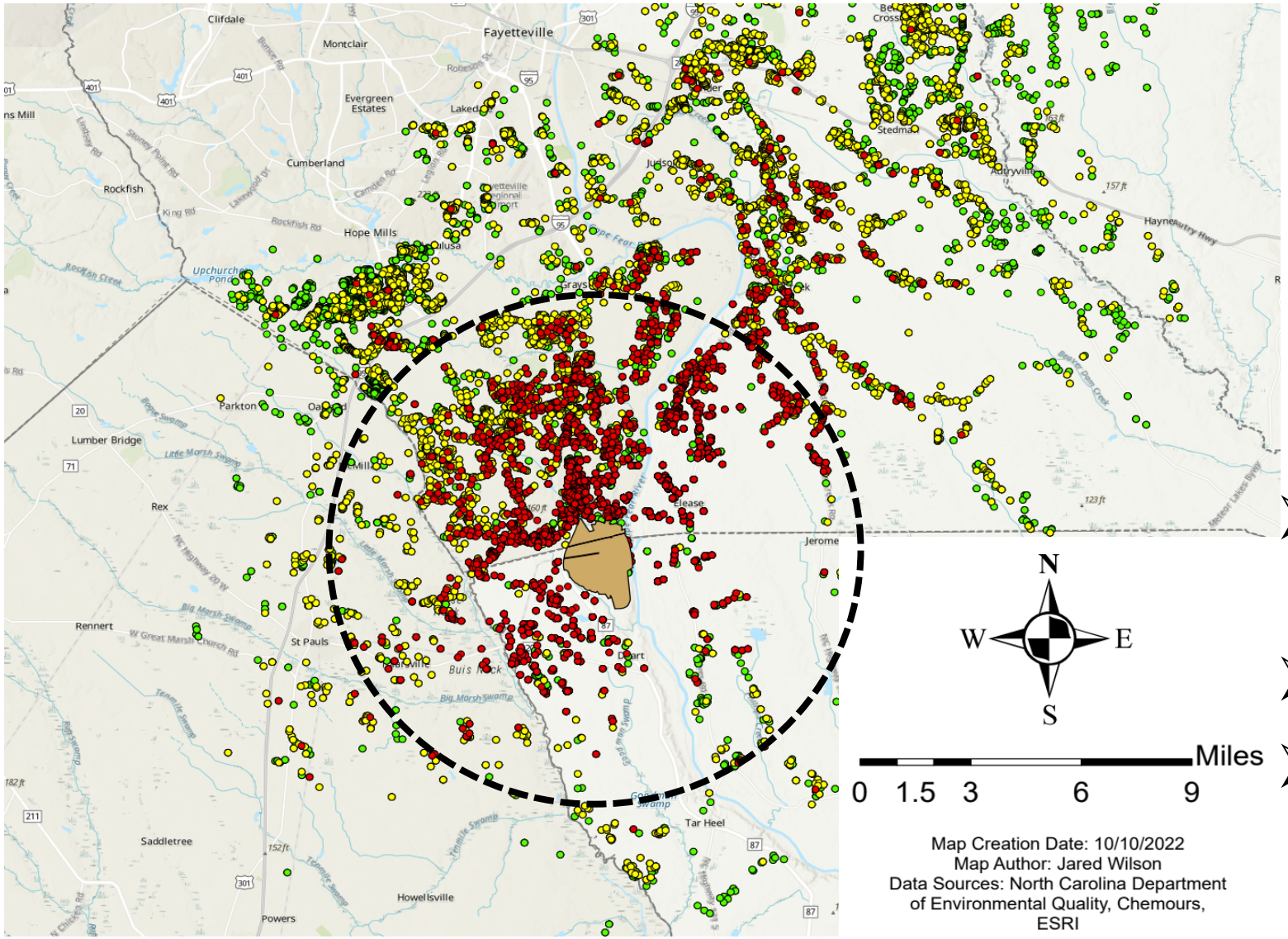




Is garden produce an important route of PFAS exposure?

Close to the fluorochemical manufacturer, many people harvested and consumed fruits and vegetables from their garden, but the uptake of PFEAs into local produce remains unclear.

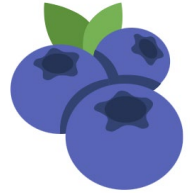
Five residential gardens were enrolled in the community



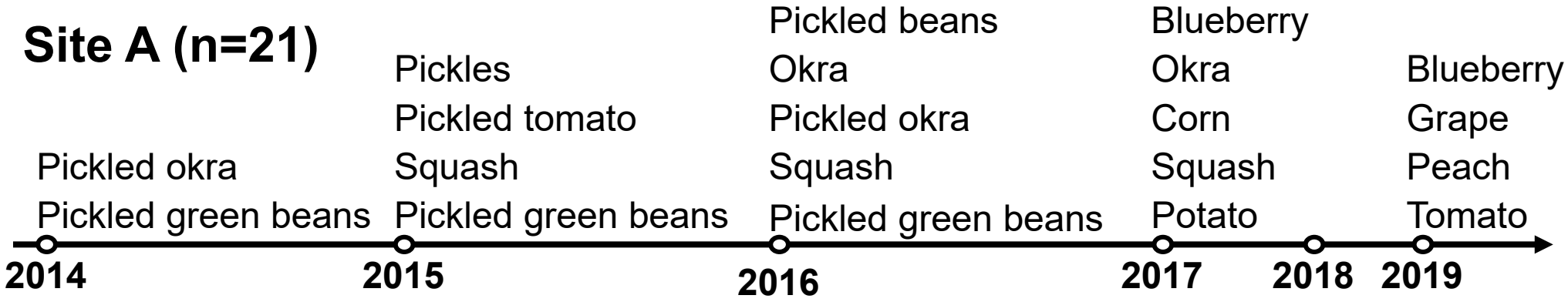
(From NC DEQ website)

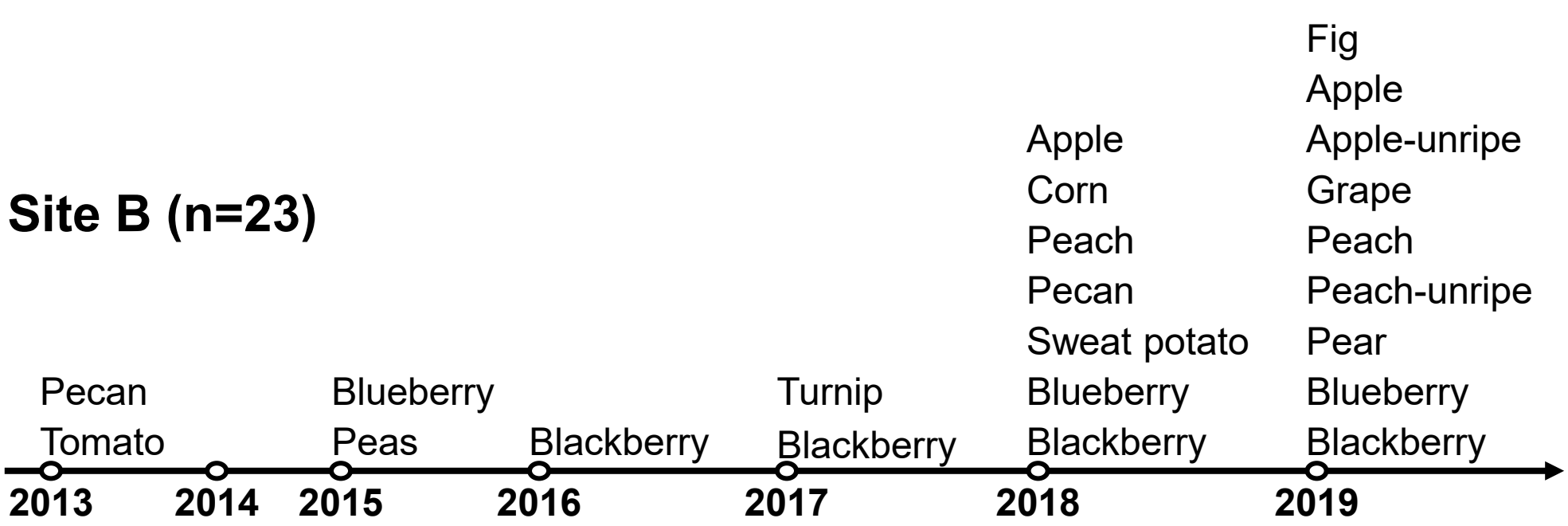
- GenX ≥10ppt
- Any PFAS (except GenX) ≥ 10ppt or Total Sum PFAS ≥ 70ppt
- No Detections or No PFAS ≥ 10ppt
- Chemours property boundary

- **All sites within a 6-mile radius of the plant**
- **53 fruits and vegetables**
- **Harvested in 2013-2019**



Produce inventory (n= 53)





2019

Site C Blueberry

Site D Blueberry

Cucumber

Site E Blueberry

Fig

Cantaloupe

Okra

Watermelon

Tomato

Cherry tomato

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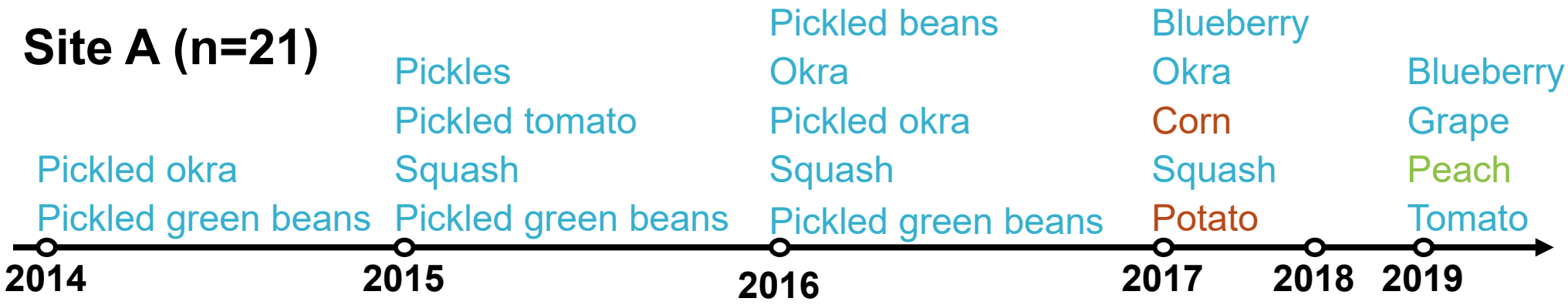
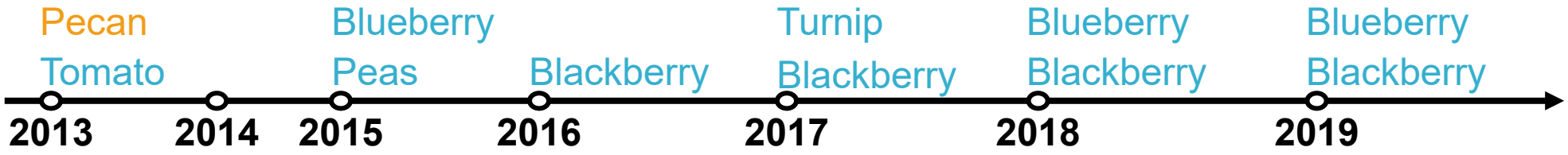


Produce types:

- ❑ **Water-rich (n=39)**
- ❑ **Tree-fruit (n=8)**
- ❑ **Oil-rich (n=2)**
- ❑ **Starch-rich (n=4)**



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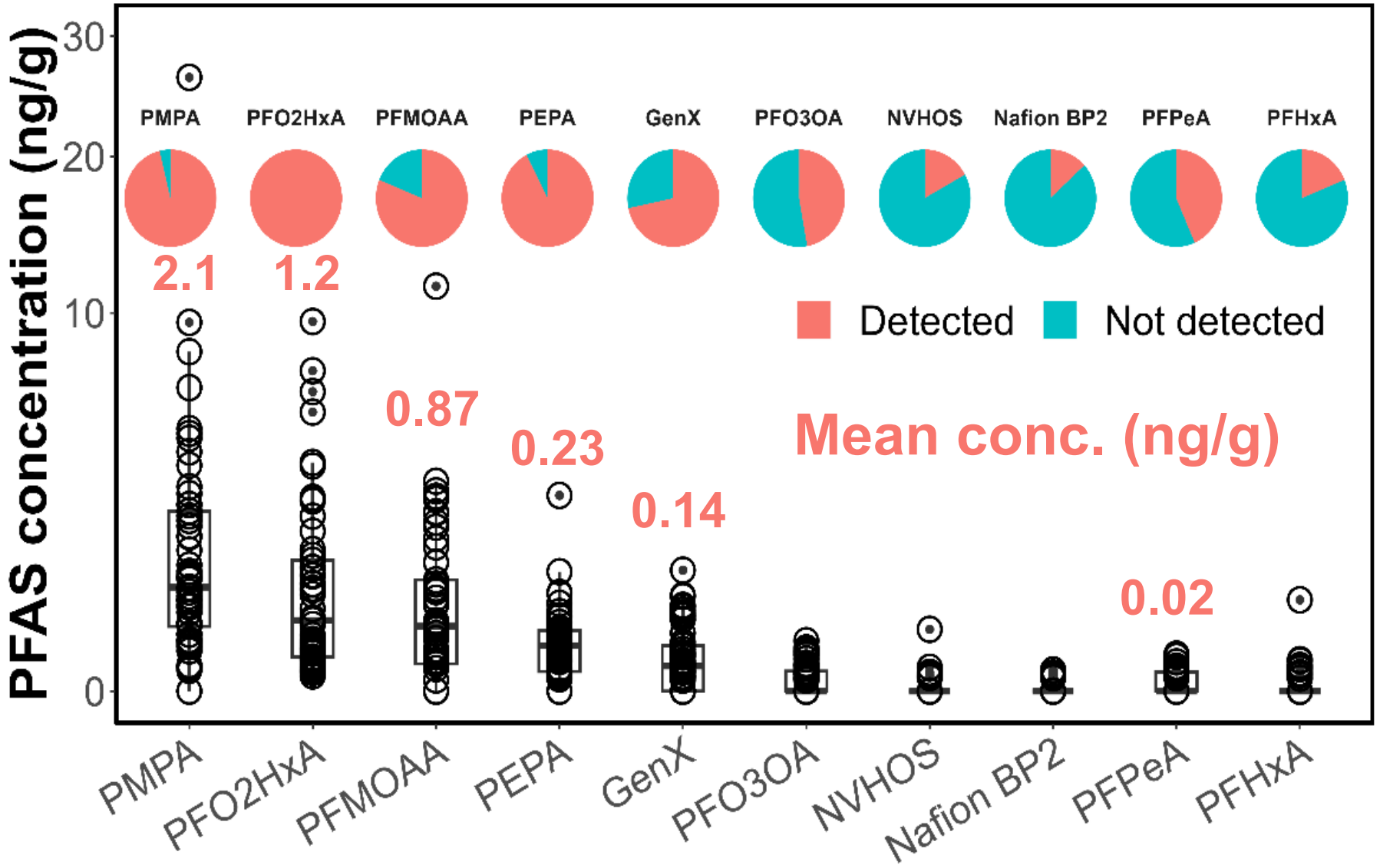
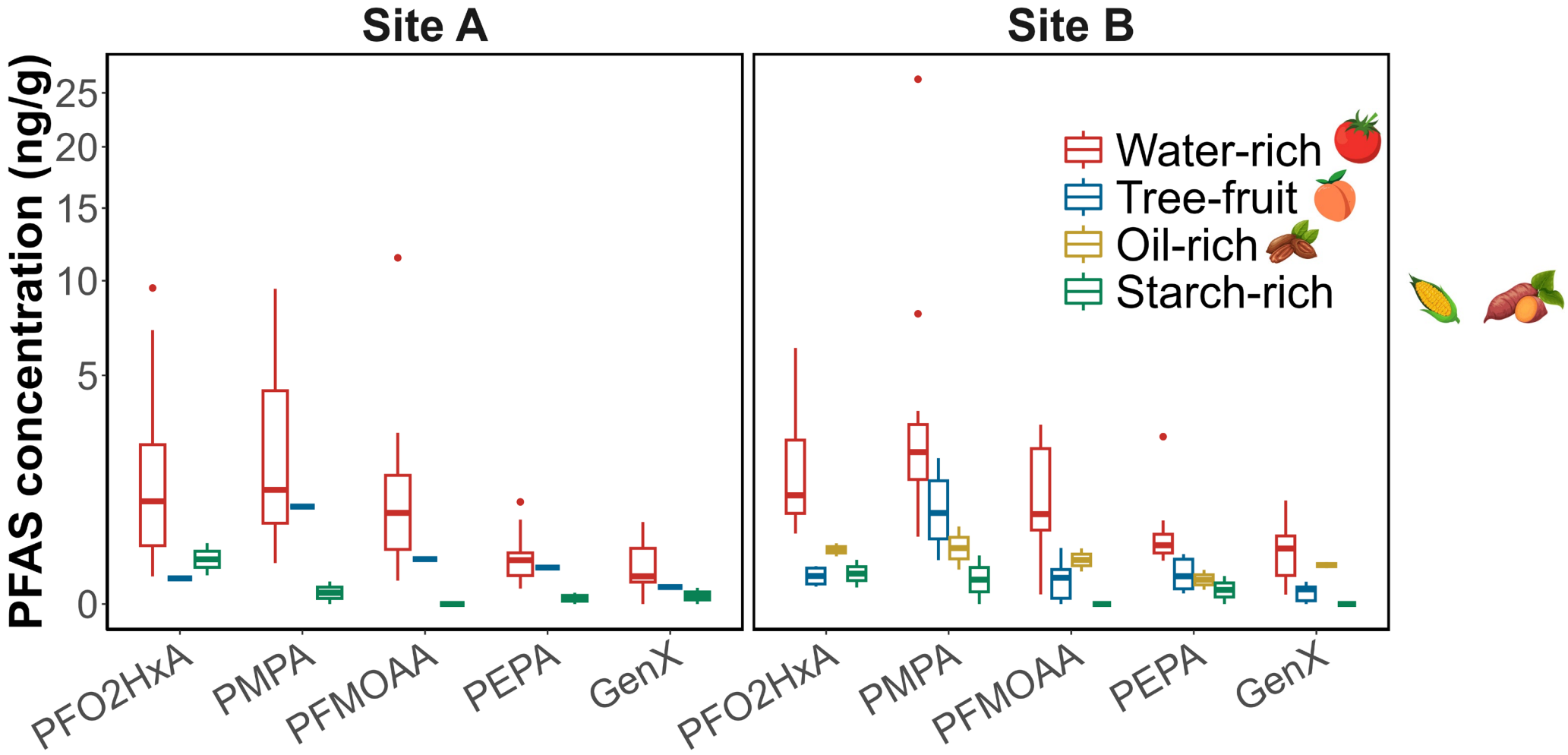
10 PFAS, including 8 novel PFAS, were detected in at least 10% of the produce samples



PFAS in edible parts of plants varies with plant type



Water-rich (e.g., berries) and starch-rich (e.g., corn) samples contained the highest and lowest PFAS levels, respectively

Recommended daily fruit and vegetable intake according to the EPA:

Children	**Adults**
186 grams	**288** grams

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B	0.193
E	0.004

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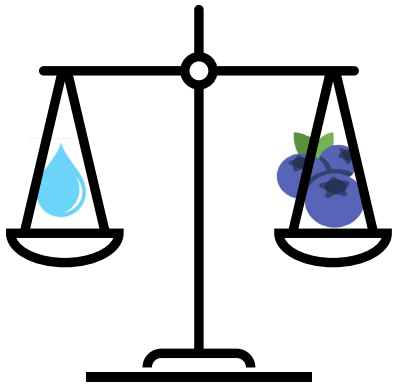
All > 186

All > 288

How important is exposure from food compared to exposure from drinking water?



How important is exposure from food compared to exposure from drinking water?

Let's assume that:

Water contains 10 ng/L GenX.

Kids (3-6 yr.) drink 0.33 L/d (~1.5 glasses of water)

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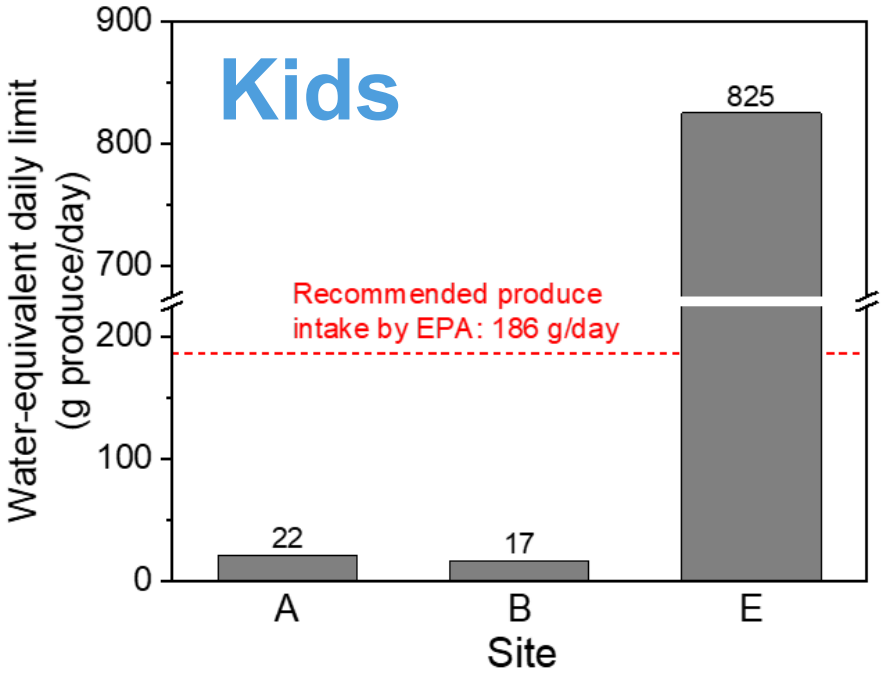

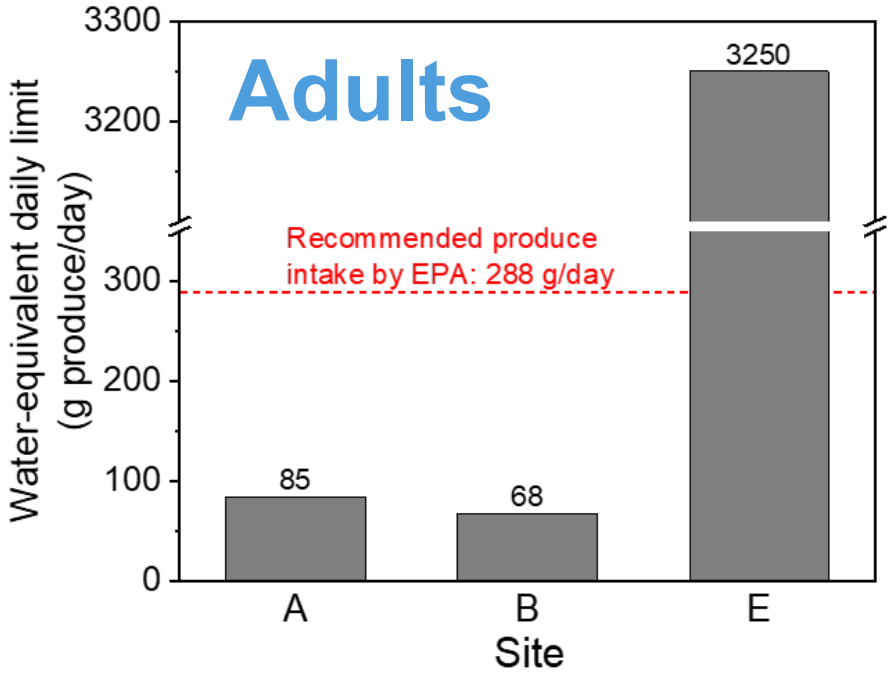

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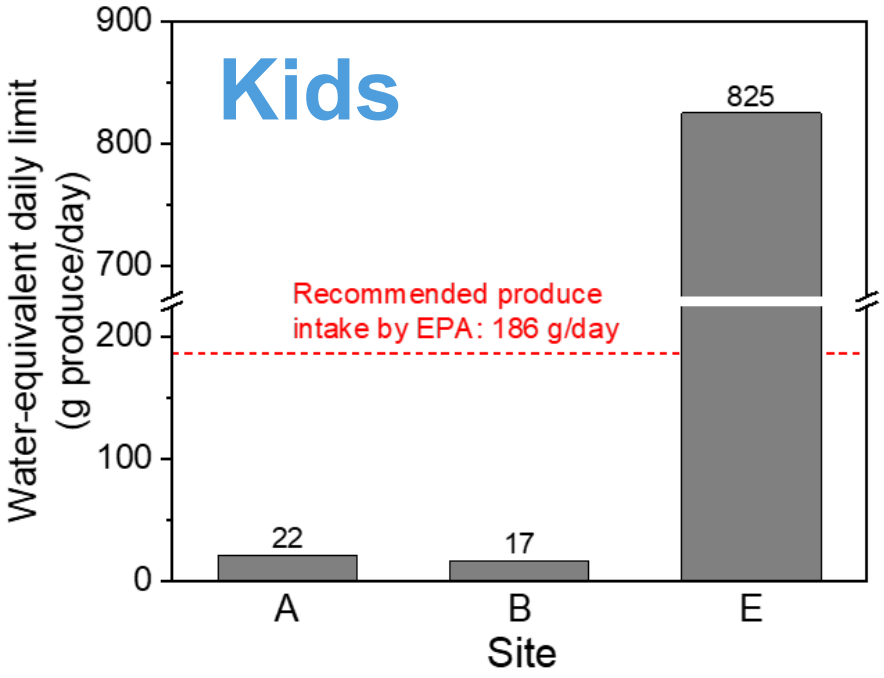
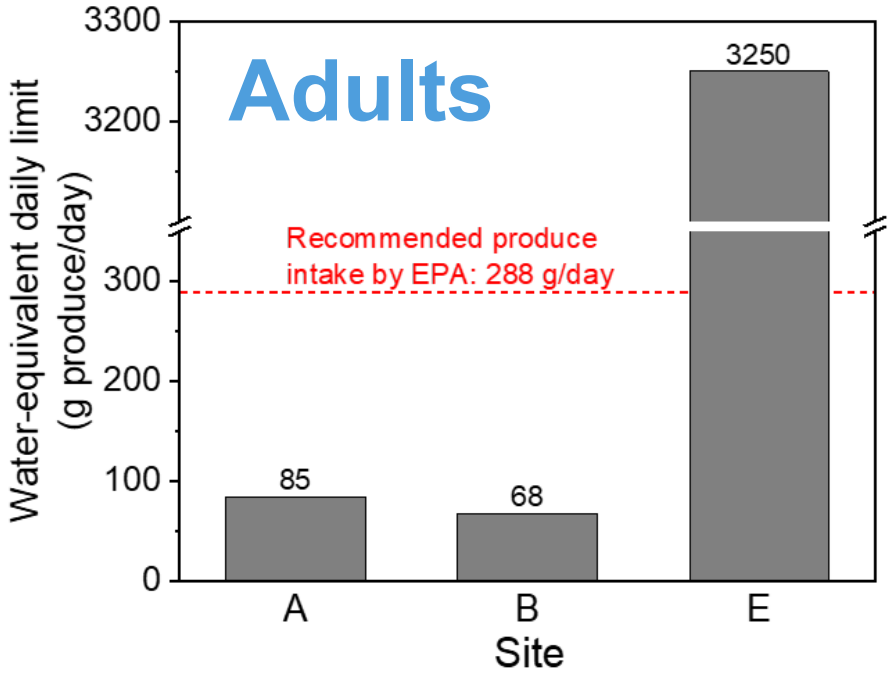
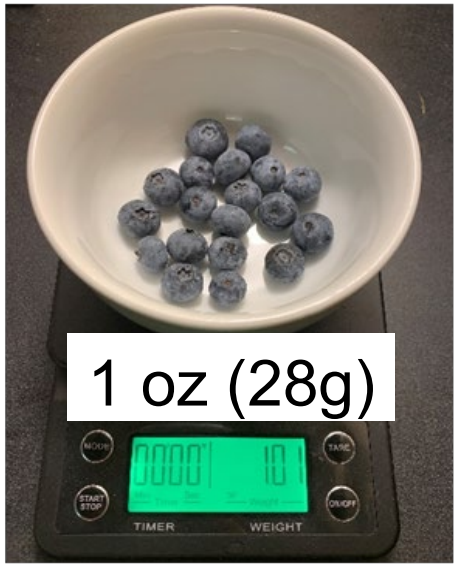




As an example:



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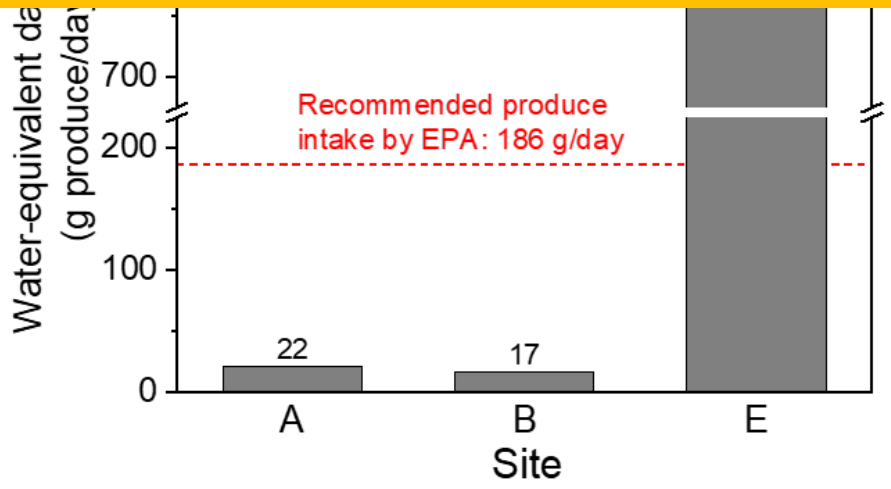
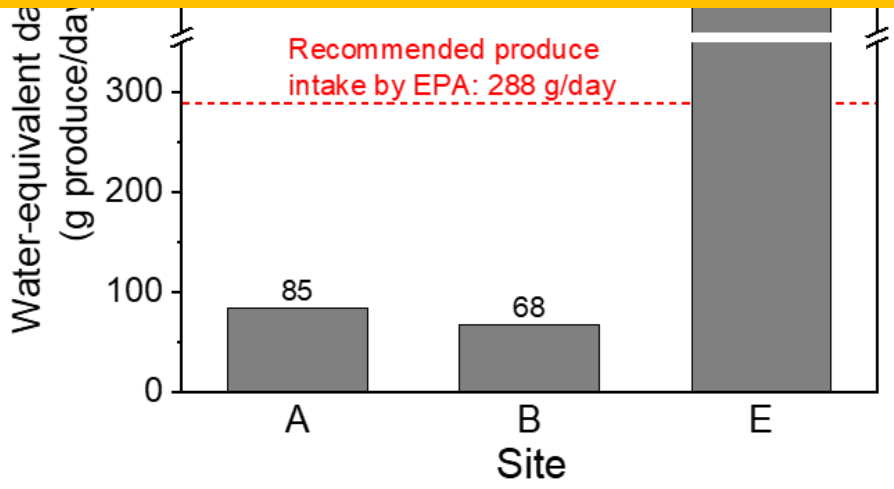
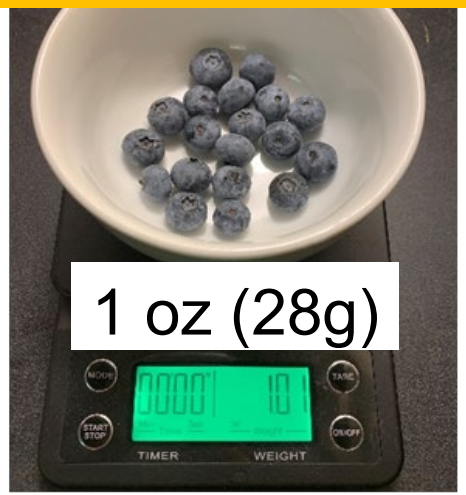
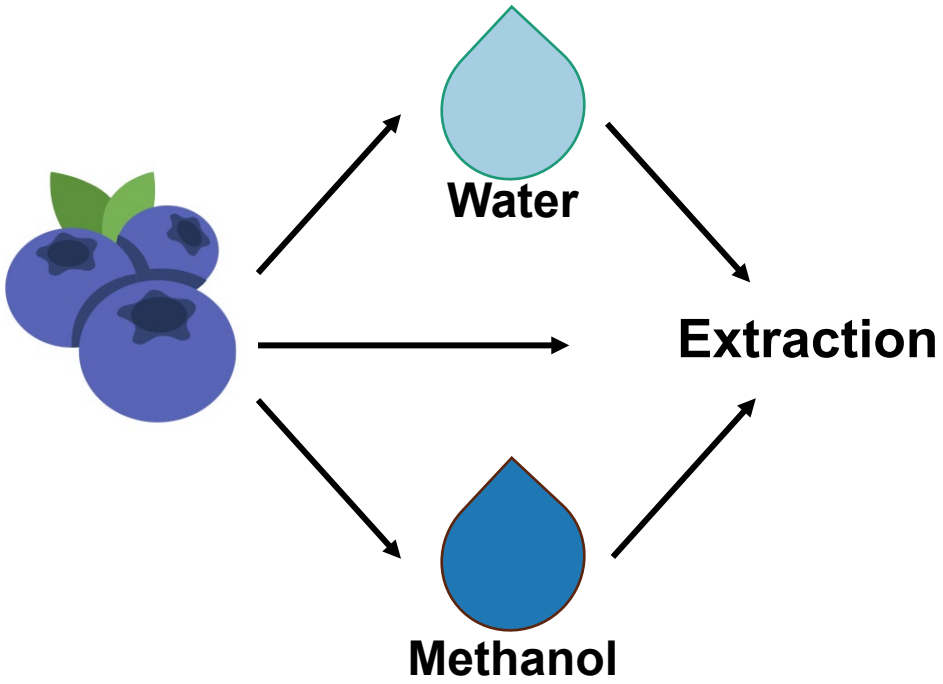
In many communities, uptake through residential garden produce could be an important route of PFAS exposure

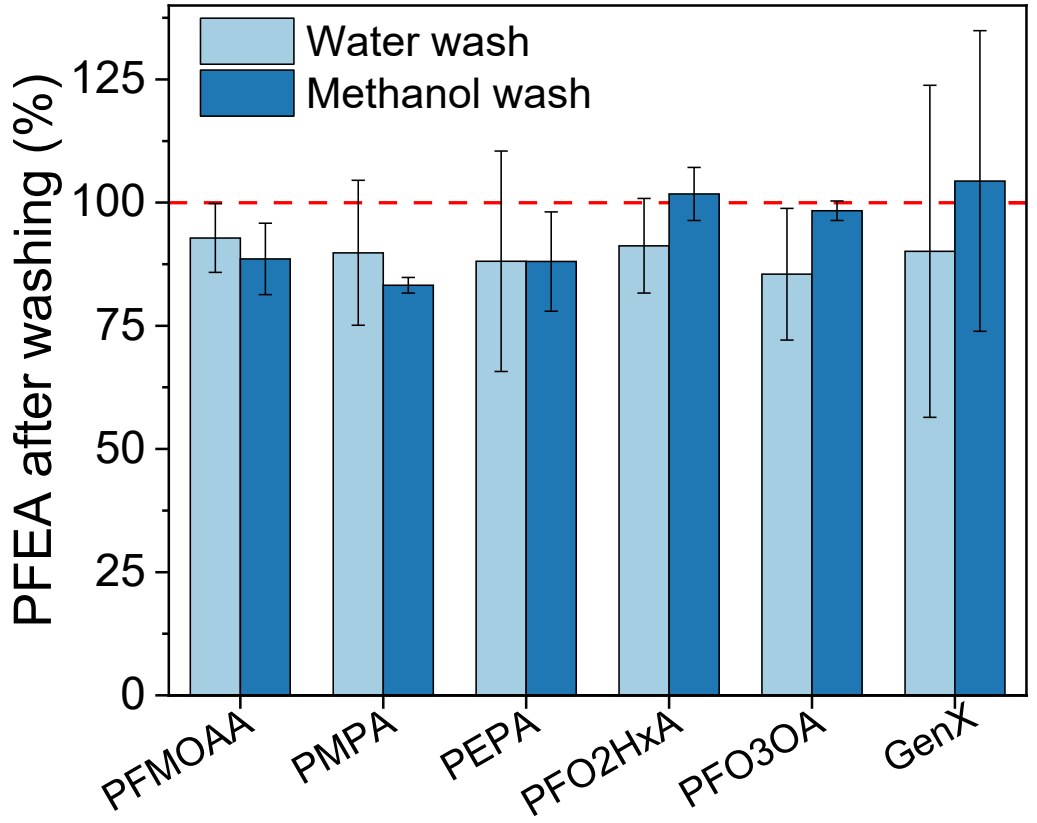






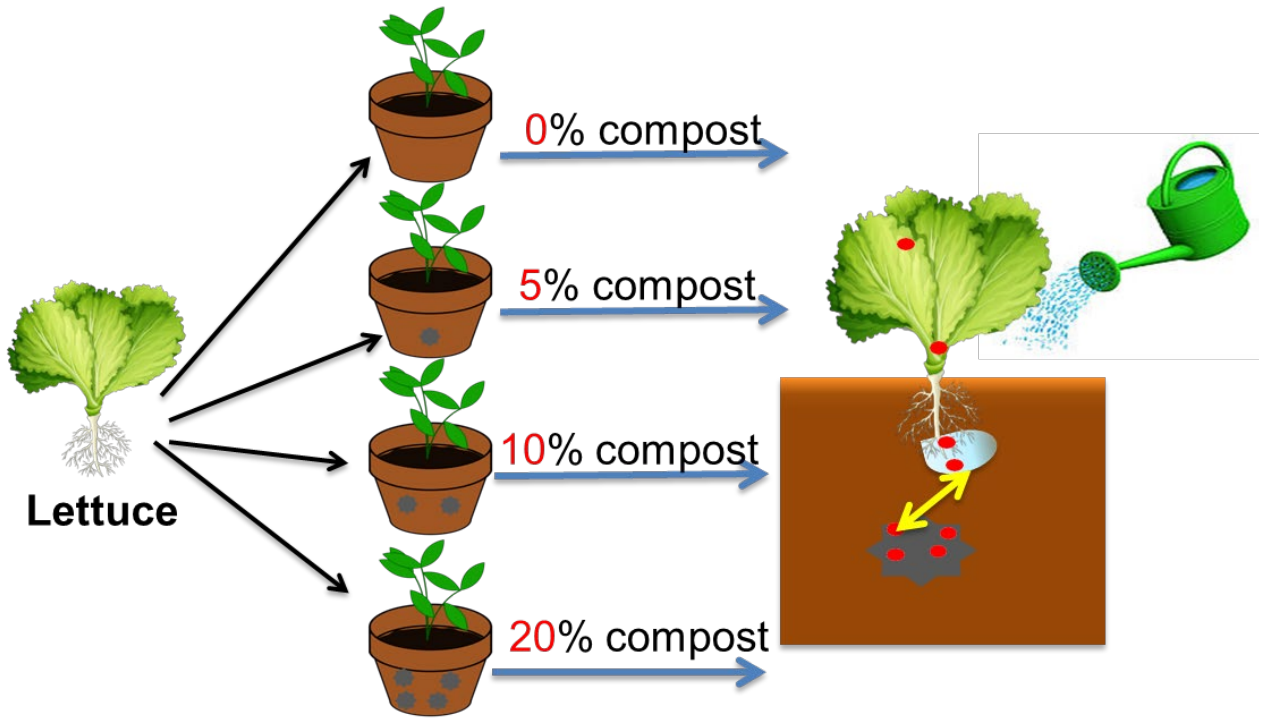
Can we clean the produce by washing?





- The majority of PFEAs detected were inside of the blueberries
- Washing would NOT be effective for reducing human exposure

Can adding clean compost soil reduce PFAS uptake?



- Greenhouse study with PFAS added to soil to see how PFAS moves from soil into plants

Dr. Yuanbo Li

Dr. Yue Zhi

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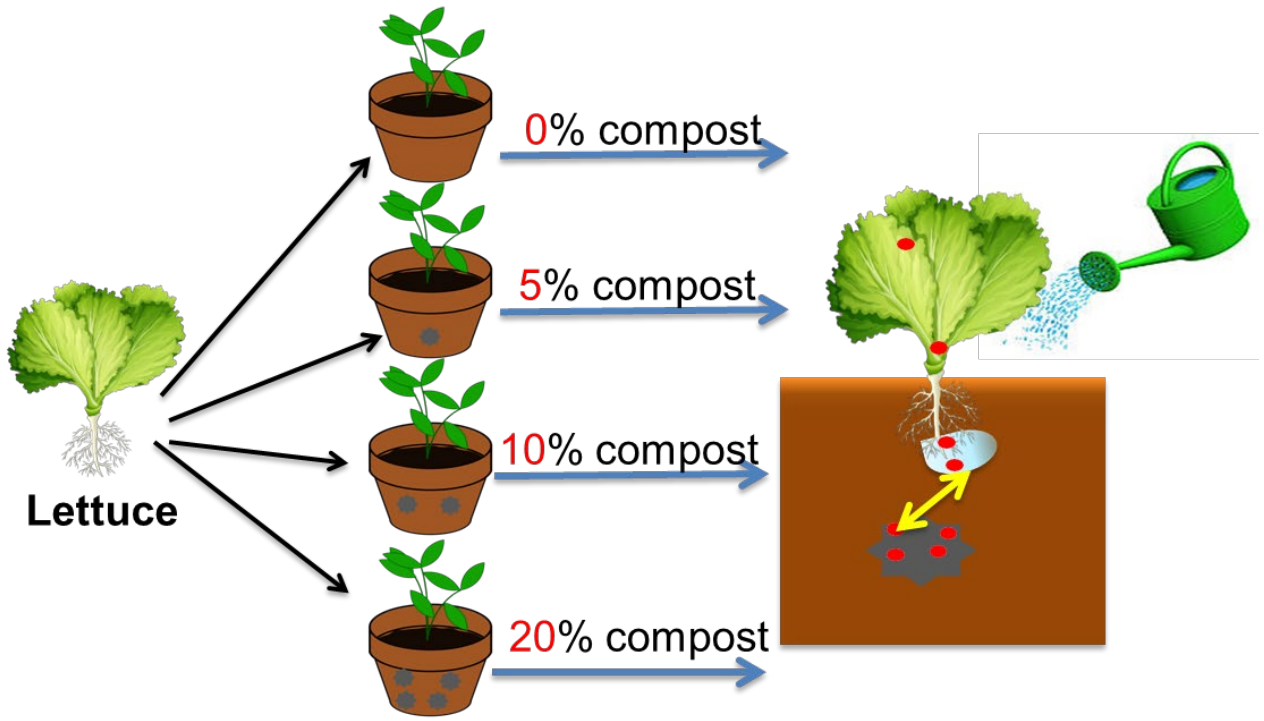

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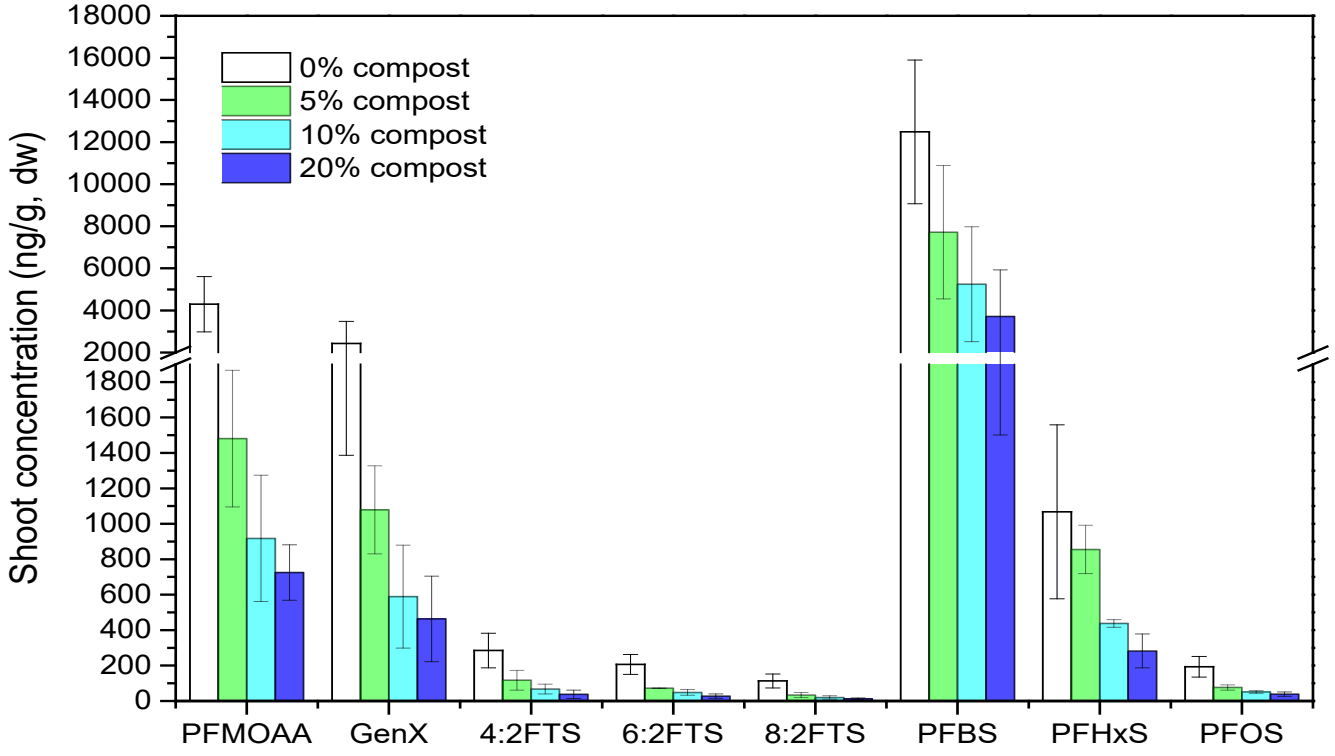

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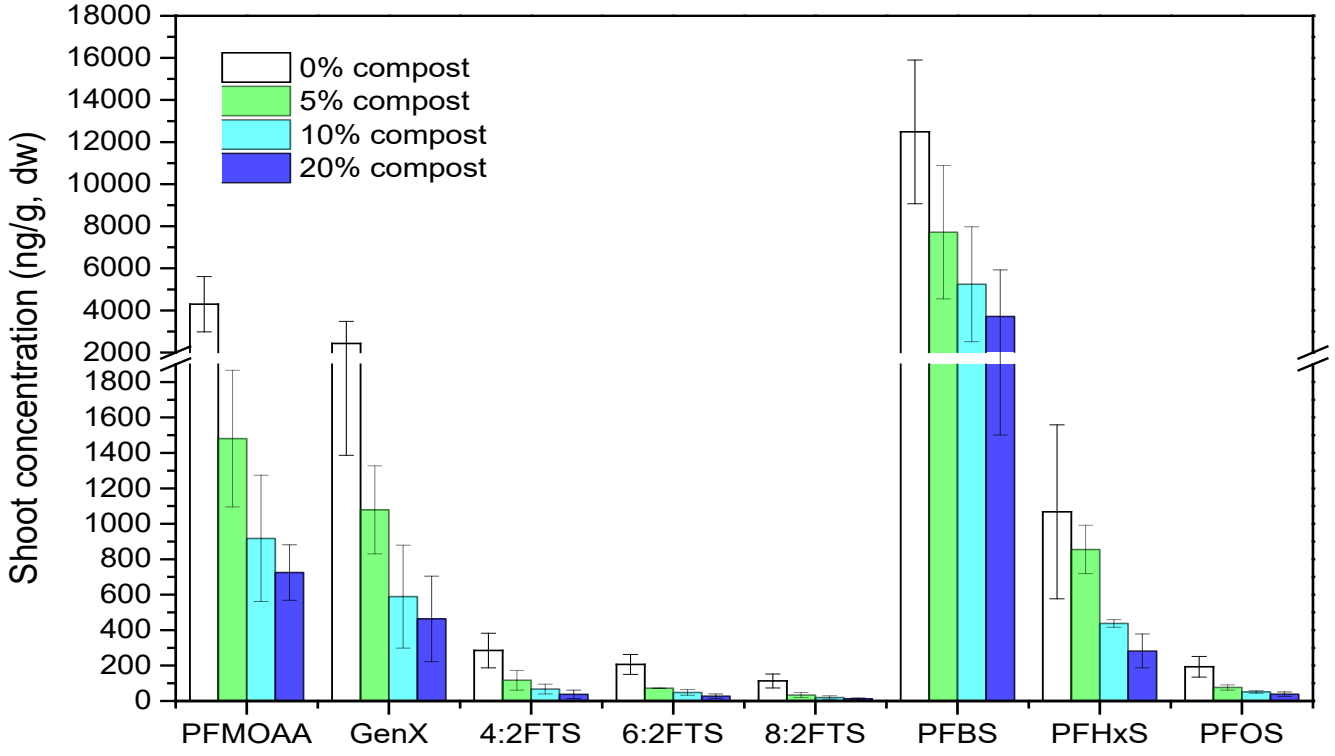

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Analyze compost for PFAS before use!

Thank you!

PFAS UNITEDD