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On Site Composting Toolkit

Your guide to implementing an organics waste management system.

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On Site Composting Toolkit

Introduction

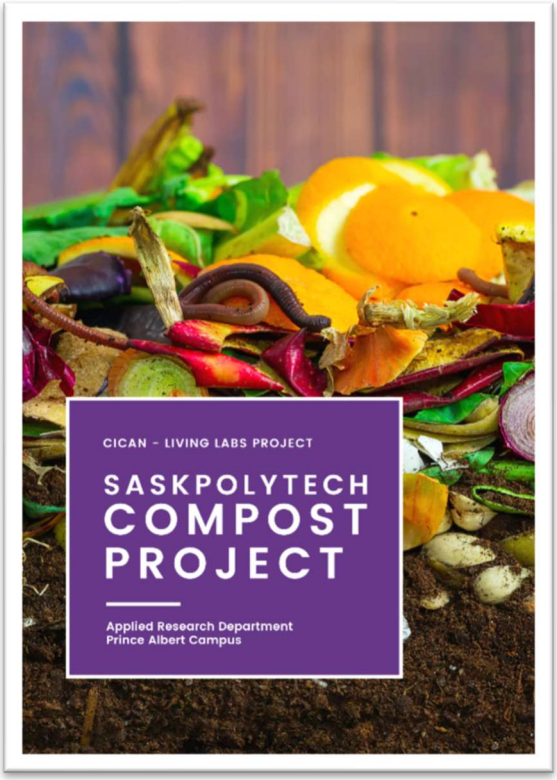
Welcome to the On-Site Composting Toolkit for Industrial Facilities and Institutions! In an era marked by increasing environmental consciousness and sustainability goals, the adoption of on-site composting stands as a transformative step toward reducing organic waste, increasing soil health, and fostering a greener future.

This toolkit has been crafted by the Applied Research Department through the Sustainability Led Integrated Center of Excellence at Saskatchewan Polytechnic Prince Albert, Saskatchewan and funded through the Colleges and Institutes of Canada (CICAN).

This toolkit was crafted utilizing the knowledge gained from:

1. 2023/24 Saskpolytech Prince Albert Campus On Site Composting Project
2. Consultations with Selkirk and Dawson College regarding their Food Waste Diversion projects that utilized a Food Cycler and Vermicomposting systems.
3. The knowledge of Keri Sapsford, owner of the Backyard and Compost Corner, who operates a windrow system to Compost for her clients in Prince Albert, and was brought on as a Composting expert to manage this project.

Through this toolkit we hope to promote the use of on-site composting at sites where composting services are not available. As Composting can reduce greenhouse gas emissions, divert waste from the landfill and utilize a beneficial nutrient resource that would otherwise go to waste it only makes sense to compost as much as possible. The benefits also expand to those who interact with your site as they become aware of nature-based solutions that will regenerate our land and economy.



How to use this toolkit

System Selection Guidance: Understand several composting systems available and identify the one that aligns with your specific requirements, space constraints, and waste characteristics. Explore the pros and cons of various systems, to make informed decisions.

Implementation Strategies: Once you've selected a composting system, receive guidance on system set up and operation. From setting up to monitoring key parameters, you'll learn how to establish an efficient composting infrastructure.

Best Practices for Success: Discover industry best practices to optimize your composting processes, troubleshoot common challenges, and ensure a high-quality compost output.

Reference: Check back once your program is implemented for general troubleshooting.

Compost Utilization: Maximize the benefits of your compost and reduce the risks. It's not just waste management, but resource utilization.

By embracing on-site composting, your industrial facility or institution has the power to create a positive impact on the community and beyond. Be empowered with the knowledge and tools needed to embark on a successful composting journey—one that not only manages waste responsibly but also cultivates a culture of sustainability within your organization

Why On-Site Composting?

Up till now industries and institutions may not have been aware of the options for dealing with organic waste or Composting on site, or how to implement these programs. Sites may be remote, municipal pick up programs may not exist, or do not service larger sites. With this Toolkit, industry and institutions can be armed with the knowledge about their options and how to set up a Composting system on their own site.

Some of the reasons for instituting an on-site composting program are listed below.

1. **The Environmental Imperative:**

Composting, as opposed to landfilling is a superior choice for the environment. Firstly, as it significantly reduces greenhouse gas emissions, contributing to your organizations carbon reduction goals. Secondly, it reduces the waste going to landfills, extending landfill lifespan and reducing demand on space. Most importantly, on-site composting transforms food scraps, which are a commonly wasted resource into a product that benefits the soil. Healthier soil grows healthier food, increases biodiversity, sequesters carbon and creates healthier ecosystems.

2. **Beyond Environmental Benefits:**

Composting serves as a catalyst for sustainable actions at both individual and institutional levels. Composting has been perceived as a task for experts, but this toolkit makes it accessible to everyone. This shift allows the recently converted practitioner and those around them to establish a profound connection with the food they consume, the waste they generate, and the potential growth they can nurture.

3. **Local Action, Direct Impact:**

One of the key benefits of on-site composting is has to do with its direct impact on local environment. Unlike pick-up programs that transport waste to distant composting sites, local composting eliminates the need for extensive transportation of both raw and finished materials, thus reducing associated costs and carbon footprints. The benefits of on-site composting extend beyond mere cost-efficiency – the finished compost can be directly utilized on-site or within the nearby community, enhancing soil health and contributing to the creation of sustainable landscapes directly within our home communities.

4. **Empowering Staff:**

On-site composting transforms waste management into an on-site participatory experience. This transformation empowers individuals, from kitchen staff to other personnel, to actively engage in waste separation at the source. Witnessing the entire composting process, from waste separation to the creation of nutrient-rich compost, instills a sense of responsibility and pride among staff members. This hands-on involvement becomes a gateway to a broader shift towards sustainability.

5. **Educational and Behavioral Impact:**

Through on-site composting, staff members not only gain practical skills applicable in their personal lives but also experience more environmental awareness. The educational aspect of a composting program helps individuals gain knowledge about waste management and composting. This helps them to make informed decisions about what they buy and what they throw out both on site and at home. A composting program prompts an individual to think about sustainability as something achievable instead of a far off unachievable concept.

6. Leadership

By embracing on-site composting, you can develop personal leadership skills while instilling an environmental ethic among co-workers and the surrounding community. Engaging in environmental stewardship through nature-based solutions aligns seamlessly with the sustainability goals your organization likely has. This not only enhances your capacity to attract talent and clients but also helps access funding. The decision to be a pioneer in this regard lies in your hands – a chance to lead or risk falling behind.

In essence, on-site composting is more than just waste management; it is a holistic solution that empowers individuals, reduces environmental impact, and creates a tangible link between waste generation and resource creation. By embracing on-site composting, organizations not only take control of their organic waste, reduce landfill dependence, and create a valuable resource in the form of nutrient-rich compost but also pave the way for a more sustainable future. The benefits extend from the workplace to the personal lives of staff members, creating a ripple effect that amplifies the positive impact on a larger scale. Establishing an on-site composting program is not merely an environmental initiative; it is an investment in a greener, more responsible, and sustainable future.

System Selection Guidance

Any Composting system you choose must meet your needs. First determine what these needs are in order to pick the best system that fits your space, time and budget.

Assessment of Needs

In order to determine the best system for On site Composting we need to assess your needs and your unique situation.

1. How much space do you have to dedicate to Composting?

   _____

2. Do you have space indoors or outdoors?

   _____

3. What kind of budget do you potentially have for Composting? Or another way of looking at this is " how much does your current garbage pick up cost and how much could be saved if you diverted approximately 40% of the waste.(and 100% of the smelly stuff)

   _____

4. What type of materials would you like to be Composting? i.e. Food Scraps, vegetable waste, meat waste, pre-consumer waste (from the kitchen) post consumer waste (from the waste collection bins)

   _____

5. How much material do you have to Compost? Is it a small coffee room, restaurant, Cafeteria, kitchen?

   _____

6. Do you have animal issues on site? I.e. animals getting into garbage containers?

   _____

7. Would you have a use for the end product?
   - Compost Sales
   - Landscape Use (Use around trees or lawn) (Give away to community members, or staff)
   - Vegetable Garden Use (Give away to community members or staff)

   _____

8. How much of a concern is the "ick" factor? Do you feel like staff might be squeamish about dealing with food scraps?

   _____

9. How much time do you have to dedicate to a Compost system

   _____

System Comparison Table	Vermicompost	In-Vessel barrel system	Backyard Compost pile	Windrow	Aerated Static Pile	Food Dehydrator
Space						
How much space do you have to dedicate to Composting?						
Under 1 m^2	x		x			
2m^2 - 10m^2	x	x	x			x
10m^2 - 100m^2	x	x	x	x	x	
100m^2 +	x	x		x	x	
Indoors or Outdoors						
Indoors	x	x				x
Outdoors		x	x	x	x	
Costs						
(Those with multiple costs are dependent on Volume)						
Under $100	x		x			
$101-$1000	x					
$1001 - $10,000	x	x				
$10,000 - $40,000		x		x[1]	x	x
$40,000 +		x		x[1]	x	x
Types of Feedstock						
Food Scraps (Just vegetable Matter)	x	x[2]	x	x	x	x
Food Scraps including Meats		x[2]		x	x	x
Cardboard	x	x[2]	x	x	x	
Sawdust	x	x[2]	x	x	x	
Wood chips		x[2]	x	x	x	
Fish Entrails		x[2]		x	x	x
Compostable Plastics		x[2]	x[3]	x[3]	x	x
Volume						
How much material do you have						
less than 1kg/day	x	x[2]	x			x
1 - 10kg/day	x	x[2]		x	x	x
10kg - 50kg/day	x	x[2]		x	x	x
More than 50kg/day	x	x[2]		x	x	x
Potential End product use						
Sales	x	x[5]		x[5]	x[5]	x
Landscape Use (Use around non edible trees or lawn)	x	x	x	x	x	x
Vegetable Garden Use	x	x[6]	x[6]	x[6]	x[6]	x

[1] Equipment needed to turn pile. If you already have a loader or skid steer the costs can be significantly less

[2] Depends on the In-Vessel system utilized

[3] Must be certified Home Compostable

[5] Must meet CFIA Requirements under the Fertilzer Act

[6] If using High Risk Feed stocks such as meat, diseased plant materials, or weeds ensure there is a heating phase to eliminate pathogens and weed seeds before using on vegetable gardens

Overview of Each Composting System

After assessing your needs, you may find that one or two systems will work for you. Further information below will provide more context and information to help aid in your decision.

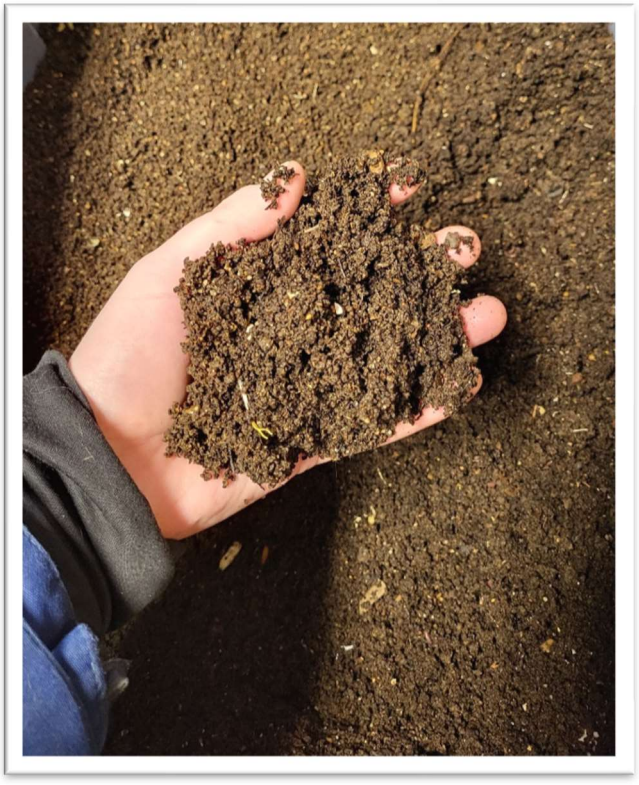
Vermicomposting

The process of turning organic waste into a soil amendment using red wiggler worms. The worms will eat rotting material and produce castings that are a highly sought after gardening amendment.

- Scale
  - Small scale – for smaller kitchens, one bin can be placed in a cupboard or closet. One standard 10 or 20 gallon Rubbermaid tub with an adequate number of worms can process up to 0.5kg of waste per day.
  - Larger Scale – for Commercial kitchens a number of bins or flow through systems can be set up to process large amounts of organic material. With enough worms, the system is only limited by the physical space that you have to place them in.
    - During our project Saskpolytech was able to process an average of 1kg of material a day in a heated shed approximately 48 sq ft with 9 bins. This feed rate increased over the project and with some time the worms could easily divert 100% of the waste from the kitchen.
    - The project can expand within this space as there is shelf space for up 30 rubbermaid bins. Worms reproduce rapidly, so the worm population and feed rate can increase with the same amount of space.
- Feed Stocks
  - Vegetable or plant matter - Vermicomposting systems are best when set up to process vegetable or plant matter only.
  - Meat, dairy, compostable plastics are not typically processed in a Vermicompost system due to the time (and sometimes smells) that can be produced when processing these items. However, when these items are pre-processed in a Bokashi composting system or the system is large enough they may be added to the Vermicomposting system.
- Location and Space
  - Indoors Only or summer operation only – The limiting factor here in Saskatchewan or Canada, is that the optimal temperature range is between 15 degrees Celsius to 30 degrees Celsius. Therefore, they need to be kept inside a climate-controlled building.

- Work involved
    - Vermicomposting requires regular maintenance or care. The Red wiggler worms can be treated as Livestock and routine checks, routine feedings in small and consistent amounts, monitoring and correcting for worm health are needed to keep the worms healthy and happily eating food scraps. Regular monitoring will also allow you to get ahead of problems before they arise, or before they become a larger problem.
- End Use
    - The Vermicast product can be utilized on houseplants, flower and vegetable gardens etc… Vermicomposting does not have a heating phase, so if the feed stock has any potential pathogens or weed seeds these will not be removed in the Composting process. With vegetable food scraps this is not typically a concern, however you will find a lot of volunteer squash, tomatoes, peppers and other seeds volunteering from the end product.
- Drawbacks
    - As die-off's can happen unexpectedly a back up systems should be in place to deal with food waste.
    - Staff involved will have to come in contact with a large amount of writhing wriggling worms. This can be an "ick" for some people.
    - As they require an indoor space in a Canadian Winter. Space available will be the limiting factor when determining volume.

A Vermicomposting system can process material quickly and provide a product that will be sought after by gardeners, houseplant enthusiasts and landscapers alike.



In-Vessel Barrel System

In-vessel composting generally describes a group of methods that confine the composting materials within a building, container, or vessel. An In-vessel barrel system is an enclosed system that mixes, and turns and may add water and/or heat to the material in order to control the Composting process. Please note that this observation is from our use of the BrewNature In Vessel Composting System. Other systems will vary in their scale, feed stocks, location, space and end use.

- Scale
  - Larger Scale – Due to factors such as cost and processing speed and the size required in order to create the heating phase these units are typically reserved for larger commercial operations that produce over 15kg per day of food waste. Most systems can be sized according to need.
- Feed Stocks
  - This will be dictated by the system utilized, however In Vessel Barrel systems do usually take all types of food scraps as they will have a thermophilic (heating) phase as part of the Composting process. Some In Vessel systems specialize in handling odorous or harder to Compost materials.
- Location and Space
  - Will vary depending on the unit purchased. But they can typically be utilized in both indoor and outdoor settings with some protection from weather in outdoor settings
  - Require outdoor space for the finished product to Cure for 30 days before it is ready for use and for storage until the product is utilized. This is piled outdoors, and the space will depend on the volume of finished product produced each month.
- Work Involved
  - Typically, the work involved with an In Vessel system is to load and unload the unit and monitor the process to ensure all processes are working correctly. Loading and unloading time will be dependent on volume and maintenance and monitoring will be dependent on the unit.
- End Use
  - As In vessel system typically ensure a thermophilic or heating phase they can meet requirements for pathogen and weed seed inactivation and therefore can most likely be utilized for most applications after the Compost has cured and is considered Mature and stable.
- Drawbacks
  - This will be dependent on the in-vessel system utilized. Do your own research from other users with similar feedstocks to get their feedback.

An In-vessel system is great for processing food scraps quickly and out of site and are less susceptible to outdoor conditions and attracting pests. They do typically require a larger financial investment which can be offset in a reduction of hauling costs. As they are a mechanical system they can breakdown and not only require composting maintenance but also maintenance of the specialized equipment itself.

Backyard Compost Pile

A Backyard Compost pile is a pile of organic material, that includes food scraps and leaves, straw or woody material. This can be processed in a manufactured or home-made Compost Bin to keep it neat. A backyard pile will need to be turned with a Compost spinner or Pitchfork occasionally.

- Scale
  - A Backyard pile is suitable for a typical family kitchen up to 4 to 5 kg/week.
- Feed Stocks
  - Vegetable and plant matter can be composted in a backyard pile. Meats, and dairy are discouraged as they can attract pests.
- Location and Space
  - A backyard pile typically needs at least 3 square meters of ground space outdoors. This will allow for a pile that scraps are added to, an active composting pile and a curing pile.
- Work involved
  - Turning the pile utilizing a pitchfork, shovel or compost turner, to incorporate air occasionally, adding to the pile, and distributing the finished compost is the physical labour involved in a Backyard pile.
- End Use
  - Backyard Compost is utilized within the landscaping or garden in the adjacent area. Backyard Compost piles are not typically suitable for saleable compost.
- Drawbacks
  - A backyard compost pile is a small system that can handle a small amount of kitchen waste, but it can be quite labour intensive as more volume is added.

A Backyard Compost pile can be an easy and efficient way to deal with a small amount of kitchen waste when access to outdoor space is available and someone is willing to maintain and monitor the Compost system.

Windrow

Windrow compost systems are a larger pile or row of organic material that includes the food scraps, leaves, or straw, or woody type materials that are turned with the use of a loader, skid steer, or Compost turner.

- Scale
  - A windrow compost system is infinitely scalable with space and equipment.
- Feed Stocks
  - Any organic material can be composted using a windrow system. Compostable Plastics, and papers can pose a concern if they are blown out of the pile as it is an outdoor and open system. This can create an unsightly mess of material blowing about the site.
- Location and Space
  - Windrow systems take up a lot of outdoor space as they require space for receiving materials, mixing, active composting, turning area, and maturing area. Considerations such as run off, drainage and proximity to other land uses is a consideration.
- Work involved
  - Windrows are maintained by monitoring temperature, and moisture levels daily and turning the piles to aerate and mix the material. As this method is typically used for large quantities of material there can be a lot of work involved.
  - Standard loaders and skid steers can be utilized to turn Compost piles or specialized Compost turners can be utilized to save on space and time.
- End Use
  - A properly managed windrow that has reached its appropriate thermophilic (heating phase) is appropriate for all end uses. This includes the sale of Compost when CFIA labelling requirements are met.
- Drawbacks
  - The space required to have a well functioning is windrow composting system is typically the limiting factor. Space for storage of feed stocks, storage of Finished and maturing piles and of course an active composting area.
  - The storage of raw feed stocks can also be an issue as raw feed stocks can be attractant to pests. If there is not enough material to create a windrow each day, the raw feedstocks will need to be stored for an amount of time until they can be incorporated into an actively composting windrow. Raw food scraps must be covered in order to prevent pests and wildlife from being attracted to the material.
  - As this is done in an outdoor environment wind can be a concern as it will blow lighter material around the space, which can look messy and is difficult to control.

Aerated Static Pile

Aerated static pile (ASP) composting refers to any of a number of systems used to biodegrade any organic material without physical manipulation during primary composting. The blended admixture is usually placed on perforated piping, providing air circulation for controlled aeration.

- Scale
  - Aerated static pile systems are typically utilized to handle large amounts of feed stocks.
- Feed Stocks
  - When mixed correctly aerated static pile can handle any type of organic material.
- Location and Space
  - Aerated static pile systems are take up a large footprint outside and require a specially built facility.
- Work involved
  - Aerated Static Piles do not need regular turning as the name implies. The work involved is mixing, loading the bays monitoring for temperature and moisture daily and then harvesting and moving to curing piles once the process has completed.
- End Use
  - A properly managed aerated static pile that has reached it's appropriate thermophillic (heating phase) is appropriate for all end uses. This includes the sale of Compost when CFIA labelling requirements are met.
- Drawbacks
  - Air blowers can get clogged on an aerated static pile system which reduces it's efficiency and use.
  - These systems can be expensive to set up and maintain.

Dehydrators

Food Pulverisers and Dehydrators pulverize and dehydrate food scraps into a shelf stable, inert product that can be further Composted, or added to land as a soil amendment. We reached out to Selkirk College in British Columbia to get information on their experience with the FoodCycler brand of Food Scrap Dehydrator and pulverizer.

- Scale
  - Food Scrap Dehydrators can come in many different scales. There are companies that make both home scale and commercial kitchen scale equipment.
- Feed Stocks
  - Any organic material including compostable plastics, meat, dairy.
- Location and Space
  - These are typically installed indoors and can be a small enough for a typical household kitchen, or large enough to handle large commercial kitchens. The size will vary depending on manufacturer and volume requirements.
- Work involved
  - The work involved with a dehydration unit are to load and unload the unit, cleaning collection bins, and distributing the end product. The unit will dehydrate and pulverize the food scraps so that they can be easier to transport.

- End Use
  - Dehydrated and pulverized food scraps are not necessarily recommended for direct use in gardens or soils. The inert material will need to break down further in order to release nutrients into the soil. When this material breaks down in the soil it will utilize nitrogen available in the soil to complete this process, leaving less nitrogen available for plants. The dehydrated and pulverized material could be shipped to the closest composting facility for further processing before being added to the soil. However, dehydrating the material will reduce the material weight significantly and will reduce hauling costs.
- Drawbacks
  - The end product requires further breakdown and this will either happen in a compost pile, or in the soil where it has the potential to steal nitrogen from the plants that you would like to grow.
  - These units can be very expensive.

Note: *For any Composting method chosen, it is recommended that you seek out someone with experience in the Composting Method of your choice to help you to set up your Composting Program. This Toolkit is meant to be a guide only and does not replace experience or knowledge.*

Composting Concepts

Compost ingredients - Browns, Greens, Water and Air

Browns, Greens, water and air describe the mixture that every Composting system needs in order to breakdown the organic material into finished Compost.

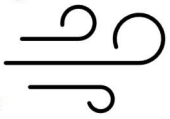
- **Browns**
  - Describe the Carbon Rich Materials – These are usually the material that are dry and dead, such as fallen leaves, wood chips or sawdust, paper or cardboard, straw etc…. Typically with Composting Food Scraps you will need two parts of "Browns" or Carbon rich materials to every one part of "Greens" or Nitrogen Rich Materials. This ratio can be adjusted with each compost "recipe" to create the best end product.

- **Greens**
  - Describe the Nitrogen Rich Materials – These are usually the materials that are wet and alive, such as food scraps, grass clippings, plant material harvested while it is still alive and manures etc….

The Ratio of Browns to Greens is referred to as the Carbon to Nitrogen Ratio. Typical compost systems require a ratio between 25:1 to 45:1. A link to a Carbon to Nitrogen Ratio Calculator can be found under the additional resources.

- **Water**
  - The Composting process is a biological process, and biology needs water to function. Good Moisture Content allows movement of the microorganisms required to breakdown the organic material. Too little water and the Composting process will be very slow or stop entirely. Too much water and the Composting process can become anaerobic (or without air) and slow down or produce offensive odors. The ideal moisture content is between 40 % to 50%, this can be gauged using the squeeze test. If water drips or pours out of the material when squeezed in your hand it is too wet, if the material does not hold a shape and breaks apart when squeezed it is too dry. If the material forms a ball and maximum 1 or 2 droplets of water seep from between your fingers it is at the optimal moisture content for a quick and efficient composting process.

- **Air**
  - The microorganisms that are required to break down the organic material and produce an end product that is beneficial to the soil are aerobic (with air) instead of anaerobic (without air). Healthy soil system are aerobic so compost should be too, to enjoy the microbial benefits. Air is incorporated in different ways in different systems. Some systems employ mechanical mixing of the material to incorporate air, some utilize a blower system in order to force air into the material, some utilize chunkier bulking materials such as wood chips to hold air space in the material.



When you are having problems with your Composting system it is a matter of adjusting one of these four areas. A list of Composting problems and their possible solutions can be found in the troubleshooting section of this toolkit.

What can you Compost

Any organic material can be composted. If it was alive once it can be composted.

1. Food Scraps (including meat and oils in some Composting systems)
2. Coffee Grounds
3. Cardboard (not glossy coated cardboard)
4. Craft paper
5. Used Paper Towels
6. Newspaper
7. Paper that is not glossy or shiny
8. Wooden cutlery
9. Straw
10. Grass
11. Leaves
12. Wood Chips, sawdust
13. Manures
14. Agricultural waste – silage, spoiled grain etc…

Sourcing Other Materials

- Food Scraps tend to be what people think of when thinking about Composting. But to make a good compost product "brown material" or carbon rich materials are also needed and can be sourced from internal and external sources. You may be surprised what kinds of "brown materials" are in your building already. Typically, you can find someone or some industry that has a waste product they are more than happy to get rid of.
    - Some things that you can utilize include:
        - Shredded Cardboard
            - Everything comes in a cardboard box, remove the plastic tape and shred the cardboard for an excellent brown material.

        - Shredded Paper
            - You likely have Shredded Paper in your building already, return it to the Compost system.
                - Note: this is not recommended for outdoor systems, as the shredded paper will blow in the wind
                - Check the source. Ensure that only paper is shredded. Envelopes with plastic windows, staples or other inorganic material will contaminate the Compost product.
        - Fall Leaves
            - If your landscaping or groundskeepers rake up fall leaves, keep a store of fallen leaves to add to the food scraps.
        - Wood Chips
            - Landscapers and Tree Trimmers will occasionally have wood chips that they cannot utilize. Reach out to your local tree trimmers and have them drop off a load at your site.
        - Sawdust
            - Whether you do woodworking on site or have someone in the office who has a woodworking hobby, collect the sawdust and wood chips for a brown material.
        - Paper towels from Bathroom Facilities
            - Paper towels can be an excellent carbon source for the Composting system. Care must be given to properly label waste receptacles to avoid contamination with regular plastic garbage.

Smells in Composting

While a properly running Composting system should not be any fouler smelling than a garbage can, there can be occasions when a composting system will smell. When something goes wrong in the Compost system, your nose knows. And nothing will stop an on-site composting system from continuing faster than if there are odor complaints.

As such, care should be taken to ensure that the composting system is well maintained and cared for. This includes:

- Regularly checking the system for smells and foul odors
- Having a plan in place to deal with any foul odors
    - Extra Carbon materials to soak up excess moisture
    - A way to aerate or stir the material so that it does not stay anaerobic
- Placing food scrap material into the system quickly and not storing it for long periods of time.

Care should also be taken in the placement of a Composting system. While Composting systems should be placed in an area that is convenient for use, thought should be given to neighboring sites, buildings, or rooms and whether there will be adverse effects if foul odors do arise. Composting systems should not be placed where an occasional foul odor will be a problem. (i.e. right beside a kitchen or eating area)

Compost Utilization

The system that you choose to use will determine what kind of end uses are recommended.

Compost use Considerations

While compost is a natural and beneficial soil amendment, it must be applied judiciously, as its improper use has the potential to cause damage and is not suitable for all environments. The following should be considered before utilizing the end Compost product.

1. Maturity
    a. Typically, if the Compost material looks and smells like a good forest soil it is mature.
    b. However, it is best if Compost is left to sit for at least 30 days before use as immature Compost can "burn" plants due to too much nitrogen.
    c. Maturity can be tested using a Solvita Test or Water cress test
2. Weed Seeds
    a. If material containing weeds or weed seeds is used in the Composting process there may be weeds seeds left in the finished Compost.
    b. Weed seeds are typically only a concern if the Compost is used on a home garden, manicured lawn or ecologically important areas. This may or may not be a concern for other uses.
    c. If the Composting process that is used has a heating phase and has reached temperatures above 130 degrees Fahrenheit for over 3 days the weed seeds will be inactivated.
3. Pathogens
    a. Occasionally food products are contaminated with pathogens such as E-coli, Salmonella etc…
    b. Pathogens are typically only a concern if the Compost will touch food that will be eaten. i.e. in a home garden. This is likely not a concern for use on lawns, trees or other uses.
    c. If the Composting process has a heating phase and has reached temperatures above 130 degrees Fahrenheit for over 3 days the pathogens will be destroyed.
4. Contaminants
    a. Plastic and other contaminants can make their way into Composting feed stocks and therefore the end product.
    b. Grass clippings or vegetable peelings that have been exposed to herbicides or pesticides are not typically a concern as a well managed composting system will break down these chemical residues.
5. Rules and Regulations
    a. The sale of Compost is regulated under the Canadian Food Inspection Agency (CFIA) under the Fertilizer act. If compost is to be sold it must meet regulations and labelling requirements listed under this act.
    b. The Sale of Vermicast (the compost product produced utilizing Vermicomposting) is not currently regulated.
    c. The use of dehydrated food scraps that are the product of food grinder/dehydrator units such as a Lomi or Food cycler are not currently regulated.

It is important to note that Composting is a natural process whereby organic matter on the ground is broken down and reincorporated back into the soil. (Think of the layer of soil in the forest that supports the plant life) Any use of Compost should consider this and ensure that the use of Compost is mimicking it's use in nature to improve the soil.

Mature Compost

Once your organic material has gone through the Composting Process and has sat for at least 30 days to mature and it smells and looks like soil it is ready for use. (If you are unfamiliar with the smell of soil, I invite you to go for walk in the forest and take a handful of soil and give it a good sniff, it is delightful).

Using your Compost

The main use of Compost is to improve the soil. Compost will help the soil retain moisture, improve soil fertility, and increase life in the soil for greater biodiversity and resilience.

These are a few ideas on how to use the Compost you make on site:

1. Distribute it to staff to use in gardens, lawns, orchards etc…
2. Top Dress the lawn on site for greener grass
3. Start a vegetable garden and use the Compost to help grow healthier soil and plants
4. Rehabilitate or reclaim degraded or disturbed land on site
5. If it meets CFIA (Canadian Food Inspection Agency) Fertilizer act regulations – bag and sell the Compost for additional revenue.

Note for Home Garden Use

If you are using the Compost to grow food, there are a few other things to consider. If there are potential pathogens, diseased plants or weed seeds in the original feedstock, you will want the Compost to reach over 130 degrees Fahrenheit for a period of at least 3 days before you can be confident that the finished Compost does not contain pathogens, or weed seeds that will disrupt your food growing plans. Utilize the Compost Method Comparison to determine which system will best meet your needs.

Best Practices

Collection of Food Scraps

Collection of food scraps

One of the most important factors in whether an On site Composting system will succeed or fail is the manner in which food scraps are collected. If there is any "ick factor" for those not directly involved with the Composting process there will be less and less support for the effort.

Any collection method should be:

- Easy
- Clean

Every collection method will be unique to your specific work site. The following tips will help to set up a collection system that is easy and clean.

- To keep things Easy - Set up collection containers next to where the food scraps are being made
    - Kitchens
        - Next to prep areas
        - Next to existing waste bins
        - Large enough to handle one meals worth of scraps, so it is convenient without the need to swap containers before meal prep is complete.
    - Coffee Rooms
        - Next to coffee machine
        - Next to existing waste bins
    - Easy to use and understand instructions on what can go in the collection container.
- To keep things Clean –
    - For both Kitchens and Coffee Rooms
        - Utilize container liners. These can be compostable liners that will be composted with the food scraps, or plastic liners that will need to be removed before Composting. (Note: there are Certified Plastic Compostable liners, look for a home compostable label or BPI Compostable Certification)
        - Or, Clean containers between collection
        - Use a container with a lid, so that it can covered when not being used
    - Collect regularly
        - Create a plan to empty collection containers in the kitchen or coffee room daily.
        - Utilize a larger collection container outside or away from eating areas to collect the food scraps if they need to be kept longer before they can be placed in the Composting System.
        - Set up your Composting system to process these scraps on a weekly to biweekly basis.
        - If fruit flies become an issue, increase collection frequency to avoid food waste sitting and allowing populations to flourish.

Any collection system will require people to utilize it. Ensure that training and signage is provided to staff on what they can place in the organics or food scraps collection bin.

Monitoring Key Parameters:

- Moisture Level
    - Check the moisture level of the Composting system using your hands.
    - Use the hand squeeze test to measure moisture.
    - Maintain good moisture level
        - If too dry - Add water, evenly water material with a spray bottle, or spray nozzle on hose.
        - If too wet - Add additional dry brown material to soak up moisture and provide air space for air to move through and dry the material. (Paper or cardboard, sawdust etc…)

- Temperature
    - Use a temperature probe to measure the temperature at the center of the Composting material. For systems that have a smaller volume a typical meat thermometer will suffice. However in a larger windrow system a specially made Compost temperature probe that is long enough to reach the center of a pile is required.
- Smell
    - Use your nose to assess whether there are any unpleasant odours.
- Worm health (In Vermicomposting systems)
    - In Vermicomposting systems, it is important to monitor worm health. This is covered under the Vermicomposting section of the System Set up Guidance.

Trouble Shooting

With monitoring and observation of the Composting system any problems should be caught quickly and can be fixed quite quickly. Remember the Composting basics of Browns, Greens, Water and Air and you should be able to fix any composting issue.

Common Composting Problems

1. **Smells sour or manure like** – this typically means that the Composting process has gone anaerobic. Observe your composting material to determine whether it is too wet, or whether it needs to be mixed to incorporate more air into the system.
2. **Not Composting quickly enough** – this is typically one of two things. Either the Browns to Greens (Carbon to Nitrogen) ratio is out of balance and needs to be adjusted, by adding more brown or green material whichever is lacking. (As a starting point in most systems you'll need twice the amount of brown material by volume then green material) Or it is too dry and the biological process has slowed down or come to a stop.
3. **Pests are attracted to feed stocks or Composting process –** determine what pests are attracted to and either remove them from the Composting process or ensure that they are covered throughout the Composting process and are not exposed where pests may find them.
4. **Excessive flies** – this is a sign that the Compost process has gone anaerobic as Flies are attracted to anaerobic decomposition. Mix or turn the Compost to incorporate more air so that flies are not as likely to be attracted to the compost.
5. **Fruit Flies –** If raw vegetable matter is exposed to air, it will attract fruit flies. Ensure that vegetable material is covered by "brown" materials so as not to be an attractant. For continuous feeding systems like some In-vessel systems, or Vermicomposting systems ensure that material added will be broken down within 3 to 5 days. Also, fruit flies do not hurt the Composting process and are only a nuisance to the humans dealing with the Composting system. If you don't mind a few fruit flies keep a fruit fly trap close to the Composting system or stick fly paper to the top of the worm bins in order to minimize their numbers.
6. **Too Wet** – If the material is too wet, (when squeezed, water pours out from between your fingers) it will quickly lead to anaerobic issues which can become a smelly problem, slow down the Composting process and even kill off beneficial organisms that aid in the Composting process. The material should be mixed with dry material or mixed regularly to dry out the material.
7. **Too Dry –** if the material is too dry it will not form a ball in your hand when squeezed and the composting process will slow down significantly. Water can be added when the material is too dry. Be careful to add water to all of the material, and not just in one spot. You don't want it too wet in one section and too dry in another. This can be done by spraying water over the material while mixing.

Getting it Right – The Debriefing Process

Setting up a Composting system is a process, and the procedures and how the system will work best for your organization will be unique to you. Composting has long been thought of as something smelly and yucky to be avoided. So it is important that problems are fixed quickly so you can continue to divert your organic waste and produce a beautiful product in the end. This is where the debriefing can help to quickly respond and change as necessary to quickly address issues before they become a problem.

The key to a great debriefing system is to define a Clear Objective, then measure the result, determine the reason for the result and decide on the appropriate response.

1. Clear Objective
    a. Result
    b. Reason
    c. Response

Example 1.

Objective: Divert 50% of food scraps from site using a Vermicompost system, while keeping worms healthy and productive.

Week 1 Result: 50% of food scraps from site were composted utilizing the Vermicomposting system, however there are some fruit flies in the bin

Reason: Fruit Flies have come in with the food scraps, and/or food scraps were left exposed and attracted fruit flies

Response: Ensure staff that is feeding the worms cover food scraps with bedding materials and install a fruit fly trap in worm area

Example 2.

Objective: Produce useable Compost and Divert 100% of food scraps from site using an In-Vessel Composting System, without disrupting neighboring facilities.

Result: Produced Compost product suitable for landscape use and diverted 100% of food scraps from landfill, however pervasive smells were present and we received complaints from kitchen and maintenance buildings in the area.

Response: Adjust moisture levels and add more carbon “browns” material to next batch to prevent anaerobic conditions.

While a formal Debriefing process is not required it can be helpful in keeping the project on track. A clear objective for the process is also necessary for ensuring your have met the goals and objectives of your organization in their diversion efforts.

Record Keeping

It is always a good idea to keep some sort of record for your On-Site Composting. If you are making the product to sell, record keep is required in the regulations. However, even if you are giving away the Compost, record keeping is essential to measure your impact and monitor the process.

Weight Diverted

- Measure Diversion Rates
  - Measure the impact of your waste diversion efforts for environmental reporting or for more accurate estimates for general waste hauling.
- Measure reductions in GHG Emissions
  - The weight of food scraps diverted from Landfill can also be converted to a reduction in GHG emissions if required for Environmental Reporting.

Compost Monitoring

- Temperature and Moisture Levels
  - For most composting systems, it is also important to keep track of temperature and moisture levels to ensure that Composting is happening properly.
  - When you continually monitor these, you are able to sense problems before they arise.
- Monitoring worm health in Vermicomposting Systems
  - Recording activity levels, redness, plumpness, and regular worm counts will allow you to monitor worm health and notice trends before they become problems.

System Setup Guidance

Now that you have decided on what type of Composting System will work best for your organization you can find more information about each systems set up so that you can start setting it up on your own.

As some systems require specialized equipment sold by different manufacturers we will refer to the manufacturers guidelines.

You will find information on setting up the following systems.

1. Vermicomposting system
2. In Vessel Composting System
3. Windrow Composting System
4. Aerated Static Pile System
5. Food Pulveriser and Dehydrator.

Vermicomposting System

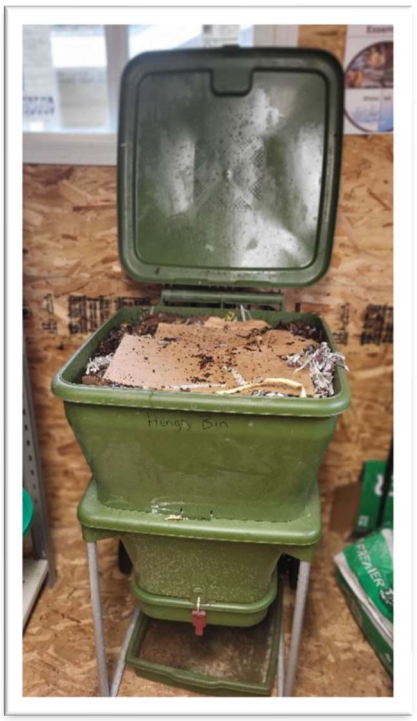
Equipment and Materials:

- Worm bins
    - Options include:
        - Rubbermaid Tubs with air holes drilled around the top inch. (Tubs must not be clear)
        - Premade flow through bins such as the Hungry Bin or Worm Tower or other flow through systems
- Red wiggler worms
    - Calculations regarding volume of waste to be processed and the amount of worm bins and worms needed will be provided in accompanying report.
- Thermometer for air temperature
- Meat Thermometer for bin temperature
- Protective gloves and aprons (as needed)
- Spray Bottle
- Cardboard and paper cut into strips (And a place to store it)
- Grit (Sand or Crushed Egg Shells)
- Optional - Weigh scale to collect total weight diverted

Did you Know

- Red Wiggler Worms need some grit (small hard pieces in their bellies) in order to process the material.

Rubbermaid Tubs set up as Worm Composters



The Hungry Bin Flow through Worm Composting system

Setting Up the Vermicomposting System:

1. Select an appropriate location for the vermicomposting system, considering temperature, ventilation, and accessibility.
    a. Choose a well ventilated, temperature-controlled area that is easy to access in order to process the material.
    b. Assess the amount of material that will need to be processed. (Red wiggler worms will eat half their weight in a day)
    c. Determine how many bins will be required to process this material. Keeping in mind that the same bin will only be fed every 3 -7 days.
2. Purchase appropriately sized bins or flow through system.
    1. We utilized Rubbermaid 10-gallon totes, 20 gallon totes also work well.
        1. Drill small holes (1/2 inch) around the top inch of the totes for aeration
        2. Line the bottom of the totes with 4 inches of moist bedding.

Bedding

- Stable Compost
- Coconut Coir
- Shredded Paper
- Shredded Corrugated Cardboard
- Shredded brown leaves

Vegetable Scraps Collection:

(Please refer to Collection Section of this toolkit for more information)

1. Set up
    a. Designate a food waste collection container in the kitchen.
    b. Educate kitchen staff about the importance of separating vegetable scraps and depositing them in the designated container.
2. Collection
    a. Kitchen to deposit vegetable scraps in designated container.
    b. Remove Vegetable scraps and move to worm composting area
    c. Optional - Record overall weight and weight fed to each bin

Feeding the worms:

- Pull back bedding material at the top and place vegetable scraps into worm bin. Ensure that:
  - Vegetable scraps are evenly distributed to the vermicomposting totes.
  - No more than 1 inch of material to each bin at a time.
  - Food is only added if most of the feed stock has been consumed.
- Add and mix in 2 parts "brown" material (such as shredded paper or shredded cardboard) for every part of food scraps.
  - (Shredded Cardboard is preferred as it soaks up moisture, plus it has a bit of structure in order to hold air space throughout the bin).
- Cover the food with bedding material.
- Add grit once a month to the worm bins (¼ cup/month)

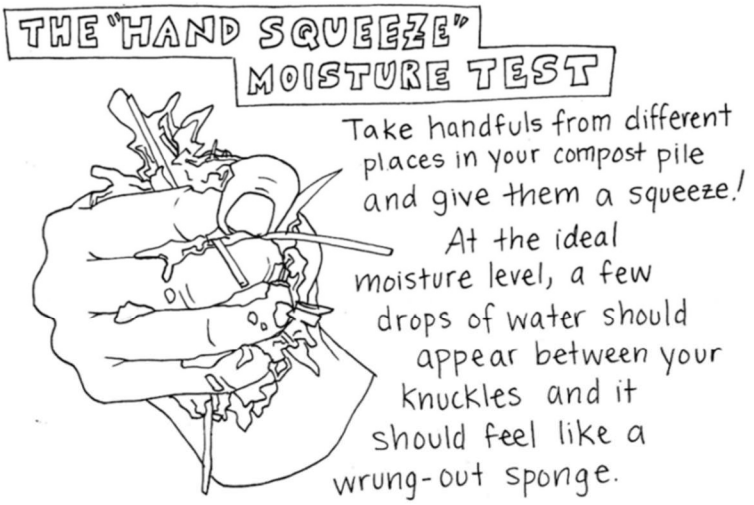
Avoid overfeeding the worms; ensure the amount of food provided is manageable for the worm population.

Monitoring Key Parameters:

Moisture Level

Check the moisture level of the vermicomposting system using your hands.

Use the hand squeeze test to measure moisture.



Measuring Moisture		Action to take
Dry	Material falls apart and does not form a ball when squeezed	Add moisture using spray bottle provided
Moist	Material forms a ball and moisture appears between fingers	Perfect! No action required.
Wet	Material forms a ball and moisture drips from between fingers	Add dry bedding to soak up some excess moisture

Maintain the moisture level at optimum levels. To do this you can:

- Utilize a spray bottle to spray water onto the bedding material if it's too dry
- Add additional dry bedding material if too wet. (Paper or cardboard)

Note – When using food scraps it will likely be quite wet. May require extra carbon/paper materials to "soak up" excess moisture. Monitor moisture closely to avoid anaerobic conditions.

Temperature:

Measure the temperature inside the totes

- Stick small meat thermometer into substrate and wait for measurement to even out
    - Maintain the temperature between 15-30°C (59-86°F), as this is the ideal range for red wiggler worms.
        - Too hot – add more carbon material to avoid conditions that create heat. (typically to low C:N Ratio or anaerobic conditions create heat)
        - Too Cold – is the temperature outside of the bin getting too cold.
        -
- Record bin temperature and air temperature in the log book

20°C is optimal, if it gets + or – 5°C you will want to start taking action to mitigate temperature difference.

Odor Monitoring

Periodically monitor the composting area for any unpleasant odors

When foul odors are present adjust the:

- moisture level,
- aeration,
- feed rate,
- adjust carbon-to-nitrogen ratio if necessary.

Foul odors are typically due to anaerobic conditions which usually means there is too much moisture, not enough aeration, or not enough carbon or air space. This can be caused by over feeding worms and feed rates may need to be backed off. To fix the problem, mix and aerate the material and add carbon rich “brown materials”.

Pest Control:

Regularly inspect the vermicomposting system for Pests.

- If mites or fruit flies are detected, take appropriate measures such as reducing moisture, adjusting bedding, or covering the food scraps with additional bedding. If fruit fly’s can’t get to the food scraps through a layer of bedding they will not multiply
- Fruit Fly traps can be a good addition to your worm composting area

Harvesting Vermicompost:

- Once your bin becomes too heavy or full the castings can be harvested.
    - Monitor the vermicompost's readiness by its appearance, texture, and the reduction in food waste volume. If it looks like dirt and smells like dirt, it's ready to go.
    - To separate some of the worms from the Vermicast you can encourage the worms to go to move from the area you would like to harvest to an area with fresh food.
        - This can be done by only feeding on one side of the bin,
            - or using a harvesting bin with holes in the bottom on top of a freshly fed bin. The worms will migrate to the new feed over a couple of days, leaving the fresh vermicast available for harvesting.
    - Note that Red Wiggler worms do not like to be exposed to light, this can be used to encourage worms to migrate to an area so that you can harvest more quickly.
- Once some of the worms have been encouraged to move to another section, castings can be placed onto a screen to separate worms from the castings.
    - Utilize a 1/4inch screen as an initial screening tool, then utilize a second 1/8inch screen for the final screening. This should adequately separate castings from the worms and cocoons.
- Weigh and record the weight of the harvested vermicompost.

In Vessel Composting System

There are many different types of In Vessel Composting Systems on the market. Typically, they require an indoor or covered space in a Canadian Climate in order to operate.

Placing materials into these units can either be set up as a flow through system or batch system and set up and harvesting will vary depending on the Unit Purchased.

Follow manufacturer guidelines to set up.

Windrow method

This is meant to be a very basic guide to provide an idea of what is involved with setting up a windrow type composting system. However, local guidelines will be different in every jurisdiction. If you decide to utilize this method, it is recommended that you contact the Canadian Composting Council to receive training and certification for operating a Composting Site.

In this method, the feedstocks are mixed and placed in a windrow that is turned based on temperature readings or need. To meet with CFIA regulations and inactivate weeds seeds and destroy pathogens, a windrow Composting system must reach a temperature of 131 degrees Fahrenheit for a period of 15 days with the pile being turned 5 times within those 15 days.

Equipment and Materials

- Equipment needed to turn Compost Windrow
    - Loaders, skid steers or specially made compost windrow turners are required to turn the Compost Windrow.
- Compost Temperature Guage
- Area for receiving food scrap materials,
- Area for storage of “browns”. Straw, Wood Chips, Leaves etc…
- Area for curing and finished Compost piles

Setting up and Operating a Windrow Composting system:

Step 1 – Preparing area and feed stocks

- Prepare area for receiving materials. Keep a separate area for food scraps and a separate area for your “brown” materials.
- Food scraps must either be incorporated into a compost pile, or covered with soil, brown material, or finished compost every day in order to prevent animal encounters.

Step 2 – Active Composting

- Mix your food scraps with brown materials.
    - The recipe will vary depending on your feed stocks.
    - Typically, the mix is 2x volume of brown materials to Volume of Food Scraps with an even mixture of bulkier wood chips and more easily digestible brown materials such as leaves or straw.
- Pile mixed materials into a windrow and cover any exposed food scrap material with finished compost, or soil to reduce pest attractants.
- Measure internal temperature of Compost pile with Compost Temperature probe and record every day
- Turn the pile and ensure that the outside of the pile has been moved to the inside of the pile.
    - Pile to be turned if internal temperatures have reached over 130^{o}F for 3 days
        - Pile may also need to be turned if it needs to be dried out, needs moisture added or if internal temperatures have reached over 170^{o}F
- Turn the pile each time the internal temperature reaches over 130^{o}F for 3 days.
- Once the pile stops heating and maintains a consistent temperature even after being turned it can move to the Curing pile.

Step 3 – Recovering Bulking agents (optional)

- If you are using Wood Chips in the mix and wish to reuse them in subsequent compost batches you can screen these out to utilize again.

Step 4 -Curing

- Place compost that is no longer heating in a pile no taller than 5 ft tall and let sit for at least 30 days while continuing to monitor for temperature and moisture.
- If Compost is to be sold or used in home gardens it is advisable to get the Compost tested for Maturity either by using a Solvita Test kit, or through a germination test.

Step 5 – Screening

- Depending on its end use the material may need to be screened to provide a consistent compost mixture that gardeners recognize as a soil amendment.
- However, if Compost is to be utilized as a mulch or under trees it is not necessary to screen the product.

Step 6 – Finished Compost

- Finished Compost will look and smell like soil and may be used in many ways to add to the soil.

Aerated Static Pile Method

An aerated static pile Composting method involves premixing of the Compost material and placing it in bays over top of perforated pipes typically with blowers attached that help to aerate the pile without physical manipulation. An Aerated Static Pile system is typically engineered and designed by an external contractor as the size of blowers and or bays is dependent on the types and volumes of raw material to be composted. This is meant as a guide only to describe some of the factors that should be considered.

Equipment and Materials

- Equipment needed mix and receive compost materials.
    - Loaders, skid steers etc…
- Air blowers and perforated pipes based on the design of your Aerated Static Pile Composting system.
- Compost Temperature Guage
- Area for receiving food scrap materials,
- Area for storage of "browns". Straw, Wood Chips, Leaves etc…
- Area for Curing and Finished Compost piles.

Setting up and Operating an Aerated Static Pile Composting System

Step 1 – Preparing area and feed stocks

- Prepare area for receiving materials. Keep a separate area for food scraps and a separate area for your "brown" materials.
- Food scraps must either be incorporated into a compost pile, or covered with soil, brown material, or finished compost every day in order to prevent animal encounters.

Step 2 – Mixing your Materials

- Mix your food scraps with brown materials.
    - The recipe will vary depending on your feed stocks.
    - Typically, the mix is 2x volume of brown materials to Volume of Food Scraps with an even mixture of bulkier wood chips and more easily digestible brown materials such as leaves or straw.
- Pile mixed materials into compost bay and cover any exposed food scrap material with finished compost, or soil or cover dependent on your system specifics.

Step 3 - Monitoring

- Measure internal temperature of Compost pile with Compost Temperature probe and record every day.
- Dependent on your system, you may measure oxygen levels, and moisture levels in the System.

Step 4 – Recovering Bulking agents (optional)

- If you are using Wood Chips in the mix and wish to reuse them in subsequent compost batches you can screen these out to utilize again.

Step 5 -Curing

- Place compost that is no longer heating in a pile no taller than 5 ft tall and let sit for at least 30 days while continuing to monitor for temperature and moisture.
- If Compost is to be sold or used in home gardens it is advisable to get the Compost tested for Maturity either by using a Solvita Test kit, or through a germination test.

Step 6 – Screening

- Depending on its end use the material may need to be screened to provide a consistent compost mixture that gardeners recognize as a soil amendment.
- However, if Compost is to be utilized as a mulch or under trees it is not necessary to screen the product.

Step 6 – Finished Compost

- Finished Compost will look and smell like soil and may be used in many ways to add to the soil.

Food Grinder and Dehydrator

A food pulveriser and Dehydrator system is used to reduce food waste volume by up to 90%, creating a disinfected, odorless and shelf stable product that can be taken to a composting facility to be fully Composted, or utilized as a soil amendment. Knowledge of Composting or composting basics is not required to operate these units.

Equipment and Materials

- Food Pulverizer and Dehydrator unit (LOMI or Food Cycler are popular brands)
- Collection Containers
- Cleaning supplies
- Larger units may require specialty electrical plug in's.

Setting up and Operating a Food Pulveriser and Dehydrator system

Each manufacturer will have a slightly different set up, so this is meant as a guide only, and manufacturers guidelines should be utilized.

Step 1 - Collection of Food Scraps

- Collection of food scraps will follow the same method as any other Composting system. Typically, all food scraps are acceptable in a Grinder/Dehydrator unit.

Step 2 – Loading the unit

- Unit is loaded daily with Food Scrap Material until an appropriate volume of material has accumulated.

Step 3 – Running the cycle

- The unit runs it cycle over a period of time. This can take between 8-24 hours to run a cycle.

Step 4 – Harvesting the material

- Material is harvested out of the unit.

Step 5 – Storage of material

- The material that is harvested is sterile and inert and therefore shelf stable and can be kept for a long period of time before use. Users of this system describe a slight earthy and/or coffee smell.

Note: A food Grinder and Dehydrator is not Composting, but it is reducing the weight and size and pest attractiveness of organic materials. This material can be applied directly onto land, however there are conflicting reports as to whether this is beneficial in the short term to soil and plants as the material will need to be further broken-down utilizing nutrients in the soil to complete this process. This material can also be transported to a composting facility at a lower cost (due to less water weight) to be fully composted and ready for application to Soil.

Bokashi Composting

System Set up

To set up a Bokashi Composting system three things are required. A container with an air tight seal Bokashi grains and food scraps. A 6 gallon bucket with a gamma seal lid and Bokashi from Lily Plain Gardens here in Prince Albert were utilized. The food scraps were obtained through the food scraps collected from the kitchen that were not utilized in the Vermicomposting system.

To set up Bokashi Composting food scraps are added along with Bokashi grains. For every one pound of food scraps added a handful of Bokashi grains is added. As the process is an anaerobic fermentation process the food scraps are pressed down so that there is no air space in the container. Once the container is full the lid is sealed, and it is left to ferment for 2 weeks.

Food Scraps are added to bucket and pressed down to avoid any air spaces.

Bokashi Grains are added to food scraps

Bokashi Grains and food scraps are added in layers until the bucket is full

Material is left to sit for 14 days to ferment

After the fermentation process is completed the fermented food scraps can be utilized in the any type of Composting system as a high nitrogen addition to the Compost. It is beneficial to the Vermicomposting system as it optimizes food for the worms by predigesting the material.

Conclusion

Our hope is that this toolkit has equipped you with the knowledge and resources necessary to implement effective composting systems in your unique setting. By embracing on-site composting, you're not only taking a proactive step towards reducing waste but also contributing to a more sustainable future for our planet.

As you embark on your composting journey, remember that every action you take, no matter how small, contributes to a larger movement towards environmental sustainability. By composting on-site, you're not only diverting organic waste from landfills but also creating valuable resources that enrich soil health and support plant growth.

In closing, we encourage you to continue exploring and expanding your composting practices, sharing your knowledge and experiences with others, and advocating for sustainable waste management solutions in your community. Together, we can make a difference and create a greener, more resilient world for generations to come.

Thank you for your dedication to on-site composting, and we wish you all the best in your composting endeavors! If you are looking for more information, please do not hesitate to contact our team so that we can clarify any questions you may have.

Authored by:

- Keri Sapsford - Research Technologist Saskpolytech Applied Research and Owner of the Backyard and Compost Corner Prince Albert.
    - keri@thebackyardpa.ca
    - (306)960-5225
    - www.thebackyardpa.ca

With assistance from Sustainability Led Integrated Centers of Excellence Prince Albert Campus Employees

- David Halstead – Research Chair
- Leila Benmerrouche – Senior Research Associate
- Volker Schmid – Research Associate
- Carley Makuch – Student researcher
- Xavier Iron-Still – Student researcher

Appendix

Definition of Terms

Here are the definitions arranged in alphabetical order:

Aerated static Pile Composting - Organic materials are mixed and placed in bays over perforated pipes typically attached to blowers to keep piles aerated without physical manipulation of the Compost Pile.

Aerobic - Refers to a biological process or organism that requires or occurs in the presence of oxygen.

Anaerobic - Refers to a biological process or organism that occurs or thrives in the absence of oxygen.

Biodegradable plastic - Plastics that can be decomposed by the action of living organisms. They are known to create small fragments called microplastics, which, when ingested by animals, can eventually make their way up the food chain. Biodegradable plastics cannot be added to any composting system.

Browns - Describe the Carbon Rich Materials. These are usually dry and dead materials such as fallen leaves, wood chips or sawdust, paper or cardboard, straw, etc. Typically with Composting Food Scraps, you will need two parts of “Browns” or Carbon-rich materials to every one part of “Greens” or Nitrogen Rich Materials. This ratio can be adjusted throughout the Composting process to create the best end product.

Carbon – The chemical element that is the fundamental building block of life. Carbon-rich material commonly referred to as “browns” includes items like straw, wood chips, sawdust, paper, fall leaves, etc. Carbon is balanced with Nitrogen in the Composting process to transform the raw organic material into the stable humus product recognized as Compost.

Carbon to Nitrogen Ratio - Refers to the relative proportions of carbon-rich materials to nitrogen-rich materials in a compost pile. For Composting, the ideal Carbon to Nitrogen ratio is around 25:1 to 40:1.

Compostable plastic - A type of material derived from renewable resources or biodegradable polymers that, under specific conditions, can break down into environmentally benign components through composting processes. Not all composting processes will break down compostable plastics.

Composting – A natural process that turns organic material into a nutrient-rich soil amendment. The process involves the decomposition of organic matter by microorganisms like bacteria, fungi, and other decomposers.

Flow through Worm Composting systems – Refers to Vermicomposting systems that employ a system allowing for feeding on the top and harvesting the finished vermicast product off the bottom of the system.

Food Scraps - The leftover or discarded portions of food that are not consumed or used.

Greens - Describe the Nitrogen Rich Materials. These are usually wet and alive materials such as food scraps, grass clippings, plant material harvested while still alive, and manures. Typically with Composting Food Scraps, you will need two parts of “Browns” or Carbon-rich materials to every one part of “Greens” or Nitrogen Rich Materials. This ratio can be adjusted throughout the Composting process to create the best end product.

In Vessel Composting - An advanced composting method that takes place within a closed container or vessel, providing a controlled and accelerated environment for the decomposition of organic materials. This approach is particularly suitable for large-scale composting operations.

Nitrogen - A chemical element crucial for living organisms and plays essential roles in various biological processes, including composting. Nitrogen-rich materials, often referred to as "greens," include items like kitchen scraps, fresh plant material, and manure. Nitrogen is balanced with Carbon in the Composting process to transform the raw organic material into the stable humus product recognized as Compost.

On Site Composting – The practice of composting organic materials directly at the location where the waste is generated. Instead of transporting organic waste to an off-site facility or landfill, on-site composting involves creating a composting system within the premises of a residence, business, farm, or institution.

Organic Material - Substances derived from living organisms or once-living matter. These materials originate from plants, animals, microorganisms, and other living organisms.

Organic Waste - Any biodegradable waste material that originates from living organisms or contains organic compounds. This category of waste includes materials that can decompose naturally through the action of microorganisms. Organic waste can be both plant-based and animal-based.

Solvita Test – A Compost Maturity Test that measures CO2 and NH3 respiration.

Vermicast - Nutrient-rich organic material produced through the process of vermicomposting, also known as worm castings or worm poop.

Vermicomposting – Composting with red wiggler worms in a controlled and enclosed environment to produce a nutrient-rich compost called Vermicast.

Water Cress Test- Compost Maturity test that utilizes watercress seeds to determine Compost maturity. Watercress is susceptible to compost immaturity and will not germinate or thrive in immature compost.

Windrow Composting - In the context of composting, a windrow refers to a long, narrow pile or row of composting materials strategically arranged to facilitate the decomposition process. Windrows are typically formed outdoors and are commonly used in large-scale composting operations.

Other Resources

- Composting Council of Canada
  - https://www.compost.org/
- Saskatchewan Waste Reduction Council
  - https://www.saskwastereduction.ca/recycle/resources/composting/large-scale-composting/
- Institute of Local Self Reliance
  - https://ilsr.org/composting/
- Compost sale regulation information
  - https://inspection.canada.ca/plant-health/fertilizers/trade-memoranda/t-4-120/eng/1307910204607/1307910352783
- Carbon to Nitrogen ratio compost Calculator
  - https://urbanwormcompany.com/composting-calculator-carbon-nitrogen-ratio/
- Community Scale Composting Systems – James McSweeny
- The Worm Farmers Handbook – Rhonda Sherman

Daily Data log

Date	Weight of food scraps to be processed	High Air Temperature (last 24 hrs)	Low Air Temperature (Last 24 hrs)	Notes

Bin #											
Date											
Weight of Food added											
Scoops of food											
Scoops of bedding											
Description of food added											
Moisture Content	Dry/Moist/Wet										
Water Pooling	Yes/No										
Bin Temp	Celcius										
Odour	Foul Odor										
	No foul odour										
Worm Health	Movement (Active, Sluggish)										
	Plumpness (Plump, skinny)										
	Color (Red, Pale)										
Pests											
Other notes											

Worm Count											
Date											
Sample Bin											
Sample taken from											
Bedding											
Active Feeding area											
Finished Feeding area											
Count											
Adult											
Young Adult											
Juvenile											
Hatchling											
Cocoon											
Notes											