Testimony on H.501

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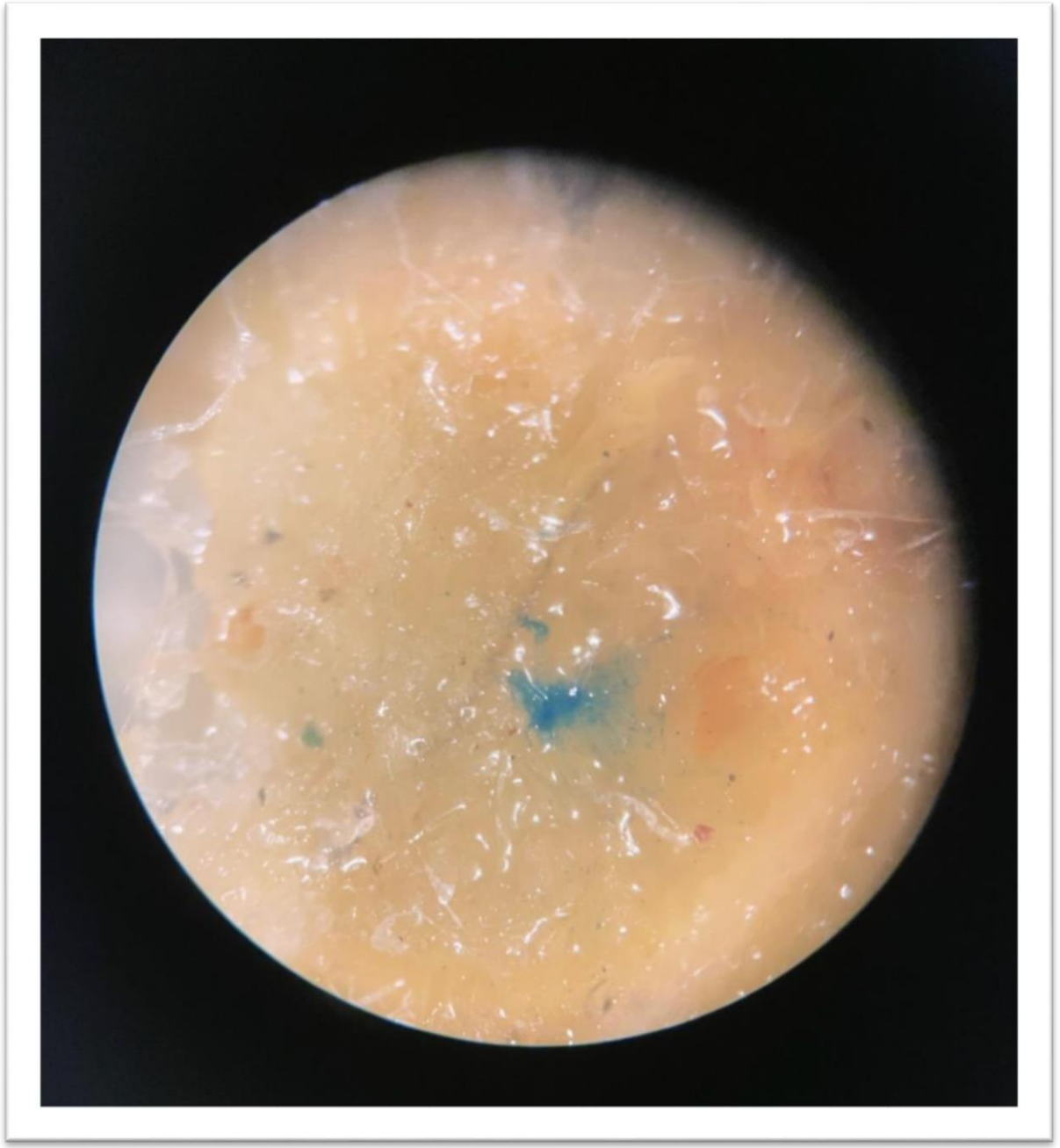

Microplastics contamination is a near ubiquitous challenge in organics recycling & beyond

- Microplastics have been detected in composts, digestates, and food wastes (16 studies, mostly from Europe & Asia)
- No technology or processing strategy is inherently free of contamination risk
- Microplastics have been detected in agricultural soils by numerous studies, as well as throughout the environment & in some foods/beverages – multiple potential sources & exposures
- Research on eco-toxicity of microplastics in soils is underway – some observations of negative effects, but more research is needed to determine risk thresholds
- Numerous unknowns continue to make this a challenging issue to navigate

I think our ultimate goal for microplastics + organics recycling policy should be:

- **Evidence-based policy** developed using the following steps:

1. **Establish standard methods for measuring microplastics in food wastes, composts, digestates, and soils**

2. **Characterize the extent of microplastic contamination throughout the organics recycling system, as well as the sources, impacts, and most effective strategies to mitigate this contamination**

3. **If toxicity is well established, evidence- and risk-based regulatory measures can be implemented** to establish thresholds for microplastic contamination of soils (e.g., limits on cumulative microplastic loading per acre of agricultural land, accounting for multiple sources)

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So what do we do now?

Working towards evidence-based policy on microplastics & organics recycling will take time. *So what do we do now?*

- **Most critical:** Generate more evidence!
- From our UVM Policy Brief (Feb 2022):

"**Precautionary microplastics legislation would be most effective with a broad focus on soil amendments versus any one technology or material.** We are in an early stage of beginning to understand this systemic issue. It is critical for legislation to bolster monitoring and research on microplastics to enable design of data-driven, risk-based regulatory standards that protect Vermont soils and enhance the sustainability of organics recycling."

UVM Progress on Methods to date

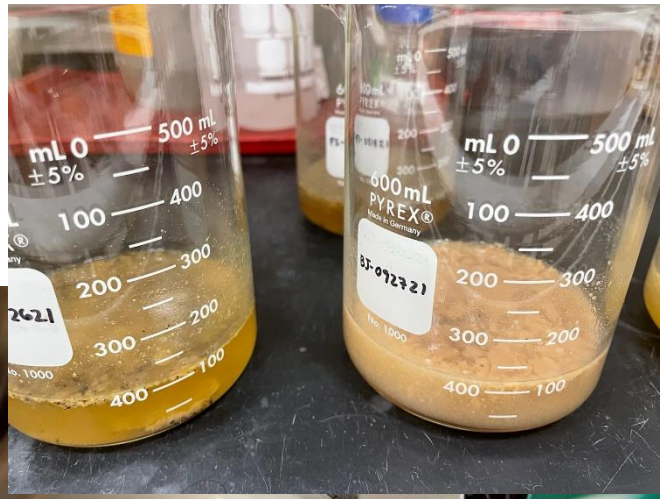
- Needle: 0.5 gram
- Hay (loose): 1 cubic foot = 5 lbs (EPA)
- Hay = 12% moisture
- Limit for microplastics in soil amendments included in the first iteration of H.501: 0.5% by dry mass

- Our task is like estimating the presence of roughly 5000 needles in a 10 cubic yard haystack (size of a small dumpster)

How do we measure microplastics?

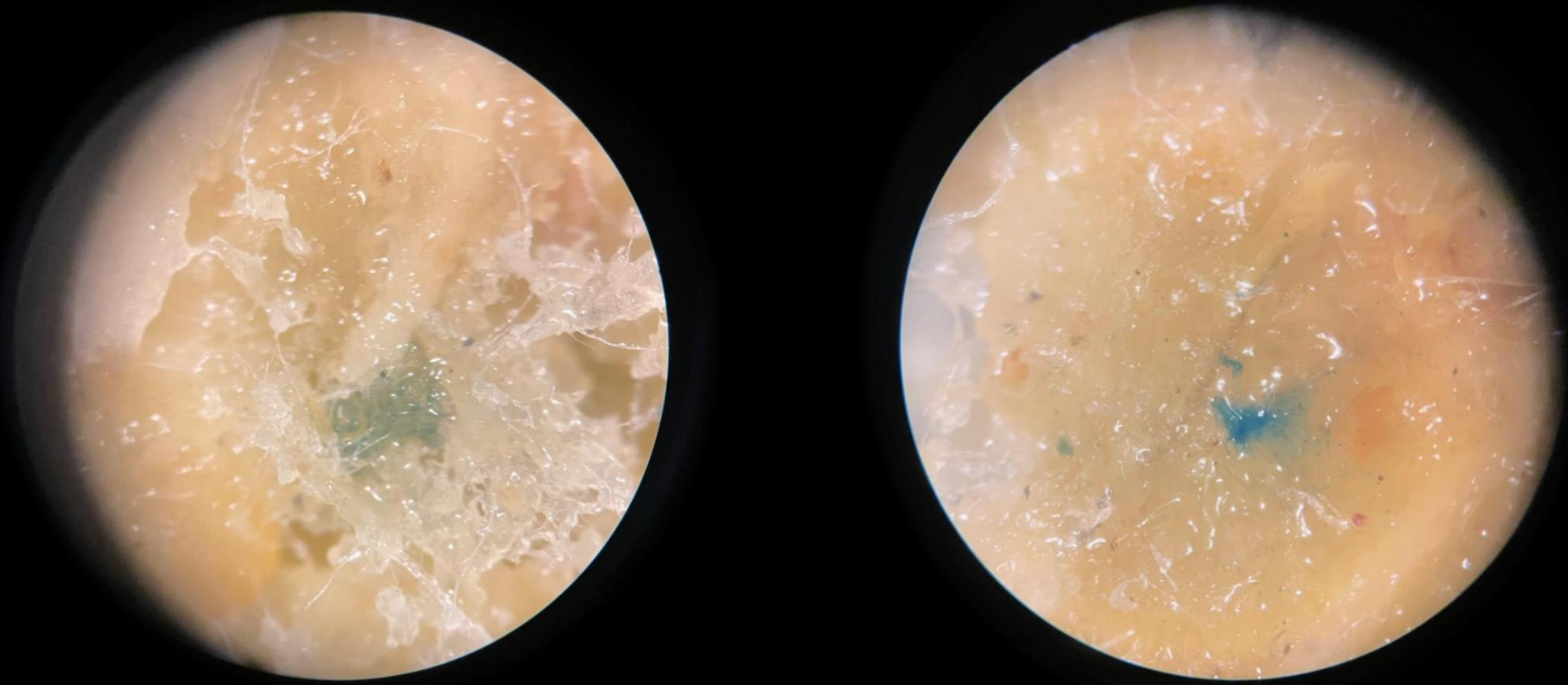
Methods

- Isolation:
  - Organic matter removal (exposure to 30% hydrogen peroxide for multiple days)
- Identification:
  - Visual inspection (40X)
  - Dichotomous key
- Characterization:
  - Size distribution (0.5 – 1 mm, 1 – 5 mm, > 5 mm)
  - Shape (film, fiber, fragment)
  - Type (FTIR Spectroscopy)



Counting microplastics under the microscope (Photo: Luke Awtry for Seven Days)

Microplastics isolated using 30% H_2O_2 method at UVM

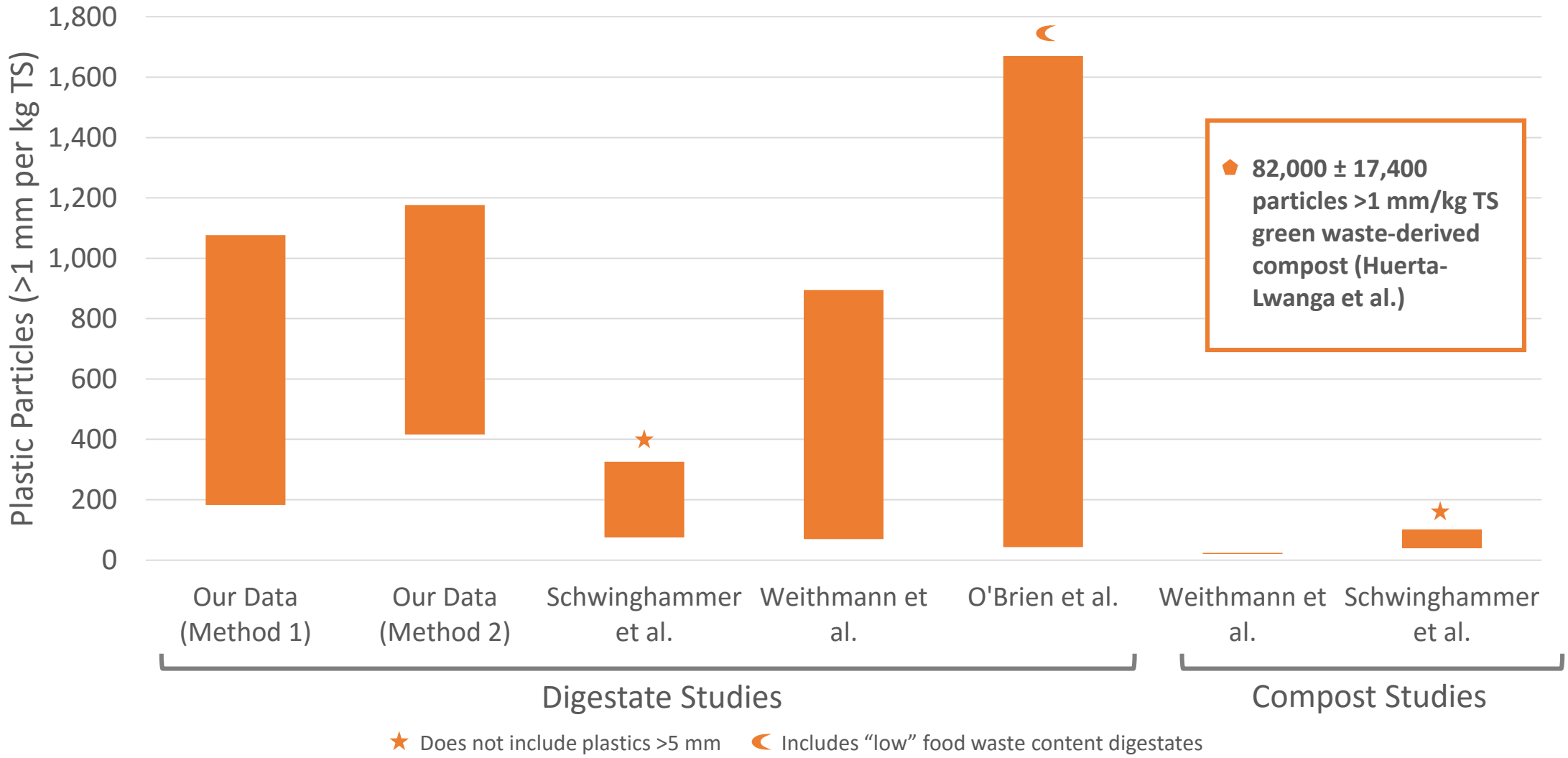


The steps from food waste collection to digestate or compost

- Human source separation (in some cases) – efficiency varies in literature
- Mechanical depackaging (in some cases) – efficiency varies in literature
- Additional processing (hand-picking, grinding, shredding, etc. - varies)
- Addition to digester or composting along with different feedstocks (which could dilute microplastics or serve as additional sources)
- Anaerobic digestion or composting, resulting in mass loss (greater mass loss during AD than composting)
- Additional screening and/or solids-liquids separation
- Final digestate or compost material

You cannot simply take plastic counts or a % contamination value for food waste feedstocks and apply that number to the final digestate or compost

PRELIMINARY: Documented ranges in food waste compost & digestate plastic content



Some key takeaways so far

- Our preliminary counts of microplastics in digestate derived in part from mechanically depackaged food waste fall within in the range reported in previous studies.

- Anaerobic digestion results in more mass loss than composting, which may contribute to higher counts per dry kg.

- One study reported over 80,000 particles > 1 mm per dry kg for compost derived from green waste, approximately 2 orders of magnitude greater than our digestate data.

Specific comments on the new version of H.501 (Draft 2.1 - received 4/19/2022)

- I much prefer this new version (4/19/2022) compared to the version that passed the House.
  - The version that passed the House was characterized by an **overly selective use of the precautionary principle** that was out of step with the available scientific evidence suggesting microplastics are a systemic issue in organics recycling.
- Sec. 3 – Study on Microplastics and PFAS in Food Packaging & Food Waste, #3 – "a summary of **existing data** on the levels of microplastics and plastics in the material produced from organics management facilities" – **existing data are extremely limited - what steps will be taken to increase the database?**

Specific comments on the new version of H.501 (Draft 2.1 - received 4/19/2022)

- Sec. 4 – “The rules shall establish standards for materials that may be accepted for depackaging and **standards for the amount of contamination, including microplastics, allowed to be present in material produced by food depackaging facilities**.”

This is too narrowly focused in my opinion. Why not include standards for a broader suite of materials, including those that will be applied to soils (composts and digestates)?

More information:

- UVM Policy Brief (Feb 2022) – previously shared with this committee, happy to resend

- Pre-print of comprehensive literature review by UVM team available online (working document): https://engrxiv.org/preprint/view/2187

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