Organic Waste Report

Climate Action Committee

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Why Compost?

- Divert useful material from the waste stream
  - Reduce your waste by approx 1/3
- Improve soil and vegetable yield ("Gardener's Gold")
  - Also reduces need to buy topsoil and fertilizer; saves money
- Reduce methane production from organics in landfill
  - Help reduce carbon footprint and climate impacts, as methane's warming potential is much greater than carbon dioxide
- Protect groundwater from contamination by leachate
- Learning to conserve and connect with nature, especially for children (can teach about life cycles and how decomposition works)

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The Composting Process

- Biological cycle of organic material

  Seed → seedling → mature plant → plant decays → bacteria turn plant material into nutrient-rich soil
- Driven by microbes, primarily bacteria and fungi
  - Different group of microbes depending on quality of process, either aerobic (needing oxygen) or anaerobic bacteria (do not need oxygen)
- Composting is best done with aerobic bacteria/microbes
  - Faster process, no methane produced
  - More aesthetically pleasing (appearance, smell, mess)
  - Need nitrogen (from organic material), water (add water if dry), and oxygen (turn over compost regularly)
  - Also need carbon from materials like leaves, newspaper

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How to Compost (Set-up)

- Need brown/green mixture, 1:1 ratio (or half and half)
  - Brown: leaves, straw, sawdust, newspaper, paper bags, dead plants
  - Green: grass clippings, kitchen scraps, finished compost
  - Shred material so that it will break down more quickly
- Location depends on unique situation, but sunny corner is best
- Roughen up/till the soil where you intend to compost, then put newspaper or small branches on top (will form base of pile and provide good drainage), followed by the material to compost
  - Steps vary slightly with other styles of composting
- Finished compost is a good starter for the next load of organics
  - No need for bioactivator or similar products
- Make sure to leave out meat products, grease, herbicide-treated lawn clippings, and pet waste

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Good Composting

- Compost pile needs to be sufficiently moist
  - Moisture level should resemble a wrung-out sponge
- Material needs turning over every week or two
  - Keeps it aerated, so it doesn't switch to anaerobic decomposition
  - Also helps it heat up, which will speed up the process
- Finished compost looks like crumbly dark soil, earthy aroma
- Troubleshooting:
  - Unpleasant odour: too much green material present; add more brown materials to restore balance (should be mild smell)
  - Slow progress: insufficient moisture or aeration; spray lightly with water or turn the pile (should only take a few weeks)

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How to Use Compost

- Apply to gardens during fall yard work
  - Makes space for winter additions of food scraps
  - Use as a soil amendment, in place of others like peat moss or topsoil
  - Good for potting, lawn top-dressing, or enriching garden beds
- Return material that is not completely broken down to compost pile/container; should be finished in spring
  - A screen can help sift this material out from the finished compost
- Leftover leaves: mulch/shred, then apply to gardens
  - will be nearly decomposed by spring

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Backyard Composting

Advantages

- Ease of use
- Use up leaf and yard waste (don't have to drop it off somewhere)
- Does not require municipal support
- Conservation of resources / recycling of useful materials
- Improved garden soil quality
  - Improved health of flowers/vegetables
- No materials actually required, though most people use a container
- Save money on fertilizer and soil ("Gardener's Gold")
- Less use of harsh chemicals
- Education for the next generation
- Connecting with the environment

Disadvantages

- Requires time and effort
- Container may be expensive or require know-how to make one
- Some materials are excluded (eg. Meat, dairy, napkins, etc.)
- Space required; problematic for small yards especially
- Have to carefully control conditions for optimal function
  - Material, moisture, oxygen conditions
  - Otherwise it may be slow or smell bad
- May attract pests (mice, raccoons)
- Pets may eat compost and become ill

Backyard Composter Designs

Main types of backyard composter designs:

- Open compost pile
- Plastic/Metal Compost Bin
- Box-style stationary composters
- Tumblers
- Vermicomposters
- Other specific variations

Minimum recommended size is $1m^3$ (1m x 1m x 1m)

- Smaller options do not produce enough heat to work optimally
- Much larger options lack oxygen and result in anaerobic activity

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Compost Pile

- Simply choose an area of 1-3m^3 in your yard to start
- Level off the bare ground where the pile will go, start with leaves/newspapers as base
- Add brown and green components, 1:1 ratio
- Mix the materials together, add a little water, and allow it to work
  - If correctly done, should reach 70-140°C in a week
- Turn the compost weekly for oxygen, ensures *aerobic* decomposition

Advantages
- Requires only a bare spot and a rake for turning over
- Ease of construction / use
- Inexpensive

Disadvantages
- exposed for pets and wildlife
- Looks messy / unkempt

Plastic or Metal Compost Bin

- Container has no bottom, place over earth then add materials to container
- Some variations include air holes for ventilation of materials inside
- Hatch at the bottom for removing finished compost
- Simply load the container, close the lid, and wait for the compost to be ready
- Requires some method to prevent being lost by the wind
- Difficult to turn over material, so may require emptying and refilling at the end of season
- Can be expensive to buy, unless subsidized

Advantages
- More attractive appearance
- Protected from wildlife

Disadvantages
- Harder to turn due to size and shape
- Cost to buy container (DIY less likely with these ones)

Stationary Box Composter

- Box is flexible in design
  - Can be all wood or partially wood, use screen or clear plastic to fill gaps
- Multiple compartments, usually two or three, allow for separate batches of compost to be in progress at once
- Material makeup is the same as the standard compost pile, just confined
- Variations include stacking towers (eg. EcoStack) and expandable bins (eg. GeoBin)

Advantages
- Can separate material at different stages
- Flexible design and cost as DIY project
- Material protected from wildlife

Disadvantages
- More work required at end of season
- Maintenance to protect wood
- More space required

Compost Tumblers

- Designed to make composting easier for people new to the process
- Basic design is a rotating drum attached to a sturdy stand that allows turning of the drum
- Loaded with the same mix of material as a standard compost pile
- Rotated approx once a week to turn over and aerate the material inside
- Done in batches: while one is cooking, other waste is stockpiled for next batch (this can be messy, as the material will start breaking down on its own)
- Some available with dual-batch capacity to speed up the rotating batches process

Advantages

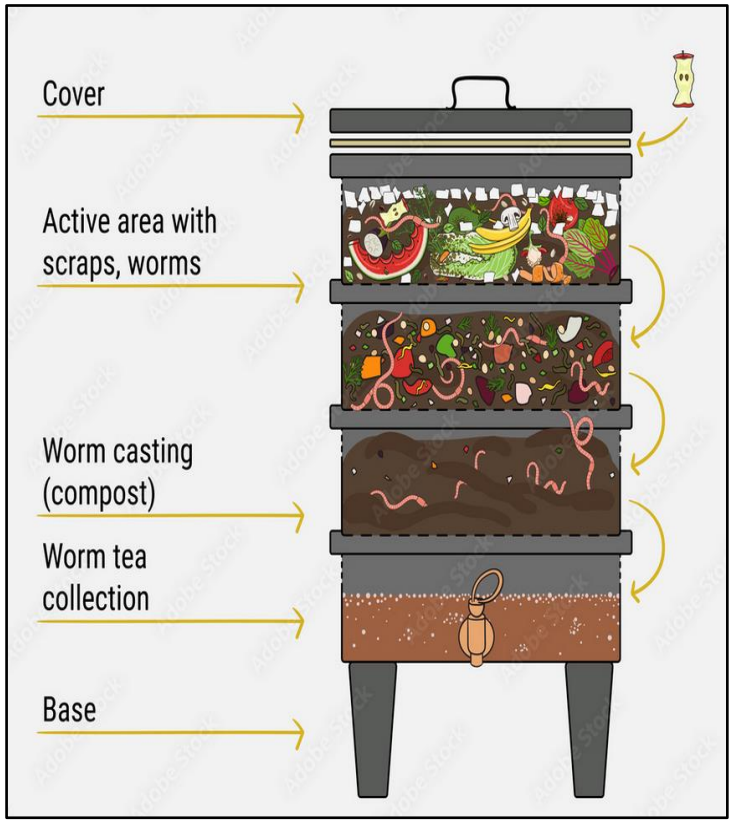
- Easy to use, especially for those new to composting
- Aeration is very easy; just rotate the tumbler

Disadvantages

- Limited space: Next batch will always have to wait, whether single or dual-batch capacity
- Expensive

Vermicomposting (Worms)

- This composting relies on worms (specifically red wrigglers) to break down food waste
- Looks like a bedside table with a number of drawers /compartments
- Each drawer is filled with dirt; food scraps get added, then switch drawers for new material
- Worms keep the compost material aerated as it breaks down
- One of the fastest compost systems due to limited capacity in each drawer



Advantages
- No turning required
- Worms speed up breakdown of material

Disadvantages
- Can be messy with all the soil involved
- Worms require warm location for winter (ie. Indoors)

Smart Pot Compost Sak

- This composter is a heavy-duty bag, made of polypropylene (same as some tarps)
  - Second bag that fits on top as a lid
  - Material is designed to be breathable (holes in the weave to allow airflow)
- Process functions the same as the other stationary composters, just with a different container
- Can empty in winter and store in minimal space
- Polypropylene can be damaged or torn in the long-term, which requires replacement

Advantages
- Most flexible container
- Large capacity
- Convenient storage when not in use

Disadvantages
- Bag eventually deteriorates and must be replaced
- Bag usually not made of sustainable material

Organic Food Waste Digesters

- Can compost all kinds of organic material
  - Includes meat, bones, even pet waste
- Requires no regular maintenance (turning over)
  - Simply fill the digester and forget it
- Relies on solar power to heat the double-walled exterior of the cone, provides this heat to power aerobic digestion inside
- Underground basket to protect against pests, allows material to combine with soil microbes and for worms to pass through and help digest the food scraps

Advantages

- Requires virtually no maintenance
- Allows for traditionally “non-compostable” materials

Disadvantages

- Limited space for composting
- No ability to see the contents to address any issues
- Can be expensive unless subsidized

Municipal Organic Waste Programs

Municipal organic waste programs may include a combination of organic waste strategies including:

- A curbside collection green bin program
  - Organic waste shipped to an external compost facility
  - Organic waste transported to a municipally owned compost facility
- Neighbourhood organics depot
- Backyard composting by providing composters or subsidizing
- Education and awareness on composting
- On-site food waste processing technology (eg. FoodCycler)

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Curbside Green Bin Collection

- Exists in most urban communities
- Green bins allow greater diversity than backyard composting: food scraps (plant-based AND meat/bones) and paper products (e.g. napkins, greasy pizza boxes/liners, etc.)
  - Some programs allow yard waste
- Ease of use for residents and waste collectors
- Easy to implement due to existing curbside trash/recycling collection in most communities
- Primary difficulty is cost for municipality, especially those with few residents (economy of scale)
  - Also difficulty with freezing temperatures (as material can get stuck inside green bin)
- Opportunity to reduce frequency of waste collection, producing cost savings for the municipality

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Neighbourhood Organics Depot

- This model has residents transport their green bins to a local depot, where the material is then composted *en masse*
  - Requires active participation of residents to collect their organics and bring them to the local depot
- Generates more commercially-viable compost due to greater level of oversight/guidance for residents
- Reduces problems related to large volume (e.g. restaurants) and potentially noxious waste, as large depots can create higher temperatures that kill all possible pathogens
  - Speeds up the process considerably beyond what is possible with backyard composting

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Backyard Composting

Municipalities can:

- Encourage backyard composting through education and outreach
- Increase accessibility for residents by providing composters at a giveaway event or subsidizing their cost
- This approach achieves the lowest diversion rate, due to problems:
  - Effort involved for residents
  - Limitation of compostable materials: no meat, oils, paper products
  - Large volume of waste in some cases (e.g. restaurants produce too much waste to backyard compost)

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On-Site Food Waste Processor

- Municipalities can subsidize the purchase of on-site food waste processors (FWPs) for residents
- Popular examples include FoodCycler and Lomi
- FWP can be loaded with vegetable matter, as well as eggshells and small bones (a little more than what can be put in a backyard composter)
- FWP works to shred and dehydrate material put inside, creates soil amendment (can then be worked into garden beds, soil amendment)
- Convenient for residents with no curbside pickup
- Where used with curbside system, greatly reduces size of organic material to be collected
- FWP units are expensive unless subsidized

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Types of Municipal Compost Systems

Windrow System

- Organic waste is arranged in long rows to mature
- Common size is 4’ high by 12’ wide
- Creates a large, hot pocket inside for material to break down
- Frequently turned to maintain air pockets inside and to redistribute hot/cold areas in the piles
  - Turning achieved using a machine with paddles that looks a bit like a windmill
- Process can take as little as a week

Gore System

- Compost is arranged in same way as windrows, but a special GORE cover is placed over top with the intent to improve the industrial composting process
- GORE cover ensures even heating of material in the pile
- Sensors attached just under the cover itself
- Also a channel to allow leachate from the composting material to pass through
- Processes as much as a couple tons every day

Perth Compost Facility

- Open-air windrow compost system
  - Simplest system
  - Organics collected are mixed with a carbon source (e.g. leaves and wood waste), placed in long windrows on a pad and turned over regularly to ensure aerobic composting
- Total annual operating cost is $157,260 or $44.93 per household
  - Collection for 3,500 households ($108,360/yr)
  - Grinding wood waste: $10,000/yr
  - Weekly adding wood waste: $7,800/yr
  - Weekly aeration of piles: $15,600/yr
  - Screening of finished compost: $12,500/yr
  - Testing of finished compost: $3,000/yr
- Capital costs include building the compost pad at the landfill site and large green bins (~$100/bin)
- Perth's operating certificate allows it to accept organic material from anywhere in Ontario
- Costs partially offset because Perth is able to collect the rest of household garbage every second week
- Millions of dollars saved in extending the life of the landfill

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Prince Edward County Organic Waste Program

- Prince Edward County has a curbside green bin collection program across rural and urban areas
  - Waste is collected and hauled from the County to the compost facility in Moose Creek
  - The green bin program cost approximately $319,000 in 2021, generating 780 tonnes of food waste
  - Green bins are purchased from the municipality by the residents
  - Estimated that only 60% of all households participate in the program and 80% of the users are urban
- Currently staff and Council are considering building a new municipal organics management facility
  - Open-air windrow compost system (similar to facilities in Perth and Gravenhurst) would cost approximately $1.5 million with operational costs between $80,000 to $100,000
  - Aerobic digesters or Gore systems that cover compost would cost approximately $5 million or more
  - A consultant is to prepare a detailed feasibility and cost analyses, expected costs between $50,000 and $100,000
- Also, completing a composter giveaway to reduce organics collection and disposal costs

Quinte Organic Waste Program

From a study that was conducted in 1992

- No curbside pickup, program focused on backyard composting
- Free composters were distributed to residents
  - Composters were offered door-to-door and in giveaway events at the waste depot
- 80% of residents either accepted a composter or said they were already using one
- After program ended, 64-81% of respondents were composting

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Options for Lanark County

- Waste in Lanark County is managed by local municipalities
- The only municipality with a green bin collection program for food waste is Perth
- Communities with a mix of urban and rural areas would benefit from a combination of curbside collection and backyard composting
  - Urban centers would be better suited for a curbside collection program due to higher population densities
  - Urban centers would also benefit from promoting backyard composting and/or on-site food waste processing technology
  - Rural areas would be better suited for backyard composting

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