

Over one-third of waste produced at home waste is organic. This includes yard and garden waste, lawn clippings, kitchen scraps, and agricultural materials.

One of the best ways to reduce the amount of organic waste you send to a landfill is to compost at home.

What is composting?

Composting is a managed process that speeds up the natural decomposition of organic material. By piling a variety of organic materials together, mixing and turning them to introduce oxygen, and adding moisture when necessary, you can create the right conditions for materials to decompose quickly. The end product of composting is a humus-like material called compost!

Why should I compost?

Compost, the end result of composting, makes an excellent soil conditioner for your garden, or a "top dressing" for your lawn. Compost improves your garden's productivity by breaking up heavy soils, increasing soil organic matter, adding a source of nutrient and helping the soil retain water. Compost can even provide some biological control of certain diseases and pests.

However, the environmental benefits of composting go far beyond your own garden. Composting can have a big impact on your family's waste output. More than one-half tonne of organic waste for a family of four each year in Alberta – waste that is traditionally sent to landfill – can be composted.

In addition to waste reduction, composting:

- Reduces the cost for waste collection and disposal.
- Protects air quality by minimizing pollutants emitted during waste collection and disposal (reduced vehicle trips equates to reduced vehicle tailpipe emissions).

Composting -
"A natural biological process, carried out under controlled conditions, which converts organic material into a stable humus-like product called compost." –
Composting Council of Canada

- Reduces the need for fertilizers and pesticides around your home.
- Keeps valuable nutrients necessary for plant growth from being lost to landfills.
- Protects water quality within your **watershed** (see Focus On Water Quality). Due to the water-holding capacity of compost, more water retained in your yard means less flowing directly into waterbodies. Runoff often carries sediments, nutrients and even contaminants that it picks up as it flows, or runs, off the land.

As well, composting is a great outdoor family activity and is a fun form of regular exercise.

How does composting work?

Composting works when optimal conditions necessary are present to speed up the natural decomposition of organic matter. Decomposition happens when decomposer organisms, including bacteria, fungi, and others feed on the carbon and nitrogen in the organic material and then produce a humus-like excrement. But the decomposer organisms don't do it all alone. Other organisms that help the decomposition process include protozoa, mites, beetles, earthworms and more. All of these organisms are found naturally in soil. Some prey on the microorganisms, while others decompose the food waste directly. In addition to needing sources of carbon and nitrogen, the organisms also require oxygen and water to live. When the decomposer organisms have optimal living conditions (correct food ratio, water, oxygen, and temperature) they are able to decompose the organic material more efficiently, speeding up the decomposition process. This may sound very complex, but Marjorie Lamb, in her book Two Minutes for a Greener Planet, sums up composting as:

"Mix organic materials in a pile with some dirt. Keep moist. Turn occasionally."

How do I Compost?

1. Feed your Bin: Mix Browns and Greens.

To compost effectively, a good mix of "browns" and "greens" is needed. Materials high in carbon are known as "browns" and those high in nitrogen are "greens." Both types of materials are needed to create an efficient compost process. As a general rule, you can add materials to the pile in a ratio of one part 'brown' material to one part 'green' material. Fresh grass clippings are an example of a green material with a high nitrogen content. Dead leaves, and even well-dried grass clippings, are a good example of a brown material with a high carbon content.

The concept of browns and greens is also useful in solving problems with a compost pile. See "Helpful Hints" on pg. 8.

Watershed - an area of land in which all water is drained - or shed - into a common point, such as a lake, stream or river. Many small watersheds form larger watershed regions.



Did you know?
Fresh grass clippings are high in nitrogen and will throw off the carbon: nitrogen ratio if used continually or if it is the only type of material in the pile. Grass clippings should 'dry' for a day or two before you add them to the compost. Clippings left on the lawn a few days before raking them up will be drier, while fresh clippings will add a lot of moisture to the pile. Better still, practice **grasscycling**. See Did You Know? on pg. 6.

What Should I Feed My Compost?

Greens (source of nitrogen)

Fruit and vegetable materials
Chopped vegetable stems
Houseplants
Coffee grounds and filters
Tea and tea bags
Grass clippings
Hair

Browns (source of carbon)

Chopped yard waste
Straw
Stale bread or cereal
Cardboard
Dried leaves
Sawdust (not pine or cedar)
Paper (black and white, shredded)

Other materials - Crushed eggshells (source of calcium)

- If starting out, add stale bread or cereal in small quantities until you have some experience monitoring your compost pile.
- Chopping material into smaller pieces creates more surface area and is recommended if you want to speed up the composting process. If you are not concerned about time, then chopping is not necessary.

What Should I NOT Feed My Compost?

Do not add materials that will take a long time to decompose, will attract pests or that may contaminate your finished compost.

Meat, bones, fish scraps – they can attract dogs, cats, rodents and insects, and decompose slowly.

Oily, fatty materials, cheese and dairy products – oils and grease take a long time to break down and their coating effect inhibits the breakdown of other materials. These products also attract insects.

Pet droppings – may contain disease organisms **pathogenic** to humans.

Diseased plants – the heat of the compost pile may not kill the disease organisms or the insects or eggs infecting the plant.

Weeds – the heat from the pile may not be high enough to deactivate seeds and shoots from weed plants.

Dishwater – like oils and grease, this will slow down the process.

Treated wood – wood might be treated with preservatives that contain antimicrobial properties, and can hinder the composting process.

Colored paper – may contain chemicals undesirable in household compost.

pathogenic –
capable of
causing disease;
producing or
originating
disease

2. Manage Your Environmental Factors

In addition to having a good balance of nitrogen (greens) and carbon (browns), there are four environmental factors to consider when composting.

Let your pile breathe

Composting is an **aerobic** process. To work properly, a compost pile needs oxygen. Without oxygen, the process will become **anaerobic** and will produce unwanted by-products such as methane gas. To ensure a pile has enough oxygen, it is necessary to physically turn the materials on a regular basis (once or twice every couple of weeks) or provide some form of static aeration (see Holding Bin: Static Pile Composting Method, pg. 5).

Manage your temperature

Heat is one of the by-products of composting. As the process moves along, the pile will heat due to the action of the decomposers (the microorganisms). Heat indicates that the microbes in the pile are working. If the pile is too small, the heat produced will be lost to the outside air and the process will take a long time to complete. As a general guideline, a pile should be a minimum of one cubic metre in size to sustain the process. If you want to monitor the temperature of your pile you can use a compost thermometer— a good working pile should be around 50°C at the most active phase of the compost process. If the pile gets too hot – above 60°C – the process will naturally slow down on its own. If you don't have a thermometer, you can feel the heat with your hand or, if that's too messy for you, stick in a metal rod. After ten minutes, pull out the rod and test if it feels warm.

In Alberta, winters are far too cold for small backyard composters to be active year-round. While there may be some activity in your compost, it will be minimal and won't produce the heat it will in summer. But keep adding material in winter and come spring, it will decompose more rapidly with a few turns of the pitchfork! Read more about winter composting on pg. 8.

Manage your moisture

Moisture is required to supply nutrients to the microorganisms in the process. At the right moisture content, the composting material should feel “as wet as a wrung-out sponge.” Too much moisture will cut off the supply of oxygen to the pile and cause the pile to go anaerobic. Too little moisture will cause the process to take a long time, or may even stop. Remember, the organisms living in the compost need to be “fed and watered!”

Manage your particle size

Particle size is related to the surface area of the materials in the pile. The greater the surface area of the particles available for bacteria to digest, the easier it is for them to break them down, and the faster the process will occur. Most particles should range from one to five cm. Branches and wood chips may be slightly larger, and can range from three to eight cm, but due to their composition, they will take longer to decompose. However, you can always practice “lazy composting”, and not chop up material before you add it to the pile. It will eventually decompose, it just may take longer!

Aerobic – A process that requires oxygen. The by-products of an aerobic process are CO₂, (carbon dioxide), H₂O (water) and heat.

Anaerobic – A process that occurs without oxygen. The by-products are CO₂ (carbon dioxide) and CH₄ (methane).

Place your composter carefully

The composter should be in a sunny or semi-sunny site. Sunlight will help add heat to the pile. The site should be level and well drained. Most importantly, the pile should be easily accessible. If it is not in a convenient spot, you won't use it.

3. What Type of Composter Should I Use?

There are many types of compost bins. It is important to consider your lawn and gardening needs and the amount of organic wastes you have to compost. Also, are you more comfortable with purchasing or building your compost bin?

In reality, composting will occur whether you place materials in a bin or in an open pile. In an urban setting, however, you are advised to use a bin to reduce chances of the compost being spread by pets, and also to contain any odors, should they arise. In a rural setting, wildlife may stop by, but it doesn't usually present the problem it could cause in a town or city (unless it's bears).

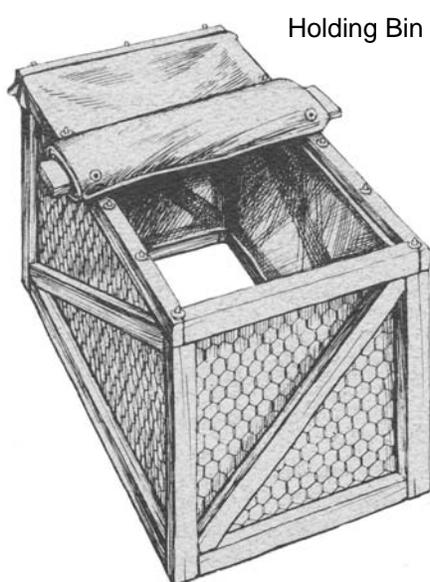
Buying a Composter

Commercially available composting units have the advantage of being durable and efficiently designed. Some commercial composters are made from recycled materials. Depending on your needs and budget, you can choose from a variety of designs. Remember that the compost should be turned on a regular basis, so it is helpful if you can reach into the bin with a pitchfork.

Building a Composter

If you wish to build your own composter, many simple designs are available. The reference books at the end of the article are a good source for information on different designs. Some points to consider:

- Consider using scrap materials to lower costs and conserve resources.
- Make the composter about one cubic metre in size. If you are making a multi-sectioned compost bin, each unit should be about one cubic metre in size.



Holding Bin

- Allow for drainage to prevent water from collecting at the bottom of the bin.
- Make the composter vermin-proof by lining the sides and bottom of the bin with 1.25 cm (½ inch) wire mesh.

Holding Bin: Static Pile Composting Method

The holding method is suitable for the gardener who is not in a hurry to get finished compost; this compost can take 6 months to 2 years to finish. This method requires less maintenance than the turning

method (described later), since the organics are simply layered and left to decompose. Place a layer of bulky yard waste, such as straw or twigs, on the bottom of the unit to provide aeration. Moisten the material if it is dry. This layer sets the stage for composting.

Add any of the organic materials described earlier. Layering materials of different densities will increase air circulation. As you add the material, occasionally sprinkle a shovelful of soil on the layers. The microorganisms in the soil help to activate the compost process.

Check the compost for moisture and add water as necessary. It should be as moist as a damp sponge.

Materials

The holding unit can be built as a four-sided, rectangular box that is open at the top and bottom.

Build the frame of this unit with 2 x 4s to provide strength. Lightweight strips of wood, such as discarded snow fencing, may be used for the cross braces.

Use a construction stapler to attach a fine wire mesh, such as chicken wire, to the sides of the frame.

Make a detachable cover for the bin using canvas or polyethylene that will not degrade in the sun. Covering the bin protects the compost from animals and weather.

One Bin: Turning Composting Method

The same bin can be used as described in the Holding Bin: Static Pile Composting Method. As with the holding method, start by placing a layer of bulky or coarse yard waste on the bottom of the unit to provide aeration. Moisten this base material if it is dry.

Alternate materials of different densities. Each layer should be about 15 cm (five inches) thick. For example, small chunks of vegetable waste should be layered alternately with uncompacted material, such as plant stalks. Sprinkle in some soil after every 25 to 30 cm (10 to 12 inches) of new material that you add. The natural organisms in the soil aid the composting process.

Use a pitchfork to mix the compost every week or two. This allows air to circulate, enhances the decomposition process, and prevents odours from developing. Mix the pile so the outer layers are placed in the centre, and vice versa. This supplies air and new material to the composting organisms. When adding new material, dig a hole in the pile and bury it under the partially composted material. This will help minimize odours and attraction of flies or other pests. Every time you turn the pile, check the moisture of the materials and add water or drier materials as necessary.

Maintain the pile so that it retains a sponge-like dampness. If the compost is slimy looking and smells sulphurous (like rotten eggs), mix in dry yard waste (browns)



Did you know?

If you are tired of raking, have too many grass clippings to compost, and want to improve the condition of your lawn, you may want to try **grasscycling**. It can, however, mean cutting your lawn more frequently, trimming just a couple of centimeters at a time. These short clippings will shade roots and soil from the hot sun, help to retain moisture, and will add nutrients to your lawn as they rapidly decompose.

and leave the cover off to reduce the moisture content. If it becomes too dry, sprinkle water on the pile and mix.

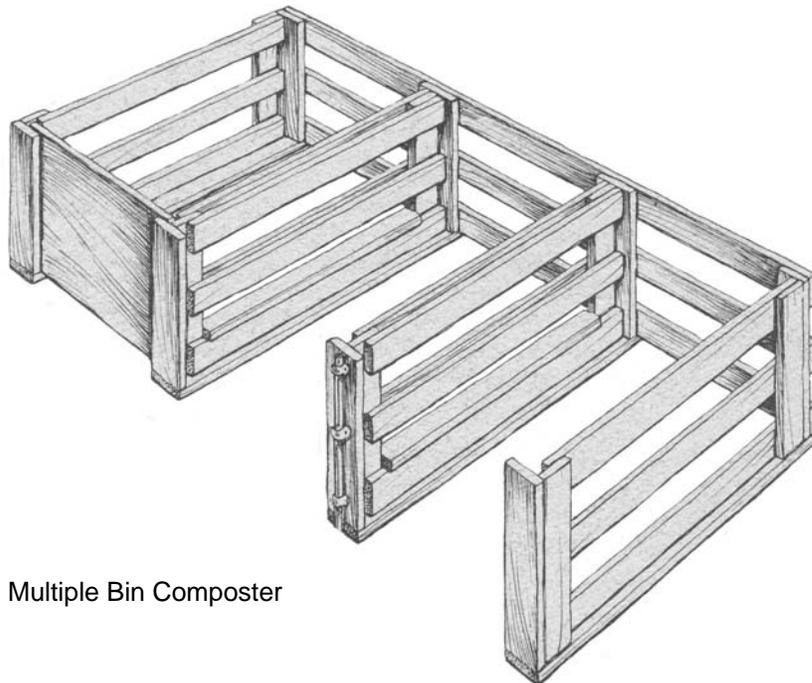
After the first batch of compost has partially decomposed, you will want to start a second batch of compost for adding fresh materials. This will give the first batch time to stabilize and mature. You can fork the first batch of compost into a separate area, and return any unprocessed material to the original bin.

Cover the pile to protect it from frost and rain. If the pile gets too wet, it will cool, and slow or even halt the composting process.

Multiple Bin: Turning Composting Method

The turning method of composting using multiple bins is suitable for households with a large amount of material to compost. The recommended unit is a three sided box that is one cubic metre in size, open at the top and bottom, with one or two additional sections beside it.

The triple-sectioned unit shown below provides a second bin to transfer compost material when you turn it, and a third section that can be used to store finished compost. If you don't know how much compost you will have, start with just one section and attach additional sections as required. Use the same composting method outlined in the "One Bin: Turning Composting Method" section.



Multiple Bin Composter

Bin Materials

One inexpensive and convenient construction method is to use discarded pallets. Pallets are the right size. They are slatted, which allows for ventilation and they

can serve as pre-built walls for the bin. You will need seven pallets for a triple-sectioned unit (depending on the pallet size). You will also need a cover for the bin, and stakes to keep the unit secure. You may wish to add planks to the front of the composting sections to further contain the material.

If you lash the pallets together with hook and eye assemblies you will be able to disassemble the bin and move it easily. Or, if you prefer, use nails or screws to fasten the boards or pallets together.

Helpful Hints

Maintenance

- Crush or shred bulky material to speed up decomposition.
- If the compost is too cold, add materials, such as grass clippings, that are high in nitrogen. Add new composting material if the pile is only warm in the centre. A one-cubic metre compost pile is ideal. Consult a gardening or composting book to fine-tune the process.
- To prevent odours, turn the pile every week or two. This provides the composting material with sufficient air. It is also helpful to cover the pile with a layer of browns to help decrease odour.
- Don't let the pile get too wet. Cover the pile to help control moisture from precipitation or frost. If it becomes too wet or slimy, the pile may begin to smell sulphurous (like rotten eggs). Simply turn it and add new brown material.
- If the pile begins to smell sharp, like ammonia, it means the nitrogen level is too high. Mix in some brown material to correct this problem.
- If your compost pile has too much carbon (browns), the pile will not heat quickly and the composting process will be very slow. Add nitrogen-rich materials (greens) to help speed up the process.
- Eggshells do not fully decompose in the composting process; it is normal to see eggshells in finished compost.
- If you live in bear country, take usual bear precautions.

In Winter

Unprocessed compost that is left at the end of summer can be composted the following spring; just let it freeze in the compost bin.

While composting comes to a halt in Alberta winters, that doesn't mean that you have to throw away kitchen scraps. These can be safely left to freeze outside in a sealed garbage bin or, directly in a compost pile for the winter.

In the fall, if you have many leaves and no separate bin for them, just place them in a contained area and shred them with a weed trimmer or lawn mower. While shredding isn't necessary, it creates more surface area, speeding decomposition once added to the compost pile.

When you start again in the spring, intersperse layers of the old, "unprocessed" material with new material. You may want to speed up the decomposition of leaves by adding high nitrogen materials, the 'greens.'

Vermicomposting - composting using worms - is another way of dealing with organic waste during the winter, or year-round in an apartment, condominium or office setting. You can find more information about vermicomposting in the "Taking Action Through Vermicomposting to Reduce Kitchen Waste" booklet.

Finishing Up

Finished compost is dark, lightweight and earthy-smelling. It should be difficult to recognize most of the original material. Finished compost – even when it has been recently turned – will be cold to the touch.

Remove the finished compost and return any undecomposed materials, along with any large chunks, to the bin for processing. Small chunks of vegetation in the compost can be dug into your garden. But be careful, if you apply unfinished compost to your garden, it could rob your garden of necessary nutrients, as the energy will go to further decompose your compost, and byproducts of the composting process may do more harm than good to your garden seeds and plants.

To ensure your compost is finished, let it sit over the winter months. Come spring, give it a few turns to aerate it, and it should be ready for you to dig into your spring plantings.

Screening the Compost

Compost may be screened to separate the finished compost from some of the bulkier materials in the pile. A simple screen can be constructed out of a wooden frame and chicken wire or other similar wire. This screen can be placed on a wheelbarrow, and the compost spread over the screen.



Bulkier material will stay on top of the screen and can be mixed back into the compost pile for further decomposition.

Using your Compost

Compost can be used in numerous ways around your home. The finished product can be mixed in the soil, used as mulch, or thinly applied to your lawn to add nutrients. The amount you use in your garden can vary; a layer of 2 to 5 cm ($\frac{3}{4}$ " to 2") of compost to the soil every couple of years will provide long term benefits for plant growth. Always remember that compost is not a replacement for soil, and plants may have difficulties growing in too much compost. **Do not plant in 100% compost.** A good ratio is 1/3 compost to 2/3 soil.

Vermi-composting – A process of composting indoors using red wiggler worms. Available commercially, red wigglers are very efficient at turning fruit and vegetable matter, tea bags and small volumes of coffee grounds into compost, year-round.

Pesticides and Compost

The simplest way to avoid pesticide residue in your compost is to not add pesticides to the lawn, or to not add treated grass clippings to your pile. Most grass clippings treated with lawn herbicides are degraded in a backyard composter, and do not pose any concerns when added to garden soils. Pressure-treated wood contains a fungicide and though risk of contamination is low, you may consider using non-treated wood to build your compost, and to not add sawdust from treated wood. In all cases, you are advised to use your judgement for what you are comfortable adding to your compost system, and eventually digging back into your gardens.

Summary

Composting is a simple, yet effective way to reduce your household waste going to landfill. While the process may appear complex, some common sense and attention to a few simple principles will result in an excellent product to enhance your garden and an environmental benefit to your community. Give it a try!

Additional References

Books

Let It Rot! The Gardener's Guide to Composting. Stu Campbell, Storey Publishing

The Real Dirt. Mark Cullen and Lorraine Johnson. Penguin

The Rodale Guide to Composting. Jerry Minnich and Marjorie Hunt. Rodale

Websites

Composting Council of Canada - <http://www.compost.org/>

City of Edmonton Waste Management – <http://www.edmonton.ca/>

(Type in *compost* or *waste management* in the search box at the top right.)

Alberta ESRD – (look under Waste) www.ESRD.Aberta.ca

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Pub No. I/994

ISBN 0-7785-3918-0 (Printed Edition)
ISBN 0-7785-3920-2 (On-line Edition)