

Principles of Composting

Composting biologically speeds up the decomposition of organic wastes into a soil-like material. Heat and carbon dioxide are also produced in the process. Composting can take place under either aerobic (with air) or anaerobic (without air) conditions. Aerobic composting is faster and is the subject of this brochure. Making your aerobic compost pile work properly requires that you take a little care to control three things:

- a) the mix of materials put into the composter,
- b) aeration, and
- c) moisture.

Materials

For best results, the micro-organisms breaking down the organic materials in your compost pile require a mix of materials containing carbon and materials containing nitrogen. An ideal mix is 25 to 30 times more carbon than nitrogen. A mixture of materials with higher carbon content takes longer to break down and a mixture with higher nitrogen content generates odours. It's important to mix different materials to achieve a proper balance of carbon and nitrogen in a composter. Some materials that can be mixed are shown in the Table on the back of this pamphlet.

Aeration

A compost pile must be aerated to provide oxygen that the micro-organisms need to survive and avoid the generation of odours. This can be achieved by mixing in coarse materials like leaves or green twigs to create air voids and periodically turning the pile with a pitchfork or shovel. As a general rule, turning the pile once a week should be sufficient. More frequent turning could result in the pile becoming too cool for the micro-organisms to work.

Moisture

Moisture is also required by the micro-organisms in a compost pile. Too dry a mixture of materials will inhibit their activity. Excessive moisture will also hinder aeration. As a general rule, the material should be as wet as a squeezed out sponge.

Types of Composters

Composting can be carried out in an open pile or in containers. Containers serve to confine the compost pile and make it more manageable and visually attractive. Depending on the container's construction, it may also provide weather protection, aid in heat retention, and can help keep out animals.

In multi-unit composters, materials can be turned by moving them from one unit to another. Single composters require mixing from the top or other open side of the unit. Barrel composters are rotated to provide the mixing required. A number of composters of various design and composition (wood, recycled plastic, wire mesh) are available from local hardware stores and garden centres. A composter can also be easily constructed to suit the specific needs of the homeowner.

Starting a Composter

Place the composter in a sunny, well drained area in the yard. The pile can be started with a thin layer of topsoil to add composting micro-organisms. Nitrogen fertilizer (containing no herbicides or pesticides) can also be sprinkled in and wetted down to aid in the breakdown of high carbon materials. No commercial compost starter is required.

Materials that compost readily include grass clippings, non-woody yard waste such as dried leaves and kitchen wastes. No meat, bones, dairy products or pet wastes should be used. These attract animals, create odours and take considerably longer to break down. Wood ashes from a stove or fireplace can be added to the compost pile in THIN layers. Do not compost coal ashes.

Materials should be broken into small pieces and well mixed to evenly distribute the organic materials and create air voids. Food wastes should be covered to avoid attracting insects.

Operating a Composter

Method 1

Fresh material should be added in a well mixed layer. Some mixing should be carried out between the layer below and the fresh layer to bring micro-organisms into contact with the new materials. The pile will tend to separate over the course of the year, with the most finished compost at the bottom and the fresh material at the top. A gate or opening at the bottom of the composter will allow removal of the finished compost.

Method 2

Alternatively, each time fresh materials are added, they may be mixed with the entire contents of the pile. This is more work and will require that, at some point in time, no additional materials be added in order to obtain a finished compost.

Operating Tips

The pile should generally be turned once per week. Steam evident as the pile is turned, indicates that composting is taking place and heat is being generated. An internal temperature of 55°C or more will ensure that weed seeds, pathogens and insect eggs are killed. Drier materials or water (as applicable) may also be added to maintain the proper moisture level in the pile.

Finished compost is dark in colour, crumbly, lightweight and has an earthy odour. The origin of some materials may still be evident but these will break down further as the compost is incorporated into the garden. Production of a finished compost normally takes 4 to 24 months depending on the amount of attention given to the operation.

Winter weather will stop or drastically slow down the composting process in a small pile. Rather than continue to add fresh materials to your compost unit and overfill it, kitchen wastes may be bagged, left outside to freeze and added the following spring.

During periods when grass growth is most rapid, some of the collected clippings can be bagged to avoid overfilling your compost unit. These may be added to the pile later on. In addition, consider mulching or leaving clippings on the lawn.

Grass clippings by themselves tend to clump, compress and hinder aeration. Odours may also be produced as the excess nitrogen in grass is converted to ammonia. In the fall, tree leaves may be bagged and stored for mixing with next spring's grass clippings. The leaves will add air voids to the mixture. Their high carbon content will also offset the excess nitrogen in grass.

Symptom	Possible Problem	Remedy
Bad Odor	<ol style="list-style-type: none">1. Too wet2. Needs more air3. An excess of high nitrogen materials	<ol style="list-style-type: none">1. Mix in dry materials such as fall leaves to compost pile.2. Turn the pile to incorporate more air or mix in materials (such as green twigs and plant stems) that do not compact to create more air voids.3. Add and mix materials containing more carbon (such as corn cobs or leaves) to balance the nitrogen.

Symptom	Possible Problem	Remedy
Attracting cats, dogs, rodents or insects	<ol style="list-style-type: none"> 1. Addition of improper food materials that impede decomposition or attract animals. 2. Insects are attracted to fruit peelings and other high sugar food wastes. 	<ol style="list-style-type: none"> 1. Do not add meat, fish, bones, dairy products or oily or greasy materials to the compost pile. 2. Cover food scraps with other materials as they are added to the compost pile.
Process is too slow	<ol style="list-style-type: none"> 1. The weather is too cold 2. The particles in the compost pile are too large. 	<ol style="list-style-type: none"> 1. Store and freeze organic wastes outside bags, containers, or composter (if convenient) and mix the compost pile in the spring. 2. Cut materials into small pieces no larger than 20-25 cm. Small amounts of topsoil may be mixed in with the materials to add more compost micro-organisms.
Pile is damp and does not have a bad odour but will not heat up.	<ol style="list-style-type: none"> 1. Lack of nitrogen 2. The surface area of the compost pile may be too small 	<ol style="list-style-type: none"> 1. Mix in high nitrogen materials such as grass clippings, lawn fertilizer or vegetable scraps. 2. Mix in more materials to create a larger pile
The center is dry	<ol style="list-style-type: none"> 1. Not enough water 	<ol style="list-style-type: none"> 1. Add water while turning the compost pile to make it as damp as a squeezed out sponge.

Carbon Nitrogen Table

Carbon-Nitrogen content of various organic materials.

Cornstalks	60:I
Leaves	40:I to 80:I
Straw	80:I
Pine needles	100:I
Paper*	170:I
Sawdust*	500:I
Wood*	700:I

High Carbon Materials

Vegetable kitchen scraps	15:I
Fruit wastes	35:I
Grass clippings	19:I

** These materials break down very slowly. The other materials, such as leaves, are a preferred source of carbon.*