COMPOSTING FOR THE HOME GARDENER

What is composting?

In nature, trees and shrubs shed their leaves and flowers and grasses wilt. This raw material or organic matter forms a layer on top of the soil and becomes a conditioner and food supply. With the aid of bacteria, fungi, worms and micro-organisms, the organic matter decomposes, releasing nutrients to support growth of new plants. We can create the same process, called composting, with kitchen scraps and yard trimmings. Compost is decomposed organic matter and can be added to garden soil for healthy plant growth.

What are the benefits of composting?

The continuous addition of organic matter and compost to soil ensures good texture, structure and nutrients needed for plants to thrive.

- Adding composts to the top of soil will help conserve water and protect prevent erosion.
- Adding compost to garden soil will improve the structure which allows air and water movement around the roots and good root penetration and growth.
- Adding compost improves the texture, water retention and drainage of soils. Compost improves water and nutrient retention in sandy soils and improves drainage and aeration in clay soils.
- Adding compost to soil will improve the soil health and availability of nutrients to plants. The balance and level of these nutrients is critical for healthy plants. Compost provides an available, balanced supply of nutrients.
- Adding compost increases disease resistance in plants.
- Putting compost on lawn annually eliminates moss and thatch.
- Composting supports and enhances the soil's community of beneficial worms, insects and micro-organisms.

What is the science of composting?

Composting is part of a biological cycle of growth and decay. During the growth process, plants use energy from the sun, carbon dioxide from the air and nutrients and water from the soil. During the decay process, plants die and become organic matter. The decomposition of organic matter is aerobic composting and involves microorganisms that require oxygen. Bacteria, fungi, insects, worms, and other micro-organisms use moisture and oxygen to convert some of the carbon from dead plants into energy for their own metabolism. The by-products of this aerobic digestion are heat, water and carbon dioxide. The resulting decomposed organic matter or compost from the decay process is beneficial to soil. The compost holds water and nutrients in the soil and makes the soil more porous.

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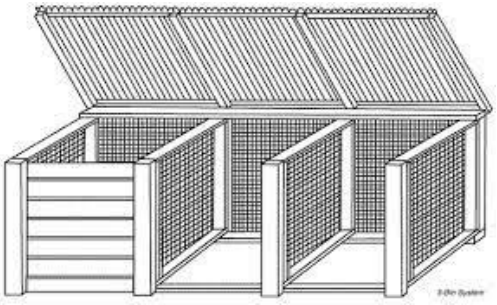
What is the best composting equipment for me?

There are different ways to make compost in your backyard. You may choose to build a composter, buy a composter or simply create a pile.



When choosing equipment to make backyard compost, there are a few things to consider.

- The volume of organic waste your household creates
- Your needs for compost in your garden
- The space you have available in your yard
- If you want to buy a bin, build it yourself or create an unstructured pile

To find out what size of composter fits for you, complete this survey by Saskatchewan Waste Reduction Council at http://swrc.ca/quiz/index

What is the best location for composting?

The location for making compost is important. Here are some considerations. Place your composter or pile

- **in the open** to discourage pests**.** Avoid placing your composter or pile under trees or near shrubs, wood piles or buildings, which could provide protected habitat and easy access for pests.
- **on grass or soil** to provide access for microorganisms important to the decay process.
- **in a convenient** spot for easy access and maintenance.
- **in partial shade** which protects the compost from summer drying. Partial sun provides solar heat to start composting action.
- **away from drying winds** to prevent too much moisture loss.
- **on well-drained soil** to prevent too much moisture.

What kind of organic materials are needed for compost?

Green and brown materials –
All organic materials contain carbon and nitrogen in different proportions. Materials that are high in nitrogen are the energy materials needed for composting and are referred to here as greens. Materials that are high in carbon are the bulking materials and referred to as browns.

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The greens in the compost are needed for fast microbial growth and as well as being high in Nitrogen, have high moisture, are dense and have low porosity. If the compost pile contains too much green material, the compost will lack oxygen and become anaerobic which will produce foul, rotten smells. The browns that are low in nitrogen have low moisture and low porosity. The browns help to aerate the pile. **Use equal amounts of greens and browns (50/50).** Examples of greens and browns are in the list below.

Greens	Browns
Fruit and vegetable waste	Fallen leaves
Fresh grass clippings	Straw
Fresh plant trimmings	Wood chips
Coffee grounds and tea leaves	Shredded newspaper
Eggshells	Sawdust
	Dry grass clippings
	Chipped Christmas tree (conifer needles)

Particle size

The size of green and brown materials going into the compost matters. For efficient composting, particle size should be about 5cm. This small particle size has more surface area for microbial activity and can be easily mixed in the compost. Even smaller particle size of about 2cm will support hot or fast composting.

Materials to avoid

For regular composting, avoid putting the following materials in the pile:

- Diseased plants, seed heads, and rhizomes (runners) of weeds. Backyard composting may not get hot enough to destroy pathogens or kill seeds
- large woody branches
- meat, grease, rice or pasta, or fish scraps as they will attract pests
- dog or cat feces, which may carry disease
- some reports do not encourage the use of fresh animal manures in backyard composting as fresh animal manure may contain pathogens, such as salmonella and E. coli, that cause disease in humans. The pathogens are not taken up by plants but may adhere to roots, low-growing leaves or fruit, such as strawberries.

What is the process to make compost?

1. Choose a flat, partly sunny, partly shady spot with good drainage.
2. Purchase a bin or build a composter or pile that is at least one cubic metre in size.
3. Shred or chop materials going into the composter.
4. Create a 6–10 cm base layer of brown material.
5. On the base layer, alternate equal layers of green and brown materials.
6. Mix the materials every week or two, for aeration and to encourage heat composting. Active aeration shortens composting time.

7. The moisture content of the materials should be like a wrung-out dishrag. Only add water if it is very dry after mixing.
8. The materials will shrink. When the pile has shrunk to about half its original size, let it mature.
9. If you have room, set up two composters so you can add to one bin or pile as the other matures.
10. Composting can continue in the winter. The decomposition process will slow or stop when the pile is frozen but turning in the spring will reactivate the pile.
11. Harvest your compost when the materials are decomposed and moist.

What is the process for hot composting?

Hot composting is faster than regular composting and requires careful attention and maintenance. You can manipulate the composting process with material size, water and air to favour the growth of high temperature microorganisms which produce heat to support fast decomposition and will kill most weed seeds and pathogens (at 55-65C over 6 days). When the hot phase is complete, lower temperature microorganisms and fungi, worms and insects complete the decomposition. Here are some components of hot composting:

- Chop, shred, mow or smash organic materials to about 2cm particles.
- Layer green and brown materials to create a pile at least one cubic meter in size. Start and end with a layer of brown material.
- Mix the pile.
- Squeeze a handful of the materials. You should barely be able to squeeze out a drop of moisture. If the pile is too dry, add water.
- Turn the pile weekly. A regularly turned pile in the hot phase usually stays hot (50-65C) for about a month. A compost thermometer is a valuable tool.
- Cover the pile during periods of rain.
- The pile will shrink to about half its original volume and with the hot phase complete, will need to mature at 26-48C for 1 – 2 months.
- The compost may be ready in about 3 months.

When is the compost ready to harvest?

A backyard composting process can take a few months to two years. Your compost is ready to harvest when it

- looks and feels like soil
- is dark and crumbly
- has an earthy smell
- the pile has reduced by about half its original volume

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How can I use the finished compost?

To harvest the compost, pull the composted material out of the pile. Some people use a screen to remove the partially decomposed material, however, this material will decompose in the soil. Use the composted material within a few months – here are some possibilities:

- For existing flower beds, add about 1.25 cm of compost as a top dressing. If adding mulch, apply compost first, then cover with mulch. If last year's mulch is still in place, remove it, add a layer of compost, then re-apply the mulch. Water until the entire root zone is saturated.
- For new beds, new lawns or vegetable gardens, add 5 cm of compost to soil surface, then mix to at least a 30 cm depth. For the best results, add your compost about 4 weeks before planting. This will give the compost some extra time to boost the level of beneficial organisms in your soil, energizing plant growth.
- Add to a home-made potting soil (one third compost to two thirds potting soil).
- Apply compost as a top dressing for plants in containers.
- Sprinkle on lawns in March or April in BC. Screen compost to ¼" (3mm) fineness and sprinkle ¼" deep on the lawn. To make a screen, screw together a 2 x 4 frame and tack on ¼" to 1/2" wire mesh.
- When planting trees or shrubs, dig a hole about 5 times the diameter of the root ball. Outside the hole, mix 1 part compost and 6 parts original soil. Place the tree or shrub in the hole and fill the hole with the compost-soil mixture. Water thoroughly.
- Use the compost as mulch around trees and shrubs. Choose a coarse-textured compost to reduce weeds and provide a thick cover to the area. Blend 1 part compost to 4 parts wood chip mulch. For best results, apply in early spring or fall. Always arrange the mulch so that water flows away from the tree trunk.
- Make a compost tea for fertilizing plants. Place compost into a sack (such as an old pillowcase) and put it in a container of water. Let sit until water turns yellow. One batch of compost can be used several times. Apply compost tea to the undersides of leaves in the evening, not on the soil.
- Add to trenches or holes when planting seeds or seedlings.
- Use as a top dressing for trees and shrubs. Spread compost around, but not against trunk, out to the drip line.

Troubleshooting

Sometimes problems occur in the composting process. Here are some common problems with possible causes and solutions.

Problem	Possible Causes	Solution
The pile has a rotten odour.	The pile is too wet and requires aeration.	Add brown or bulking materials and mix and turn the pile. Break up clumps. Do not add water.

The pile has an ammonia odour.	The pile is compacted causing an anaerobic situation.	Introduce oxygen by turning the pile and breaking up clumps.
The pile is dry.	The pile has too much brown material and not enough moisture. The pile may also be in a sunny drying spot.	Add green or energy materials. Mix and turn the pile. Test that the pile has the moisture of wrung-out dish rag. Add some moisture if required. Cover to reduce evaporation.
The pile is damp and warm only in the middle.	Not enough organic material is in the pile.	Add more green and brown layers to make at least one cubic meter. Mix the new ingredients into the old ingredients and break up any mats and clumps.
The pile is damp and sweet smelling but not heating up.	Lack of nitrogen or not enough material is in the pile.	Chop organic materials into approximately 5cm pieces. Add green materials to make at least one cubic meter and mix.
Pests are in the pile.	Food scraps may be attracting pests. Rodents may use the pile as a nesting site.	Bury food scraps immediately after adding them to the pile. Never add meats, grease or dairy scraps to the pile. Turn the pile regularly to discourage nests. Place ¼ inch mesh wire on the bottom and top of the pile or bin. Consider using a pest-resistant bin.
A large number of flies are in the pile.	Food scraps are attracting flies.	Put fruit and vegetable scraps in the centre of the pile, then cover with soil or brown material.

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