

Characterizing Microplastic Contamination in Agricultural Soils

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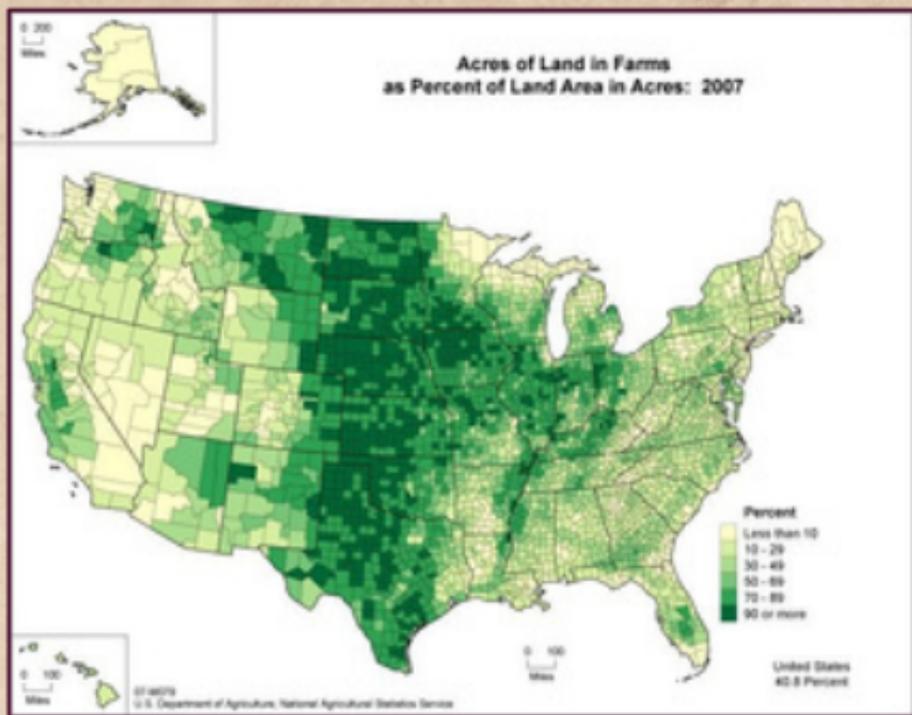


the **INSTITUTE** for **ENERGY EFFICIENCY**

UC SANTA BARBARA



Agriculture in the U.S.



1,894,950

total farms in the U.S.

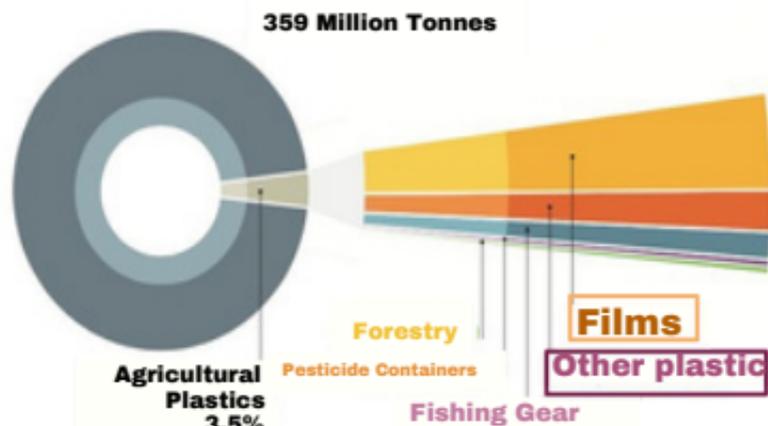
893,400,000

acres of farmland

Plasticulture

The practice of using plastic in agricultural production

Figure 3: Global plastic production and share of plastics used in agricultural production, 2018.



800 MILLION POUNDS

of agricultural plastic are used annually in the U.S.

Films and Irrigation

The Biggest Contributors

Plastic Mulch **Film**



Greenhouse **Film**



Drip Tape **Irrigation**



Via Epic Farmer



Via Yuki Floyd



Via ROAD REPORT Journal

Via Ag-Tech

Microplastics

Plastic debris smaller than 5 millimeters

Fiber



Via Flickr

Fragment



Via New Scientist

Bead



Via Capradio

Film



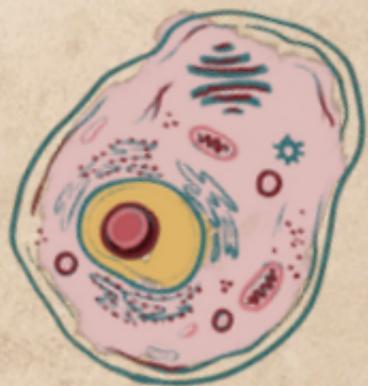
Via Jove

Line



Via Researchgate

Microplastics Analogy



Virus

1. Introduces genome
2. Spreads between cells
3. Disrupts cell function



Via UCSF Magazine

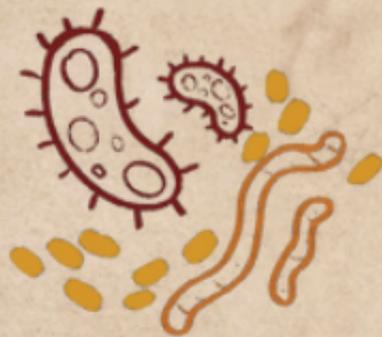
Via Shawnee County Conservation District



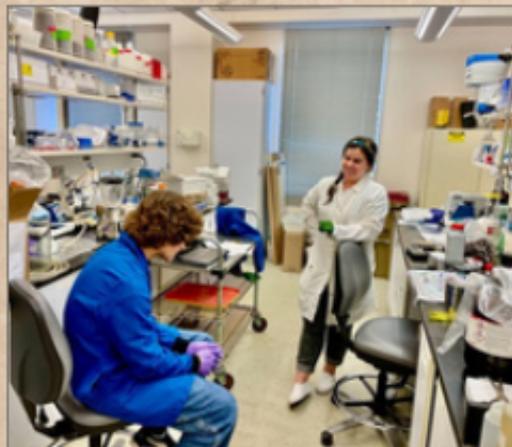
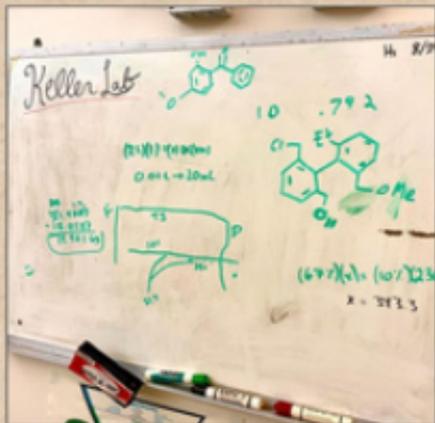
1. Introduces toxins
2. Travels through food chain

3. Disrupts microbial communities

Microplastics



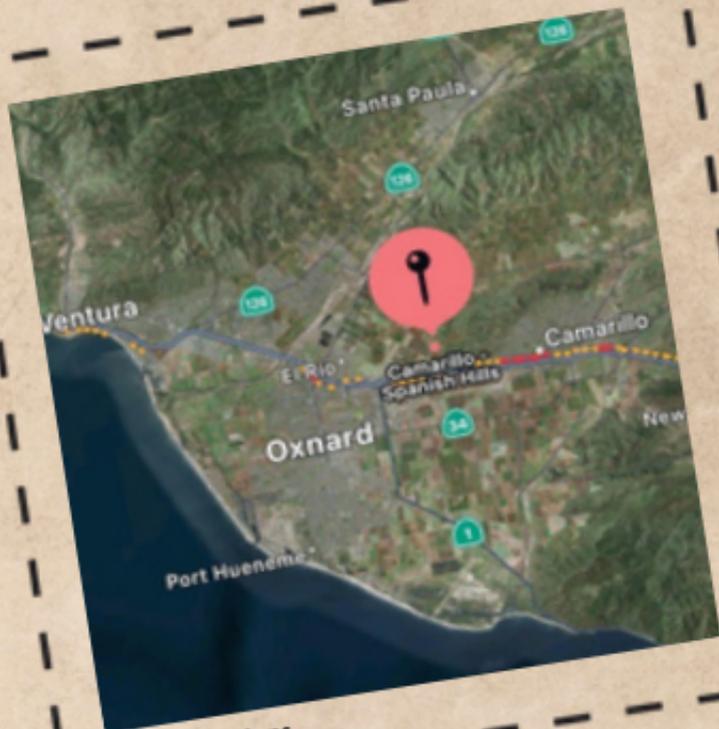
Keller Lab



UNDERSTAND
the impacts of chemicals
and materials

ADVOCATE
for their
sustainable use

CREATE
management
strategies



Via Apple Maps

Project

Goal

Characterize microplastic contamination in soil samples from different plots in UCANR farms

The Plots



Celery

- Drip Tape



Organic Berries

- Drip Tape
- Plastic Mulch Film



Strawberries

- Drip Tape
- Plastic Mulch Film
- Fumigation

Methods

①



75mL
 CaCl_2

+



25g
Soil Sample

=



②

Sonicator



Methods

③



Centrifuge

Density Separation



Lighter



1.4 g/cm³



Denser

④

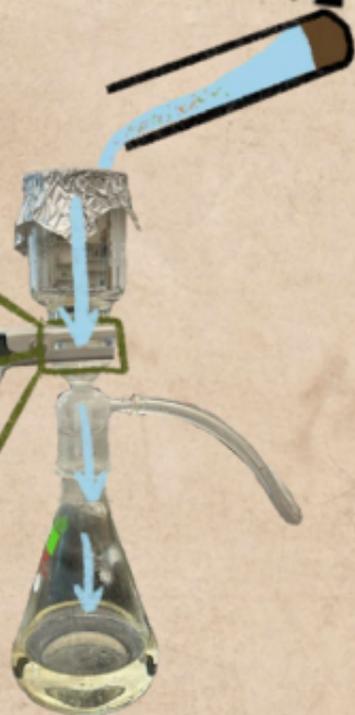
200µm



10µm



1µm



Step 5

⑤ Data Collection



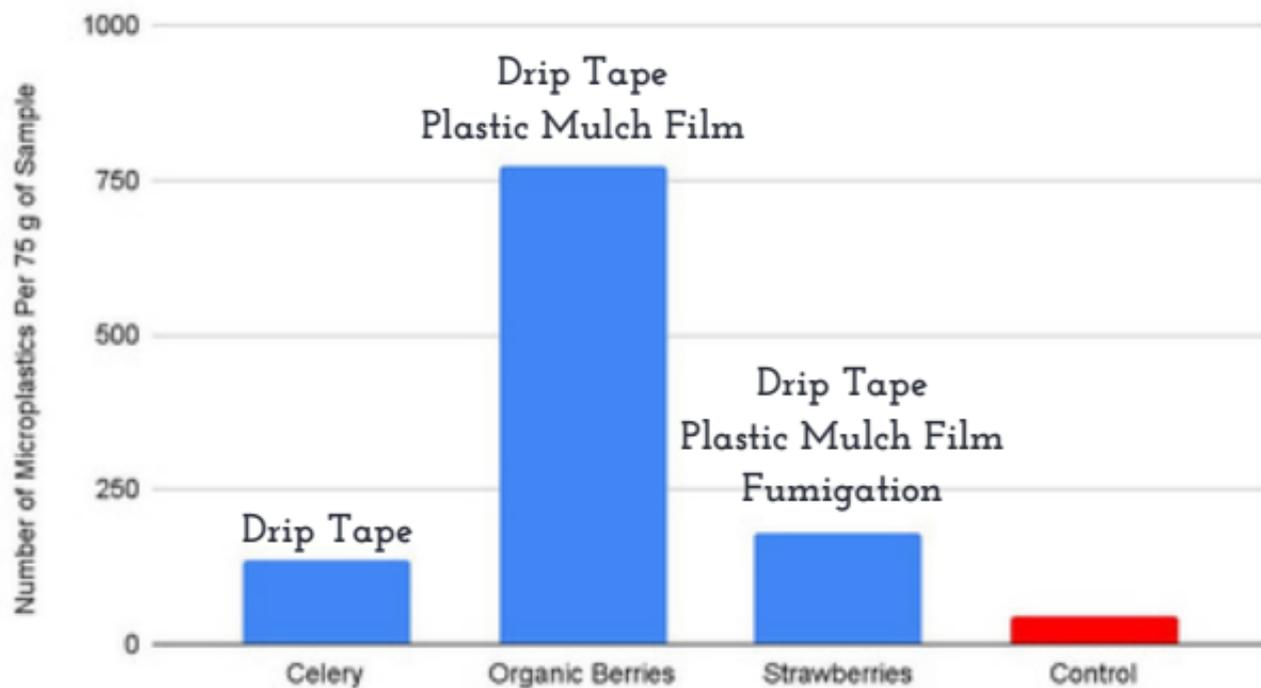
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Microplastics

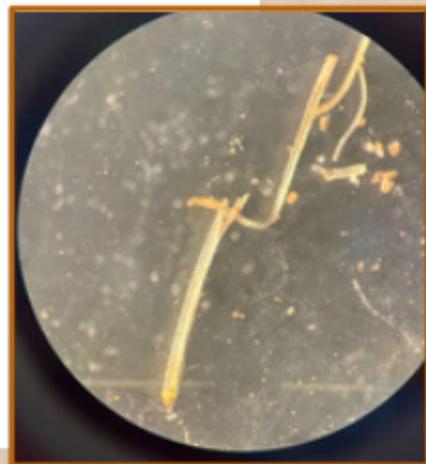
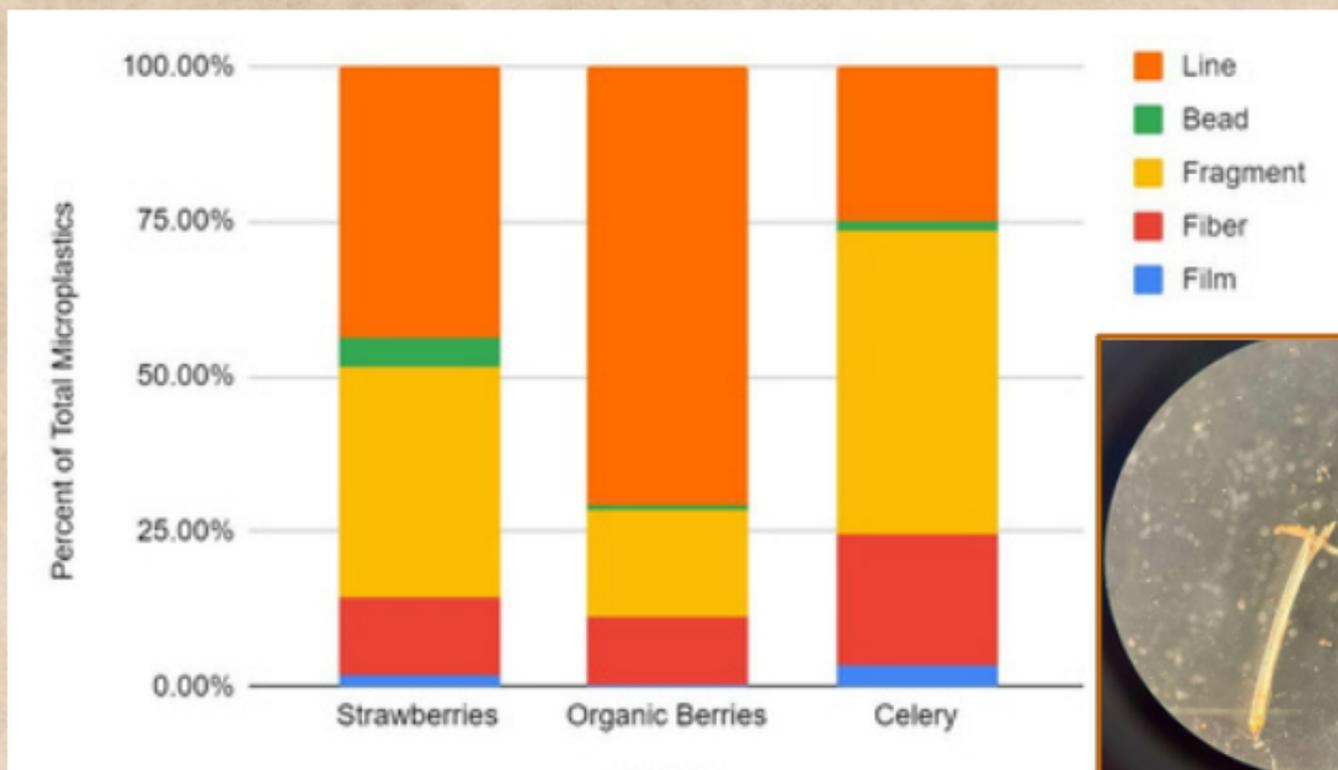
Organic Sediment



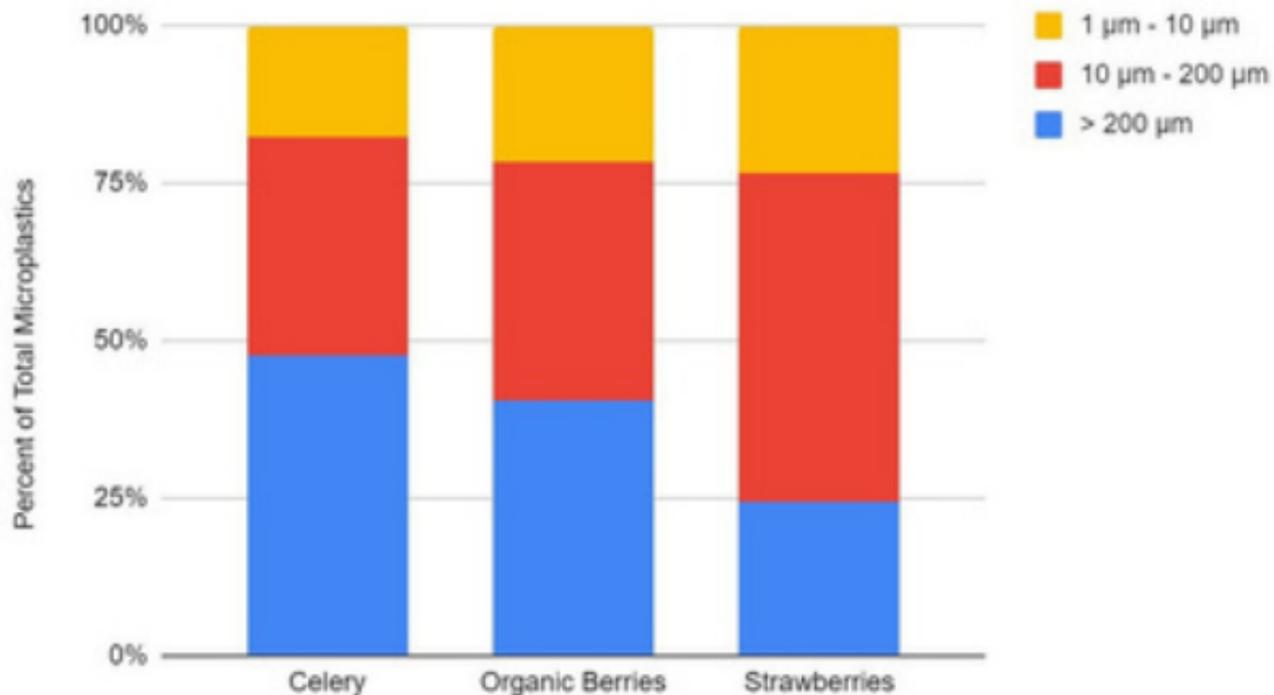
Total Microplastics Counted



Morphology Percentage Breakdown



Size Percentage Breakdown



Conclusions

- Organic Berries had the greatest total count

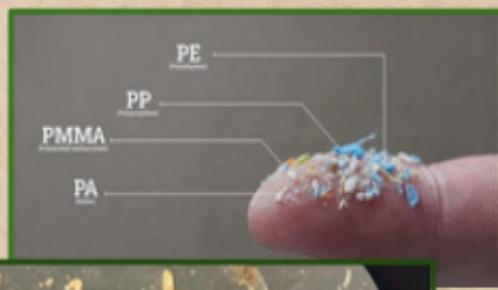
Could be due to the fertilizer

- Microplastics were present in all samples

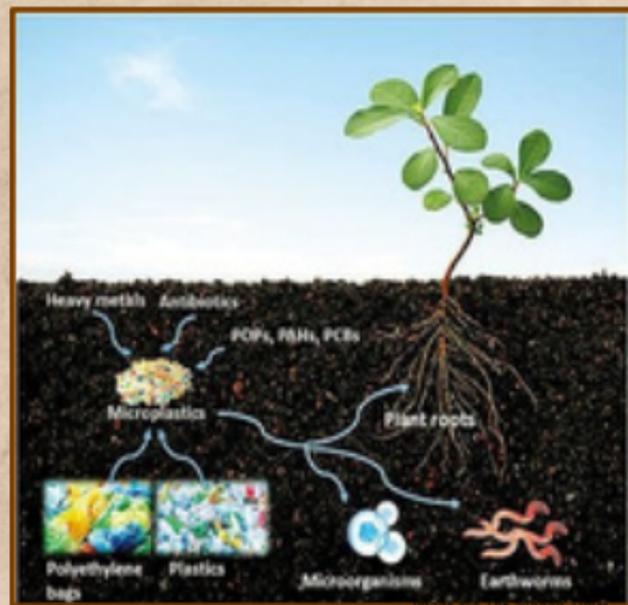
Future research is required to gain more insight

Future Research Possibilities

Image
via
JBT



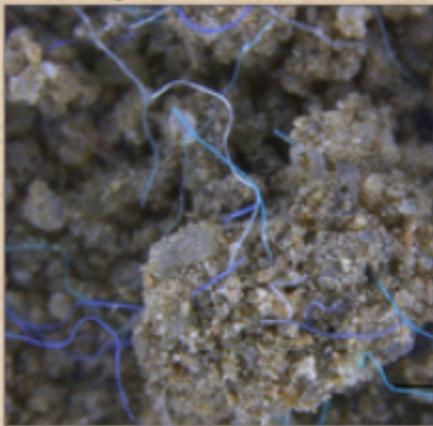
Identification



Impacts

Takeaways

Via Phys



Microplastics pose
a serious danger

Via Wikipedia



There is no
clear answer

Via Chelsea Miao



The Best and
The Brightest

Acknowledgements

