

At Home with Composting

What is Composting?

Composting is a natural process through which organic material is converted into a soil-like product called compost or humus (pronounced "hue-mous"). The process works with the help of micro-organisms, such as bacteria and fungi, combined with air and moisture.

Composting is an important way to recycle and can be done at home. It is an easy way to reduce the amount of household garbage by about one-third. As well, it produces a valuable soil amendment for use in gardening and landscaping.

What's In the Mix?

Most household organic waste can be composted at home. For backyard or home composting to work best, it is important to use the following selected material.

From the Garden:

- Leaves (chopped - to speed their breakdown)
- Grass (not wet)
- Plants & Weeds (without ripe seeds)
- Old potting soil
- Soft plant stems

From the Kitchen:

- Fruit scraps (Preferably add only citrus fruit scraps in the spring, summer and fall. If non-citrus fruit scraps are added during these seasons, do so in moderation, and always cover with a layer of grass and/or leaves. In seasons when you have a lot of fruits, you can freeze some and add the material gradually.)
- Vegetable trimmings
- Egg shells (rinsed and crushed)
- Tea bags
- Coffee grounds with filters
- Shredded paper

Do NOT include:

- Meat, fish and bones
- Plastics
- Metals
- Fats and oils
- Dairy products
- Pet waste

How To Compost

Getting started

1. Choose your composter. Home composting can be done with the use of a "build your own" or with a commercial unit, often available through your municipality.
2. Select the location. The ideal spot is convenient and accessible in a sunny area with good drainage. If the unit is placed in the shade, the decomposition will be slower.
3. Turn the soil in the location of the composter.
4. After placing the composter, cover its floor with wire mesh, such as chicken wire, to permit aeration and drainage while keeping rodents from entering the bottom of the compost.
5. Alternate waste that is wet (e.g. kitchen scraps) and dry (e.g. yard material).
6. If available, add some "finished" compost, garden soil or a compost starter (available at most garden centres) to the pile. This helps to speed up the start of the composting process.

Clues for Effective Composting

- The composting process works best when the organic pieces are small. Weeds and trimmings should be shredded.
- Don't add thick layers of any one kind of waste. Grass should not be more than 6 cm deep and leaves (chopped or dried and crumbled) can be up to 15 cm deep. If you can, let grass dry first or mix with dry, coarse material, such as leaves, to prevent compacting.
- The composter contents should be moist like a wrung-out sponge. If the contents are too dry, it will take overly long to compost; and if too wet, the contents may begin to smell.
- Turn or mix the compost every couple of weeks or each time you add new material. This keeps the compost well aerated.
- Add a shovelful of earth that contains worms every five weeks to keep the compost odour-free and decomposing rapidly.
- You can add materials, including all fruit scraps, to your compost all winter long. The breakdown process slows down or stops when the pile is frozen, but it will start up again in the spring. Thorough turning in the spring will reactivate the pile. In cold environments, it is advisable to empty the composter in the fall to make plenty of room for winter composting.

Troubleshooting

Composting is not difficult, but sometimes the process requires a little extra attention. Here are some easy solutions to correct certain situations which might occur.

- If the pile does not decrease in size or generate heat, composting may need a boost. If the pile is dry, add water and mix thoroughly. If the pile is wet and muddy, spread it in the sun and add dry material. Remember to save "old" compost to mix with incoming material.

- If the centre of the pile is damp and warm, but the rest is cold, the pile may be too small. Try to keep your composter as full as possible. Mix new with old and dry with wet, and break up mats and clumps.
- If the pile is damp and sweet-smelling but not heating, it may need nitrogen. Add grass clippings, kitchen scraps or a sprinkling of organic fertilizer from the garden centre.
- If the compost pile develops a foul odour, it may not be getting enough air. Loosen up the pile, break up clumps, unblock vents and perhaps add some wood chips to help the pile "breathe." Mix in some lime to hasten decomposition and reduce odours. Stove and fireplace ash can also be added. Turning the pile always helps aeration.
- If animals are getting into the compost, be sure your compost container has a cover. Add wire on the floor of the compost and/or wire mesh around the base to help to prevent pests from digging under the pile. Attract animals less by digging in or covering food scraps with garden waste when they are added.

Is It Finished Yet?

The composting process can take from two months to two years, depending on the materials used and the effort involved. To accelerate the process, the pile must be a balance between wet and dry material, be turned frequently and contain kitchen and garden waste that is shredded or in small pieces. Compost is ready to be used when it is dark in colour, crumbly and has an "earthy" smell. You can sift the compost to eliminate material that has not yet finished composting. Return these bits back to the pile to complete its transformation into humus.

Put Compost to Good Use

Composting can benefit your soil and plants in many ways. It increases the soil's organic matter content and its moisture-holding capacity. Compost improves soil porosity and helps to control soil erosion. It also enhances plant and flower growth and helps plants develop a sound root structure. Use it on your lawn, in your garden, around trees or combine it with potting soil for your plants.

Compost and Bears

A compost pile can be odorous and attract bears, especially if it contains food products. By following the guidelines in this brochure, the attraction of bears can be minimized.

| There is currently no bear-proof composter. It is important to manage your compost by following the clues for effective composting by providing the best conditions possible for rapid decomposition and minimizing the odours so that you can compost successfully without attracting bears and other wildlife.

COMPOSTING

1. What is composting?

Composting is a natural biological process, carried out under controlled conditions, which converts organic material into a stable humus-like product called compost. During the composting process, various microorganisms, including bacteria and fungi, break down organic material into simpler substances. Composting is an aerobic process, meaning that the microorganisms require oxygen to do their work.

2. What can be Composted?

Composting has the potential to manage all of the organic material in the waste stream which cannot otherwise be recycled. Some examples of organic material that can be composted include food scraps, leaves and yard wastes, agricultural crop residues, paper products, sewage sludge and wood.

3. Can composting manage all our wastes?

Since approximately 50% of the waste stream is organic matter, composting can play an important role in the integrated waste management plans of any community. However, the remainder of the waste stream (such as items made of plastic, glass, metals, ceramics and rubber) cannot be composted.

4. Is composting compatible with other waste management systems?

Yes. Composting should be part of a comprehensive waste management system that emphasizes source reduction, reuse, composting and recycling, and proper disposal of any residual material.

Some materials (such as paper products) can be recycled or composted. While paper can be composted, clean paper is generally more valuable when recycled. Soiled paper or paper that cannot be recycled economically can be composted.

5. What are the benefits of a successful composting program?

In addition to diverting a large proportion of the waste stream away from disposal, an effective composting program can produce a high quality soil amendment with a variety of end uses. Diverting organic wastes from landfill sites helps to conserve landfill space and to reduce the production of leachate and methane gas (both of which add to the cost of operating a landfill).

6. Is composting new?

No. Agricultural wastes have been composted forever. Large scale composting of other organic wastes, including municipal sewage sludge, has been a component of some municipal waste management programs since the 1950s.

THE COMPOSTING PROCESS

7. What different types of composting systems have municipalities implemented?

Municipal composting programs can include a combination of backyard, on-site and centralized management approaches for all or a portion of a municipality's waste stream. The major differences between these approaches are described below.

- **Backyard Composting**

Many municipalities encourage "Home" or "Backyard" composting, where individual households compost at home.

- **On-Site Composting**

The industrial, commercial and institutional sectors can take advantage of larger scale on-site systems to manage their organic wastes and avoid disposal costs.

- **Centralized Composting**

Many organic waste generators will not be able to compost all of their wastes on site and therefore rely on programs to collect and compost their wastes at a centralized facility.

Many municipalities have implemented programs to collect and compost leaf and yard wastes in conjunction with home composting programs.

Combined programs for the collection of organics and recyclables, known as "wet/dry" programs have been tested in several municipalities in Canada and the US. Full-scale programs are being implemented in Canada.

8. How long does the composting process take?

A number of factors are important in controlling the composting process and the time that the process takes. These factors include temperature, moisture, oxygen, particle size, the carbon-to-nitrogen ratio of the waste and the degree of mixing or turning involved. In general, the more actively these factors are controlled, the faster the process.

The length of the process also depends on the degree of decomposition desired in the finished product. Typically, an immature compost can be produced in about a month, while a mature compost may be allowed to cure for six months to a year.

9. What is the best location for a backyard composter?

The composter should be placed in a well drained area and where it is convenient to use. It should be placed where it can get as much sun as possible as the microbiological activity will be high. If the unit is placed in the shade, the activity is reduced and the process takes longer.

10. Can I compost in the winter?

Yes, you can compost year-round. As the temperature falls, microbial activity decreases but it starts up again as soon as the weather warms up. To make room for your winter organics, empty the finished compost from your unit in the fall. You may also want to move the unit to a more accessible location for the winter. Also, organics can be collected in a covered container stored just outside the back door. In the spring, the collected organics can be added to your composter. Kitchen wastes are high in nitrogen so you need to add lots of leaves or something rich in carbon

to be sure that you have the right carbon-to-nitrogen ratio needed for the microorganisms to be most effective.

11. Are there many centralized composting facilities in Canada?

There are about 162 centralized composting facilities in operation or in plan across Canada. These facilities, which include a mix of publicly- and privately-owned and operated operations, processed almost 700,000 tonnes of organic waste in 1995, an increase of 154% versus 1993.

12. What are the different types of centralized composting processes?

There are three basic types of centralized composting processes or methods.

In the **In-Vessel Method**, the organic material is composted inside a drum, silo, agitated bed, covered or open channel, batch container or other structure. The process conditions are closely monitored and controlled and the material is aerated and mechanically turned or agitated.

The **Aerated Static Pile Method** involves forming compostable materials into large piles, which are aerated by drawing air through the pile or forcing air out through the pile. The pile is not turned.

In the **Windrow Method**, compostable material is formed into elongated piles, known as windrows, which are turned mechanically on a regular basis.

13. Are special additives required?

In some cases, such as in the composting of grass clippings, the raw material may be too dense to allow for the proper flow of air or may be too moist. A common solution to this problem is to add a bulking agent, such as wood chips, to provide structure to material and to allow for proper air flow. The amount of bulking agent required is usually determined based on experience. Some facilities add commercial fertilizers to their composting process, but this can usually be avoided by combining different waste streams together in a specific "recipe". Inoculating the material with microbes is not normally required, since most wastes naturally contain the microbes needed for successful composting to occur.

14. Does composting cause odours or attract rodents?

Any waste management facility, including a composting site, has the potential to generate offensive odours or to attract pests. However, experience at hundreds of composting facilities has shown that proper design and operational procedures can prevent or control these problems. Excessive or offensive odours are generally a sign that the composting process is not proceeding properly, usually because of inadequate aeration or excessive moisture. Close monitoring of these factors can usually help to minimize odours. Facilities can employ abatement systems, such as biofilters, to treat occasional odours. Preventing odours and ensuring that the site is kept clean will ensure that the site does not attract rodents or other pests.

15. Does composting pose a health risk to workers or to those located near a facility?

Some people have expressed a concern that certain microbes present at composting facilities and the compounds they produce, may become airborne and endanger the health of site workers and those located downwind of a composting facility. Studies of concentrations of fungal spores and other airborne materials at and near composting sites show that concentrations are higher around some composting operations, such as turning and screening, and the levels drop to background levels within a short distance.

While airborne concentrations of fungal spores and other microbes at composting sites are higher than background levels, studies of long time compost site workers show no negative health effects.

Wherever decaying organic matter is present, certain microbes occur naturally. Spores of the fungus *Aspergillus fumigatus* are commonly cited as a source of concern. *Aspergillus fumigatus* is one of the most widely distributed microorganisms on earth is known to exist in almost every interior and exterior environment. People are routinely exposed to low levels (and occasionally high levels) of *Aspergillus fumigatus* without consequence.

The conclusion reached by health and environmental agencies in the US and Europe is that normal, healthy individuals suffer no increased health risk by either working at, or living near, a compost facility. However, some individuals may be more sensitive to microbes at a composting facility (because of a reduced resistance resulting from drugs or disease). These individuals should not work at composting facilities.

ECONOMICS AND SITING A FACILITY

16. What is the cost of a composting facility? How does composting compare to other waste management activities?

Unfortunately, there is no simple answer to this question - in part, because of the wide variety of local circumstances that influence the cost of waste management. An accurate estimate of the cost of a composting facility requires detailed knowledge of project specific criteria such as location, site conditions, waste composition, facility size and level of technology. The cost of collecting and composting organic wastes should be evaluated as a component of an integrated system of waste management since increased diversion through composting will result in lower costs for collection and disposal of garbage.

17. How much space is required?

The amount of space required for a composting operation depends greatly on a number of factors including the quantity of waste to be handled, the composition of the waste, the system design and operating conditions, and the length of time that the material will be on-site. For example, an on-site, in-vessel composter in an institutional setting can take up a minimum of space, especially if the compost is moved elsewhere for curing. Conversely, windrow facilities can range in size from about 1 acre to more than 20 acres.

18. What approvals and siting issues can I expect to encounter when planning a centralized composting facility?

Most provincial governments regard composting sites to be waste management facilities which require formal approvals or licenses. Some provinces have exempted some types of composting (such as leaf and yard waste facilities) from the full approval process, but still require that they be properly sited and operated. Municipal governments should also be consulted about by-law and other siting requirements. Most jurisdictions are concerned about issues such as the distance to neighbours, local soil conditions and potential impacts on local water and groundwater. Proponents of composting facilities are strongly advised to consult the provincial environmental department early in the planning stages to discuss siting and other approval requirements.

19. What is the best way to collect organic wastes?

This question continues to generate considerable debate, despite growing experience with the collection of organic wastes. Determining the "best" method in any circumstance will require tradeoffs between the conflicting objectives of low cost collection and low cost processing. For example, the use of plastic bags may lower collection costs, but may increase the cost of processing to remove unwanted plastic. Conversely, the use of curbside collection containers makes processing easier, but requires more capital expenditure for collection equipment.

COMPOST QUALITY

20. What makes a good quality compost?

Exactly what makes a good quality compost is usually best determined by the requirements of the end user of the material. However, there are a number of important criteria which are normally used to judge compost quality. Among these are maturity, organic matter content, the presence of physical contaminants (such as glass, metal or plastic), pH, particle size, nutrient content, moisture content and trace element content.

21. Are there regulations or standards for compost quality?

Compost produced in Canada may be subject to regulation by the federal and the provincial governments. Several provinces have guidelines and standards which determine the suitability of the material for use on a regulated or unregulated basis. Agriculture and Agri-Food Canada regulates compost offered for sale in Canada through the federal Fertilizers Act. The Canadian Council of Ministers of the Environment (CCME) has worked to establish national guidelines for compost quality.

In addition, the Bureau de normalisation du Québec (BNQ), a member of the Standards Council of Canada, has developed voluntary industry standards for compost quality. Compost which meets this standard will be able to bear a BNQ label as an indication of its quality.

22. What steps can be taken to ensure that a facility produces high quality compost?

The most important step in producing a high quality compost is to control the quality of the material entering the process. This is most often achieved through source separation. Source-separated organics are those organic wastes which have been separated from potential contaminants prior to collection. Other contaminants can be removed through a pre-processing stage or by screening the final compost. Finally, the composting process itself can determine some characteristics of the final compost, such as maturity and particle size.

END USES FOR COMPOST

23. Are there markets and end uses for compost?

Compost can be used in many applications depending on the quality produced and the quality of the product. High quality compost is being used in agriculture, horticulture, landscaping and home gardening. Medium quality compost can be used in applications such as erosion control and roadside landscaping. Even low quality compost can be used as a landfill cover or in land reclamation projects.

24. Is compost a fertilizer?

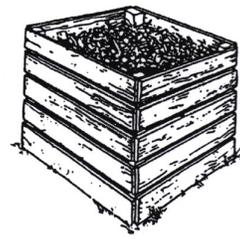
Compost can contain varying amounts of nutrients such as nitrogen, phosphorus and potassium. However, the concentrations of these nutrients in compost are usually lower than those found in common fertilizers.

Compost is more properly described as a soil amendment or soil conditioner which returns valuable organic material to the soil. In addition, compost does benefit the soil by improving soil structure, aeration and water retention.

25. How can I get more information about composting?

For additional information about composting, please write **The Composting Council of Canada** at **16 Northumberland Street, Toronto, Ontario M6H 1P7** or Email us at info@compost.org. Specific information about the composting initiatives in your community may be obtained by calling your local municipal recycling and composting.

Build Your Own Composter!



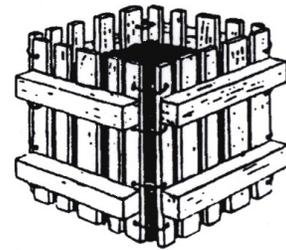
Single Wooden Unit

Choose a 3'X 3' square site for your compost bin. Use a sledgehammer to pound the four posts (2X4) into the ground three feet apart, at the corners of the square. Nail 1X6 wood to the posts, leaving two inches between boards.

One side can be left open to allow for any easy access if you wish. A second unit would allow the compost to mature in one box while you add materials to the first box.

Wooden Pallet Unit

One easy way to build a simple and effective compost bin is to use four wooden shipping pallets and tie them together. Many retail outlets will allow you to reclaim the discarded pallets for use at home. After placing the four pallets upright to form your square bin, tie the four corners with rope, wire or chain. You can sew a fifth as a floor inside your bin to increase airflow and stability.



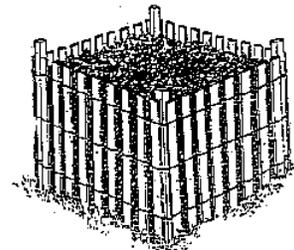
Compost Pile

No construction necessary. Find a sheltered spot in your backyard to begin your pile. That's it! Just keep in mind that items such as paper towels and napkins can blow around without a containment unit.



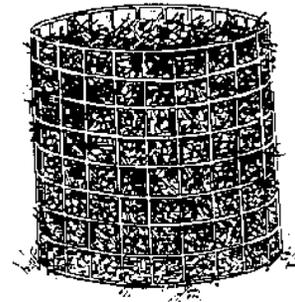
Snow Fence Bin

Wood or plastic snow fence (or chicken wire) can be used to make a composter that is cheap and very easy to set up. If you want to turn the pile, you can remove the fence, set it up beside the first pile, and turn the compost into the newly set up bin. Simply make a circle out of the fence and tie it with metal wire to a couple of posts.



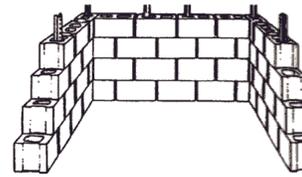
Wire-Mesh or Hardware Cloth Unit

Tie 3-4 ft of hardware cloth into a circle and attach the ends with wire ties using pliers. Space wood or metal posts around the inside, hold tight against the wire and pound them firmly into the ground to provide support.



Cement Block Bin

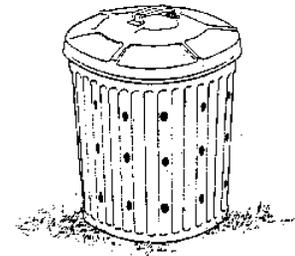
Cement blocks or bricks may be used to build a composter. It is easy to set up and can be constructed with two sections to facilitate the turning of the pile from one section to the next.



Drum/Can

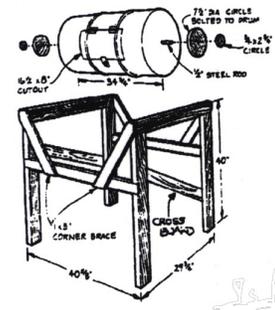
A plastic or metal drum may be used as a composter. It requires very little space in your backyard and is cheap and easy to set up.

Remove the bottom of the can and puncture holes throughout. You may want to raise the can off the ground for additional ventilation.



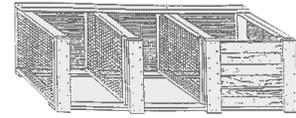
Rotating Barrel Composter

If your composting operation is small and you neither relish nor have the time for turning materials, then you'll find this composter suited to your needs. The barrel is rotated several times whenever new materials are added. It is constructed with a minimum of hand-powered tools and is not difficult or time-consuming to build. It will cost about \$60 to building providing you use a second-hand barrel.



Wood-and-Wire Three-Bin Turning Unit

A wood-and-wire three-bin turning unit can be used to compost large amounts of yard, garden and kitchen wastes in a short time. Although relatively expensive to build, it is sturdy, attractive and should last a long time. Construction requires basic carpentry skills and tools. With optional lids and bottom, this unit can be made rodent-resistant.



Mulching - a fancy word for “Being on top of the Soil”

Mulching is another form of composting. A layer of organic material is added on top of the soil. It mimics what happens on the forest floor where leaves and needles drop to the ground, break down over time and then are taken back up into the plants as food. It is a very slow but efficient way of composting.

Benefits of mulching include:

- **water/moisture conservation** - mulch acts as a sponge to hold water and nutrients close to the soil, blocking the drying effects of sun and wind to reduce evaporation by more than 70 percent. This encourages healthy plant growth, prevents drying of shallow roots and results in less watering. Mulches also attract earthworms that tunnel through the soil, providing aeration which allows for improved water absorption.
- **weed control** - thick layers can reduce germination and growth of weeds, eliminating the need for herbicides.
- **insulation** - stabilizes soil temperatures, keeping root zones cooler in summer and protects soil from heaving during winter temperature fluctuations (apply after ground has frozen). By covering bare soil, mulch prevents soil compaction and erosion caused by heavy rains and wind.
soil enrichment - replenishes and enriches the soil as it decomposes, reducing the need for compost, manure and fertilizers. Increased organic matter results in less digging, tilling and cultivation. It improves the soil's texture: making sandy soil more water retentive and clay soil more porous. It helps to create an ideal environment for earthworms and micro-organisms, essential to healthy soil.
- **adaptable** - may be selected either for its rapid decomposition, its longevity or a combination of both. Most natural or organic mulches gradually break down and decompose to add nutrients to the soil and improve texture and drainage. This is helpful in vegetable plots. In ornamental plantings of flowers, shrubs and trees, you may prefer a more decorative and long-lasting mulch.

Tips on Mulching

- Spread the organic material on top of the soil, around plants and on garden paths. Wood chips, leaves from deciduous trees and shrubs, lawn clippings and sawdust are suitable mulch materials around perennial plants. Around vegetable and annual flower gardens, it is best to use nitrogen-rich (“Greens”) materials like lawn clippings and other green garden trimmings.
- Leave grass clippings on the lawn after mowing to add nutrients and reduce water loss.
- Annuals, perennials and vegetable seedlings can benefit from a mulch which is moved aside at planting time and then pulled back around the plant as it grows.
- Don't mulch too closely around the trunks of trees (you'll smother the roots) or too closely at the base of heat-loving vegetables and flowers (mulches cool the soil). Mulch trees out to the drip line, which is the outer perimeter of the tree's branches.
- Mulches can be an ideal hiding place for insects such as slugs and snails. Remove or turn mulch under during the Spring to discourage egg-laying.
- Mulch should be no deeper than 5 to 7.5 centimetres (2 - 3 inches) to ensure circulation of air into the soil.
- Don't mulch with weeds containing seeds or persistent roots.

With special thanks to the **Greater Vancouver Regional District** (604-736-2250) and the **City of Toronto** (416-392-4689) for use of their informational materials to produce this factsheet.