EBC Solid Waste Management Program

Organics in Massachusetts: Where is it All Going?
Welcome

Thomas A. Mackie

*EBC Solid Waste Management Committee*

*EBC Board of Directors*

*Shareholder, Mackie Shea, P.C.*
Welcome to Bowditch & Dewey, LLP

Robert D. Cox, Jr.

Managing Partner
Bowditch & Dewey, LLP
Thank You to Our Bronze Sponsor

REPUBLIC SERVICES
Gretchen Carey

Program Co-Chair

Recycling & Organics Coordinator

Republic Services

President, MassRecycle
Massachusetts Organics Progress Report

John Fischer, Branch Chief

Commercial Waste Reduction and Waste Planning

Massachusetts Department of Environmental Protection
Massachusetts Organics Progress Report

John Fischer
EBC
May 21, 2019
Overview

- Massachusetts has worked on advancing food waste reduction for decades now
- Organics Action Plan – February 2012
- Commercial Organics Ban – October 2014
  - Updated periodically since
- Build infrastructure based on largest sources first
SWMP Food Waste Reduction Goal Status

- 2020 Plan goal - divert additional 350,000 tons/year of food material from disposal
  - off of estimated 100,000 baseline estimate, so 450,000 tons total
- As of 2017 – total reported diversion at 280,000 tons
  - Increase of 180,000 tons
Reducing Wasted Food – Progress to Date

- Overall 5% increase from 2016-2017
- 2017 – total reported diversion = 280,000 tons
  - Compost – 150,000 tons
  - AD – 88,000 tons
  - Donation – 26,000 tons
  - Other – 13,000 tons – processed into wastewater
  - Animal feed – 1,700 tons
- Does not include on-site systems
  - Estimated to be about 50,000 tons annually
- Believe underestimates amount going to animal feed
Organics Infrastructure - Donation

- 26,000 tons
- Most through food banks – fairly steady
- Growth in food rescue – fresh & perishable foods
  - Continues steady increase – up 14% from 2016
Organics Infrastructure - Collection

- Hauler collection customers – food materials
  - 2014 – 1,350
  - 2015 – 1,550
  - 2016 – 1,700
  - 2017 – 2,100
  - 2018 – 2,300
- Up 70% from 2014-2018 (950 customers)
- As with cardboard, collection service necessary but not sufficient for compliance
Organics Infrastructure – Compost & AD

- Currently 45 sites listed in Massachusetts
- Compost capacity about 150K TPY
- AD capacity for food materials (13 facilities total)
  - > 600,000 TPY total operational or under development
  - 400,000 TPY permitted capacity is operational
  - 120,000 TPY under construction
  - 120,000 TPY not yet permitted
- De-packaging operations
  - 7 currently accepting to some degree
  - 2 more under development
Economic Impact Analysis

- Conducted in 2016 for MassDEP by ICF International, Inc.
- Benefits included
  - Supported about 900 jobs (500 direct jobs)
    - 150% growth from 2010 to 2016
    - Estimated to grow to 1,370 jobs by end of 2017
  - $77 million of value added to state GSP and $175 million in economic activity
  - Nearly $50 million in planned facility and capital investments
Organics Grants & Loans

- **Recycling Loan Fund**
  - 14 organics loans for $2.3 million since 2000
  - 5 more AD loans for $2.3 million since 2013

- **Recycling Business Development Grants**
  - 7 grants for $1.2 million to manage packaged food material

- **Sustainable Materials Recovery Program**
  - 46 grants totaling $2.4 million since 2012
  - Includes facility development, drop-off equipment, carts, and technical assistance

- **Mass Clean Energy Center**
  - $4.4 million in construction grants for facilities using food material as feedstock since 2012
RecyclingWorks Assistance

- Provides assistance through phone hotline and email
- Provides direct, on-site technical assistance
- Technical assistance and workshops for compost operators
- Web content: searchable service providers database, BMPs guidance, case studies
Waste Ban Compliance

- 45 NONs and 4 penalties issued so far for food material
- Several more enforcement actions in process now
- Expect to do more targeted outreach & compliance assistance
- Continue to support through RecyclingWorks technical assistance
Solid Waste Master Plan Development

- Draft Plan in 2019 and final in 2020
- Food material still the number one material in both residential and commercial trash
- Will be a continued focus in the 2030 Plan
Policy Development
Reduced Ban Threshold

- Currently holding Organics Subcommittee meetings
- Develop comprehensive strategy to support reduced ban threshold
- Discussing potential level of $> \frac{1}{2}$ ton/week
- Estimate approximate doubling of businesses subject
- Goal to ensure needed infrastructure is in place
For More Information

- John Fischer, MassDEP
- [John.fischer@mass.gov](mailto:John.fischer@mass.gov)
- 617-292-5632
- [https://www.mass.gov/guides/commercial-food-material-disposal-ban](https://www.mass.gov/guides/commercial-food-material-disposal-ban)
Food Recovery as a Solution for Organics

Lauren Palumbo

Chief Operating Officer
Lovin’ Spoonfuls
IN THE U.S.:

There are over **40 million** hungry Americans.

**40%** of food is wasted.

Wasted food is the **largest** source of solid waste.

**21%** of our fresh water use goes to making food that is wasted.

Wasted food has a **$218 billion** retail value.

Sources: [Feeding America](https://www.feedingamerica.org), [NRDC Wasted Issue Paper](https://www.nrdc.org/wasted)
If food were a country, it would be the #3 greenhouse gas emitter (after China and the U.S. and before Russia and India).

Sources: NRDC August 2012 Issue Paper
MORE THAN 650,000 PEOPLE ARE FOOD INSECURE IN MASSACHUSETTS.

LOVIN’ SPOONFULS HAS RESCUED OVER 12.5 MILLION POUNDS OF FOOD TO DATE, PROVIDING MORE THAN 10 MILLION MEALS.
OUR FOOD RESCUE MODEL: DIRECT DISTRIBUTION

70+ vendor partners
65,000 pounds rescued weekly

Grocery stores
Farms
Farmers markets
Produce wholesalers

Same day delivery
Refrigerated delivery vehicles
Professionally trained drivers
Mobile inventory tracking system

140+ non-profits
30,000+ clients weekly

Homeless shelters
Soup kitchens + food pantries
Crisis, recovery + addiction centers
Child care/after school
Veterans and military services
Senior centers
HOW WE WORK WITH BUSINESSES

Our method guarantees consistent and professional service for our vendor partners that donate food.

We offer:
- Compliance with Good Samaritan laws
- Steady schedule with a regular, trained Lovin’ Spoonfuls staff member
- Training materials and programming for staff
- In-store visits & reporting to ensure product is not being wasted
TRIPLE BOTTOM LINE SOLUTION

Eradicating food waste benefits us all!

**People:** social benefits of feeding hungry population & reducing waste in landfills

**Planet:** environmental benefits of efficient resource use

**Profits:** saving money on food, tax breaks for donors, reduced waste disposal bill
30% LESS WASTE COULD FEED 50 MILLION PEOPLE.
“We are able to provide quality produce that allows seniors access to nutritious food that they otherwise couldn’t afford. This allows seniors to not have to make choices between medication and healthy foods.” – Brookline Senior Center

“Women’s Lunch Place and Lovin’ Spoonfuls’ missions are fully aligned and evident in our shared commitment to social and economic justice. The Lovin’ Spoonfuls team pulls in twice a week with beautiful fresh food deliveries to the delight of Chef Sherry and our entire community.” – Judy Beckler, Interim Director at Women’s Lunch Place

“A partnership with Lovin’ Spoonfuls means that we can provide our critically-ill clients with meals that are full of healthy, fresh produce and rescued food that would otherwise go to waste. This partnership allows for resources of time and money to be spent elsewhere for the agency.” – Community Servings

"Before working with Lovin’ Spoonfuls, we were only able to offer our residents canned goods, but not on a regular basis. Since working with Lovin’ Spoonfuls, we are able to offer a variety of food every week." – Caritas Communities

Learn more about our work, our partners, and our team at lovinspoonfulsinc.org
Emerging Contaminants and Issues with Compostable Foodware and Other Products

Terri Goldberg

Executive Director
NEWMOA

Environmental Business Council of New England
Energy Environment Economy
Overview

• PFAS Use in Compostable Food Service Ware (FSW)
• State, Local, & Private Actions on PFAS
• Recent OR DEQ Study on Compostable Packaging & Food Service Ware
• NEWMOA Food Recovery Resources

Disclaimer – personal views; not necessarily the views of NEWMOA or its members
What is PFAS?

• Per- and polyfluoroalkyl substances (PFAS) class of more 4,500 – 5,000 fluorinated chemicals

• Prefluorooctanoic acid (PFOA) & perfluorooctane sulfonic acid (PFOS), two of the most well studied PFAS have been associated with cancer, developmental toxicity, immunotoxicity, growth & learning delays in children, & other health effects

• Highly persistent (i.e., take a long time to break down in the environment), ubiquitous, & can migrate into food from packaging & food service ware

• Can contaminate compost, drinking water, & crops

• Many PFAS have little to no data demonstrating their safety
Why PFAS Are Used?

- Widely used because of their ability to repel heat, water, & oil
- Commonly used to manufacture non-stick, grease & stain-resistant coatings on many industrial & consumer products, including food packaging & service ware
- PFOA & PFOS phased out & replaced with other members of PFAS class
What Products Contain PFAS?

PFAS compounds can be added to paper & fiber products:

• Bowls
• Take-out & soup containers
• Plates
• Clamshells
• Food trays, boats, & scoops
• Deli & portion cups
• Boxes
• Bags, wrappers, bakery liners, such as muffin papers & sandwich bags
Can We Tell?

• Maybe: Brands may not know if PFAS are added to their products, because the chemicals may be added by raw material providers

• Some brands sell products under the same name with & without PFAS

• All molded fiber products contain PFAS

• Ask the supplier for test results or get products tested

Center for Environmental Health (CEH) has conducted independent testing
CEH Findings

- Tested plates, bowls, clamshells, & multi-compartment food trays for their total fluorine content
- In total, >130 products representing 39 manufacturers/brands were tested & classified as “non-fluorinated” or “fluorinated”
- 57% percent of these products were fluorinated
Results

- Products made of the following materials tested as no or low-fluorine:
  - Bamboo
  - Clay-coated paper or paperboard
  - Clear PLA (polylactic acid) & paper-lined with PLA
  - Palm leaf
  - Paper with unknown coatings & uncoated paper
Results

• Products made of the following materials consistently tested as fluorinated:
  ▪ All molded fiber products, such as wheat fiber
  ▪ “Blend of plant fibers”
  ▪ Silver grass (miscanthus)
  ▪ Sugarcane waste, including molded recycled paper & polylactic acid (PLA)-lined molded sugarcane
Harvard Study

• Tested a variety of common consumer products, including compostable plates & bowls from Harvard dining hall & restaurants

• Found that paper-based compostable food containers had among the highest PFAS concentrations of all the products evaluated

• www.seas.harvard.edu/content/reducing-chemical-exposure-on-campus-one-compostable-plate-at-time
Washington State’s Action

- March 2018 – law regulated PFAS in food contact materials & articles
- Dept. of Ecology (DoE) must conduct an alternatives assessment (AA) & publish its findings January 2020
- Prohibition on PFAS chemicals in food packaging will become effective January 1, 2022 if AA finds safer alternatives are available; if not, DoE is required to conduct further AAs starting in 2021 & annually thereafter
- Prohibition of PFAS chemicals will become effective 2 years after DoE’s AA findings that there are available safer alternatives
- Food packaging manufacturers must certify compliance after the date the prohibition takes effect
SF’s Ban on PFAS in FSW

• August 2018 – 1st city in the U.S. to prohibit PFAS chemicals in FSW
• Effective on January 1, 2020
• Covers FSW, including food contact products that are designed for single use for prepared foods – bowls, containers, forks, knives, lids, napkins, plates, spoons, straws, trays, & similar items
• Also food service ware accessories provided along with single use plates or cups – condiment packets, chopsticks, cup lids, cup sleeves, food or beverage trays & napkins, toothpicks, sticks & stirrers, and more
More

• Also prohibits cocktails sticks, splash sticks, stirrers, straws, or toothpicks made with plastic, including compostable, bio- or plant based plastic
Other Regulations

- CA has listed PFOA & PFOS under its Prop 65 list of chemicals since Nov. 2017; warnings required by Nov. 2018
Actions by BPI

- In Sept. 2018, the Biodegradable Products Institute (BPI) announced that would restrict & eventually eliminate fluorinated chemicals from their certification.
- They adopted a limit of 100 ppm total fluorine in 2019, & “no intentionally added fluorinated chemicals” shortly thereafter.
- “BPI’s overarching goal is to assist in the diversion of organic waste to composting, by verifying that products & packaging will completely break down in a professionally managed composting facility, without harming the quality of that compost.”

[Link to BPI Blog](https://www.bpiworld.org/BPI-Blog.html/6650181)
Oregon DEQ Study

• Recent life cycle (LC) environmental impacts report on packaging & food service ware (FSW)-
  www.oregon.gov/deq/FilterDocs/MaterialAttributes.pdf

• Reviewed available LCA studies/literature on bio-based & compostable packaging & FSW

• Compared impacts of bio-based & compostable packaging & FSW with fossil-fuel based counterparts
A Few Findings

Compostable FSW – cups, plates, clamshells, & cutlery & materials included PLA, paperboard, cellulose pulp, and paper & board

- “Composting compostable FSW tends to result in increased impact potentials for most categories when compared with landfilling, incinerating, or recycling it.” p. 90

- “The primary reason for these results are the higher production impacts of compostable materials, which are bio-based PLA & fiber-based products in the LCA studies identified.” p. 90
More Findings

- “Compostable FSW is generally not preferable to non-compostable FSW, ...results in higher production impacts than fossil-fuel materials...” p. 92
- “A possible exception is a case where FSW is collected & composted with food waste due to improvements in collection efficiency & the increased nutrient content of the compost results from the increased amount of organic matter composted along with the FSW.” p. 92
- More study needed.
- www.oregon.gov/deq/FilterDocs/compostable.pdf
Oregon Composters Message

9 Oregon composters believe that compostable packaging & FSW compromise their composting programs & limit many of the environmental benefits of successful composting.

Reasons why they don’t want “compostable” packaging or FSW delivered to their facilities:
1) They don’t always compost
2) Contamination happens
3) They hurt resale quality
4) They can’t sell to organic farmers
5) They may threaten human & environmental health
6) Increases their costs & makes their job harder
7) Just because something is compostable doesn’t mean it’s better for the environment
8) In some cases, the benefits of recycling surpass those of composting
9) Good intentions aren’t being realized

NEWMOA Food Recovery Resources

• Backyard Composting Handout & Guide -
  www.newmoa.org/solidwaste/projects/food/Home_Composting_Template.pdf

• Reducing Food Waste –

• Food Recovery & Donation –
  www.newmoa.org/solidwaste/projects/food/Food_Donation_Template.pdf
Recent Webinars

Organized Jointly by NEWMOA & NERC

• Confusing Landscape of Compostable Products – [www.newmoa.org/events/event.cfm?m=316](http://www.newmoa.org/events/event.cfm?m=316)

• Lessons Learned from Implementing the Food Recovery Hierarchy – [www.newmoa.org/events/event.cfm?m=343](http://www.newmoa.org/events/event.cfm?m=343)

• Edible Food for Donation – [www.newmoa.org/events/event.cfm?m=370](http://www.newmoa.org/events/event.cfm?m=370)
Terri Goldberg
NEWMOA Executive Director

tgoldberg@newmoa.org; (617) 367-8558 x302

www.newmoa.org
The Science of Manufacturing Composting

James Gist

Chief Financial Officer
Brick Ends Farm

Environmental Business Council of New England
Energy Environment Economy
Brick Ends Farm
South Hamilton, MA
978-468-3131

Go Be Green
Who is Brick Ends Farm?

Brick Ends Farm is a 130-acre farm located in Hamilton, Massachusetts, owned and operated by Peter Britton. Growing vegetables and specializing in making compost and enhanced soil, Brick Ends Farm was one of the first farms to register with the Massachusetts Department of Food and Agriculture for food waste composting in the 1980s.

We are a Compost facility that utilizes Static aerated piles which allows us to maximize our output while minimizing our footprint. This philosophy of low impact high value helps us create our soils.

It is also why we believe that composting is a truly sustainable solution to the recovery of organic materials from our waste stream.
How does Brick Ends create a high quality soil?

We take organic food waste (nitrogen) and combined that with leaves and wood chips (carbon) in a static aerated pile for over 11 months.

This process is evaluated by our staff soil scientist through a quarterly soil and food web test. This allows us maintain quality and develop a consistent product.
# Soil Test Report

**Prepared For:**
Chip Osborne  
Osborne Organics  
11 Laurel St  
Marblehead, MA 01945  

cos@osborneorganics.com  
781-254-7862

## Results

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Value Found</th>
<th>Optimum Range</th>
<th>Analysis</th>
<th>Value Found</th>
<th>Optimum Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil pH (1:1, H2O)</td>
<td>6.2</td>
<td></td>
<td>Cation Exch. Capacity, meq/100g</td>
<td>13.3</td>
<td></td>
</tr>
<tr>
<td>Modified Morgan extractable, ppm</td>
<td></td>
<td></td>
<td>Exch. Acidity, meq/100g</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Macronutrients</td>
<td></td>
<td></td>
<td>Base Saturation, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>9.3</td>
<td>4-14</td>
<td>Calcium Base Saturation</td>
<td>57</td>
<td>50-80</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>690</td>
<td>100-160</td>
<td>Magnesium Base Saturation</td>
<td>15</td>
<td>10-30</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>1525</td>
<td>1000-1500</td>
<td>Potassium Base Saturation</td>
<td>13</td>
<td>2.0-7.0</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>238</td>
<td>50-120</td>
<td>Scoop Density, g/cc</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Sulfur (S)</td>
<td>28.9</td>
<td>&gt;10</td>
<td>Optional tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micronutrients *</td>
<td></td>
<td></td>
<td>Soil Organic Matter (LOI), %</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>Boron (B)</td>
<td>0.9</td>
<td>0.1-0.5</td>
<td>Soluble Salts (1:2), dS/m</td>
<td>1.34</td>
<td>&lt;0.6</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>21.3</td>
<td>1.1-6.3</td>
<td>Nitrate-N (NO3-N), ppm</td>
<td>157</td>
<td></td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>2.3</td>
<td>1.0-7.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>0.1</td>
<td>0.3-0.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>22.9</td>
<td>2.7-9.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum (Al)</td>
<td>100</td>
<td>&lt;75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Compost Detail**

Report prepared for:
Osborne Organics
Chip Osborne
11 Laurel Street
null
Marblehead, Massachusetts 01945 USA

For interpretation of this report please contact your local Soil Steward or the lab.

---

**SOIL FOODWEB NEW YORK**

17 Clinton St.
Center Moriches, NY 11934 United States
631-750-1553
soilfoodwebny@aol.com
http://soilfoodwebnewyork.com

---

<table>
<thead>
<tr>
<th>Assay Name</th>
<th>Result</th>
<th>Units</th>
<th>Desired Level</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organism Biomass Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Weight</td>
<td>0.45</td>
<td>N/A</td>
<td>0.20 to 0.80</td>
<td>Within normal moisture levels.</td>
</tr>
<tr>
<td>Active Fungi</td>
<td>33.39</td>
<td>µg/g</td>
<td>&gt; 3.00</td>
<td>Fungal activity within normal levels.</td>
</tr>
<tr>
<td>Total Fungi</td>
<td>997.53</td>
<td>µg/g</td>
<td>&gt; 300.00</td>
<td>Good fungal biomass.</td>
</tr>
<tr>
<td>Hyphal Diameter</td>
<td>3.00</td>
<td>µm</td>
<td>&gt; 2.50</td>
<td>Disease suppressive fungi likely present.</td>
</tr>
<tr>
<td>Active Bacteria</td>
<td>77.37</td>
<td>µg/g</td>
<td>&gt; 3.00</td>
<td>Bacterial activity within normal levels.</td>
</tr>
<tr>
<td>Total Bacteria</td>
<td>2,670.36</td>
<td>µg/g</td>
<td>&gt; 300.00</td>
<td>Good bacterial biomass.</td>
</tr>
<tr>
<td>Actinobacteria</td>
<td>0.00</td>
<td>µg/g</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Organism Biomass Ratios**

<table>
<thead>
<tr>
<th></th>
<th>Result</th>
<th>Units</th>
<th>Desired Level</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF:TB</td>
<td>0.37</td>
<td></td>
<td>0.01 to 10.00</td>
<td>Balanced fungal and bacterial biomass.</td>
</tr>
<tr>
<td>AF:TF</td>
<td>0.03</td>
<td></td>
<td>&lt; 0.10</td>
<td>Good fungal activity.</td>
</tr>
<tr>
<td>AB:TB</td>
<td>0.03</td>
<td></td>
<td>&lt; 0.10</td>
<td>Good bacterial activity.</td>
</tr>
<tr>
<td>AF:AB</td>
<td>0.43</td>
<td></td>
<td>0.01 to 10.00</td>
<td>Bacterial dominated, becoming more bacterial.</td>
</tr>
</tbody>
</table>

**Protozoa (Protists)**

<table>
<thead>
<tr>
<th>Assay Name</th>
<th>Result</th>
<th>Units</th>
<th>Desired Level</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flagellates</td>
<td>102,739.73</td>
<td>number/g</td>
<td>&gt; 10,000.00</td>
<td>Should provide a good inoculum of protozoa.</td>
</tr>
<tr>
<td>Amoebae</td>
<td>61,844.59</td>
<td>number/g</td>
<td>&gt; 10,000.00</td>
<td></td>
</tr>
<tr>
<td>Ciliates</td>
<td>617.87</td>
<td>number/g</td>
<td>&lt; 1646.00</td>
<td></td>
</tr>
<tr>
<td>Nitrogen Cycling Potential</td>
<td>200+</td>
<td>lbs/acre</td>
<td>Nitrogen levels dependent on plant needs. Estimated availability over a 3 month period</td>
<td></td>
</tr>
</tbody>
</table>

**Nematodes**

<table>
<thead>
<tr>
<th>Assay Name</th>
<th>Result</th>
<th>Units</th>
<th>Desired Level</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nematodes</td>
<td>2.84</td>
<td>number/g</td>
<td>&gt; 10.00</td>
<td>Low numbers and diversity.</td>
</tr>
<tr>
<td>Bacterial</td>
<td>2.38</td>
<td>number/g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fungal</td>
<td>0.00</td>
<td>number/g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fungal/Root</td>
<td>0.26</td>
<td>number/g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predatory</td>
<td>0.00</td>
<td>number/g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root</td>
<td>0.00</td>
<td>number/g</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Miscellaneous Testing**

<table>
<thead>
<tr>
<th>Assay Name</th>
<th>Result</th>
<th>Units</th>
<th>Desired Level</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.coli</td>
<td>0.00</td>
<td>CFU/g</td>
<td>&lt; 800.00</td>
<td>For most areas, the maximum E.coli CFU/g is 800 - 1000. Please check your local regulations for more information.</td>
</tr>
</tbody>
</table>

---

Sample # : 03-12047
Unique ID : W
Invoice Number : 4736
Sample Received: 08 Jan 2019
What are some utilizations of compost?

Compost for many years has been used as an amendment to soils however the direct application of compost has a much higher impact.

1. Use as a weed barrier and long term fertilizer in flower beds.
2. Top dress and seed lawns
3. Compost tea as an organic solution to liquid fertilizer.
What are some of impacts of compost?

Because our product is consist its impact can have a number of added benefits.

1. Soil remediation by the removal of soil contaminates.
2. Organic mater % = Total organic carbon * 1.72
3. 1 % increase in soils organic mater helps soil hold 20,000 more gallons more water per acre.
13,000 Tons
1,700 Tons
88,000 Tons
150,000 Tons
Food Recovery Hierarchy

• 100% Sustainable
• Environmental Benefits
• Low Resource Utilization
• Removes Food Waste from Landfills
• Does not Create a secondary waste product further down stream. (AD)
Brick Ends Farm
South Hamilton, MA 01982
978-468-3131
Website: www.brickendsfarm.com

Hours of Operation
Monday-Friday 7:00am-4:00pm
Saturday 8:00am-Noon
Sunday - Closed
Moderator: Panel Discussion

Debra Darby

Program Co-Chair and Moderator

Program and Marketing Director

Organix Solutions
Bioplastics: Term to define two different kinds of plastics

- Plastics based on renewable resources (origin of raw material used)
- Biodegradable and compostable plastics according to ASTM D6400 / EN13432

Bioplastics may be based on:
- Renewable resources and biodegradable
- Renewable resources but not be biodegradable
- Fossil resources and biodegradable
Biobased or Fossil-Based Resources

FROM RENEWABLE RESOURCES (BIOBASED)

Bioplastics/Not Biodegradable
- Bio-PE, Bio-PP, Bio-PET

Biodegradable/Compostable
- PLA, PHA (PHB), TPS

FROM PETROLEUM-BASED RESOURCES

Not Bioplastic
- LDPE, HDPE, PP, PA, PS, PVC, EVOH oxo-fragmentable blends
- Co-Polyester (Ecoflex), Polycapro lactone, PVA

Source: BIOPLASTICS Magazine
Composting, Compost and Compostable

**Composting** – a natural process that turns organic materials into a nutrient-stable product that is added to the soil produced through the activity of aerobic (oxygen requiring) microorganisms.

These microbes require oxygen, moisture, and food in order to grow and multiply. When these factors are maintained at optimal levels, the natural decomposition process is greatly accelerated.

The microbes generate heat, water vapor, and carbon dioxide as they transform raw materials into a stable soil conditioner.

**Compost** is rich in nutrients for gardens, landscaping, horticulture, urban agriculture and farming

- Beneficial for the land as a soil conditioner, a fertilizer, and as a natural pesticide for soil.
- Useful for erosion control, land and stream reclamation, wetland construction.

**Compostable Plastic** – plastic that undergoes degradation by biological processes during composting to yield CO2, water, inorganic compounds, and biomass at a rate consistent with other known compostable materials and leaves no toxic residue.
Biodegradable and Compostable

There is a difference between the terms “biodegradable” and “compostable”.

While everything that is compostable is biodegradable, not everything that is biodegradable is compostable.

**Biodegradable** - important in biodegradation are the microorganisms, which are present in the environment. It is very important to specify the environment where biodegradation is intended to take place including soil, water, landfill, and home and industrial composting environments.

**Compostable** does have a time frame attached to it, though that time frame is defined by the composting facility and their specific operational requirements. Typically most composters would like materials they allow into their facilities to break down in less than 80 days.

**Claims of Compostability** should be qualified to the extent necessary to avoid consumer deception.
Biodegradable plastic as “a plastic in which all the organic carbon can be converted into biomass, water, carbon dioxide, and/or methane via the action of naturally occurring microorganisms such as bacteria and fungi, in timeframes consistent with the ambient conditions of the disposal method.” --- ASTM

ASTM D6400 - This specification covers plastics and products made from plastics that are designed to be composted in municipal and industrial aerobic composting facilities.

A set of three tests, including D5338, that must meet pass/fail criteria for the compostability of a plastic in an industrial composting facility. A product that passes this standard specification can claim to be compostable.

- Must physically disintegrate to the extent that it cannot be “readily distinguishable” from the finished compost product.
- Must actually biodegrade (be consumed by microorganisms) at a rate comparable to known compostable materials.
- Cannot have adverse impacts on the ability of the compost to support plant growth.

ASTM D5338
Standard for testing how products will biodegrade in a composting facility. This standard does not provide a pass/fail specification, but instead defines the test method to do so. For the equivalent pass/fail, see the D6400 standard specification.
Biodegradable Products Institute (BPI)

BPI is North America’s leading certifier of compostable products and packaging.

• Certification program by a third party process using independent labs and an accredited technical reviewer to determine whether materials and products meet the ASTM standards for compostability.

• Ensures that products and packaging displaying the BPI logo have been independently tested and verified according to scientifically based standards.
Replace Petroleum-based materials with Biobased materials.

Design for end of life disposition; consider product obsolescence.

Reduce landfill waste; alternative disposal options including composting and AD.

Regulations for climate change; solve rather than reduce.

Do more with less waste; consider externalities.

Whole Systems Thinking©
Thank you. For more information contact

Debra Darby
ddarby@darbymarketing.com
978-376-8879
Moderated Discussion

Moderator: Debra Darby, Program Co-Chair
Organix Solutions

Panelists:
• John Fischer, MassDEP
• James Gist, Brick Ends Farm
• Terri Goldberg, NEWMOA
• Lauren Palumbo, Lovin’ Spoonfuls