



C4 Cross Campus Capstone Classroom

We support the Sustainable Development Goals



Digestion in York's Living Lab

TABLE OF CONTENTS

1 About

2 Project Goals

3 Compost

4 Three-tier Composting Initiative

5 Scaling Up

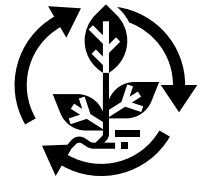
6 Future Growth

7 Resources

8 References



ABOUT



As part of York University's cross-campus capstone classroom (C4) and in the spirit of exploring a closed-loop system on York's Keele campus we have chosen to revitalize the three-tier composting system in the Maloca Community Garden. The intention of this project is to divert organic waste produced by selected vendors at York University that would otherwise go to the landfill and turn it into useful compost that can be used on campus.

This project is in collaboration with Associate Professor John Simoulidis, Department of Social Science. This initiative is intended as a pilot project with the eventual goal of implementing a large scale, fully developed composting program on York's Keele campus.

This project will contribute to several Sustainable Development Goals (SDGs 3, 4, 9, 11, 12, & 13) identified within York's University Academic Plan (2020-2025), helping York realize its Sustainability Mission.



PROJECT GOALS

Increase awareness and accountability around food waste and waste management at York



Create opportunities for experiential education as part of York's vision of the university campus as a Living Lab



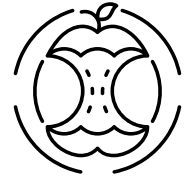
Build towards circularity and sustainability



Build a foundation for future students interested in composting and urban agriculture on campus



WHY COMPOST?



Our food system and consumption habits are major contributors to climate change, biodiversity loss, and pollution. Globally, roughly 30% of the food we produce is wasted - approximately 1.8 billion tonnes/year. On a more local level, in 2015, Ontarians generated about 3.7 million tonnes of food and organic waste. About 60% of this was sent to landfills. This is of great concern because when food and organic waste end up in landfills and break down in an oxygen-deprived environment, it produces harmful methane gasses. These potent gasses contribute 8-10% to greenhouse gasses globally. Further, the space required for agriculture and ever-expanding landfills puts additional strain on natural ecosystems.

In combination with reducing food waste along supply chains and in homes, an important way of mitigating the harmful effects of food waste is composting. Composting involves combining and managing organic waste materials so that they decompose. Microbes in the soil break down the waste and turn it into nutrient-rich material that can be used to help plants grow. Importantly, it is one critical step to responsibly diverting food and organic waste as well as an important component of a circular closed-loop system. According to the United Nations Environmental Program (UNEP), the practice of composting is one of the best options for managing organic waste while also reducing environmental impacts.

In 2015,
Ontarians
generated about
3.7 million
tonnes of food
& organic waste.

Microbes in the
soil break down
the waste and
turn it into
nutrient-rich
material.

BENEFITS OF COMPOSTING AT YORK

At York University, where food and organic waste are otherwise disposed of on a mass scale, there are many benefits associated with composting.

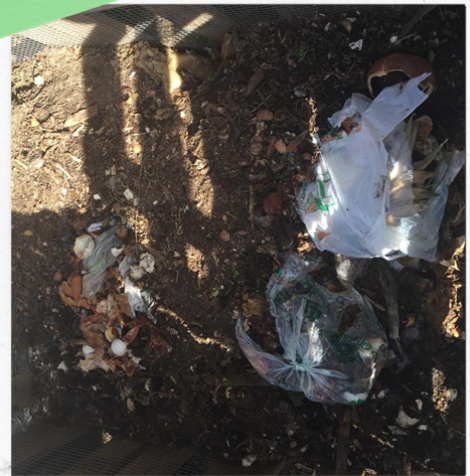
Implementing an on-site compost system can:

- Localizing composting will save money for the university
- Promoting a circular economy on campus
- Help divert food and organic waste produced by York University from landfills
- Contribute to a closed-loop system by producing a nutrient-dense product that can be returned to the soil, which can then be used to grow the food that we eat
- Provide exciting opportunities for students and faculty to build awareness around the need to address and reduce food waste and the need for more sustainable waste management approaches
- Reduce dependence on chemical fertilizers
- Help to improve soil fertility
- Improve water retention and nutrient delivery to plants
- Help reduce greenhouse gas emissions





The current three-tiered composting system in the Maloca community garden



The compost system has been in disuse for over two years



The contents of the current compost bins is highly contaminated and unsafe for use in food production

HOW OUR CLOSED LOOP SYSTEM WORKS

What

A three-tier composting system

Where

Maloca Community Garden

Why

We chose a three-tier or three-bin system as it works within the confines of our space in the Maloca garden. It is also a system that requires less expertise and specific care than other composting systems, such as vermicomposting. This makes the style of compost more accessible to students and researchers. It also makes the legacy of this project more manageable when it is eventually passed on to the next group of students.

Who

We have partnered with the woodshop in the Fine Arts Department and the Checkout Fresh Market grocer in York lanes to source our material.

How

- Food and organic waste are collected from grocery stores and restaurants on-campus
- Green and brown materials are weighed and transported to the Maloca Community Garden
- Material is incorporated into the compost bin
- Three-tier composting systems use equal parts brown material (High carbon) and green material (High nitrogen)
- Once the organic matter has been broken down by soil microbes it will be moved to the second bin where the material is left undisturbed to break down even further. At this stage, the compost will get warm. You may even notice steam rising from the pile.
- Finally, the unrecognizable soil-like compost is moved to the third bin. At this stage, the internal temperature of the compost pile will drop until you have high-quality compost.
- Mix the nutrient-rich compost into your garden to enrich the soil



The current composting system in the Maloca Community garden has historically struggled with contamination and mismanagement. Whether this is due to neglect or well-meaning error, as we move forward, we want the compost system to remain uncontaminated in order to maintain food grade status. As such, the new system will be locked and will only be accessible to a limited number of individuals. Restricting access to the composting system will allow us to ensure the right materials are going into the bins as well as track the waste diverted. The data collected can then be used to prove the effectiveness of our system.

Following a composting orientation offered in the spring, gardeners from the Maloca Community garden will have the chance to supplement the compost with organic waste from their own homes. This will take place once a week during a pre-determined drop-off time. During drop-off, a member of the team will be present to help receive, sort, and weigh compost being dropped off by the community.

We hope that many people can benefit from the compost produced through this initiative as well as from learning about how to create a quality compost. Opportunities to build awareness will ensure consistent compost quality and care.

COMPOST QUALITY TIP

Material is incorporated into the compost bin by:

- churning the existing compost
- layering brown and green material with brown material on top to cover the fresh waste
- water should be added as needed to maintain the moisture of the compost pile

PEST!



Wildlife is an inevitable part of composting and any urban agriculture activity. Several measures will be implemented to deter pests from making the compost system home. As well, a contingency plan has been created if a problem develops.

Deterrence

- When revamping the compost we will vigilantly check for holes or weak places in the infrastructure
- Any weak areas will be patched and reinforced, paying particular attention to the corners of the bins and joining points
- 16 Gauge 1/2" by 1/2" fencing will be used to line the bins
- The coffee ground will be regularly included as part of our greens input to deter rodents

In the event of pests (Knock on wood)

- Assess the cause by looking for the top 3 causes:
 1. Contamination; 2. Low moisture content (too dry creates ideal nesting conditions); 3. A hole
- If the cause can be identified - fix the problem
 1. Remove contaminants and add a thick covering of brown material
 2. Add water and churn the compost thoroughly. Moist conditions are ideal for speed of decomposition
 3. Patch the hole using fencing and zip ties or a staple gun

Treating the bin

After identifying and remediating the cause, additional deterrents need to be put into place. There are three treatments that have worked in our experience:

1. Chilli - the scent and spice of chilli is unattractive to rats and most other animals so sprinkle some on top of the pile and around the sides of the bin
2. Coffee - used coffee grounds give off a strong odour which is unattractive to mice and rats so next fill use as much coffee as possible
3. Peppermint or clove oil spray- 10-15 drops per 1 cup of water in a spray bottle, apply to the outside and inside of the compost bins

SCALING UP



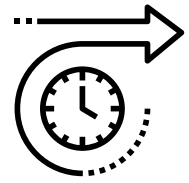
In response to the question, "how can we address important waste management needs and enrich the soil?" we chose to focus on a closed-loop composting system as it diverts waste, reduces greenhouse gas emissions, and creates productive output that can be fed back into urban agriculture initiatives. Yet, in order for on-campus composting to have a significant impact on waste diversion, it needs to be scalable.

After researching three-tier composting, single bin composting, vermicomposting, and row composting, we found that a three-tier system was most appropriate for our current scale and the amount of land that we have access to. Three-tier composting, however, can not address the large quantities of organic waste produced on York's campus as a whole, as the output is simply too great. A row composting system is most ideal for the scale of composting that York requires. Unfortunately, the space required to make windrows (long rows of compost) is too great for our project or to get approval from the University at this time. In spite of this, we do hope that in demonstrating the effectiveness of compost as a form of productive waste diversion that the University will move towards implementing a macro-scale closed-loop system of waste management wherein no external contractors will be required to manage green waste, currently managed by Aramark. The ultimate vision is to have all compost be processed on campus to divert waste from landfills and lessen costs for the University. As such, we would recommend that the viability of row composting be explored further in future research.

We also hope that this composting system pilot project can be used as a tool for experiential learning and hands-on activity. The integration of sustainable practices of waste diversion is both exciting and essential for the longevity of York and our beautiful green earth.



FUTURE GROWTH



2022

- Establish sustainable sources of green and brown inputs
- Produce productive compost that can be distributed to gardeners at the Maloca Community garden
- Generate data that can help support the longevity and expansion of the project
- Assist Dr John Simoulidis in producing a report about this composting initiative
- Integrate the Maloca gardeners into the program

Future Years

- Use the project as proof of concept to establish other composting systems across campus
- Increase diversion of food and organic waste on campus
- Create a permanent position for a composting coordinator who manages various composting sites, coordinates volunteers, and offers workshops and engagement for York students and staff
- Increase student and staff engagement



RESOURCES



Food Organizations

In the GTA:

Foodshare, <https://foodshare.net>

Greenest City, <https://greenestcity.ca>

Black Creek Community Farm, <https://www.blackcreekfarm.ca>

The Stop, <https://www.thestop.org>

Sundance Harvest, <https://www.sundanceharvestfarm.com>

Sustain Ontario, <https://sustainontario.com>

At York:

Regenesiis, <https://regenesiis.eco/en/home>

Office of Sustainability, <https://www.yorku.ca/sustainability/>

The Carbon Free Cooperative, <https://decarbonizeyorku.wixsite.com/carbon-free-co-op>

Indigenous Environmental Justice Project, <https://iejproject.info.yorku.ca>

York University Academic Plan (2020-2025), <https://www.yorku.ca/uap2020-25/>

<https://yfile.news.yorku.ca/2020/06/28/york-university-launches-new-academic-plan-for-2020-to-2025/>

RESOURCES



Inspiration

Ryerson University, Urban Farm, <https://www.ryerson.ca/university-business-services/urban-farm/>

UBC's SEED program, <https://sustain.ubc.ca/teaching-applied-learning/seeds-sustainability-program>

University of Toronto, Sky Garden, <https://civmin.utoronto.ca/home/about-us/about-civmin/skygarden/>

University of Guelph, Honey bee research committee, <https://hbrc.ca>

University of Guelph, Campus Composting Program, <https://sustainability.hospitality.uoguelph.ca/waste-reduction/campus-composting-program>

Royal Roads University, Healing City Soils, <https://compost.bc.ca/healing-city-soils/>

Compost Education Center, Neighbourhood Composting Program, <https://compost.bc.ca/programsresources/neighbourhood-composting-program/>

FURTHER READING AND WATCHING



Industrial Agriculture:

The Omnivore's Dilemma, Michael Pollan

Stuffed and Starved: Markets, Power and the Hidden Battle for the World's Food System, Raj Patel

Who Really Feeds the World? The Failure of Agribusiness and the Promise of Agroecology, Vandana Shiva

FOOD, Inc., Robert Kenner

The Biggest Little Farm, John and Molly Chester

Food Security:

Proof Household Food Insecurity in Canada (2017-2018), Executive Summary, <https://proof.utoronto.ca/wp-content/uploads/2020/03/Household-Food-Insecurity-in-Canada-2017-2018-Exec-Summary.pdf>

Fact Sheet - Race and Food Insecurity, https://foodshare.net/custom/uploads/2019/11/PROOF_factsheet_press_FINAL.6.pdf

Indigenous and Black Food Sovereignty:

Braiding Sweetgrass, Robin Wall Kimmerer

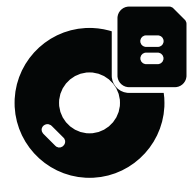
Angry Inuk, Alethea Arnaquq-Baril

Gather, Sanjay Rawal

Earth to Table, <https://earthtotables.org/about/>

White Earth Land Recovery Project, <https://www.welrp.org>

FURTHER READING AND WATCHING



Toronto Black Food Sovereignty Plan,

<https://www.toronto.ca/legdocs/mmis/2021/ec/bgrd/backgroundfile-170565.pdf>

Anti-Racism in Farmers Markets Toolkit, [Click here to access the toolkit](#)

Composting and Food Waste:

How Cutting Your Food Waste Can Help the Climate,

<https://www.bbc.com/future/article/20200224-how-cutting-your-food-waste-can-help-the-climate>

Reduced Food Waste, <https://www.drawdown.org/solutions/reduced-food-waste/technical-summary>

Ontario Food and Organic Waste Framework, <https://www.ontario.ca/page/food-and-organic-waste-framework>

REFERENCES

“...”



DeAngelis, Z. (2022, January 16). 15 scents that rats hate (and how to use them). Pest Pointers. Retrieved April 11, 2022, from <https://pestpointers.com/scents-that-rats-hate-and-how-to-use-them/>

Government of Ontario. (2021, July 29). Food and organic waste framework. ontario.ca. Retrieved April 11, 2022, from <https://www.ontario.ca/page/food-and-organic-waste-framework>

United Nations. (2021, July 27). How composting can reduce our impact on the planet. UNEP. Retrieved April 11, 2022, from <https://www.unep.org/news-and-stories/story/how-composting-can-reduce-our-impact-planet>

