**Integration of Anaerobic Digestion into Organics Processing: Co-composting of Digestate**

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**Background**

City of Edmonton

- Capital of Alberta.
- Population: 880,000.
- GDP = $80,000 per year.
- Residential waste diversion goal of 90% by 2017.

**Current situation**

- Capacity issues.
- Wish to treat more biosolids.
- Growth to ICI sector.
- Installing AD capacity.

**Anaerobic digester**

40,000 t y⁻¹

SSO from ICI

OFMSW

Manure

Digestate

Biogas

**Final products**

**Inputs**

**Digestate Co-composting Hypothesis**

- Co-composting of digestate with fresh organics will reduce MRT of composting.
- Controlled variable:
  - Digestate portion ranged from 0 to 100%.

**Background**

Digestate Co-composting

- Why Co-compost?
  - Common MO in composting & AD processes.
  - Extracellular enzymes in digestate.
  - Nutrient addition, e.g. N, P, Mg, Fe.
  - Physical amendment: BD & MC.
- May result in:
  - Shorter lag phase.
  - Shorter retention times or more stable product.
  - Decrease in energy needs.
  - Lower costs??

**Key Objective for Today**

Highlight potential of digestate co-composting.
Digestate preparation
• 500 L HSAD pilot-scale facility.
• With the same feedstock materials used in the full scale:
  a. Pretreated OFMSW (-2’), 48%
  b. ICI SSO, 51%
  c. Horse manure, 1%
  d. Woodchips, as needed.

Composter feedstock
• 2 to 5” material in spring 2015.
• Mostly yard waste, grass, & thatch.

Material & Methods
Digestate Preparation

<table>
<thead>
<tr>
<th>Composter ID</th>
<th>Main feedstocks</th>
<th>Amendments</th>
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<tbody>
<tr>
<td>C1</td>
<td>0 (% of wet wt.)</td>
<td>100 (kg)</td>
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<tr>
<td>C2</td>
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<td>C3</td>
<td>20</td>
<td>80 (kg)</td>
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<tr>
<td>C4</td>
<td>30</td>
<td>70 (kg)</td>
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<tr>
<td>C5</td>
<td>40</td>
<td>60 (kg)</td>
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<tr>
<td>C6</td>
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<td>25 (kg)</td>
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<tr>
<td>C8</td>
<td>100</td>
<td>0 (kg)</td>
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</table>

1 Wet weight. 2 Woodchips.
Results

Stability - Specific Oxygen Uptake Rate

Time (days)

Stability end point

Results

RHG, OC Removal, & Stability

Digestate Co-composting

Summary & conclusion

Integration of composting and AD processes

Effects of co-composting of digestate (inoculation amount)

Digestate prepared in AD, mixed with fresh OFMSW, added to composters

Best performance with about 20-40% digestate (wet weight)

What is the practical significance of these findings . . . ?

Acknowledgments

Material & Methods

Experimental Setup
### Materials & Methods

#### Experimental Set-up

- **Dryer unit**
- **Cooler**
- **Flow meter**
- **Gas sensor**

### Materials & Methods (Analytical Method)

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<th>Analyses</th>
<th>Units</th>
<th>Standard Code</th>
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