



# Module: Compost

## Introduction

While we encourage you to decrease food waste by making sure to eat what you buy, composting can help take care of what is left. Composting is the process of turning organic material into a nutrient rich, soil-like material. In this module, students will learn about what materials are compostable, how the material is processed, and explore how compost can reduce waste for disposal while creating a valuable material that can be used on lawns and in gardens.

## Learning Objectives

1. Understand the concepts of decomposition and composting
2. Identify acceptable and nonacceptable materials for compost
3. Determine the role microorganisms play in composting
4. Distinguish between aerobic and anaerobic states
5. Explain a variety of composting processes
6. Identify and describe key elements of the composting processes

## Resource Materials

Videos:

- How to participate in the Green Bin program – “The Basics”
- Helpful tips to make green bin use easier – Addressing the “Yuck” Factor
- Backyard composting for beginners

Websites:

- [Durham Region Waste Management](#)
- [Composting Council of Canada](#)

## What is composting?

Composting is the process of turning **organic material**, such as garden and food scraps, into a dirt-like material called **humus**. The process works with the help of bugs, insects, and **microorganisms** (a microscopic organism such as bacteria and fungi) combined with air and moisture. Everything that grows will eventually decompose in time. Providing the ideal compost environment can speed up the process. Compost is rich in nutrients and can be used on home lawns and in gardens.

## What are the benefits of compost?

Compost can be used to enhance the quality of soil and help feed plants by improving soil’s organic matter, adding nutrients, retaining water, and suppressing plant disease and pests. As a result, composting reduces the need for chemical fertilizers, reduces the need for irrigation and associated energy uses, and diverts materials away from less favourable disposal options like the black bag garbage.

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With the Region’s curbside Green Bin and Yard Waste collection programs, organic materials can be diverted from the black bag garbage right from your home. Backyard composting, vermicomposting, and grass cycling are also a great way to divert organic material, enrich your own soil, and reduce the amount of waste that needs to be managed at the curb.

## Green Bin Program

To participate in the Region’s Green Bin program, residents are required to place food waste, some paper products, and other compostable materials in a certified compostable or paper bag. This material can then be placed into the green bin for weekly collection at the curb. Some examples of acceptable green bin materials are provided below.

Food waste	Paper products	Other compostable items
Bread and cereal	Paper egg cartons and drink trays	Dryer lint
Tea bag, coffee grounds and filters	Paper towels and napkins	Feathers
Dairy products	Shredded paper	Hair
Eggs and eggshells	Tissue	Houseplants
Flour and grains		Pet fur
Fruits and vegetables		Sawdust and wood shavings
Meat, bones, fish and shellfish		
Nuts and shells		
Pasta, couscous, rice and potatoes		

There are several materials that are often mistaken for acceptable green bin materials. Some examples of unacceptable items are provided below.

Unacceptable green bin materials
Aluminum foil
Baby wipes and diapers
Coffee cups
Coffee pods
Disposable mop sheets
Feminine hygiene products
Incontinence products
Pet waste
Plastic bags
Plastic wrap

For additional information on the Region’s Green Bin program, two videos below have been provided.

- How to participate in the Green Bin program – “The Basics”
- Helpful tips to make green bin use easier – Addressing the “Yuck” Factor

## Yard Waste program

In addition to the organics collected through the Green Bin program, the Region also collects yard waste from the curb. Yard waste includes leaves, tree trimmings, and other plant materials that are typically generated in outdoor residential settings. The Region collects yard waste from April to early December, with additional collection of natural Christmas trees in January.

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Residents are required to place yard waste in paper yard waste bags or clearly labelled, returnable open-top containers (with drainage holes in the bottom) prior to setting their materials out for curbside collection. We do not pick up yard waste in cardboard boxes, blue boxes, green bins, or plastic bags and the bags/containers cannot weigh more than 20 kilograms (44 pounds).

Brush and branches can be difficult to manage in a bag/container. Securely tie brush in bundles up to one metre (36 inches) long and 76 centimetres (30 inches) wide. No branch should be more than 10 centimetres (4 inches) in diameters.

Some examples of acceptable and unacceptable yard waste materials are provided below.

Acceptable materials	Unacceptable materials
Branches	Grass clippings
Christmas trees	Hay bales
Decorative corn stalks	Plastic flowerpots
Fallen fruit	Sod
Garden trimmings	Soil
Gourdes and pumpkins	Stones

### What happens to green bin and yard waste material after collection?

The Region’s green bin material can be managed in an **aerobic** compost system (meaning the microorganisms breaking down the organic materials require oxygen), or an **anaerobic** digestion system (meaning a process without oxygen). In this module, we will explore aerobic composting.

### Aerobic composting system

In the aerobic composting process, microorganisms eat the decaying organic materials. As the microorganisms break down the organic materials, they release by-products including water, carbon dioxide (CO<sub>2</sub>), and energy (in the form of heat). The heat produced in this process is sufficient to kill off unwanted weed seeds and harmful microorganisms that can cause disease as they are not adapted to these conditions. The biological activity and the temperature of the compost material is controlled by aerating the material and managing the moisture content. The balance between nitrogen and carbon rich materials are closely monitored when feeding large scale systems to promote ideal composting conditions. Decomposition will slow down if there is too much carbon (browns). Too much nitrogen (greens) can cause unpleasant odours.

### Aeration

The temperature of the compost material is decreased by mixing and turning the pile. The temperature will increase again as the biological activity increases due to the additional oxygen availability. The microorganisms will slow down if the material is not aerated.

### Moisture

The moisture content also plays an important role in successful composting. The microorganisms will not be able to function with too little moisture, and too much moisture can cause compaction or the filling of air space with water. This will decrease the available oxygen and can cause anaerobic conditions. The moisture level within the compost material is managed to meet the needs of the microorganisms.

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## Final curing

After the compost material has been processed it requires final curing where the compost is given time to become stable. The compost will no longer produce heat and will only give off an earthy, soil-like smell. Once complete, the compost is ready to be used.

## Grass cycling

Grass cycling means leaving the clippings on the lawn after mowing it. Fresh grass clippings break down quickly and are made of approximately 80 percent water which helps retain moisture on your lawn. Grass cycling helps keep your lawn healthy by returning nutrients (such as nitrogen, potassium, and phosphorus) back into the lawn and decreases collection and processing costs.

Collected clippings can become anaerobic very quickly because of their high demand for oxygen and can be problematic in large quantities at a composting facility. Because of this, and the additional environmental benefits of keeping grass clippings on your lawn, grass clippings are prohibited from yard waste and organics collection in Durham Region.

Additional Tip – Mulching leaves into your grass and garden beds is a great way to recycle a natural resource and avoids the need to rake and bag leaves. Mulched leaves add nutrients to your lawn and garden beds and reduces the need for services such as collection trucks and processing facilities to manage this material. To mulch your leaves, remove the grass catcher from your lawn mower and mow over the leaves on your grass until the pieces are approximately the size of a dime. The mulched leaves will break down and fertilize your lawn, enrich your soil, and decrease or eliminate the need for additional applications of fertilizer.

## Backyard aerobic composting

When considering backyard composting, either aerobic or anaerobic methods can be used. Aerobic composting is quicker, produces less odour, has less impact on the environment, and the end product is richer in nutrients when compared to anaerobic composting.

Backyard composting is an inexpensive way to add nutrients to your garden while **reducing** the amount of food and yard waste you place out to the curb for collection. Our video Backyard composting for beginners provides a brief introduction to the topic.

Green waste (such as fruit and vegetable scraps) and brown waste (such as dry leaves, sawdust and corn husks) are added to a compost bin placed in a well-drained spot in your backyard. You can [purchase backyard composter](#) through the Region, a local store, or you can build your own compost bin.

Once you have chosen your backyard compost bin, use coarse material such as sticks, twigs and bark (approximately six inches in depth) to create a base layer. This will allow air to flow through the pile. Now you can alternate between layers of green and brown waste. The compost material should include a balance of approximately 50 per cent green waste (which is rich in nitrogen) to 50 per cent brown waste (which is rich in carbon) by weight. Green waste contains more moisture and is typically heavier than brown waste, therefore two to three buckets of dry brown waste should be added for every one bucket of green waste. If too much green material is added to the compost pile at once, it can create poor conditions and cause unpleasant odours. The brown waste helps combat this issue.

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Keeping some leaves aside in the fall to add throughout the summer months can be helpful for times when browns are not as readily available.

The compost should be slightly damp and mixed regularly (every couple of weeks or when new materials are added) to add oxygen to the pile. This will help breakdown the material and reduce any potential odours. Once the material has broken down into a dark, soil-like material, it's ready to be used on your lawns and in your gardens.

<b>Green waste</b>	<b>Brown waste</b>
Vegetables and fruit scraps Coffee grounds and filters Tea bags and leaves Plant trimmings	Straw and dry hay Wood chips and sawdust from untreated wood Shredded paper Egg and nut shells Hair and animal fur Paper, shredded newspaper Paper towels Paper tubes

For best results, the items listed below should not be included in a backyard composter. While these are organic materials, they can create potential issues, including odour, pests, and pathogens (bacterium, virus, or other microorganism that can cause disease).

- Meat, fish, and bones
- Fats and oils
- Dairy products
- Pet waste
- Cheese, meat or other sauces

The [Composting Council of Canada](#) is a great resource for more tips and tricks for successful backyard composting.

## Vermicompost

Vermicompost is another option for areas without access to curbside Green Bin collection or a backyard composter. This might include condos, apartment buildings or town homes. This process can be done indoors year-round, which also makes it a great option for schools and classrooms.

Vermicompost is the processing of organic wastes through worms known as red wigglers. These worms eat organic waste, then excrete casts. These castings are full of organic matter and desirable microorganisms which can be used to promote healthy growth and root structures in plants.

The Ontario Ministry of Agriculture, Food and Rural Affairs Factsheet, [Vermicasting \(or Vermicomposting\); Processing Organic Wastes Through Earthworms](#), is a great resource for additional information on vermicomposting.

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## 2018 residential waste audit

The Region completed a comprehensive residential waste audit in 2018. The audit illustrated that approximately 49 per cent of materials disposed of in the Region's garbage was organic material, including:

- food waste (30 per cent of total disposed)
- soiled paper (8 per cent of total disposed)
- sanitary products and pet waste (12 per cent of total disposed)

This is largely due to multi-residential buildings without access to the Green Bin program, incorrectly sorted organics from residential homes, and the lack of alternative programs for items such as sanitary products and pet waste. To address this issue, the Region continues to explore options to increase participation and expand the acceptable materials within the Green Bin program.

## Conclusion

While we encourage you to decrease food waste by making sure to eat what you buy, composting can help take care of what is left. Compost can be used to enhance the quality of soil and help feed plants by improving soil's organic matter, adding nutrients, retaining water, and suppressing plant disease and pests. As a result, composting reduces the need for chemical fertilizers, reduces the need for irrigation and associated energy uses, and helps divert materials away from less favourable disposal options like the black bag garbage.