

Compost and Mulch

Compost and mulch go hand in hand with any gardening project. Compost is a natural soil fertilizer, with built-in time release that adds valuable nutrients to the soil for healthy plant growth. Compost is made up of organic matter (food, leaves) that has been broken down by insects and bacteria to create humus, a rich dark material that looks like soil. Mulch is created from a number of natural materials (wood chips, compost, leaves), and is used to control weed growth, retain soil moisture, provide winter protection and add organic matter to the soil.

Make the Nutrition Connection

Good compost enriches the soil, which enriches the plants, which, when consumed, provides you with essential nutrients for good health. When plants are grown properly in nutrient-rich soil, they absorb 23 of the essential elements people require, including vitamins, minerals, fiber, amino acids, carbohydrates and enzymes, and convert them into food nutrients. So dig in — start growing and get composting!

(Modified from C. Forrest McDowell and Tricia Clark-McDowell, *Home Composting Made Easy*)



Beaverbank-Kinsac Elementary School

Make composting fun and incorporate it into daily school life. Have students paint signs and label their compost, storage and garbage bins. Explore each of the components of composting and make the connection between composting and waste reduction.

Design details

1 Composting



Practical Tips for Composting

- Find a spot for your composter(s) that is easy to maintain, close to a hose, close to your gardens where it will be used, and is out of the way of active play zones. You may want to create a path to your composter to make it more accessible.
- Locate your composter(s) in a spot with good drainage, away from tree roots (the roots steal nutrients from compost) and out of full sun to prevent excessive heat build-up (especially if using black plastic bins).
- Start your compost with good organic materials, like food scraps and leaves, to provide the balance of nutrients your compost needs.
- Chop up larger materials that you put in your compost to help speed the process. Large materials require more time to break down and can slow the composting process by months.
- Do not add meat, fish or bones, fatty foods or dairy products to your compost. These foods will attract rodents. Use wire mesh over wooden bins as a sure way to keep rodents out!

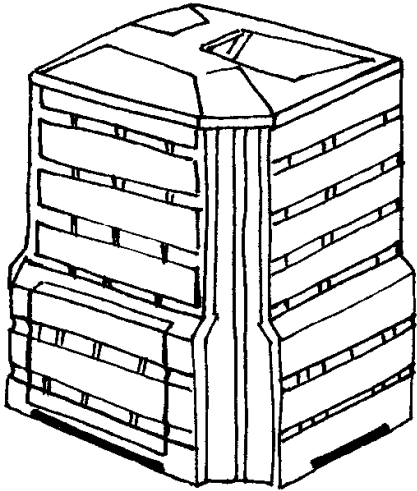
- Keep your compost about as moist as a wrung-out sponge. If the pile gets too wet, mix in more dry materials or leave the lid off for a few sunny days.
- Turn your compost every few weeks. Mixing and aerating the pile helps to speed the composting process.
- Add a layer of garden soil to your compost periodically to ensure helpful organisms like bacteria, fungi, insects and worms stay in your compost. These organisms play a key role in breaking down the organic materials.
- Keep a pile of leaves on hand to add to your compost throughout the year. Leaves add nutrients, help discourage flies and reduce odours.
- Let fresh grass clippings dry out for a few days before adding to your pile. Add grass clippings in thin layers — do not overload the pile all at once. Too many clippings can harm the bacteria that are working hard to break down your compost.
- Be patient! Finished compost can take anywhere from six months to a year to produce.

did YOU know...

Using the right tool to turn your compost pile can make a huge difference in compost time and quality of finished compost material. The "Compost Cane" is specially designed to mix and aerate the compost while it is turned. The compost cane is made and distributed by Jim Lindsay in Orangeville, Ontario.

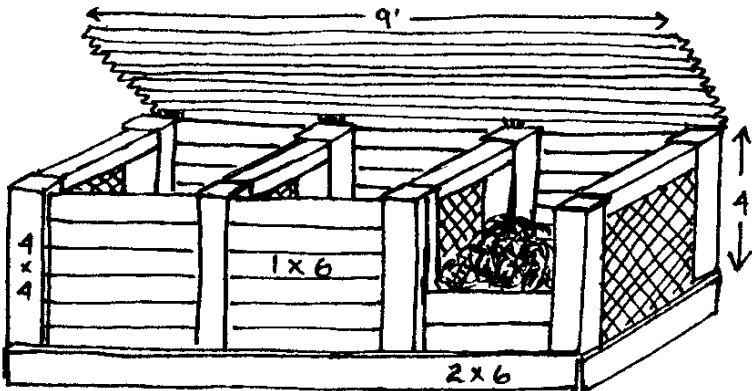
Types of Compost Bins

a) One-Bin System — This is the most popular and inexpensive method of composting. Typically, these composters are recycled plastic or wooden bins. Some municipalities may supply schools with a bin, or you can try building your own wooden bin.



A Model for a Durable Composter
A number of schools in southwestern Ontario have compost bins that are 100 per cent rodent proof, can compost everything including meat and are made of used materials. A retired teacher made the composters of steel panel doors that had been discarded as part of an industrial process. The steel shell, along with a sturdy inner liner insulated the composter, helping to contain more heat and improve the composting process. If your school is handy or has access to similar used materials you may want to try your hand at making a durable composter like this.

b) Multi-Bin System — Depending on your compost goals and the volume of compost you produce, you could create a double- or triple-bin system. The additional bins act as storage for either green or brown materials, while the main bin is the active bin where you add and mix the materials, creating compost. This system is very effective for schools since everything you need is contained, convenient and tidy. The bins can be made of re-usable material or non-treated wood.



Building Your Compost

Start your compost with good organic materials – these can be thought of as “greens” and “browns”. Greens include vegetable and fruit peelings, fresh grass clippings, well-rotted manure or compost, garden waste and weeds without seeds. Browns include leaves, coffee grounds, wood shavings (free of glues and preservatives) and straw or hay. Greens and browns, when layered or mixed together provide the balance of nutrients your compost needs. Green materials provide your compost with nitrogen and brown materials supply carbon. Carbon provides the microorganisms in your pile with energy (carbohydrates) and nitrogen gives them protein. Remember, composting is more of an art than a science. The goal is to achieve a balance in your compost with nutrient levels, moisture and aeration. Here are a few tips to help you build your compost.

- Adding two parts of a green material to one part of a brown material is the best way to achieve the nutrient balance your compost needs.
- If your compost smells like ammonia you have too much nitrogen (greens). Add more browns, such as dry leaves, turn your pile and put soil on top.
- If your pile is not composting you may have a lack of nitrogen. Add more greens such as grass clippings and vegetable scraps to the pile. Or, your compost may be too dry. Add moisture and turn your pile.
- If your compost smells like rotten eggs, there is poor air circulation. Turn your pile regularly and add dry materials, leaves and grass clippings.

Harvesting and Using Your Compost

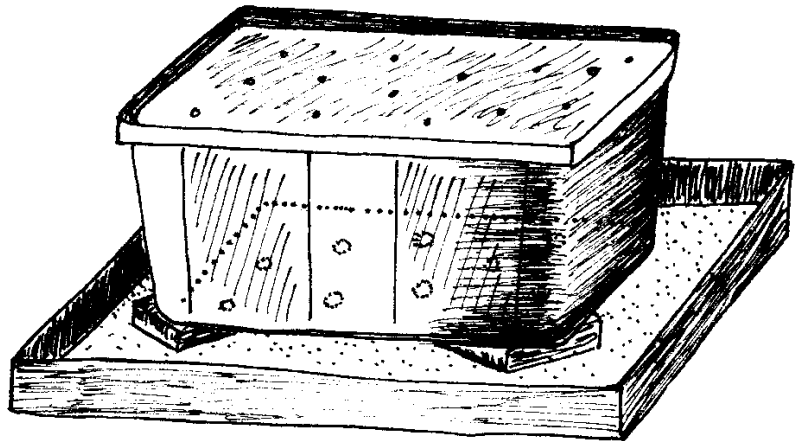
Finished compost is dark brown or black, crumbly-textured and has a rich earthy smell. But there really is no *finished* state for compost. You can use compost when it still has a few recognizable bits of twigs, leaves and straw in it. These bits will finish decomposing in your garden. The key is to not use compost before any decomposition has occurred. It could take anywhere from six months to one year for your compost to be ready depending on the heat and activity in your pile, the type of materials you have added and the amount of care (turning, layering, watering) you have provided. Use your compost for:

- a) **Soil Amendment** — Dig in five to 10 centimetres per year, in the spring or fall, before planting. If you do not have enough compost to dig into the entire garden area, dig a handful or two into the hole you have created for your plants.
- b) **Mulch** — Compost is also good mulch. When placed 10 to 15 centimetres deep around your plants it will retain soil moisture and eventually work into the soil, adding nutrients.
- c) **Compost Tea** — Create compost tea by placing compost in a burlap bag and placing the bag in a barrel of water. Let the tea steep for one week, gently stirring the water every day. Squeeze the burlap bag to extract all the moisture. Use the tea to water your garden or individual plants. The leftover compost can be added to the garden as mulch or placed back in the compost pile.

Composting Variations

Vermicomposting

Vermicomposting is composting with worms, specifically red worms or red wigglers. This type of composting can be done indoors year-round, requires little space and is more accessible for those without access to an outside composter. The vermicomposting process produces fine granular compost called castings. Worm castings are an excellent fertilizer or soil additive.



Creating a Home for Your Worms

Worms need a bin with good drainage, ventilation and bedding. The bedding provides a place for your worms to live and work and also helps with air circulation, moisture retention and odour control. Here are a few steps to follow when creating a home for your worms.

- Use an opaque bin with a lid. Red worms are sensitive to light.
- Determine the size of bin required based on the number of people using it and the amount of material you are planning on composting. For instance, a bin used by four to six adults would be 60 by 105 by 30 centimetres (2' by 3.5' by 1') and would hold 1.5 to 2.0 kilograms (3 to 4 pounds) of worms. You may want to have one large bin or two or three small bins for a class so you can share compost duties between groups of children.
- Drill approximately eight to 10 holes (1 centimetre wide) in the bottom of the bin for drainage. Duct tape fine screening on the bottom of the bin to cover the holes and make sure the worms and bedding do not fall through. Place the bin on blocks with a tray underneath to catch any liquid that drains out.
- Drill holes in the lid of the bin for good ventilation. To discourage fruit flies, duct tape fine screening over these holes as well.
- Provide a bed of finely shredded newspaper (with only vegetable-based inks) for your worms. Although newspaper is the easiest and most common bedding, other materials can be used including straw, grass clippings, dried leaves, chopped plants, ground cardboard, shredded paper or any mixture of those. The bedding should be kept as moist as a wrung-out sponge, and should initially fill about two thirds of your bin. Worms will eat their own bedding.
- Keep in mind that worms prefer temperatures between four and 27 degrees Celsius. You can place your bins outside during the warmer months, but they must be brought in once temperatures get close to four degrees Celsius.



Feeding Your Worms

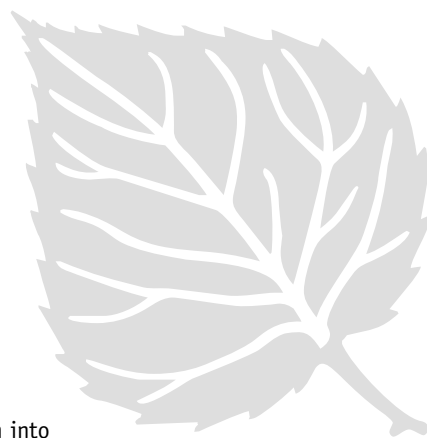
Worms will eat just about any type of food waste, including vegetable and fruit wastes, coffee grinds, filters and tea bags, and finely crushed egg shells. Do not feed your worms starches (breads), oily or fatty foods, meat scraps, bones or dairy products.

- Feed your worms once or twice a week. Bury the food scraps at least one inch below the surface of the bedding and leave for the worms to eat.
- Make sure the size of the material you feed your worms is not too large (no bigger than one to 2.5 centimetres). If the material is too large, the worms will need to wait for fungi to break down the material before they can pass it through their digestive system. Try chopping or blending larger food pieces so they are easier for your worms to eat.

Harvesting the Bin

Over a period of three to six months, worms will convert the food wastes and their bedding into castings — you will notice a considerable decrease in the bedding material and it will become noticeably darker with individual castings visible. This means it is time to change, or harvest the bedding. Stop feeding the worms for three to four weeks so the remaining food scraps are consumed, then harvest using one of the following methods.

- Sorting** — Move the finished compost and worms over to one side of the bin. Add new bedding and fresh food wastes into the other side of the bin. The worms will move into the new bedding on the other side in search of the fresh food. Once the worms move over to the other side (approximately one to two weeks) you can carefully remove the compost from the other side.
- Layering** — Take the lid off your bin and expose the contents to bright light. The worms will work their way down to the bottom of the bin to escape the light. As they move down, remove the castings one layer at a time. The worms will be left in a fairly shallow layer at the bottom. Add new bedding and start again.
- Pile and Sort** — Dump the contents of the bin onto a large plastic sheet and split them into cone-shaped piles. Place a bright light over the sheet. The worms will move down the pile away from the light and you will be able to remove the compost from the top of each pile. Put the small piles of worms back in your bin with fresh bedding and start again. This method could get a little messy, so extra supervision may be required! Store the castings in a plastic bag until needed.



You can add some of the castings and worms to your garden directly in the spring by removing two thirds of the contents of your bin and working it into the garden on planting day. Make sure to add fresh bedding for the remaining worms in your bin. Do not put too much food into the bin until the worms have had a chance to replenish their population.



2

Mulch

Tips for Applying Mulch

Mulching is one of the best things you can do for your soil and your plants. A layer of mulch will: help prevent the germination of weed seeds and reduce the need for weeding; moderate soil temperature and keep plant roots cool; retain soil moisture and reduce the frequency of watering; protect the soil from crusting and erosion caused by rain and wind; and provide winter protection for sensitive and shallow-rooted plants.

Mulch can be divided into organic and inorganic mulches. Organic mulches, including wood chips, bark, cocoa bean hulls, leaves, leafmold, compost and grass clippings help to improve the soil by adding organic matter and nutrients as they decompose. Inorganic mulches, such as crushed stone, plastic and landscape fibre are generally used in more permanent locations such as paths. They are not recommended for gardens since they do not add any beneficial nutrients to the soil, can be difficult to install and remove, and can limit the growth of self-seeding wildflowers.

- Maintain a 7.5 centimetre (three-inch) layer of mulch for fine materials such as shredded leaves or compost.
- Maintain a 10 centimetre (four-inch) layer of mulch for coarse materials such as wood chips. The wood chips will compact after they are placed on your garden.
- Plan to add more mulch as it decomposes and works itself into your garden. The time for adding mulch will vary depending on the coarseness of the mulch used. Some finer mulch materials require topping up every fall. Remember to not put more than is required on your garden.
- Pull the mulch back 7.5 centimetres (three inches) from the main plant stem or trunk to avoid insect or disease problems that could occur if the area around the base of your plant becomes too moist.
- Use very little, if any mulch, on wet or poorly drained soils. The mulch may keep the soil too wet and could cause root rot or the growth of toxic compounds that injure plants. If mulch is used in wet areas, use a coarse textured one.
- Add mulch in the spring once the soil has had a chance to warm up. Adding mulch to cool soil will maintain the soil in that state and could damage the roots of your plants. Add winter mulch once plants have gone dormant and temperatures are below freezing. Waiting for dormancy and cool weather is important since winter mulch is used to keep plants dormant, not keep them warm, and to protect plants against soil fluctuations and frost heaving over the winter.



Hillside Outdoor Education Centre



Organic Mulch Variations

a) *Bark*

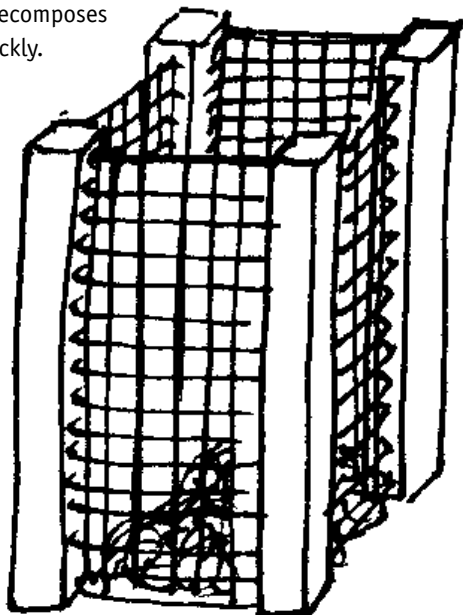
Bark mulches are usually made from the by-products of pine, cypress or hardwood logs. Most common are shredded bark and bark chunks. They resist compaction, will not blow away, are attractive and are readily available at all nurseries and garden centres. Some shredded barks, such as cypress, decompose slowly, adding nutrients over a longer period of time and requiring less topping up. Be careful of larger-sized bark nuggets (e.g. pine nuggets) that tend to blow or wash away. Coarse bark mulches are also not suited to slopes since they do not cling and will fall down the slope.

b) *Cocoa Bean Hulls*

Cocoa mulch is a natural by-product derived from the cocoa plant. It is readily available at most nurseries and garden centres. You will need to water the cocoa mulch after applying to ensure that it does not blow away and that a porous mat is created by the natural gum found in the cocoa bean hulls. Other sources such as rice hulls, oat husks, corn husks or sunflower husks can also be used but may not be as readily available.

c) *Compost*

Compost makes an ideal mulch as well as food for your soil and plants. The ideal compost mulch is coarse material, such as decomposed leaves, wood chips or bark compost. Leaves can be composted at your school by mixing them with topsoil in an open-leaf compost pile and turning the pile during the fall and winter. By spring the leafmold can be spread on your gardens. Keep in mind that leafmould is not as attractive as wood chips or bark, can be more difficult to apply and decomposes much more quickly.

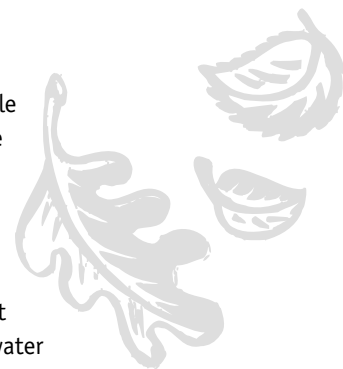


d) *Grass Clippings*

Grass clippings should generally be left on the lawn to add nutrients to the soil. However, they can be used as mulch for your gardens if prepared properly. Allow grass clippings to dry and mix them with compost or an organic material low in nitrogen before applying as mulch. Fresh grass clippings are high in nitrogen and water and readily ferment. The heat and ammonia released in fermentation can injure or kill other plants.

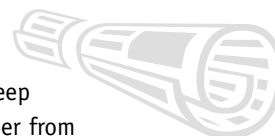
e) *Leaves*

Leaves are the most inexpensive materials available if there are a number of large trees around your school. However, keep in mind that leaves blow away easily, can be a fire hazard when dry and can form a mat when wet that interferes with air and water movement into the soil. Shredding or composting leaves (creating leafmold) before using them as mulch will prevent the leaves from forming a mat over the soil and impeding water and air movement. Or, mix the leaves with another light material like compost, wood chips or straw to prevent them from forming a solid mat. Do not use leaves that have been sprayed with chemicals, or have been exposed to oil on the street.



f) *Newspaper*

Three layers of newspaper, overlapped, can effectively keep down weeds. To keep the paper from blowing away wet it and weigh it down with compost or another mulch. Shredded newspaper and cardboard also works well.



g) *Wood Chips*

Wood chips can be made from many different kinds of trees. They resist compaction, do not blow away and weather to a nice silver-gray colour. Wood chips are generally available from your municipality or utility company for little or no cost. However, these mulches can often contain seeds from trees and other plants that can sprout and create weed problems in your gardens. Also, don't use mulches that have not been properly aged or composted. Wood chips that have been aged can be toxic to plants due to the formation of organic acids during the decomposition process, and if placed too close to tender plant stems will harm or kill plants.



Where to *gO* from here?

Sources for this fact sheet

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Organizations and Web sites

Peterborough Green-Up: www.greenup.on.ca
Recycling Council of Ontario: www.rco.on.ca
The Compost Cane, Jim Lindsay, Orangeville, Ontario: (519) 942-2952

Example projects

Beaverbank-Kinsac Elementary School, Beaverbank, Nova Scotia: (902) 864-6805
Glendale Public School, Brampton, Ontario: (905) 451-2463
Hillside Outdoor Education Centre, Scarborough, Ontario: (416) 396-6963