Minutes of the Technical Awareness Group Meeting (1st meeting)
For the Sargassum-Arsenic Research
Supported by the Hinkley Center for Solid and Hazardous Waste Management
Meeting held, September 19th, 2023, 10:00 to 12:30 pm (eastern)
Meeting Participation was through Virtual Connection (Zoom)

Attendees:
Speakers:
Afeefa Abdool-Ghany, University of Miami, now at FIU
Alexandra Stiffler, University of Miami
Cynthia Silveria, University of Miami
Helena Solo-Gabriele, University of Miami
Jiayu Li, University of Miami
Shahar Tsameret, University of Miami

Attendees via computer webinar:
Alejandro Quintas, NEAT Sand
Aliza Karim, Miami Waterkeeper
Amanda Oehlert, University of Miami-RSMAES
Angela Delaney, Broward County Marine Resources
Brittany Mc Intyre, University of Miami
Clara Sidan, Assistant Director at City of Miami, Resilience and Public Works Department
Craig Ash, Waste Management
Dan McChesney, Shapiro Enterprises
Doug Farrington, ADAR Technologies
Eli Rosa Estevez, City of Miami
Elizabeth Kelly, Martin County
Emilio Lopez, SOP Technologies
Griffin Alexander, Biscayne Bay Aquatic Reserve
Griselle Correa, City of Miami (NPDES and Stormwater Department)
Jared Jacobs, Fertile Earthworm Farms
Julia Poliadis, Fertile Earthworm Farms
Kimberly Moore, University of Florida, IFAS
Lanette Sobel, Fertile Earthworm Farm
Ligia Collado-Vides, Florida International University
Libbie, Farmer in the British Virgin Islands
Mary Beth Morrison, Solid Waste Authority of Palm Beach County
Melanie Cerna, Florida International University
Nohhyeon Kwak, University of Miami
Peter Klaich, Shapiro Enterprises
Peter Swart, University of Miami-RSMAES
Roland Samimy, The Village of Key Biscayne
Ron Portell, ADAR Technologies

Samantha Tiffany, Environmental Resource Manager for the City of Miami Beach
Schonna Manning, Florida International University
Steve Laux, Hinkley Center for Solid and Hazardous Waste Management
Sonia Brubaker, Chief Resilience Officer & Director for the City of Miami
Tom Morgan, Miami-Dade County Parks and Recreation
Tracy Mincer, Florida Atlantic University
Valentina Caccia, Division of Environmental Resource Management (DERM)
Victoria Lewis, University of Miami
Vincent Encomio, Florida Sea Grant Agent for Martin and St. Lucie County
Xavier DeRoos, Renewable Composting

Agenda
TAG Meeting, Sargassum Composting and Beach Quality

Date: September 19, 2023 (Tuesday)
Time: 10:00 am to 12:00 am (Eastern)
Location: Virtual, Zoom Link, https://miami.zoom.us/j/96237537197

10:00 am	1. Welcome and Introductions	Solo-Gabriele
10:15 am	2. Summary of Prior **Hinkley** Research a. Year 1: Compost Production and Characteristics (Pause for Q&A) b. Year 2: Economics of Compost Production (Pause for Q&A)	Abdool-Ghany
10:25 am	3. Research Plan and Results to Date for New **Hinkley** Project: Arsenic/Bacterial Impacts Under Natural Decomposing Conditions a. Research Plan b. Progress/Results to date c. Next Steps d. Question and Answers	Abdool-Ghany
10:45 am	4. Research Plan and Results to Date for **NSF** Project focused on Air Emissions and Microbial Communities a. Introduction and Initial Results for Air Emissions b. Initial Results for Enterococci c. Next Steps d. Questions and Answers	Li/Tsameret
11:05 am	5. Microbial Communities in Sargassum	Abdool-Ghany
11:10 am	6. Microbial Ecology of Sargassum a. Virus and bacteria interactions (Pause for Q&A)	Silveira/Stiffler
11:30 am	7. Additional questions and answers, wrap up. Open and free discussion.	Solo-Gabriele
12:00 noon	8. Adjourn	

Questions: hmsolo@miami.edu

Minutes

Questions, Answers, and Comments (After item 2 on agenda, Year 1)

1. Q: Were temperature taken during the composting process?
   A: Yes, temperatures were taken during the composting process for both the small- and large-scale experiments. The temperatures within the large-scale experiments did reach the 131°C that is recommended. Within our small-scale experiments this temperature was not reached.

2. Q: Could this be a reason as to why the bacteria levels are different in both experiments?
   A: The temperature can play a role in the difference in the bacteria levels in both experiments. For the small-scale experiments, the compost was made in a covered, shaded area, while the large-scale piles were open to environmental conditions. The exposure to the sun, which causes solar inactivation, could have contributed to the lower levels of bacteria in the large-scale experiment versus the small-scale experiment.

3. Comment: Radishes are directly connected to the soil, so there will be more trace metal accumulations. Perhaps another vegetable that is not developed in the soil will have a lower trace metal concentration than that of the radish. Also, there should be caution when trying to grow the mangroves in the Sargassum compost, as there is much more contact and inundation from water.

4. Q: Is there interest in exploring the growth of the other vegetables in the Sargassum compost?
   A: Radishes are known to bioaccumulate trace metals, which could have led to the higher levels of trace metals. As for other plants being grown in the Sargassum compost, we do not have plans to test out this theory. It would be great to look at other plants and vegetables being grown in Sargassum compost.

5. Q: Did you look at the arsenic levels in the Sargassum itself before composting to see if it increased or decreased during the composting process? Where is the arsenic coming from?
   A: We monitored the small-scale and large-scale composting experiments every two weeks and collected samples for trace metals analysis. There is data on the concentrationz of arsenic overtime, but what we found is that we did not see a consistent trend in the arsenic concentrations. We believe this is this due to the heterogeneity of Sargassum used to start the experiments. When the Sargassum samples were collected, there were other organic materials mixed into it and thus composted as well. This can alter the arsenic concentrations of the compost sample every time a sample was collected.

6. Q: There is a lot that needs to be explored with the fate of arsenic. Do you know of any studies that speak to the different forms of arsenic?
   A: As part of prior research on treated wood, it was found that there is a lot of arsenic in treated wood. There are methylated forms, and then there's the inorganic forms, and the inorganic tend to be more toxic than the organic forms. There is a tendency for the organic forms to degrade into the inorganic forms.

7. Q: Can vermiculture mitigate the arsenic in the Sargassum?
   A: There's evidence that there's multiple microorganisms that can sequester arsenic that are found in vermiculture systems. Running the Sargassum through a vermicomposting system can potentially mitigate the arsenic concentrations.

Questions, Answers, and Comments (After item 3 on agenda, Year 3)

1. Q: What season was this work completed in?
   A: The work for Phase 1 of this project was completed in from July 2023 and ended in September 2023. This corresponds to mid to late in the Sargassum season. Coming down to the last sampling period, we noticed a shift in more seagrass within the samples. The Sargassum that was collected for our Phase 2 experiments were collected in August. The Sargassum that was collected was not fresh. This is part of the reason as to why we want to start over this part of the experiment.

2. Q: Are you comparing the same amount of replicated Sargassum versus Seagrass for Phase 1? Do these results represent one collection period for all?
   A: There were more Sargassum samples collected for the Phase 1 across all beaches. The same number of replicates are not available for Seagrass. We have collected 2 Seagrass samples so far. These results also only represent two sampling efforts for the Phase 1. It will be interesting to add in the results from the third and last sampling effort to see how the results change.

3. Comment: in a previous study that we completed we did see that there were lower levels of bacteria in the Sargassum and as it decomposed the levels of bacteria started to increase.

4. Q: Did the beach see higher levels of arsenic when the Sargassum was removed?
   A: Looking at the results across all beaches we saw that overall, the water sample collected had lower levels of arsenic. The sand under the Sargassum and the supratidal sample types had similar levels of arsenic. Overall, we saw higher levels of arsenic in the sargassum samples. Now when we look at the results between samples where Sargassum is removed versus not removed we don’t see much of a difference in the arsenic concentrations in the Sargassum samples collected. We are still analyzing the data and will be looking at whether beaches with and without Sargassum removal have different levels of arsenic in the sand.

Questions, Answers, and Comments (After item 4 on agenda, NSF Research)

1. Q: Is there nay thought in testing for arsenic or methane aerosols emissions in the chamber studies?
   A: We have not considered this for the study, but we can collect samples and test for it. The other part of our group focuses on methane, and it'll be interesting to combine the two parts.

2. Q: Have you thought about sampling at the Fort Lauderdale facility?
   A: That's a fantastic idea. We started our sampling campaign at Crandon Park and have gotten a lot of support. Our main concern with collecting samples in the field is having access to an electrical outlet for continuous deployment. We also must apply for permits to collect samples.

Questions, Answers, and Comments (After item 6 on agenda, Microbial communities)

1. Q: Do these viruses live outside of the environment? Does this virus get denatured or killed off through a composting effort?

   A: For the composting efforts, some of the viruses can be stable in the environment and stay around until the find the host that can support them. Some of them are very unstable and can be affected by UV light. This is a great way of inactivating the viruses. Now the viruses that we are talking about infect bacteria and do not affect humans. The viruses become of concern when they cause bacteria to become pathogenic to us. Viruses can impart genes into the bacteria which cause the bacteria to become pathogenic.