

# Composting on Campus

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# Report



Overview of current composting practices on university campuses across Canada. Review of financial analyses, important considerations, and barriers to a composting program.

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## Introduction

Composting is the biological decomposition of organic material into a soil-like product or humus which is beneficial to soil and plants (BC Ministry of Agriculture and Food, 1996). Composting can divert a significant amount of waste from landfills. Furthermore, “GHG emissions from waste decomposition are greatly higher for landfills than for composting system” (Lou & Nair, 2009). Therefore a composting program decreases greenhouse gas emissions as well as reduces the amount of waste being sent to landfills. The 2008 TRU Waste Audit found that 33.9% of waste on campus was organic (Cleveland, 2008). This is similar to the results of other Canadian university waste audits, where the range of organic materials in the waste was approximately 20 – 29% (Gray, 2010).

Many university campuses across Canada have initiated composting programs. These range in scope from individual-initiated vermicomposting to large-scale industrial operations. A web search was conducted of most Canadian universities and selected post-secondary institutions, with the results summarized below. Most institutions did not have information specifically regarding composting practices on campus available online, therefore this list may not be comprehensive.

## Composting at Canadian Universities

### British Columbia

#### BCIT

- **Vermi-composting (worms)**
- Does not include meat, fish, bones, fats, oils, dairy
- Product used on campus flowerbeds

<http://www.bcit.ca/sustainability/operations/waste/burnabycomposting.shtml>

#### UBC Okanagan

- Two **'Earth Tubs'** - “a fully enclosed composting vessel featuring power mixing, compost aeration, and biofiltration of all process air”  
(<http://www.compostingtechnology.com/invesselsystems/earthtub/>)
- Earth Tub capacity is 4,000 lb
- Requires manual mixing (rotate cover) at least two times a week
- Worked with Aramark Food Services (each kitchen facility has 20-gallon bin)
- Product used in flower beds and gardens on campus

<http://web.ubc.ca/okanagan/sustainability/sustcamp/operations/waste.html>

<https://people.ok.ubc.ca/publicaffairs/update/2008-Fall/site/food-services.html>

## UBC Vancouver

- **In-vessel composter** (mechanized, fully-enclosed vessel)
- Capable of processing **5 tonnes of organic waste daily**
- Produces compost within **two weeks** (excluding compost maturation time)
- UBC Waste Management collects pre-consumer and post-consumer food scraps, and plant wastes
  - Cooked food waste, meat and bones, dairy products, grains, bread, pasta, paper towels, napkins, paper cups, plates, raw fruit, vegetables, coffee grounds, coffee filters, tea bags, egg shells, grass, leaves, plant clippings, hay, straw
- Collection sites in almost 70 locations all over campus (large green bins, small green bins, sorting stations)
- Product used on university landscapes

<http://www.recycle.ubc.ca/compostmain.htm>

## University of Northern British Columbia

- Joint program with PGPIRG (Prince George Public Interest Research Group) and REAPS (Recycling and Environmental Action Planning Society)
- Does not include meat, fish, dairy, oils
- Powered by volunteers and two staff members
- Compost site and organic demonstration garden behind UNBC residence halls

<http://pgpirg.unbc.ca/compost.htm>

## University of Victoria

- **Office Compost Program:** volunteer program for faculty, staff, students to participate
- University provides an Office Compost Kit (10L Compost Bin, biobags, info signs)
- Volunteers take the full bags to one of three centralized compost stations on campus
- Includes cooked food and meat and dairy

<http://web.uvic.ca/sustainability/OfficeCompostProgram.htm>

<http://web.uvic.ca/sustainability/WasteRecyclingComposting.htm>

## Saskatchewan

### University of Saskatchewan

- **Vermicomposting** projects around the campus
- Planning on a composting program

<http://facilities.usask.ca/sustainability/whatcampusisdoing/>

## Manitoba

### University of Winnipeg

- Initiated large-scale composting in Fall 2008
- Includes cafeteria cutlery, plates, coffee cups, etc.

<http://www.uwinnipeg.ca/index/uw-news-action/story.5/title.greening-uwinnipeg-with-campus-wide-composting>

## Ontario

### Queen's University

- **Multi-prong approach** to composting
  - Two dining halls- **industrial size composting units** (baked during 14 hour cycles), product used on campus
  - Other dining halls and retail food outlets- including meat and dairy
    - Organic bins that are picked up weekly and sent to a composting site
  - Leaf and yard waste- to the Kingston Area Recycling Centre composting
  - Residences- 11 **vermicomposting** units, looked after by floor residents with organic waste collected in yogurt pots
  - Tea Room- vermicomposting

<http://www.queensu.ca/sustainability/initiatives/practices/wastediversion/composting.html>

### University of Guelph

- Small-scale backyard program- residences and departmental areas
  - Self-managed indoor collection bucket and **backyard composter** (basic residential style)
  - Does not include meat and dairy
- Large-scale manure composting program

<http://www.pr.uoguelph.ca/sustain/composting/>

### University of Ottawa

- Small-scale **vermicomposting**
- **Electric composting machine** (same type as Concordia University)
- Includes all food scraps (meat, dairy, etc), biodegradable take-out containers, coffee grounds, tea bags

<http://www.sustainable.uottawa.ca/index.php?module=CMS&func=view&id=59>

<http://www.sustainable.uottawa.ca/index.php?module=CMS&func=view&id=70>

<http://www.sustainable.uottawa.ca/index.php?module=CMS&id=14&newlang=eng#compositing-pilot-project>

## University of Waterloo

- Many small initiatives to promote kitchen composting and vermicomposting

<http://www.soer.uwaterloo.ca/solidwaste.htm>

## York University

- Approximately 60 composters around campus
- No meat or dairy

<http://www.yorku.ca/csbo/groundsfleetwaste/recycling/program.html>

## Quebec

### Concordia University

- Two composting sites on both campuses (downtown and outside city centre)
- Downtown: vermicomposting beds
  - Product used by Geography department
  - Education and awareness- free composting workshops, Worm Swap program
- Loyola Campus
  - Started by a student initiative, and grew with multiple partners' support
  - Student volunteer engagement
  - Transition to full management by University Facilities
  - Product used for plants on campus, with future expansion output to go to the creation of green spaces within the university

<http://sustainable.concordia.ca/ourinitiatives/r4/compost/>

[http://www.compostec.ca/brome\\_EN.html](http://www.compostec.ca/brome_EN.html)

### McGill University

- Big Hanna T240 **in-vessel composter**
- Pre- and post-consumer organic waste from cafeterias, residences, and other buildings
- Future plan to acquire food waste macerators to break up organic waste and remove water before processing in composter, in order to increase capacity more than 2x
- Partnership with student group Gorilla Composting

<http://gorilla.mcgill.ca/compostingatmcgill.php>

<http://www.mcgill.ca/sustainability/initiatives/composting/>

<http://publications.mcgill.ca/reporter/2009/10/great-expectations-for-big-hanna/>

### Université de Sherbrooke

- Large-scale compost vessel
- Includes compostable tableware
- Product used on green spaces on campus and community garden

<http://www.usherbrooke.ca/medias/nouvelles/capsules-video/2010-04-19-les-chemins-du-compostage-a-ludes/>

## Summary

| Institution | Vermi-Comp. | Small-scale | Large-Scale |
|-------------|-------------|-------------|-------------|
| BCIT        | #           |             |             |
| UBC Okan.   |             |             | #           |
| UBC Van.    |             |             | #           |
| UNBC        |             |             | #           |
| Uvic        |             | #           |             |
| U. Sask.    | #           |             |             |
| U. Winnipeg |             |             | #           |
| Queen's     | #           | #           | #           |
| Guelph      |             | #           | #           |
| Ottawa      | #           |             | #           |
| Waterloo    | #           |             |             |
| York        |             | #           |             |
| Concordia   | #           |             | #           |
| McGill      |             |             | #           |
| Sherbrooke  |             |             | #           |

**Table 1.** Summary of composting programs at 15 Canadian post-secondary institutions.

## Financial Analysis

Below are a few examples of the financials of installing and operating a large-scale composting system.

|                                |                       |
|--------------------------------|-----------------------|
| Vessel                         | 323,000               |
| Infrastructure                 | 150,000               |
| Housing facility               | 194,000               |
| "Other"                        | 3,000                 |
| <b>Total capital costs</b>     | <b><u>670,000</u></b> |
| <b>Annual Operating</b>        |                       |
| <b>&amp; Maintenance Costs</b> | <b><u>132,610</u></b> |

**Table 2.** Summary of costs for the **small model WEMI composter** (0.9 tonnes daily) at U of T.

\*\*\*Labour costs are almost 65% of total annual expenses. (Rasanu, 2008).

|                                |                         |
|--------------------------------|-------------------------|
| Vessel                         | 765,000                 |
| Infrastructure                 | 152,000                 |
| Housing facility               | 196,000                 |
| "Other"                        | 3,000                   |
| <b>Total capital costs</b>     | <b><u>1,116,000</u></b> |
| <b>Annual Operating</b>        |                         |
| <b>&amp; Maintenance Costs</b> | <b><u>139,040</u></b>   |

**Table 3.** Summary of costs for the **UBC-V large model WEMI composter** (5 tonnes daily) at U of T.

\*\*\*Labour costs are almost 65% of total annual expenses. (Rasanu, 2008).

### UBC Vancouver

|   |                         |
|---|-------------------------|
| WEMI Vessel                             | 700,000                 |
| Civil Infrastructure                    | 180,000                 |
| Site Preparation and Utility Servicing  | 260,000                 |
| Project design, Management, and Permits | 130,000                 |
| Collection Carts                        | 30,000                  |
| <b>Total Capital Costs</b>              | <b><u>1,300,000</u></b> |
| <b>Annual Operating Costs</b>           | <b><u>180,000</u></b>   |

**Table 4.** Summary of costs from UBC Vancouver composting program (Batty & Bonfield, 2009).

### Concordia University: Loyola Campus

|                               |                      |
|-------------------------------|----------------------|
| Brome Vessel                  | 35,000               |
| Infrastructure Costs          | 35,000               |
| <b>Total Capital Costs</b>    | <b><u>70,000</u></b> |
| <b>Annual Operating Costs</b> | <b><u>15,000</u></b> |

**Table 5.** Summary of costs from Concordia Loyola campus composting program (Batty & Bonfield, 2009).

### Large-scale Composting Vessels

| Vessel            | Price (CAD\$) | Notes |
|-------------------|---------------|-------|
| 1 Earth Tub       | 10,037        | 1     |
| 2 Earth Tubs      | 18,589        | 1     |
| Small WEMI        | 323,000       | 2     |
| Large WEMI        | 765,000       | 2     |
| Brome 8100        | 34,375        | 3     |
| Big Hanna         | ?             | 4     |
| Norlen X-Act      | 194,100       | 5     |
| Flow-thru vermi 1 | 4,895         | 6     |
| Flow-thru vermi 2 | 19,000        | 6     |

**Table 6.** Price list of composting vessels.

#### Table 6 Notes

\*\*\*All prices do NOT include taxes, shipping, installation, infrastructure and housing facility.

1. Source: <http://www.compostingtechnology.com/invesselsystems/earthtub/pricing/>

USD Exchange Rate: 1.00625

Processing capacity: 20 – 75 kg/ day per Tub.

Eg. UBC Okanagan

Includes meats, cheese, and other fatty foods less than 10% of total waste input.

2. Source: Rasanu, 2008.

Processing capacity: Small 0.9 tonnes/ day, Large 5 tonnes/ day

Eg. UBC Vancouver

Includes pre- and post-consumer food scraps, meat, dairy, etc.

3. Source: McGill Gorilla Composting ecoAction Application Form  
Eg. Concordia University

4. Big Hanna Canadian distributor is Vortal Inc.  
Multiple models available.  
Eg. McGill University Big Hanna Model T240

5. Source: Spitzberg & Gell, 2005  
Processing capacity: 400 kg/ day; Size: 24 x 6 ft

6. Source: Spitzberg & Gell, 2005  
Processing capacity: 50 or 272 kg/ day

Other costs to consider (unique to each campus)

#### **Capital Costs**

- Vessel delivery
- Vessel installation
- Vessel infrastructure and housing facility
- Promotion and education campaigns
- Collection containers
- Staff training

#### **Operational Costs**

- Collection
- Transportation
- Processing bulking agents
- Energy and electricity
- Labour – maintenance and use of product compost
- Promotion and education campaigns

## **Considerations for Future Composting Programs**

- **Amount of organic waste** produced per year, and any projected future changes
  - What is the goal diversion rate (% of waste stream)?
- Compostable **materials** included – meat, dairy, paper towels?
- Type and brand of compost **vessel**
- **Minimization of contamination - education and awareness** campaigns
  - Eg. The biggest problem faced by the Concordia composting program is to get people to sort organic from inorganic waste (Batty & Bonfield, 2009).
- Constant **turnover of students**, therefore continuous education and awareness required
- **Capital and operating costs**
- Possibility of **funding** – available grants, partnerships, etc.
  - Government of Canada ecoACTION
  - TD Friends of the Environment Foundation grant
- **Training** staff, particularly at food service locations
- Manual **rotation** of the vessel (if necessary)
- Gathering and emptying the **collection containers**
- Use of the compost **product**

- Future inertia and **long-term plan** for the composting program
  - Who is responsible going forward?
  - Established and integrated policies and procedures
- **Rodents** – depends on vessel and closure
- **Smell** – depends on vessel and size of items in composter
- What are the next best **alternatives** to a large-scale composter?

## Conclusion

Many Canadian universities and post-secondary institutions are currently undertaking a variety of sustainability initiatives in order to “green the campuses.” By conducting a web search, it was found that fifteen Canadian post-secondary institutions currently have composting programs, ten of which include large-scale composting. Although composting has very positive environmental benefits including reducing landfill waste, reducing GHG emissions, and naturally fertilizing green spaces, there exist a variety of barriers to composting programs which emerge repeatedly in the literature (Batty & Bonfield, 2009; Gray-Donald, 2010, McEachren et al, 2004; Rasanu, 2008).

According to a study by Dahle & Neumayer, 2001, there exist four important barriers to campus greening at higher educational institutions: Financial, Awareness, Cultural, and Urban. This provides a framework in which to discuss the relevant barriers to initiating a composting program.

### 1. Financial.

A large-scale composting program is relatively costly, in both capital and ongoing operating costs. According to several financial feasibility studies at other universities, there will be a cost/net loss associated with a university composting program (Batty & Bonfield, 2009; McEachren et al, 2004; Rasanu, 2008). The cost savings from reduced landfill tipping fees, as well as less manure and fertilizer purchases, do not offset the operating costs.

### 2. Awareness.

A successful composting program requires an extensive degree of awareness and education by all the stakeholders (students, faculty, staff, and visitors) in order to encourage participation and minimize contamination. Contamination of the composting material with non-compostable waste is a major challenge to any composting program, especially in a large institution with a multitude of people (Batty & Bonfield, 2009). In addition, the nature of a university is a continuous turnover of students therefore it will require continuous education and awareness (McEachren et al, 2004). Awareness must include the *how* and *why* of a program in order to stimulate environmental awareness and participation (Dahle & Neumayer, 2001).

### 3. Cultural.

This is closely related to ‘Awareness’ and addresses the prevailing organizational culture of the university and the ‘campus culture’, as well as the cultural diversity of the university’s stakeholders. The predominant attitudes and actions towards the environment and sustainability on campus will affect the success of a composting program. This is linked to

student engagement and general levels of interest in and understanding of environmental issues, as well as to awareness and education campaigns. The other dimension of a potential cultural barrier is international diversity. TRU has students from more than 70 countries at the Kamloops campus (TRU, 2010). The breadth of cultural differences may create a larger diversity in perceptions of waste management and sustainability initiatives, which is another consideration for the education and awareness campaigns.

4. Urban.

An urban location and restricted space was found to be the least significant barrier (Dahle & Neumayer, 2001), nonetheless it remains an important factor for considerations such as location, transportation of pre- and post-compost products, use of compost product, potential smell, and potential rodents.

In conclusion, this report provides a brief summary of existing composting programs on Canadian campuses, as well as provides a generic analysis of undertaking a composting program at a university. It also addresses various issues and barriers to consider while going forward with further studies and project planning in this area. Lastly, it provides a collection of relevant resources.

## **Links**

Compost Council of Canada

[www.compost.org](http://www.compost.org)

The Greater Victoria Compost Education Centre

<http://www.compost.bc.ca/>

Wright Environmental Management Inc. (eg. UBC Vancouver)

[http://www.wrightenvironmental.com/index\\_nonflash.html](http://www.wrightenvironmental.com/index_nonflash.html)

Earth Tub – Green Mountain Technologies (eg. UBC Okanagan)

<http://www.compostingtechnology.com/inveselssystems/earthtub/>

Brome Composting Equipment (eg. Concordia)

<http://www.bromeequip.com/brome-composting-machine/>

Big Hanna Composter (eg. McGill)

<http://www.susteco.se/>

[http://gorilla.mcgill.ca/docs/Vertal\\_reference\\_03\\_all\\_39234.pdf](http://gorilla.mcgill.ca/docs/Vertal_reference_03_all_39234.pdf)

## References

- Batty, A. & Bonfield, B. (2009). Composting at SFU: Challenges and new beginnings. Retrieved from [http://www.sfu.ca/cscd/wp-content/uploads/2010/01/batty\\_bonfield-organicwastepaper.pdf](http://www.sfu.ca/cscd/wp-content/uploads/2010/01/batty_bonfield-organicwastepaper.pdf)
- BC Ministry of Agriculture and Food. (1996). *Composting Factsheet*. Retrieved from <http://www.agf.gov.bc.ca/resmgmt/publist/300Series/382500-2.pdf>
- Cleveland, M. (2008). Waste audit 2008 results. (Electronic document).
- Dahle, M. & Neumayer, E. (2001). Overcoming barriers to campus greening: A survey among higher educational institutions in London, UK. *International Journal of Sustainability in Higher Education: 2* (2), pp. 139 – 160.
- Gray, P. (2010). Comparison of Canadian university waste audits. (Informal, electronic document. Information retrieved from multiple online sources.)
- Gray-Donald, D. Personal communication. December 9, 2010.
- Kielback, D. (Loyola Compost Coordinator). Email correspondence. December 4, 2010.
- Lou, X.F. & Nair, J. (2009). The impact of landfilling and composting on greenhouse gas emissions – A review. *Bioresource Technology: 100*, pp. 3792 – 3798.
- McEachren, J. et al. (2004). The feasibility of a campus wide composting program at the University of Waterloo. Retrieved from <http://www.watgreen.uwaterloo.ca/projects/library/w04campuscomposting.pdf>
- Rasanu, S. (2008). On-site in-vessel composting at the University of Toronto's St. George campus: A financial analysis. Retrieved from <http://sustainability.utoronto.ca/Assets/Sustainability+Digital+Assets/Research+and+Publications/Student+Research/Waste/Work+Study+-+2008+-+On-Site+In-Vessel+Composting+at+the+University+of+Toronto+St.+George+Campus-+A+Financial+Analysis.pdf>
- Rogger, C. et al. (2011). Composting projects under the Clean Development Mechanism: Sustainable contribution to mitigate climate change. *Waste Management: 31*, pp. 138 – 146.
- Spitzberg, D. & Gell, K. (2005). Organic waste recycling at McGill University. *Gorilla Composting*. Retrieved from <http://gorilla.mcgill.ca/docs/october3.pdf>
- Sullivan, D. (2010). College students initiate food waste diversion. *BioCycle: September 2010*, pp. 65 – 67.
- Thompson Rivers University. *Information for International Students*. Retrieved from <http://www.truworld.ca/internationalstudents.html>  
Accessed December 10, 2010.