QUARTERLY PROGRESS REPORT 2
[Project Period August 1, 2024, to July 31, 2025]

PROJECT TITLE: Evaluation of Sargassum Recycling Options through Risk-Based Approaches

AWARD NUMBER: AWD 08952 (SUB00004521)

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Work accomplished during this reporting period:

- For this project we will be comparing risks from recycling Sargassum against current management options of Sargassum, such as leaving the Sargassum on the beach. For comparative purposes, we have computed risks to children from exposure to arsenic at the beach. We have since written this work and and submitted it to a journal for consideration. The manuscript is titled, "Estimating Children's Health Risks to Arsenic following Recreational Play on Beaches with Sargassum." This paper is currently under review.
- Completed sample preparation – See sample list in Table 1 and Table 2.
- Speciation Results – All liquid and solid samples were tested at FIU lab and results have been received.
- Risk Assessment – Computations for the risk assessment have begun. A manuscript for the risk assessment and As content speciation in recyclable products is currently being drafted.
- TAG meeting held June 21st 2024 – minutes attached below.
- Journal articles from prior Hinkley Center funding on Sargassum compost research were published. One was published in *Resources, Conservation & Recycling Advances* and the other was published in *Waste Management*. More details given under the first two bullet items under metrics, journal articles.
- The field, mesocosm, and laboratory portion of the Arsenic Beaches study are complete. Data has been consolidated and analyzed. A manuscript from the Phase 1 results of this study have been written up and submitted to a journal. A manuscript from Phase 2 is currently being drafted.

TAG Meetings:

- Year 1: The first TAG meeting was held on December 15, 2020.
- Year 1 and 2: The second TAG meeting for Year 1 and the first TAG meeting for Year 2 was held on July 14, 2021.
- Year 1 and 2: The third TAG meeting for Year 1 and second TAG meeting for Year 2 was held on March 17, 2022.
- Year 1, 2 and 3: The fourth TAG meeting for Year 1, the third TAG meeting for Year 2, and the first TAG meeting for Year 3 was held on March 7, 2023.
- Year 3: The second TAG meeting for Year 3 was held on September 19, 2023.

- Year 3, 4: The third TAG meeting for Year 3 and the first meeting for Year 4 was held on June 21, 2024.

Metrics:

1. Research publications from THIS Hinkley Center Project.

JOURNAL ARTICLES

- McIntyre, B., Cerna, M., Ferguson, A., Li, J., & Solo-Gabriele, H. M. (2024). Estimating Children's Health Risks to Arsenic following Recreational Play on Beaches with Sargassum. *Risk Analysis* SUBMITTED
- Abdool-Ghany, A. A., Blare, T., & Solo-Gabriele, H. M. (2023). Assessment of Sargassum spp. management strategies in southeast Florida. *Resources, Conservation & Recycling Advances*, *19*, 200175. https://doi.org/10.1016/j.rcradv.2023.200175
- Abdool-Ghany, A. A., Pollier, C., Oehlert, A. M., Swart, P. K., Blare, T., Moore, K. K., & Solo-Gabriele, H. M. (2023). Assessing Quality and Beneficial Uses of Sargassum Compost. *Waste Management*, 171, 545-556. https://doi.org/10.1016/j.wasman.2023.09.030
- Blare, T., Abdool-Ghany, A. A., Solo-Gabriele, H. M. 2023. Cost Estimates for Producing *Sargassum* spp. Compost *University of Florida Institute of Food and Agricultural Sciences EDIS.* https://edis.ifas.ufl.edu/publication/FE1128
- Blare, T., Abdool-Ghany, A. A., Solo-Gabriele, H. M., Gonzalez, E. 2023. Costos Estimados de la Producción de Sargazo Compostaje . *University of Florida Institute of Food and Agricultural Sciences EDIS.* https://edis.ifas.ufl.edu/publication/FE1130 (Spanish version)

PUBLISHED ABSTRACTS

- 2021 FSBPA Annual Conference Abstract
    - **Title:** Sargassum Invasion: Composting as a Solution
    - **Abstract:** *Sargassum* spp. is one of the dominant forms of marine macroalgae (seaweed) found on beaches throughout Florida. Excess *Sargassum* is washing up on the shores of Florida beaches and originates from the Sargasso Sea in the Northern Atlantic Ocean near Bermuda. Recently there have been large quantities of *Sargassum* reported in the central Atlantic Ocean and the Caribbean Sea. During the summer of 2018 and 2019, record amounts of *Sargassum* spp. were documented along beach coastlines resulting in local authorities hauling this seaweed to the nearest landfill. Hauling and landfill disposal of seaweed can cost the cities and municipalities hundreds of thousands of dollars per year.

      The influx of *Sargassum* onto the shores is important to maintain the ecological balance. The difficulty has been when the amounts of seaweed stranding onshore are excessive. When excessive, the local ecology suffers and the aesthetics of the beach decline. In extreme conditions, the seaweed is so thick on the water surface that turtles are unable to surface for air, thus drowning in embayments where the Sargassum accumulates. When excessive amounts of *Sargassum* are found on the sand, it also contributes to a decline in the aesthetic quality of Florida beaches and ultimately impacts on the tourism industry. When left on the shore to decompose, the *Sargassum* will release unpleasant odors (hydrogen sulfide) into the environment. It also attracts insects, e.g. sand flies, as it decomposes. Bacteria levels in the seaweed also tend to increase. When the decomposing *Sargassum* is washed back to the water it results in the issuance of beach swim advisories due to elevated bacteria levels further impacting the economy of the area by limiting access to safe recreational waters along the coast. Thus,

coastal communities are looking for alternative ways to handle the material once removed from the beach.

Alternative methods are needed for handling excessive amounts of Sargassum that are found on Florida's coastlines. In order to combat this problem, local government agencies are exploring how to remove the seaweed and are looking for beneficial uses. Composting offers one potential and beneficial alternative. Instead of leaving the seaweed to decompose on shore, or hauling it off to landfills via trucks, Sargassum can be potentially composted. Compost consists of decomposed organic matter. This natural process of recycling organic matter can be used to produce a rich soil amendment. Compost maintains moisture more effectively and provides a rich environment for plants to grow. Seaweed is rich in nutrients that are absorbed from the sea and from the energy from the sun, making it a potentially rich soil amendment. In addition to its use as a soil amendment, it should be ensured that the composting of seaweed is within the standards of heavy metals and bacteria levels so that the constituents are within satisfactory health-based levels. The objective of this project is to evaluate the suitability of producing compost from seaweed in tumbler composters.

Four experiments were conducted to evaluate the need for pre-washing and suitable mixes. The recipes included: no washing of *Sargassum*, washing *Sargassum* with freshwater, grass clippings mixed with *Sargassum*, and mulch mixed with *Sargassum*. These recipes were sampled biweekly and measured for bulk physical-chemical parameters, nutrients, metals, and bacteria. Once the compost was cured, radish bioassays were setup to evaluate the plant growth in each of the recipes. Results indicate that electrical conductivity (saltiness) is not an issue when composting the seaweed (values are well below the U.S Composting Council standards). Preliminary carbon to nitrogen results show that the compost can be used to grow plants. Results from the radish bioassays indicate that the compost is able to support growth of plants.

- Goldschmidt 2022
    - **Title**: Is composting a feasible disposal option for beach-stranded Sargassum in South Florida?
    - **Abstract**: Over the last decade there has been increased proliferation of Sargassum in the north Atlantic Ocean, with massive strandings occurring on near annual frequency in the Caribbean, western Africa, and United States since 2011. Such events have environmental, health, and economic impacts, because Sargassum is known to have a high capacity to absorb metals from the environment [1]. A common disposal method is mechanical collection of the stranded Sargassum and subsequent landfill disposal. Thus, leachates of degrading Sargassum can contribute to contamination in soils and groundwater near landfills. Compost can be a potential solution and can present a sustainable management method if concentrations of potentially toxic metals are below EPA guidelines. The objective of this project is to determine whether composting is a feasible management solution for Sargassum strandings. We assessed compositional characteristics of the compost [nutrient ratios (C:N, P), elemental concentrations, abundance of indicator bacteria] in both small-scale and large-scale settings. The first phase (small-scale) of study involved experiments using tumbler composters, which independently evaluated the impacts of washing the Sargassum prior to composting, as well as the impact of mixing with other vegetative wastes (grass, mulch, etc). The second phase (large-scale) involved two 4 yd3 compost piles with different additives (a control pile and vegetative waste) in a municipal setting. In the first phase, the mixture of Sargassum and grass clippings produced compost with the best C:N ratios and lowest concentrations of toxic metals. Bacteria levels did exceed EPA regulatory limits in this treatment. Preliminary radish bioassay experiments also suggested best growth in the compost treatment mixed with grass clippings. Unwashed Sargassum produced compost with moderate C:N but the highest concentrations of toxic metals. Within the larger scale experiments conducted in the second phase, the Sargassum treatment

produced the best C:N ratios and lowest bacteria levels compared to the Sargassum and vegetive waste treatment.

[1] Rodríguez-Martínez, R. E., et al., (2020). PeerJ, 8, e8667.

- Phycological Society of America 2024
  - **Title**: Assessing The Agricultural Viability of *Sargassum* Compost: Quality Analysis and Pathogen Investigation
  - **Abstract**: With fertilizer costs on the rise, *Sargassum* compost could offer a cost-effective alternative for farmers and gardeners. Prior work that included interviews with stakeholders and a comprehensive cost analysis emphasized the potential economic viability and benefits of composting *Sargassum* from inundations in southeastern Florida, suggesting that beach managers can potentially recoup costs through the sale of compost. The focus of the current study was to evaluate the quality of *Sargassum* compost against 11 guidelines (nutrients, bacteria) and to evaluate the potential for Sargassum to harbor pathogens. Despite nutrient ratios occasionally falling short of standards, the compost sustained radish growth, indicating its potential agricultural value. Most trace metal levels aligned with regulatory guidelines, although arsenic levels exceeded residential use standards, limiting the use of the compost. Bacteria levels met regulatory standards in large-scale experiments, though not consistently in small-scale trials. Further, preliminary metagenomic sequencing data on short term (STS) and long term (LTS) stranded *Sargassum* indicated the biomass can be a host to diverse and potentially, pathogenic bacteria (*Vibrio* and *Staphylococcus*). Overall, these findings support that stranded Sargassum can be composted for beneficial applications, including fill and farming of non-edible plants. However, quality concerns should be addressed to assess the presence of microbial contaminants and the concentration of heavy metals to ensure its safe utilization.

2. Research presentations resulting from THIS Hinkley Center Project. The interim results from this study have been presented during the following meetings.

- "Sources of Enterococci to a Coastal Beach Experiencing Elevated Background Levels" Webinar organized by SOP Technologies, Miami FL. July 2020. (Speaker presentation by H. Solo-Gabriele and A. Abdool-Ghany). [This webinar was attended by over 70 individuals.]
- "Sources of Enterococci to a Coastal Beach Experiencing Elevated Background Levels" Webinar organized by the City of Hallandale Beach, Hallandale Beach, FL. August 2020. (Speaker presentation by A. Abdool-Ghany).
- "Sargassum Seaweed Management in the State of Florida" Webinar organized by Recycle Florida Today. March 18, 2021. (Speaker presentation by A. Abdool-Ghany and H. Solo-Gabriele).
- "Sargassum Composting- A Solution" Presentation organized by Ana Zangroniz of Florida Sea Grant for Miami Dade County Parks and Recreation. June 24th, 2021. (Speaker presentation by A. Abdool-Ghany and H. Solo-Gabriele).
- "Sargassum Composting" Annual Conference organized by Recycle Florida Today. September 8th, 2021. (Speaker presentation by A. Abdool-Ghany).
- "Sargassum Invasion: Composting as a solution" Annual conference organized by Florida Shore and Beach Preservation Association. September 17th, 2021. (Speaker presentation by A. Abdool-Ghany).
- "Is composting a feasible disposal option for beach-stranded Sargassum in South Florida?" Annual Goldschmidt conference. July 10-15, 2022. (Speaker presentation by A. Abdool-Ghany).
- "The Challenge of Managing Seaweed (Sargassum) Deposited on Florida's Beaches." 2023 Solid Waste Association of North American (SWANA) Florida Chapter Conference, Daytona Beach, FL, July 2023 (speaker presentation by H. Solo-Gabriele).

- “Managing Seaweed (Sargassum) Deposited on Florida’s Beaches.” Hinkley Center Advisory Board Meeting, held at Orange County Public Works, Orlando, FL, May 2024 (speaker presentation by H. Solo-Gabriele)
- "Estimating Children’s Health Risks to Arsenic following Recreational Play on Beaches with Sargassum" Poster presentation at the REU program, University of Miami, FL. August 2024. (Speaker presentation by Melanie Cerna).

3. List who has referenced or cited your publications from this project (data from Scopus).

- Almela, V. D., Tompkins, E. L., Dash, J., & Tonon, T. (2023). Brown algae invasions and bloom events need routine monitoring for effective adaptation. Environmental Research Letters, 19(1), 013003.
- Gabriel, D., Maridakis, C., Fredericq, S. (2024). Gone with the wind: An unexpected Sargassum inundation in the mid-Atlantic Azores archipelago. Marine Pollution Bulletin, 204, art. no. 116522.
- Leal-Bautista, R.M., Rodriguez-Garcia, J.C., Acosta-González, G., Chablé-Villacis, R., Tapia-Tussell, R., Bautista-García, J.E., Olguìn-Maciel, E., Alzate-Gaviria, L., González-López, G. (2024). Assessment of Leachate Generated by Sargassum spp. in the Mexican Caribe: Part 1 Spatial Variations, Water (Switzerland), 16 (9), art. no. 1251.
- Elizalde-Mata, A., Trejo-Caballero, M.E., Yánez-Jiménez, F., Bahena, D., Esparza, R., López-Miranda, J.L., Estevez, M. (2024). Assessment of Caribbean Sargassum species for nanocellulose foams production: An effective and environmentally friendly material to water-emerging pollutants removal. Separation and Purification Technology, 341, art. no. 126627
- Oueld Lhaj, M., Moussadek, R., Mouhir, L., Mdarhri Alaoui, M., Sanad, H., Iben Halima, O., Zouahri, A. (2024). Assessing the Evolution of Stability and Maturity in Co-Composting Sheep Manure with Green Waste Using Physico-Chemical and Biological Properties and Statistical Analyses: A Case Study of Botanique Garden in Rabat, Morocco. Agronomy, 14 (7), art. no. 1573.
- Machado, C.B., Marsh, R., Hargreaves, J.K., Oxenford, H.A., Maddix, G.-M., Webber, D.F., Webber, M., Tonon, T. (2024). Changes in holopelagic Sargassum spp. biomass composition across an unusual year. Proceedings of the National Academy of Sciences of the United States of America, 121 (23), art. no. e2312173121.
- Correa-Bustos, A., Berti, F., Salas-Sanjuán, M.D.C., Segura-Pérez, M.L. (2024). Characterization of Mixtures of Rugulopteryx okamurae Compost and Plant Residues to Determine the Most Effective Composition as a Substrate and Source of Nutrients. Horticulturae, 10 (6), art. no. 567.
- Timshina, A.S., Robey, N.M., Oldnettle, A., Barron, S., Mehdi, Q., Cerlanek, A., Townsend, T.G., Bowden, J.A. (2024). Investigating the sources and fate of per- and polyfluoroalkyl substances (PFAS) in food waste compost. Waste Management, 180, pp. 125-134.
- Thomas, C., Filella, M., Ionescu, D., Sorieul, S., Pollier, C. G. L., Oehlert, A. M., Zahajska P, Gedulter N, Agnon A, Ferreira Sanchez D, Ariztegui, D. (2024). Combined genomic and imaging techniques show intense arsenic enrichment caused by detoxification in a microbial mat of the Dead Sea shore. Geochemistry, Geophysics, Geosystems, 25(3), e2023GC011239.

4. How have the research results from THIS Hinkley Center project been leveraged to secure additional research funding?

    - We submitted a pre-proposal to EREF, but it was not awarded.
    - We have also submitted a proposal to Commissioner Raquel Regalado of Miami-Dade County. It was intended to evaluate a composting operation located in Crandon Beach. The objective of the proposal was to evaluate the suitability of producing compost from seaweed on a large scale.

- An NSF-RAPID proposal was submitted by Dr. Jiayu Li, PI, and Dr. Helena Solo-Gabriele, coPI. The purpose of the proposal was to evaluate sulfur emissions from Sargassum and to evaluate the microbial communities. This proposal has since been **funded**.
- A proposal was submitted to the Google challenge to evaluate sequestration of carbon dioxide via Sargassum efforestration of the ocean. This proposal was not funded.
- A proposal was submitted to Miami-Dade Innovation Authority in collaboration with a local company to identify sustainable solutions for repurposing Sargassum seaweed. This proposal was not funded.
- A proposal was submitted to the Conservation, Food & Health Foundation to identify beneficial uses for Sargassum compost for farming in the Caribbean. This proposal was **funded**.
- A proposal was submitted to the US Environmental Protection Agency South Florida Program to evaluate Biochar made from Sargassum for the reduction of CyanoHABs and toxins. This proposal was not funded.

Additional proposals are pending.

5. What new collaborations were initiated based on THIS Hinkley Center project?

- Collaboration with BiocharNow, led by James Gaspard, focused on creating biochar from Sargassum collected by the University of Miami research team. James Gaspard provided expertise and support in the pyrolysis process, transforming the Sargassum into biochar to assess its potential benefits for environmental management and soil improvement.
- Legena Henry – UWI and Rum&Sargassum. In this collaboration, the research team will be supplied with biodigestate and biogas samples from a rum distillery, which were tested for arsenic levels. This initiative aims to understand the safety and potential applications of byproducts from the rum production process in environmental and agricultural contexts.
- Caribbean Agricultural Research and Development Institute (CARDI): CARDI's extensive farmer network facilitated the collection of crop and soil samples to evaluate the use of Sargassum-derived products, such as fertilizer and compost. Additionally, CARDI offers opportunities to collaborate on future training programs for farmers in the Caribbean, enhancing their knowledge of sustainable practices involving sargassum-based agricultural inputs.
- Upon initiation of this project, we have been in contact with the City of Fort Lauderdale. Mark Almy and his team have been gracious enough to show us their composting operations.
- One of our TAG members (Chip Jones) has allowed us to tour his facilities and see the machines that are used in operation. We met with him and took a tour of his operations on December 11, 2020.
- Another TAG member (Mark Richards) offered for us to tour Crandon Beach to get an idea of the influx of seaweed that plagues the unique area. We toured Crandon Beach with Mark Richards on December 29, 2020.
- We are in contact with Dr. Kimberly Moore, from the University of Florida, IFAS. She has provided guidance on the quality of compost and helped to design the radish bioassay experiments. We are working with her to establish a set of standards that can exclusively be used for sargassum compost.
- Afeefa worked in Dr. Amanda Oehlert's lab to analyze the metals and phosphorous found in the tumbler composters as well as the compost piles.
- Dr. Peter Swart invited us to be a part of the proposals submitted to Commissioner Regalado. We also analyze for nutrients in his lab.
- Through Dr. Blare, we have collaborated with individuals in the agricultural community who are helping to set up interviews with growers that work with Sargassum compost.

- Recycle Florida Today and the Organic Compost Council have been big supporters of our research by promoting our work through meetings they organize.
- We have met with the CEO/founder of Sustainscape Inc, Dennis de Zeeuw. His company produces fertilizer from Sargassum. He has two products that he uses throughout his jobs in Broward County. Dr. Blare and Afeefa met with him on September 20, 2021.
- The CEO/founder of Algas Organics, Johanan Dujon, reached out to us to hear more about our research. We will also hear more about the operation he is running and how he deals with Sargassum. We plan on meeting him on September 22, 2021.
- Ana Zangroniz who is a Florida Sea Grant Extension Agent at the UF/IFAS Extension Miami-Dade County, reached out to us requesting that we present our research to Miami-Dade County. From this presentation we also were in contact with Tom Morgan, who is the Chief of Operations for Miami-Dade County Parks, Recreation and Open Spaces Dept.
- Rebecca Wakefield who is the Chief of Staff in the office of Commissioner Raquel Regalado, reached out to us to find out more about our research. She has indicated an interest in developing a coalition to address the seaweed disposal issue.
- Ultima, a start up sequencing company, process Sargassum samples we provided for microbial communities.
- We are currently working with UMiami faculty, Dr. Cynthia Silveira, in evaluating the results from the microbial community analyses.
- We have since teamed up with UMiami faculty, Dr. Jiayu Li, with whom we are collaborating on an NSF funded project focused on Sargassum emissions and microbial communities.
- We have been in communication with Dr. Schonna Manning of FIU who serves as Dr. Afeefa Abdool-Ghany's post-doctoral advisor. We have discussed research ideas that integrate micro- and macro-algae.
- We have been participating in the FORCE Team initiatives to promote composting in Florida. This group is led by Miriam Zimms of Kessler and Associates and the group serves as a forum to promote communication and collaboration.

6. How have the results from THIS Hinkley Center funded project been used by the FDEP or other stakeholders?

- Members of the FDEP have participated in our TAG meetings and in meetings organized by our collaborators. They include Karen Moore, Lauren O'Connor, and Chris Perry. The FDEP has provided us with guidance in the process for obtaining permits for on-beach composting projects. They have also provided us with guidance in terms of applicable regulations. Currently they are considering classifying sargassum compost as yard trash. The regulations for yard trash do not include arsenic and as a result seaweed compost would pass FDEP regulatory thresholds. The FDEP is interested in our work because it will help guide the agency in terms of classifying Sargassum compost. They appear to want to encourage recycling and have been keeping up with our work on this project.
- Representatives from the FDEP indicated during our TAG meeting on March 17, 2022 that they plan to develop regulatory guidelines specific for Sargassum compost. A key component of their decision making will be the results reported from the Hinkley Seaweed projects.
- Miami-Dade County DERM has since initiated their own Sargassum compost study to confirm levels of arsenic in the compost and its runoff. These results will be used to establish potential permitting requirements for Sargassum compost in the county.
- Dr. Solo Gabriele met with Ana Zagroniz of Miami-Dade SeaGrant and Miami-Dade County Parks and Recreation to discuss needs in Miami-Dade County on June 27th 2024.

- Dr Solo Gabriele met with Karen Moore and Lauren O'Connor to discuss FDEP initiatives in developing standards for Sargassum compost on July 11th 2024.

Table 1: Sample list of solid samples processed and dates analyzed

ID	Description	Date Sargassum Collected	Date Sifted	Date dropped off at lab	Date Analyzed by Dr. Cai
CS-240313	Compost Solid	240313	240702	240813	240829 -240909
BS-240313	Biochar Solid	240313	240702	240813	240829 -240909
GS- 240702	Sargassum Solid	240702	240702	240813	240829 -240909
BS-240723	Biochar Solid	240702	240723	240813	240829 -240909
DS- 240723	Dried Sargassum Solid	240702	240723	240813	240829 -240909
GS-240718	Sargassum Solid	240718	240718	240813	240829 -240909
CS-240718	Compost Solid	240313	240718	240813	240829 -240909
BS-240806	Biochar Solid	240723	240806	240813	240829 -240909
DS-240806	Dried Sargassum Solid	240723	240806	240813	240829 -240909
GS-240730	Sargassum Solid	240730	240730	240813	240829 -240909
CS-240930	Compost Solid	240702	240930	241017	241106 - 241203
DS-240827	Dried Sargassum Solid	240730	240827	241017	241106 - 241203
CS-241016	Compost Solid	240730	241016	241017	241106 - 241203

Table 2: Sample list of solid samples processed and dates analyzed

ID	Description	Date Sargassum Collected	Date SPLP Performed	Date dropped off at lab	Date Analyzed by Dr. Cai
GL-240730	Sargassum Liquid	240730	240730	240813	240829 -240909
GL-240718	Sargassum Liquid	240718	240718	240813	240829 -240909
GL- 240702	Sargassum Liquid	240702	240702	240813	240829 -240909
CL-240313	Compost Liquid	240313	240702	240813	240829 -240909
CL-240718	Compost Liquid	240313	240718	240813	240829 -240909
BL-240313	Biochar Liquid	240702	240702	240813	240829 -240909
BL-240806	Biochar Liquid	240723	240806	240813	240829 -240909
BL-240723	Biochar Liquid	240702	240723	240813	240829 -240909
DL- 240723	Dried Sargassum Liquid	240702	240723	240813	240829 -240909
DL-240806	Dried Sargassum Liquid	240723	240806	240813	240829 -240909
Z-240702	Blank Liquid	-	240702	240813	240829 -240909
CL-240930	Compost Liquid	240702	240930	241017	241106 - 241203
DL-240827	Dried Sargassum Liquid	240730	240827	241017	241106 - 241203
CL-241016	Compost Liquid	240730	241016	241017	241106 - 241203

Appendix: TAG Member List

Sargassum Composting
TAG Member List

RESEARCH TEAM MEMBERS

Name	Affiliation and Address	Phone Number	Email
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Melanie Cerna	Undergraduate Student University of Florida		

HINKLEY CENTER

Name	Affiliation and Address
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Mary Beth Morrison	Director of Environmental Programs, Solid Waste Authority of Palm Beach County	mmorrison@swa.org
Enrique Sanchez	Deputy Director, Parks and Recreation of the City of Fort Lauderdale	ESanchez@fortlauderdale.gov
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Appendix B: TAG Meeting Attendance and Minutes/Agenda

(Our next TAG Meeting is scheduled for June 21, 2024)

Minutes of the Technical Awareness Group Meeting (2nd meeting)
For the Sargassum-Arsenic Research
Supported by the Hinkley Center for Solid and Hazardous Waste Management
Meeting held, June 21st, 2024, 10:00 am to 12:00 pm (eastern)
Meeting Participation was through Virtual Connection (Zoom)

Attendees:
Speakers:
Afeefa Abdool-Ghany, University of Miami, now at FIU
Brittany Mc Intyre, University of Miami
Helena Solo-Gabriele, University of Miami
Jiayu Li, University of Miami
Melanie Cerna, Florida International University

Attendees via computer webinar:
Alejandro Prado Iriarte, University of Miami
Alejandro Quintas, NEAT Sand
Alina Ruta, Miami-Dade Innovation Authority
Angela Delaney, Broward County Marine Resources
Bethany Tober, Biscayne Bay Aquatic Reserve
Caroline Irvin, Division of Environmental Resource Management (DERM)
Chadeene Beckles, Caribbean Agricultural Research and Development Institute (CARDI)
Chrissy Hudson, ADAR Technologies
Craig Ash, Waste Management
Danielle Jimenez, Division of Environmental Resource Management (DERM)
Dan McChesney, Shapiro Enterprises
Dan Meeroff, Florida Atlantic University
Elizabeth Kelly, Martin County
Gloria Antia, City of Miami
Guangliang Liu, Florida International University
Hannah Sackles, University of Florida
Isabela Puente, University of Miami
James Gaspard, BioChar Now
Jessica Lorenzo, City of Miami Beach
Josefina Olascoaga, University of Miami
Kimberly Moore, University of Florida, IFAS
Koa Wong, University of Miami
Lanette Sobel, Fertile Earthworm Farm
Legena Henry, Rum and Sargassum
Ligia Collado-Vides, Florida International University
Lisa James, Caribbean Agricultural Research and Development Institute (CARDI)

Louis DiVita, Hinkley Center for Solid and Hazardous Waste Management
Mark Almay, City of Fort Lauderdale
Mary Beth Morrison, Solid Waste Authority of Palm Beach County
Pamela Sweeney, Division of Environmental Resource Management (DERM)
Rivka Reiner, University of Miami,
Roland Samimy, The Village of Key Biscayne
Samir Elmir, Department of Health, Miami Dade-County
Schonna Manning, Florida International University
Shahar Tsameret, University of Miami
Shelly Krueger, Florida Sea Grant Agent for Monroe County
Stephanie Roche, Broward County's Resiliency Department
Steve Sternick, Beach Raker
Susan Noel, Loxahatchee River District
Timothy Kirby, City of Miami
Thierry Tonon, York University, UK
Tristan Alvarez, Caribbean Agricultural Research and Development Institute (CARDI)
Vincent Encomio, Florida Sea Grant Agent for Martin and St. Lucie Counties
Wilbur Mayorga, Division of Environmental Resource Management (DERM)
Yong Cai, Florida International University

Agenda
TAG Meeting, Sargassum Composting and Beach Quality

Date: June 21, 2024 (Friday)
Time: 10:00 am to 12:00 am (US Eastern)
Location: Virtual only, Zoom Link, https://miami.zoom.us/j/92016167950

10:00 AM	1. Welcome and Introductions	Solo-Gabriele
10:15 AM	2. Summary of Prior Hinkley Sponsored Research a. Economics of Sargassum Compost b. Compost Production and Characteristics c. Questions and Answers	Abdool-Ghany
10:25 AM	3. Results to Date for Current Project (Arsenic and Bacteria Impacts from Sargassum Left on Beaches) a. Overview b. Phase 1 Results (Beach Study) c. Phase 2 Results (Mesocosms) d. Next Steps e. Questions and Answers	Abdool-Ghany
10:45 AM	4. Future Hinkley-Sponsored Research (Approaching Sargassum Reuse from a Risk Based Approach)	Solo-Gabriele/Mc Intyre
10:55 AM	5. Farmer Study for three Caribbean Countries a. Overview b. Progress to Date and Next Steps c. Questions and Answers	Mc Intyre
11:05 AM	6. Risk Assessment for Sargassum Beach Contact	Mc Intyre/Cerna
11:15 AM	7. 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. Results for Enterococci c. Next Steps d. Questions and Answers	Li/Tsamaret
11:30 AM	8. Additional questions and answers, wrap up. Open and free discussion.	Solo-Gabriele
12:00 PM	9. Adjourn	

Questions: hmsolo@miami.edu

Minutes

Questions, Answers, and Comments (After item 2 on agenda, Summary of Prior Hinkley Sponsored Research)

1. Q: Can the arsenic get transferred to pollinators such as bees, butterflies, and birds?
   A: We have not looked at this specific question. We are unaware as to if/how the arsenic can be transferred to the pollinators. We did notice that there were bees that were attracted to the mesocosms that we set up for Phase 2 of the current study.

2. Comment: One of the pathways that should be evaluated further is the leachate from the Sargassum and storm water quality at/near a Sargassum composting site. In our research we have found that arsenic is present at orders of magnitude greater than the actual cleanup target level for groundwater. We have also seen an issue with the chloride concentrations in the leachate and the storm water.
   A: During the current study we did monitor the leachate from the decomposing Sargassum and the arsenic concentrations specifically. We will present on the results in the next section.

3. Comment: It needs to be qualified that any property that will be receiving materials that is considered commercial/industrial will have to issue a restriction to the property to ensure that the land does not change in the future to residential use.

Questions, Answers, and Comments (After item 3 on agenda, Results to Date for Current Project)

1. Q: Is there a way to factor the rising tide in saltwater in the arsenic concentrations? Does the integration take place above the high tide line or is it in the intertidal areas where it could be subject to salt water?
   A: For this project we simulated what would happen if the decomposition process would take place above the high tide line. It would ideally be applicable to composting on or near the beach or possibly letting it dry on the beach. We agree that the intertidal zone may have different arsenic concentrations and the salt water has the ability to interfere affect the release of the arsenic from the Sargassum.

2. Was the Sargassum fresh when collected for the start of the project? Where was the sand collected for the mesocosms?
   A: The Sargassum was fresh when collected for the project. We ensured that it was a fresh landing of Sargassum using EpiCollect. This site was monitored everyday to make sure that we were able to collect during a fresh stranding event. The sand was collected from the supratidal zone at the same location the Sargassum was collected.

3. The Sargassum morphotype may impact the level of arsenic and its release. Different morphotypes impact the beach at different times.
   A. We agree that documenting the morphotype and species of Sargassum is important and we plan to do this as part of the study. We have samples that can be used for this.

4. Was the Sargassum from the dune area?
   A. The Sargassum was collected from the intertidal zone area and it was fresh.

5. Comment: Sargassum is not allowed to be buried and cannot be used for dunes.

6. Comment: the reduction overtime that was observed is only for one loading event to a Sargassum composting operation. The reduction will not be seen since there will be multiple loading events seen at a composting facility.

Questions, Answers, and Comments (After item 4 on agenda, Future Hinkley-Sponsored Research)

1. Comment: Working with the State, we want to ensure that we account for the transformation of the different species of arsenic once the material is released into the environment. Transformations are always of concern.

2. Comment: The Rum&Sargassum Inc. company is a spin off company from the University of West Indies. The company is on-the-ground now. The digestate is used as a fertilizer. Currently running a 6-car pilot study where the use of biomethane can be used as transport fuel.

Questions, Answers, and Comments (After item 5 on agenda, Farmer Study for three Caribbean Countries)

1. Q: Is there a baseline for arsenic concentrations for what farmers are seeing?
   A: We are not aware of any individuals who have looked at the arsenic concentrations in the farming products. Right now, we are working with CARDI to get that network of farmers to start talking with them, to see what they know and what's going on. This study is kind of twofold; it's a baseline study, but also data will be used for a risk assessment.

Questions, Answers, and Comments (After item 6 on agenda, Risk Assessment)

1. Comment: Reminder to include aggregate risk and recommend the use of Dr. Roberts' risk assessment approach.
   A. We will be aggregating risks from ingestion, dermal, and inhalation routes and we have been using Dr. Roberts' 2005 report as a guide.

Questions, Answers, and Comments (After item 7 on agenda, NSF Project focused on Air Emissions and Microbial Communities)

1. Comment: Air emissions have been an issue in Martinique but has not yet been an issue in Miami-Dade.

   A. In our field monitoring we have not be observing levels of hydrogen sulfide that would have an immediate effect on human health.